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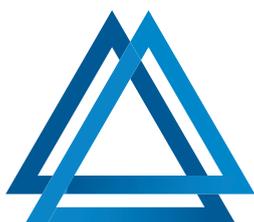
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PART 1. BOOK OF ABSTRACTS

EMPIRICAL ECONOMICS, FIRMS AND INDUSTRY STUDIES

FACTORS OF CAR OWNERSHIP IN RUSSIAN REGIONS
MARIA MOISEEVA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

In Russia, transport problems have been a focus of attention because the large territory of the country and its poor transport connectivity impede its socio-economic development. In this regard, a study of the factors of car ownership has played a key role in the development of state policy for optimizing the Russian transport system.

There have been numerous attempts to establish a link between car ownership and the socioeconomic and urban-developmental characteristics of different countries. However, research on the factors of car ownership rate in different countries has been controversial. Therefore, the factors of car ownership depend on the country and on the regional characteristics. However, there are few studies on car ownership factors in Russia due to a lack of statistical data. Besides, most Russian researchers have focused on the consumption of energy resources (Eder & Nemov, 2017), transport safety (Makarova, Shubenkova, Mukhametdinov & Pashkevich, 2018), and the sociocultural factors of car use (Ksenofontov & Miliakin, 2018), although a consideration of spatial characteristics would also be also helpful in an explanation of the car ownership rate.

The aim of this study is to find out what factors determine the car ownership rate in the regions of the Russian Federation. Based on a panel data analysis, this paper investigates the effect of economic, geographical, and urban features, such as one's disposable income, built-up area, population density, road metrics, and public transport development, on the car ownership rate in different Russian regions.

In order to determine the factors affecting car ownership rate in Russian regions, socioeconomic, urban, and transport data were analysed. Grounded in the foreign literature reviewed, the conceptual framework of the car ownership model rests on a number of assumptions. First, personal cars satisfy the need for transport services or for mobility. Second, a household's demand for cars depends on their affordability, which, in turn, is determined by the level of the disposable income of the population. Third, the need for transport services can be satisfied through the development of public transport, since car ownership and the possibility of using public transport are substitutes.

This paper studies the level and the factors of car ownership, using regional statistical data though considering the level of the territory's urbanisation. In total,

the sample includes data on 78 regions of the Russian Federation for the period from 2000 to 2017.

The database for the study was created by using Rosstat's main socioeconomic and transport indicators of the regions of the Russian Federation.

Prior to model evaluation, unit root tests were conducted for each variable to ensure accurate results and to exclude the possibility of non-stationary time series in the panels and the presence of false regression. In this paper, we used procedures for unit root testing in the data with a homogeneous alternative proposed in Levin, Lin, and Chu (2002) and with a heterogeneous alternative proposed in Im, Pesaran, and Shin (2003). The next step is to find whether car ownership rate and its factors were cointegrated in the long run or not. In the last step, using the results of the corresponding statistical tests, an appropriate model for the panel will be determined.

All analyses will be conducted using the *R* software statistical packages (version 3.5.1).

The study allows us to determine the key factors of car ownership in Russian regions. It is expected that the car ownership rate in Russian regions has a positive correlation with the average annual income, the percentage of urban population, and the density of public roads, but a negative relationship with the level of public transport use.

EFFECTIVENESS OF ASYMMETRIC CONGLOMERATE ALLIANCES IN REFINING INDUSTRIES: A GAME THEORY APPROACH
POLINA SIDOROVA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

The core objective of the study is to provide evidence of the conceivable effectiveness, being considered as external stability, of asymmetric conglomerate coopetitive agreements in oil refining. Asymmetric is a scale measure. One leader and several niche players cooperate in the technological aspect (mutual CAPEX) and compete on the market.

Game structure: Players: leader (one); niche players; buyers (competitive market).

Strategies:

Costs optimization — technological cooperation;

Sales competition (long-term agreements, adjusted quality, min price).

We consider utilities to be estimated as a company's value surplus from this game simulation. The gain is supposed to be estimated discretely in dynamics.

Recently, there has not yet been provided any theoretical solution or empirical evidence for the effectiveness of asymmetric conglomerate alliances, i.e. externally stable in the long-run, coopetitive relations being considered. We will try to reach this objective by a derivation of the Nash bargaining solution for two and several players, as well as by estimating their conceivable surplus to the expected market value of the companies. Stochastic characteristic function of market values could be derived for the expected gain to be estimated. We consider an oil refining company to coopete with chemicals producers. Thus, we are looking for a theoretical justification of such a kind of alliance being effective in the long term.

SHORT-TERMISM AND FIRM SURVIVAL: THE EVIDENCE FROM THE RUSSIAN METALLURGICAL INDUSTRY
VASILISA MAKAROVA, JULIA BERLIN —*HIGHER SCHOOL OF ECONOMICS, RUSSIA*

Uncertainty provokes the emergence of a trend of short-termism in corporate governance. The effectiveness of risk management and long-term decision-making are jointly determined. In this research, effective risk management decreases the risk of default. High uncertainty forces agents to make short-term decisions although long-term solutions are more sustainable - the firm are sprung over by current shocks. The profitability growth paradox is the basis of the research idea. This study demonstrates how short-term decisions affect the survival of the firm. The model is based on the assumption of the redundancy of performance values. The analysis revealed that maximizing profitability due to short-term debts, high cash, and insufficient interest coverage ratio increases the risk of the company's default.

THE DOUBLE INCREASE AND DECREASE IN OBLIGATORY INSURANCE PAYMENTS FOR THE SELF-EMPLOYED: A DIFFERENCE-IN-DIFFERENCES ESTIMATION
EVGUENII ZAZDRAVNYKH — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

This study estimates the double increase in obligatory social security insurance payments for the self-employed in 2013 and the subsequent double decrease in 2014 in a developing economy. We investigate whether entrepreneurs adjust their behaviour for the increase and decrease in these payments with the same speed in both cases. In order to estimate this effect, the difference-in-difference approach is used. The results show that entrepreneurs rapidly respond to the increase in insurance payments. However, their response to the decrease in these payments is slower than to the decrease. Thus, the self-employed have very rapid reaction to "bad" news and a slow reaction to the "good" policy news.

BANKRUPTCY FACTORS AT DIFFERENT STAGES OF THE LIFECYCLE OF RUSSIAN COMPANIES
YURI ZELENKOV, ELENA FEDOROVA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

Many aspects of bankruptcy have not yet been thoroughly studied; among such issues are the causes that lead to bankruptcy at various stages of the company's

lifecycle. We hypothesize that the most significant factors influencing the probability of company bankruptcy at a particular stage of its lifecycle are those the effectiveness of which is at the lowest level at this stage. The studied factors include the external environment, as well as the quality of financial and corporate governance. The methodology of the research consists of the PLS-SEM methods (to define the impact of factors on bankruptcy) and DEA (to define the effectiveness of factors usage). The empirical database includes 376 Russian public companies. The simulation results support the hypothesis. We also revealed that the external environment exerts a more powerful effect on the probability of bankruptcy at the stage of growth. The role of financial management increases from the initial stage to the final stage of the life cycle. Corporate governance is less important than the other two factors, but its impact is significant at the stage of growth.

EFFECTS OF INNOVATION POLICY MEASURES ON INDUSTRY-SCIENCE INTERACTIONS
VALERIYA VLASOVA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

Beyond extended attention to the multifaceted networking strategies known as open innovation (Chesbrough, 2003; Dahlander and Gann, 2010), interactions between the industry and R&D performers, i.e. public research organizations and universities, remain the potentially central channel for the development of radical and impactful innovations (Bercovitz and Feldmann, 2006; Kaufmann and Tödtling, 2001). Existing research, however, emphasizes the complex composition and heterogeneous impact of factors that determine the emergence and the effectiveness of industry-science links, especially in different settings (Jensen et al., 2016; Rapini et al., 2009). There is a clear gap in the available body of knowledge on the factors influencing the process of transferring knowledge and technology from R&D performers to the industry in immature national innovation systems.

We address this research gap in two ways. First, we provide a conceptual framework underlying the analysis of barriers to effective industry–science cooperation. Second, we examine the perception of barriers to knowledge and technology transfer by innovative enterprises and R&D performers.

We analyze the process of knowledge and technology transfer from several points of view: Who are the cooperation partners and what are their motivation and needs? How is the interaction process organized and managed? What are the characteristics of the transfer object? When and under what conditions does the interaction occur? The answers to these questions allow us to identify four groups of barriers, respectively: orientation-, process-, content-, and context-related barriers.

The empirical analysis is based on the case of Russia, a country that has a special variety of capitalism (Hall and Thelen, 2008): a unique combination of inherited (and elaborate) vs. emerging configurations of incentives, business models, value

chains, and networks. The developed network of R&D organizations and universities is combined with the overall limited propensity of business towards innovation activities (Gokhberg and Kuznetsova 2015; Roud and Vlasova, 2018).

The data behind the study originates from two specialized surveys conducted in 2014–2015 by the Institute for Statistical Studies and the Economics of Knowledge of the National Research University Higher School of Economics — one directed at innovative manufacturing enterprises, the other one at R&D organizations. The available data allows matching the perceptions of transferring and acquiring parties (i.e. R&D organizations and enterprises) and position industry–science interactions to the innovation activity of enterprises, while also controlling the role of long-term cooperation. We use the degree of novelty of innovation as a measure of effectiveness and distinguish between several modes of interaction: acquisition of R&D results that led to new-to-firm, new-to-market, and new-to-world innovation.

BORROWINGS FROM STANDING FACILITIES: A MODEL AND EVIDENCE FROM RUSSIA
IAKOV KUGA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

I develop a model of borrowings from standing facility in a corridor type monetary policy framework with REPO auctions, and attribute spread between the standing facility rate and the auction rate to a premium for reinvestment-opportunity risk. An equation for the premium shows that the spread declines and total borrowings grow as more liquidity is provided through the auction. The model suggests that a standing facility is an inferior source of liquidity for banks, that is, borrowings from the standing facility go down as demand for liquidity grows, when demand for liquidity is high enough. I propose a method of structural estimation of the model and provide parameter estimates for Russia based on data for a period between April 2014 and September 2016. According to the estimates, individual banks' demand for liquidity is highly persistent and its variance across the banks is high. Simulations show that, for estimated parameters and money market conditions, inferiority of standing facility is not uncommon. The central bank can pursue quantitative targets keeping the standing facilities rates at a fixed level, but this policy affects the auction rate.

ANALYSIS OF AIRLINE PRICING STRATEGIES AND FACTORS THAT INFLUENCE AIRFARES
TIMUR NASIBULLOV, KARINE KUZNECOVA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

This paper investigates the various methods and factors that determine airline ticket prices on the Russian market. In the first part of the work, the papers of famous foreign economists are reviewed to determine key factors that influence airfares in various countries of the world. For instance, the paper of Diego Escobari "Dynamic Pricing, Advance Sales and Aggregate Demand Learning in Airlines", published in the Journal of Industrial Economics, states that the pricing process in this industry is dynamic and airfares are influenced by airfares and loading of the aircraft in previous time periods. Moreover, the author comes to the conclusion that

with the decrease of the number of days till flight, airfares also decrease, but peak prices can be seen when 7 and 14 days are left till flight, which can be explained by the fact that passengers with inelastic demand, who are ready to pay more for the particular flight, start to purchase the tickets. This allows the companies to implement the strategies of price discrimination. Other authors highlight that airfares are influenced by the day of the purchase, the day of the flight, and the distance of the flight, as with the increasing distance not only do the costs grow but there are fewer substitutes for air transport. Another important factor highlighted by the researchers is the effect of the reputation of the company: passengers cannot check the security of their flights themselves, so they tend to trust bigger companies with good reputation. Many researchers point out that it is the competition that determines the prices of tickets. For instance, Borenstein and Rose in their paper suggest that high price dispersion is usual for highly competitive flights, whereas Gerardi and Shapiro tell us about the reverse relation between competition and price dispersion. There are also opinions that this relation is non-monotonous and different for economy and business class tickets. Researchers Wang K., Zhang A., Zhang Y., who analyze Chinese and Indian airline industries, come to conclusion that country-specific characteristics, such as the level of compliance with antitrust laws, the presence of low-cost airlines and the elasticity of demand of the citizens, also determine airfares.

Overall, this literature review helps us to understand that airline fares can be determined by the number of days between the purchase of the ticket and the flight, the number of seats remaining available, the characteristics of the airline, the capacity of the aircraft, the elasticity of the passengers' demand, the distance of the flight, the level of the competition, and the additional options offered to the passengers. Moreover, country-specific characteristics are also important, which means that we should check all these factors for validity within the airline industry of the particular country. Due to the lack of papers devoted to the problem of airline tickets pricing in Russia, it is suggested to state some hypotheses and check them using the data of the Russian airline industry.

The data were collected by the author of the paper and comprise information on more than 20,000 flights of the Aeroflot, Utair, Pobeda, Russian Airlines, and Ural Airlines companies during the years 2018 and 2019. The data were collected from the official websites of the companies. To make the analysis more objective, the data on the flights during the 2018 FIFA World Championship, New Year, and other holidays are not included into the analysis. Each row of data contains the following information: airline, request and flight date and time, city of departure and arrival, luggage and baggage size, options of change and return, ticket class, number of seats remaining available, ticket price, and other available information.

It is suggested to test the following hypotheses:

1. The relation between the number of days between the purchase date and the flight and airfare is inverse;
2. The relation between the distance of the flight and the airfare is strictly positive;
3. The airfare is influenced by the day of week of the purchase and of the flight;
4. The airfare is influenced by the additional options of the tickets, such as change and return options;
5. The airfare is influenced by the competition within the direction;
6. The airfare is influenced by the specific characteristics of the airline;
7. The airfare is influenced by the airfares in the previous periods.

All the hypotheses are tested separately for low-cost, economy, and business segments, as the literature review shows that the above-mentioned factors may have different influence on the ticket prices of different segments.

After an econometric analysis, which included various tests on the right model specification (that particularly showed a monotonous relation between the number of days till the flight and the price), multicollinearity, heteroscedasticity, and other appropriate tests, logarithmic models were chosen for all the classes. The following basic model was estimated:

$\ln Price_i = \alpha_0 + \alpha_1 \ln Days\_till\_Flight_i + \alpha_2 \ln Distance_i + \alpha_3 Remainingplacesdummy_i + \alpha_4 Dayofweek_i + \alpha_5 Peakhour_i + \alpha_6 Changedummy_i + \varepsilon_i$, where

• Price stands for the ticket price;

• Days_till_Flight stands for the number of days between the purchase of the ticket and the departure of the flight;

• Distance stands for the distance between the city of departure and the city of arrival;

• Remainingplacesdummy is a dummy-variable that equals to 1 if fewer than 4 seats remain available;

• Dayofweek is a dummy-variable that equals to 1 if the departure is on Friday evening, at the weekend, or on Monday morning;

• Peakhour is a dummy-variable that equals to 1 if the departure is from 7 a.m. to 10 a.m. and from 3 p.m. to 7 p.m.;

• Changedummy is a dummy-variable that equals to 1 if there are change/return options for an extra fee (in case of low-cost tickets) and equals to 1 if there is free change/return option (in case of economy/business tickets).

The results of the analysis include the following facts:

1.   For low-cost tickets, with the increase in the distance by 1%, the price increases by 0.23%. The price of tickets for flights where few places remain available is 32% higher. The price of tickets for flights at weekends, Friday evenings, and Monday mornings is 7.2% higher. The price of tickets with the option of change/return for an additional fee is 52% higherthan for tickets without this option. The number of days between the purchase and the flight, as well as the fact that the flight is delayed during peak hours, do not influence the price of low-cost tickets.

2.   For economy tickets, with the increase in the distance by 1%, the price increases by 0.15%. With the decrease in the number of days before the flight, the price tends to increase. The price of tickets for flights where few places remain available is 20% higher. The price of tickets for flights at weekends, Friday evenings, and Monday mornings is 1.4% higher. The price of tickets with the option of free change/return is 27% higher than for tickets without this option.

3.   For business tickets, with the increase in the distance by 1%, the price increases by 0.07%. With the decrease in the number of days before the flight, the price tends to increase. The price of tickets for flights where few places remain available is 4.7% higher. The price of tickets with the option of change/return for an additional fee is 23% higher than for tickets without this option. The prices of tickets for flights at weekends, Friday evenings, and Monday mornings are 1.5% lower, which can be explained by the fact that the demand for weekend business tickets is lower than for workday ones.

Overall, with the decrease in the number of days before flight, the price of the airline tickets tends to increase for economy and business segments. With the increase in the distance by 1%, the airfares increase by 0.23%, 0.157%, and 0.07% for low-cost, economy, and business tickets, respectively. For the low-cost and economy segments, the price of weekend flights is higher, whereas for business segment it is lower. Additional options, such as change and return options, increase the price of low-cost tickets more than the price of economy and business tickets, which can be explained by the fact that airlines try to compensate for the low fares by charging higher prices for additional options.

After that some additional factors, such as the size of the airline, the number of flights of the airline in the direction, the number of competitors in the direction, as well as the price of the ticket for the same flight in period (t-1) were included in the model. Though the impact of the initial factors remained almost unchanged for all the segments, the model showed that the size of the company has a positive influence on the airfares, whereas with the decrease in the number of competitors, the prices tend to increase. Moreover, the prices of the tickets of all the segments are influenced by the prices of such tickets in the previous period, which supports the findings of foreign researchers.

DETERMINANTS OF SUSTAINABILITY REPORTING IN RUSSIAN COMPANIES

ALEXANDRA DEVIER, SHAYAN ALI KHAN, MARIIA KHAPTCOVA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

This study aims to find the factors which impact on Russian companies' decision to voluntarily disclose information on sustainable development issues, such as social and environmental impact, and to have this information independently certified for compliance with international reporting standards. Although sustainability, or non-financial reporting, has now become widely applied and acknowledged by Russian companies, patterns and determinants of sustainability reporting in Russia have not been studied enough. This leads to the uncertainty at the management level in terms of how much resources should be allocated to making sustainability disclosures — not only non-financial reports, but also joining other global initiatives related to sustainable development. The main contribution of this study is to bridge the research gap by providing an extensive analysis by using the appropriate variables, chosen using the existing literature in this area.

The study examines whether sustainability practices in the Russian business environment are supported by legitimacy theory, agency theory, or stakeholder's theory. The research is based on secondary data collected from multiple sources. The information whether the company has issued a sustainability report in the in period of 2016–2018 and whether it is independently certified was mainly acquired from the Global Reporting Initiative (GRI) database. For a more exhaustive list of sustainability reporting observations, it was supplemented by the data from the Corporate Register (corporateregister.com) and the National Register and Library of Non-financial corporate reports composed by the Russian Union of Industrialists and Entrepreneurs (RSPP). As for companies' financial and ownership data, the SPARK-Interfax database was used.

For creating the sample, a list of 1,000 Russian companies with the highest total assets was initially taken. Then, it was cleared from non-profit organizations (as they are not the object of the research), subsidiaries that were more likely to be reported in the parent company's report, and a few holdings that comprise companies with their own sustainability report. Then, the data were matched with the GRI data, based on the parent organization's report. For observations with missing data values, the needed financial information was manually searched from the companies' websites and their annual reports. The final number of observations in the database amounted to 847 companies, 101 of them publishing information on sustainable development topics. Finally, the companies that have their sustainability reports independently certified were identified through the information on certification in the GRI database. Overall, there were found 19 companies that voluntarily choose to conduct independent certification of their sustainability report.

The data on whether the company is traded domestically was collected from the Moscow Exchange website, while the information on whether the company is traded on foreign stock exchange markets was derived using the Thomson Reuters

database, taking the information on the stock ticker from SPARK-Interfax database into account.

The research was conducted in two steps: at first, the quantitative methods described below were used to identify the significant factors of the company's decision to publish a sustainability report in any form it might take — a standalone report or an integrated report. Then, a new sample was composed out of the companies that publish a sustainability report, with 19 of them having their report independently certified for compliance with international reporting standards, and the determinants of independent certification were identified. To test our hypotheses, a logit model was applied, which included both binary and continuous independent variables and a binary independent variable. Variance Inflation factor (VIF) was calculated for the model to measure possible multicollinearity among the predictors; however, no significant multicollinearity was detected. Furthermore, a robustness test was performed in order to verify that our results are robust to the choice of the estimation model. All models showed consistency with the originally proposed logit model.

The evidence from this study suggests that the patterns of sustainability reporting practices among large Russian companies tend to follow the legitimacy theory and the stakeholders' theory. This finding is consistent with a wide range of similar studies in different countries. Larger companies and companies belonging to high-profile industries (i.e. industries with a higher public visibility and a higher level of political risk, such as energy, mining, chemicals, forest, and paper) are generally more likely to disclose non-financial information than smaller companies from low-profile industries. It can be assumed that large Russian companies are more prone to mitigate the social perception of them as a "necessary evil" and turn it in a positive direction in order to have a good relationship with the local communities, attract talented employees, and minimize social risks. To achieve this, companies communicate their commitment to create value for stakeholders as well as shareholders, report on their sustainability actions and performance, which goes in line with the stakeholders' theory. At the same time, no evidence of profitability impact on the firm's decision on sustainability reporting was found, which failed to support the signaling theory.

Another interesting finding is the fact of the company being traded on a foreign stock exchange has a significant impact on sustainability reporting, while the fact that the company is traded at Moscow Exchange only is not significant. It can mean that investors and owners in Russia exert less pressure on firms to disclose non-financial information than foreign investors. The global trend for the so-called ESG ("Environmental, Social, Governance") investment is only starting to enter the Russian investment environment. For certain industries, especially from the primary sector of the economy, the main and almost only factor defining the firm's investment attractiveness in Russia is the commodity price (e.g. oil, coal, gold, etc.),

whereas the global anecdotal evidence suggests a higher interest of investors in social and environmental risk of the company's business activities.

Also, surprisingly enough, governmental ownership has a strong influence on sustainability information disclosure, which might be regarded as a unique characteristic of Russian business environment. This may be the result of higher external stakeholders' expectations for transparency from the side of a governmental corporation, but the implicit factors may also lie in the need for compliance with additional legal requirement for information disclosure for state-owned companies. Foreign ownership was found to be insignificant.

Finally, contrary to expectations, the research has found no significant factors among the chosen variables that would explain the likeliness of the company to have its sustainability report independently verified by an auditor. This could be a result not only of data scarcity but also of the fact that the decision of non-financial report independent assurance lies in other spheres and that other proxy variables should be used rather than the ones used in this study.

The managerial implications of this research are the expected better understanding of the drivers of sustainability reporting in Russia, which would improve the management's decision-making concerning the sustainability disclosure strategy on the one hand, and predict the firm's behavior in relation to ESG factors on the other hand.

Despite the obtained results, the research also leaves much scope for further studies — not only quantitative ones, but also qualitative ones. Multiple interviews and case-studies are needed to approach the true motives that make companies report on social and environmental issues. Content analysis could be used to examine sustainability reporting practices in Russia and their evolution over time. As for the quantitative methods, further studies in this area could explore mediators' and moderators' effects in the regression model, as well are use cross-panel data in dynamics.

IDIOSYNCRATIC SHOCKS: ESTIMATION AND THE IMPACT ON AGGREGATE FLUCTUATIONS
SVETLANA POPOVA — *BANK OF RUSSIA, RUSSIA*

Many macroeconomics models suggest that business cycle fluctuations are the results of aggregate shocks and that firm-level shocks have a negligible effect there. But the granular hypothesis suggests that shocks from individual firms can generate non-trivial effects on aggregate fluctuations that have been found in recent research from other countries. Using Russian firm-level data on sales over the period from 1999 to 2017, we test the hypothesis that Russian economy is granular, and we find that idiosyncratic (or firm-level) shocks contribute substantially to aggregate sales fluctuations. Moreover, we show that the linkage effect is more important in aggregate volatility explanations but that it does not work for top-100 large firms. The results of the paper are helpful for understanding the drivers of business-cycle fluctuations and for estimation of policy effects.

HOW IS INSURANCE FRAUD CONDUCTED AND PREVENTED IN RUSSIA? EVIDENCE FROM A SURVEY OF INDUSTRY EXPERTS

YURIY TIMOFEYEV, TATIANA BUSALAEVA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

The study aims to explore the current fraud prevention trends in the Russian insurance industry. Survey responses from 20 experts and professionals of the leading insurance companies in Moscow were collected. More than half of them are former police officers who work in security or investigation departments. Mainly qualitative analysis to process the data was employed. According to the experts' opinion, the existing gaps in the legislation and difficulties in cooperation with the police are the main sources of the inefficiency of fraud prevention strategies utilized by the Russian insurance companies. The respondents agree that both insurers and fraudsters actively use new technologies. Fraudulent claims in the compulsory third-party liability motor insurance remain the most common activity among Russian criminals, although they quickly expand into health and property insurance. Typically, an insurance fraudster is a 34-year-old male with a college/university degree who cooperates with an insurance broker in 42 percent of cases. Based on this, a set of recommendations aimed at increasing the efficiency of insurance fraud prevention was produced.

THE IMPACT OF AN INTERREGIONAL TRANSMISSION LINE ON PRICES AND VOLUMES ON THE RUSSIAN ELECTRICITY MARKET

ANASTASIIA REDKINA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

This paper investigates the change in the behavior of prices and volumes on the Russian electricity market, caused by changes in the electrical grid. The analysis is performed on two previously unconnected macro regions, which currently have a "fictional" interregional transmission line. We use a dataset with economic variables together with the flow frequency as a technical variable of the electrical grid and prove that the latter matters. Our estimates indicate that given the existence of the interregional link, prices in the regions converge to some extent and generation volumes in the regions are shaped by its regions' and the adjacent regions' load. In the future research, the whole electrical grid of Russia should be taken into account.

THE DEGREE OF THE READINESS OF THE RUSSIAN INSURANCE MARKET FOR THE TRANSITION TO SOLVENCY II

YULIIA TARASOVA, TAISIYA SHUVALOVA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

The problem of insolvency is ambiguous and requires a solution in every field of activity. Insurance is, to a larger extent, based on the mutual trust of the participants, and this is the reason for governmental control of the solvency, among other things in the new legislation. Entering the WTO means that the insurers become subject to both the foreign legislation and the domestic one. During the process of transition

to the international requirements, major questions connected with the adaptation to those requirements arise. All the aforementioned aspects confirm the relevance of the current survey. The position stated before determined the aim of the research — that is, the assessment of the Russian insurers from the view of their readiness to the implementation of the new requirements contained in the Solvency-II Directive.

Several tasks were set to achieve the aim of the survey. The analysis of the current state of the Russian insurance market has been performed. Analogues of Solvency-II and the experience of the Directive implementation in foreign countries where Solvency-I had functioned before were thoroughly examined. Apart from this, the detailed analysis of the main differences between Solvency-I and Solvency-II — which arise from the risk-oriented approach used in the new Directive, the introduction of the additional indicators of the financial health of the company, and the global changes in the financial markets' performance — was performed.

Alongside with this, the evaluation of the Russian insurers' overall state has been performed (with the use of the quantitative approach), and the legislation readiness for the implementation of Solvency-II has been also considered (with the use of the qualitative approach). One of the important points of the research is the assessment of the level of market readiness for the Solvency-II Directive and an estimation of the possible consequences in the case of the eventual implementation of the Directive requirements in the Russian Federation. According to the results of the calculations performed during the research, more than 40% of the insurers demonstrated compliance with the Solvency Capital Requirement (SCR), whereas the Minimal Capital Requirement was fulfilled by almost 90% of the insurance companies studied. Nevertheless, despite the obtained results, a number of challenges that may influence a successful Solvency-II implementation in Russia were identified.

INTANGIBLE-DRIVEN ECONOMY AND DATA-LED BUSINESS MODELS

THE ANATOMY OF PAID CROWDSOURCING PLATFORMS

ANDREY SALTAN, KONSTANTIN BAKHAREV, EGOR YANKOV — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

Information and communication technologies (ICT) are transforming business and the societal landscape at an ever-increasing rate. One of the most noticeable effects is the fast growth of digital platforms and marketplaces that facilitate the provision of services and the exchange of goods. This growth is primarily determined by the growth of the Internet and the expansion of the frontiers in software development, which allows efficient and effective online collaboration of the market participants. Another prominent example of ICT-enabled innovation is the introduction of crowdsourcing approaches for implementing projects as a logical evolution of outsourcing. Crowdsourcing involves a large number of participants (crowd) wishing to contribute to a particular project or initiative, and ICT provides the required infrastructure for effective and efficient communication, task allocation, and assembly of the completed parts into a ready solution. The combination of the idea of crowdsourcing with platform thinking has led to the emergence of a particular category of digital platforms called paid crowdsourcing platforms, which are designed for implementing commercial crowdsourcing projects. Examples of such projects include collecting and verifying of data from open sources, developing samples for machine learning and computer vision models, classifying textual and graphical objects, and updating information in web mapping services.

Right after crowdsourcing projects were first introduced, they received sufficient attention from researchers in a diverse range of disciplines, including information technologies, economics, and sociology. A lot of these studies in these disciplines investigate, develop, and evaluate crowdsourcing as a phenomenon with far-reaching prospects for development and impact. However, these studies do not provide convincing grounds for non-trivial issues of managing paid crowdsourcing platforms. Managing these platforms requires thoughtful balancing tradeoffs between various pricing schemes and matching algorithms, as well as defining pipelines for the allocation of tasks and the verification of answers. This paper addresses the issues of designing the internal structure of paid crowdsourcing platforms, with a particular focus on the use of pricing mechanisms.

The research intended to be presented at the Conference is threefold. First, we conducted a literature review to obtain a better understanding of state-of-the-art research of the design and the operations of crowdsourcing platforms from different perspectives, as well as to ground our study. We found that quite often researchers

in pure social sciences or ones who are interested in the evaluation of the societal impact of information technologies tend to consider crowdsourcing platforms as "black boxes" that match agents on different sides of the market to achieve specific goals. Without denying the validity and importance of such an approach in this paper, we will adopt different microstructure approaches and explicitly model crowdsourcing operation processes and principles to evaluate their effectiveness and efficiency. This approach corresponds well with the research perspective accepted in information technology and computer science domains. Similarly, researchers in these domains attempt to search for optimal technological platform structures and algorithms behind various processes. Supplementing these findings with research findings on the optimal economic structure of paid crowdsourcing platforms delivers a complex vision on platform structures. This is an essential goal with sufficient theoretical and practical contributions.

Second, we will discuss the results of the survey of the paid crowdsourcing platforms market. The market overview was based on the detailed analysis of 40 platforms that we were able to identify, including Amazon MTurk and Yandex.Toloka. The literature review, supplemented by a market overview, allowed us to propose a seven-dimensional pricing scheme and thematically to classify pricing models used across these dimensions. The observed heterogeneity of patterns regarding mechanisms employed allowed us to make assumptions on interdependencies across various dimensions and mechanisms that could serve as a valid research hypothesis for simulation and analytical modeling, as well as action research.

Third, an analytical model of a crowdsourcing platform is put forward to illustrate tradeoffs between pricing patterns, matching principles, and the task-pipeline design. The developed model captures the fundamental mechanisms and principles of paid crowdsourcing platforms. The performed simulation allowed us to make sustain estimations on the efficiency of usage of the pricing mechanisms, including surge pricing, membership fees, and price discrimination. Although within the model we were able to obtain a better understanding of the usage of different pricing mechanisms, more research is needed to address the issues of finding the optimal economic structure for paid crowdsourcing platforms.

The conference presentation is going to be one of the first steps of the ongoing research exploring the anatomy of paid crowdsourcing platforms that bridge the gap between the engineering and the business/economics aspects of their operations and impact. We will conclude the presentation with reflections on challenges for the platforms' operating companies, as well as a research perspective that could contribute to finding proper solutions for various aspects of the design and operations of paid crowdsourcing platforms. The presented study of paid crowdsourcing complements and extends the existing literature on crowdsourcing and platform economy; it also creates an appropriate basis for further research in these directions.

THE SYSTEM FOR ORGANISATIONAL INTEGRATION ON DATA LEVEL
DARIUSZ PUT — CRACOW UNIVERSITY OF ECONOMICS, POLAND

The problem of organizational integration embraces many aspects and is often very complex. Organizations are different; they consist of various departments, carry out different processes, use diverse systems, operate in multi-cultural environments, and cooperate with business partners, which also requires some kind of integration. As a result, different processes are supported by heterogeneous systems and applications, which makes gathering, processing, and accessing data and information a difficult task. So, elaboration of integrating solutions on various levels of organisational activities, including data and information level, seems to be one of significant research issue.

A considerable number of solutions have been elaborated as far as organisational integration is concerned. Integration may be perceived as a connection between cooperating companies. Although such inter-organisational collaboration can offer better services, their performance management is complex and often fails. Kourti (2017) discusses four patterns for a more effective performance management of inter-organisational collaborations. There are also approaches which focus on process level integration and because processes are different, elaborated solutions are usually adjusted to their specifics. Some researchers suggest designing integrating solutions on the basis of actual processes and existing applications; others propose a more radical business process redesign (Palma, 2016; Palma-Mendoza, Neailey, Roy, 2014). There are also approaches concerning integration on the system level. Systems are built continuously, often by composing existing sub-systems. In a complex world of uncertainty and constant change, the new system integration paradigm must feature two main characteristics: support for a system-of-systems approach to manage complexity and support for a high-level relation between sub-systems to manage diversity, uncertainty, and dynamics (Diaconescu et al., 2016).

As far as data integration is concerned, there have been several solutions elaborated. The prob-lem of designing data integrating systems includes the following aspects: modelling a data integration application, processing queries, dealing with inconsistent data sources, and reasoning on queries (Lenzerini, 2002). Some authors propose mixed methods (e.g. Fielding, 2012; Greenhalgh et al., 2010; Pluye et al., 2010). Wang, Haas and Meliou (2018) classify data inte-gration systems by their explainability — the ability to derive explanations which provides op-portunity for systems to interact with human users. What is more, alternative to data integration — diffraction concept, which is supposed to be the way of letting data speak to us in different ways and, conversely, allowing us to speak back with and to the data differently too, has also been proposed (Uprichard, Dawney, 2019). Diffraction allows the data to cohere — or not. And if not, then maybe all there will

be to show at the end of the period of research is a number of cuts producing different visibilities that cannot be forced into a singular narrative.

In this article, organisational integrating solutions on the data level are discussed. Areas where data integration is necessary are characterised, including machine learning, which demands utilizing data from the greatest possible variety of sources, and this is why data integration plays a key role in the whole process (Dong, Rekatsinas, 2018). Different approaches (including central databases, federated solutions, data warehouses, and ontology-based systems) are dis-cussed, compared, and characterised. Because one of the important parts of integrating solutions is how data are delivered to users, the system enabling to create pre-defined, as well as ad hoc, queries and the process of its designing is discussed. The proposed system consists of four levels, and its core is based on the co-shared ontology that stores metadata about the available data and information gathered by individual, autonomous systems constituting the integrating solution. The most important problems connected with the implementation of such a system are discussed, and methods for overcoming some of them are proposed. Finally, the process of query formulation in the system is discussed.

The proposed system, the process of its designing, and some problems connected with its preparation and elaboration have been discussed. Of course, organisations are heterogeneous, so implementation of the whole system in one institution is questionable. But, problems described in this paper appear in a considerable number of data integrating approaches, so the proposed solutions may be applied in various different systems to resolve problems appearing during the elaboration of almost any data integrating system.

HR-DETERMINANTS OF BANKS SURVIVAL IN RUSSIA
VICTOR KRAKOVICH, JEFFREY DALE DOWNING, TAISIA SHUVALOVA —
HIGHER SCHOOL OF ECONOMICS, RUSSIA

The banking sector can be considered the "backbone" of the economy (Vaziri et al., 2012). A healthy banking industry is a required condition for the economic development of the country. That is why it is particularly important to study factors contributing to banks' financial stability. The situation in Russia provides a unique opportunity to investigate such factors. In the period from 2013 to 2019, the Russian Central Bank withdrew the licenses of more than 450 banks; the total number of functioning banks on 15th July was 464. So, in the seven-year period, the banking sector was halved in terms of the number of credit institutions. At the same time, banking assets concentrated among the largest banks. In 2013, the top5 banks possessed 50.28% of the total banking sector assets, while in 2019, their share rose to 60.44% (EMISS). In western economic history, we can also find examples of banking sector consolidation. The amount of banks functioning in the United States decreased by 30% in 1988–1997. However, at the end of the 1990s, the number of newly created banks exceeded those that left (Berger et al., 1999). The number of banks in EU15 also declined significantly between 1985 and 2004 — from 12,315 to 7300 (Goddard et al., 2007). The Russian case can still be considered a unique one because of the higher proportion of closed banks in a shorter period.

This situation can be used as a natural experiment to study the factors affecting banking stability. Financial performance indicators are relatively easy to collect and process as banks have an obligation to submit monthly reports that can be used for analysis to the Central Bank. The problem with using only financial indicators is that they are presented as a fait accompli and by themselves do not help much to predict the prospects of the bank (Norton & Caplan, 1996). It is necessary to estimate and analyze other intangible factors in order to define the properties of more competitive banks.

The resource-based view and the concept of dynamic capabilities are among most popular tools to define competitiveness factors of firms (Teece et. al., 1997). According to this approach, firms should focus on the development of valuable, rare, inimitable, and nonsubstitutable (VRIN) resources as a source of competitive advantage (Barney, 1997). Mostly, such resources will be connected to the human resources because people and their skills and knowledge possess all the components of the VRIN framework (Saá Pérez&Falcón, 2004).

A number of other researchers have also mentioned intellectual capital management and human resources specifically as important additions to the traditional strategies of the firm. Hiltrop (2005) mentioned the necessity of linking the model of human resource management used in the company with its main strategy and objectives. HR policy is only part of the whole system of various actions required for the best possible performance; nevertheless, it deserves attention from the employer's side and should be taken into consideration as well as the financial results. The same point is emphasized by Ferreira et al. (2011), where the authors affirm the increasing relevancy of HR development and the choice of its development strategy with respect to the major objectives of the firm. Intellectual capital as a whole is steadily gaining more importance, becoming an asset of greater value than any of the physical ones (Yalama&Coskun, 2007). According to Al-Musalli&Ismail (2012), physical capital is vital for operating; however, there is a strong dependency of the service quality on the intellectual capital and human resource management, which eventually get to be more valuable due to the increasing number of market players and the inclusivity of traditional assets (meaning that almost every organization can gain access to them and use them properly, as it was described above). Human capital has quite a noteworthy influence on the customer impressions and their will to continue negotiations with a specific banking organization, which is of great importance to the bank (Ferreira et al., 2011) The increasing role of the intangibles is also confirmed by Chen et al. (2014), who stated that the economy had experienced a transition to the knowledge-based foundation from the former industrialized approach, and under such circumstances growth and affluence depend more on intellectual assets.

So, it becomes evident that there is a growing need for the development of appropriate measures and proxies for human resource management efficiency and

intellectual capital impact. Financial tools commonly used for measurements of tangibles are inefficient to estimate intellectual capital (Maditinos et al., 2011). One of the methods used by the researchers is based on the investigation of job advertisements placed by the organizations in various sources. Addressing various surveys performed on this topic (Shahbazi et al., 2010, Müller et al., 2014, Kureková et al., 2016), one can derive a number of common patterns used when exploiting the approach described above.

The very basic concept of the job advertisements analysis method is as follows: a sample of adverts is collected; it can be either one-period data or a larger variety to perform the comparison and observe the dynamics. Usually, the approach employed for further analysis is referred to as "text mining" or, more broadly, "content analysis". In most cases, the author of the research concentrates on the conditions offered by the employer and on the skills required to perform job duties. The classification later imposed on the data extracted from the initial sample can vary according to the investigator's needs and assumptions; for instance, Shahbazi et al. chose to categorize all the identified competencies and skills by their belonging, namely personal skills, generic ones, and those specific for a certain discipline. Kureková et al. implemented two different techniques of clustering: firstly, they divided skills into the groups of formal, technical ones and non-cognitive ones, and then introduced the chosen strategy of splitting skills by the size of the specification, namely general skills (the broadest category), skills specific for an industry, and lastly those which relate to a specific company. The findings of these authors imply that the demand for exact competencies is quite manifold and varies not only by the type of the job but within similar structures across the states as well.

In our research, we look at the demand for different vacancies of Russian banks for the period of 2013–2017. The data are collected from the hh.ru website. We define the HRstrategy factors contributing to the probability of bank survival controlling for financial indicators.

ECONOMIC POLICY UNCERTAINTY AND COMPANY INVESTMENTS IN HUMAN CAPITAL
IULIIA NAIDENOVA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

Introduction

Human capital is one of the key resources of any organization. Human capital takes part in all activities of an organization combining all other resources (Kianto, Sáenz, & Aramburu, 2017). There is vast literature that supports the importance of human capital for organizational performance (see, for example, Cuganesan, 2006; Seleim, Ashour, & Bontis, 2007; Shrader & Siegel, 2007; Li, Qin, Jiang, Zhang, & Gao, 2015; Kianto et al., 2017). Despite the fact that human capital belongs to individuals, not the companies they work for, companies invest in human capital by training and hiring new employees with useful skills and knowledge.

However, it is questionable, how organizations change their behavior with respect to human capital investments under uncertainty. Theoretical models confirm the

impact of uncertainty on human capital investments on individual (Kim, 2010) and country (Wasmer, 2006; Gervais, Livshits, & Meh, 2008) levels. On the country level, previous research found the in the period of turbulence it is better to have less specific human capital (Wasmer, 2006; Gervais et al., 2008). The research devoted to the analysis of consequences of crisis generally shows higher unemployment rates (Campello, Graham, & Harvey, 2010; Heyes, 2013) but the effect can be substantially mediated by government policy such as in the case of Germany after the crisis 2008-2009 (Bellmann & Gerner, 2012; Zagelmeyer, Heckmann, & Kettner, 2012). Using sports data, Kuhnen amd Oyer (2016) shown that uncertainty hinders hiring and the effect is stronger when firms face greater firing and replacement costs and less competition. However, other research found the important role of human capital to succeed in the period of high economic turbulence (Guevara & Bounfour, 2011; Shakina & Barajas, 2014) and to recover after the crisis (Barajas, Shakina, & Fernández-Jardón, 2017). Therefore, it can be reasonable for a firm to invest in human capital even under high uncertainty.

The measurement of uncertainty is another important issue in investigating the impact of uncertainty on investments in human capital. Previous research generally addresses this issue by considering the periods of high turbulence and comparing it with a period of stability. Baker, Bloom and Davis (2016) developed the index of economic policy uncertainty (EPU) based on newspaper coverage frequency. Baker et al. (2016) shown that EPU negatively and significantly affects firm-level investment rates and employment growth. Subsequent research confirmed the negative influence of EPU on corporate investments (Kang, Lee, & Ratti, 2014; Wang, Chen, & Huang, 2014; Gulen & Ion, 2015). Current research is aimed to investigate the effect of the EPU on corporate investments in human capital and test whether the effect varies across countries.

Data and methodology

We use a dataset of more than 1,300 public non-financial companies during the period from 2004 to 2014 located in five European countries: the UK, Germany, France, Spain, and Italy. Financial data about the companies were collected from the Bureau Van Dijk (Amadeus) and Thomson Reuters databases. Additional non-financial information has been collected from publicly available sources such as company websites, rating agencies and patent and information bureaus. The EPU index for each country is publicly available on the http://www.policyuncertainty.com. According to the methodology presented on the website, the EPU index is "constructed from three types of underlying components. One component quantifies newspaper coverage of policy-related economic uncertainty. A second component reflects the number of federal tax code provisions set to expire in future years. The third component uses disagreement among economic forecasters as a proxy for uncertainty". Monthly EPU data is averaged across the year.

To measure the company's investments in human capital we use the company's cost of employees (relative to sales) and change in the cost of employees during the year (relative to sales). Control variables describe the general features of a company as well as investment in material capital. Companies' main characteristics are presented in table 1. The financial variables are measured in millions of euros. The correlation matrix shows low correlations among the variables, therefore, there should not be multicollinearity issues (table 2). The dynamics of EPU (Figure 1) shows the high correlation of the EPU index among all considered countries but with considerable difference in EPU value.

Table 1. Descriptive statistics for the main variables

Variable	Mean	Standard Deviation	Minimum	Maximum
Cost of employees$_t$ / Sales$_t$	0,280	0,195	0,000	1,988
(Cost of employees$_t$ - Cost of employees$_{t-1}$) / Sales$_t$	0,011	0,063	-0,496	0,479
Cost of employees$_t$ / Number of employees$_t$	0,071	0,628	0,000	38,902
EPU	134,629	58,467	59,301	315,339
Tobin's q	1,497	1,222	0,089	15,057
Company size (natural logarithm of total assets)	5,582	2,319	-1,398	12,643
Capex$_t$ / Total Assets$_t$	0,071	0,154	-3,847	4,067
Financial leverage$_t$	1,061	1,447	0,000	19,883
Sales$_t$ / Assets$_t$	1,035	0,709	0,000	11,829
ROIC$_t$	0,060	0,112	-0,500	0,987
Corporate university	10,842	0,351	0,477	0,000
Share of managers that own shares	10,471	0,291	0,340	0,000

Table 2. Correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Cost of employees$_t$ / Sales$_t$	1.00											
(Cost of employees$_t$ - Cost of employees$_{t-1}$) / Sales$_t$	0.13	1.00										
Cost of employees$_t$ / Number of employees$_t$	0.05	0.01	1.00									
EPU	0.08	0.00	0.02	1.00								
Tobin's q	0.10	0.11	-0.01	-0.11	1.00							
Company size	-0.34	-0.04	-0.01	0.01	-0.19	1.00						
Capex$_t$ / Total Assets$_t$	-0.01	0.18	-0.01	-0.09	0.04	0.02	1.00					
Financial leverage$_t$	-0.16	-0.05	-0.01	-0.05	-0.08	0.21	-0.02	1.00				
Sales$_t$ / Assets$_t$	-0.07	-0.04	-0.02	-0.01	0.10	-0.25	-0.06	-0.01	1.00			
ROIC$_t$	-0.14	0.17	-0.01	-0.04	0.25	0.03	0.136	-0.13	0.1	1.00		
Corporate university	-0.00	0.06	0.03	0.06	-0.02	0.16	-0.01	-0.04	0.06	0.05	1.00	
Share of managers that own shares	0.01	-0.02	-0.00	-0.04	0.03	0.05	0.00	0.03	0.01	0.01	-0.36	1.00

Preliminary results

Models 1-3 shows the results for the cost of employees relative to sales as a dependent variable whereas models 4-6 are for change in the cost of employees relative to sales. The results for model 1 evidence that on average, there is a negative impact of EPU on corporate investments in human capital. Change of EPU on 1 standard deviation (58) will change the cost of employees to sales ratio approximately by 0.006 which is 2% of the average value of the dependent variable. Thus, the effect is economically significant. However, the estimations for models 2 and 3 shows that the impact varies by country and industry. In Germany, high level

of EPU makes companies invest more in human capital. In services and professional services industries companies do not change the level of investments in human capital depending on EPU.

However, the results for models 4-6 contradicts previous results and evidence for positive change in human capital investments with the growth of EPU. The effect also varies across countries and industries, but always stays positive.

Conclusion

Current research is aimed at the investigation of companies' behavior with respect to human capital depending on the uncertainty of economic policy. Unlike previous studies focused on capital expenditures (Kang et al., 2014; Wang et al., 2014; Gulen & Ion, 2015) and even the study of employment growth of Baker et al. (2016), we found the positive impact of EPU on change in the cost of employees. Vice versa, the decrease in EPU can cause a decrease in hiring new qualified employees. This corresponds to theoretical assumptions regarding specific and general labor (Wasmer, 2006; Gervais et al., 2008).

The research highlights the specificity of human capital as a firms' resource. This result can be driven by employment policies aimed at supporting employment or inclusion of the crisis period 2008-2009.

Table 3. The analysis of EPU impact on firm-level investments in human capital

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Models for the cost of employees			Models for change in the cost of employees		
EPU (LAG)	-0.0001***	-0.0001	-0.0001	0.0001***	0.0002***	0.0001**
	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.0000)
GERMANY * EPU (LAG)		0.0002**			0.0001*	
		(0.0001)			(0.0001)	
FRANCE * EPU (LAG)		0.0000			-0.0001**	
		(0.0000)			(0.0000)	

SPAIN * EPU (LAG)		0.0000			0.0001	
		(0.0001)			(0.0001)	
ITALY * EPU (LAG)		0.0002			0.0001	
		(0.0001)			(0.0001)	
MANUFACTURING * EPU (LAG)			-0.0001***			0.0001*
			(0.0000)			(0.0000)
ENERGY * EPU (LAG)			-0.0004***			0.0001
			(0.0001)			(0.0001)
SERVICES * EPU (LAG)			-0.0000			-0.0000
			(0.0001)			(0.0000)
TRADE * EPU (LAG)			-0.0001**			0.0001
			(0.0001)			(0.0000)
PROFESSIONAL SERVICES * EPU (LAG)			0.0000			0.0000
			(0.0000)			(0.0000)
TOBIN'S Q (LAG)	-0.0034**	-0.0035***	-0.0030**	0.0053***	0.0050***	0.0051***
	(0.0013)	(0.0013)	(0.0013)	(0.0011)	(0.0011)	(0.0011)
COMPANY SIZE (LAG)	-0.0141***	-0.0142***	-0.0134***	-0.0256***	-0.0251***	-0.0257***

	(0.0029)	(0.0029)	(0.0029)	(0.0025)	(0.0025)	(0.0025)
CAPEX / TOTAL ASSETS (LAG)	-0.0182***	-0.0190***	-0.0173***	0.0362***	0.0355***	0.0356***
	(0.0052)	(0.0052)	(0.0052)	(0.0044)	(0.0044)	(0.0044)
FINANCIAL LEVERAGE (LAG)	-0.0020**	-0.0020**	-0.0020**	-0.0022***	-0.0023***	-0.0022***
	(0.0009)	(0.0009)	(0.0009)	(0.0008)	(0.0008)	(0.0008)
SALES / ASSETS (LAG)	-0.0343***	-0.0348***	-0.0340***	-0.0457***	-0.0452***	-0.0457***
	(0.0037)	(0.0037)	(0.0037)	(0.0031)	(0.0031)	(0.0031)
ROIC (LAG)	-0.0755***	-0.0761***	-0.0763***	0.0667***	0.0660***	0.0665***
	(0.0104)	(0.0104)	(0.0103)	(0.0088)	(0.0088)	(0.0088)
CORPORATE UNIVERSITY (LAG)	0.0033	0.0033	0.0024	-0.0140*	-0.0132*	-0.0141*
	(0.0092)	(0.0092)	(0.0092)	(0.0078)	(0.0078)	(0.0078)
SHARE OF MANAGERS THAT OWN SHARES (LAG)	0.0291*	0.0281*	0.0270*	0.0005	0.0016	0.0015
	(0.0159)	(0.0159)	(0.0159)	(0.0135)	(0.0135)	(0.0135)
COMPANY FIXED EFFECTS	included	included	included	included	included	included
YEAR FIXED EFFECTS	included	included	included	included	included	included
CONSTANT	0.4007***	0.3926***	0.3980***	0.2001***	0.1875***	0.2000***
	(0.0194)	(0.0200)	(0.0194)	(0.0164)	(0.0170)	(0.0165)

OBSERVATIONS	8,212	8,212	8,212	8,212	8,212	8,212
R-SQUARED	0.0522	0.0533	0.0600	0.1049	0.1075	0.1067
NUMBER OF NUMBER	1,306	1,306	1,306	1,306	1,306	1,306

Note: Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. Base level for country is UK. Base level for industry is Construction.

INNOVATIVE STRATEGIES UNDER ECONOMIC DISTRESSES: EVIDENCE FROM RUSSIAN CRISES

SOFIA GRITSUK, KRISTINA BELOVA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

Under the unfavourable economic conditions, companies need to quickly react to such an environment. However, the role of innovations in this process is insufficiently studied in terms of the Russian crises. The goal of the research is to explore innovative strategies of companies in Russia under the two consequent crises: the global financial and economic recession of 2008–2009 and the local politically-driven crisis of 2014. In particular, the research specifically considers the internal factors of Russian companies, which lead to innovations, largely defined by the R&D investments and the number of patents. The study provides longitudinal panel data of the financial results for the period of 2008–2017. The regression model with the fixed effect is used to consider the relationship between innovation-related variables and the performance of Russian companies in general and in the period of the crises. Furthermore, the innovations are considered in terms of the input-output effect, which reveals the relationship with the performance, as well. For that matter, the 3SLS regression model has been used to show the different levels. The main findings are asfollows. Firstly, R&D investments and patents are positively significant in terms of operating revenue, EBIT, and operating margins for both the crises of 2008–2009 and 2014. Secondly, patents have statistically bigger coefficients than R&D investments. Thus, R&D investments can be considered the input of innovations as they are positively significant for patents. Moreover, crisis heterogeneity has been observed in terms of industries, meaning a different influence. Thus, the oil industry has been affected the most by the crisis of 2008–2009, and R&D investments had a positive influence in such unfavorable conditions, proving the first hypothesis of the study. The production and services industries have been the most significant in terms of the crisis effect in 2014. Therefore, the overall statistical influence of innovations is found for the performance of companies.

THE ESSENCE OF BUSINESS MODEL INNOVATION IN START-UP COMPANIES

PAVEL MILEI — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

The phenomenon of business model innovation has been gaining an ever-growing interest of the practitioners and academics alike. Affected by the gaps and discrepancies in the underlying business model concept, the research on business model innovation, however, is still at an early stage and lacks solid theoretical grounding. One of the main gaps in the existing research pertains to the lack of well-delineated boundary conditions of business model innovation field. In particular, the question of whether business model innovation takes place in entrepreneurial or incumbent firms has not been unequivocally addressed in the literature. The present study seeks to fill in the existing research gap by explaining the essence of business model innovation in the context of entrepreneurial firms.

The conducted review of the literature revealed that the majority of academics study business model innovation only in the context of incumbent firms, whereas much of the remaining research examines the matters of business model innovation without clearly differentiating between the entrepreneurial and the established firms. In the meanwhile, inquiries into the phenomenon of business model innovation in the context of start-up companies remain very scarce and scattered. Nevertheless, we argue that business model innovation is intrinsically different in established and entrepreneurial firms and, therefore, the research on business model innovation calls for a distinct theoretical setting to accommodate start-up companies. We suggest that the research differentiate between four clusters based on whether business model innovation takes place in a start-up or an established firm, and whether it involves the creation of a new business model (business model design) or a transition in an existing business model (business model reconfiguration). Accordingly, we propose that business model innovation can be a result of (1) replacement of an established business model (business model reconfiguration in an incumbent firm), (2) parallel business model (business model design in an incumbent firm), (3) "pivot" in a business model (business model reconfiguration in an entrant firm), and (4) start-up business model (business model design in an entrant firm). Leaving the research on incumbent firms (addressed in the extant literature on business model innovation) and research on "pivot" in a business model (addressed in the lean start-up approach) beyond the scope of our study, we aim to explain the essence of business model innovation within the cluster of start-up business model.

Although every start-up which enters a certain market employs a particular business model, not every start-up business model result in business model innovation. In order to elucidate what constitutes a business model innovation in start-ups, our research suggests that innovativeness of a start-up business model shall be measured in three dimensions, which we denote as breadth, depth, and reach. The breadth of business model innovation refers to the number of business model elements undergoing a change. Unlike established companies, which already employ an initial "status quo" business model that they can change, start-up companies do not employ any status quo business model to compare the breadth of change against. Consequently, we maintain that the reference point for measuring business model innovation breadth in the context of start-up companies shall be the predominant business model present in the market. The appropriate scale to

embrace the breadth of BMI ensues from the total number of elements attributed to a business model. Building on the insights from the widely used Business Model Canvas framework, which distinguishes nine building blocks of a business model, we propose a scale of business model innovation breadth from 0 to 9. The depth of business model innovation relates to how radical the change in business model is. We propose the following scale to describe the depth of innovation in a business model: old, incrementally new, moderately new, and radically new. The last dimension of start-up business model innovativeness refers to the reach of innovation. Traditionally, the reach of innovation has been measured by whether it is new to the firm, the market, the industry, or the world. Following the line of argument that start-up companies do not have a status quo business model that can be used as a reference point, we maintain that "new-to-the-firm" band of innovation reach is redundant in the context of start-up companies. Accordingly, we propose the following scale of BMI reach: known-to-the-market, new-to-the-market, new-to-the-industry, and new-to-the-world. We maintain that innovativeness of start-up business models is a matter of extent. While start-up companies whose business models are located around the intersection of three axes (low breadth, depth, and reach) cannot qualify as business model innovations, those start-ups that can achieve the highest breadth, depth, and reach bring the most innovative business models to the market.

The conducted study makes a contribution to the existing research on business model innovation by incorporating start-up business models as a distinct unit of analysis and explaining what constitutes a business model innovation in a start-up company based on a three-dimensional scale of business model innovativeness. This study is among the first to lay a conceptual foundation of research on business model innovation in start-up companies. Future research may build upon the proposed concepts to empirically analyze how business model innovation impacts the performance of entrepreneurial firms.

CONCEPTUAL FRAMEWORK OF AGENT-BASED MODEL OF RELATIONAL CONFLICTS IN RUSSIAN RETAIL
YULIA MOROZOVA — HIGHER SCHOOL OF ECONOMICS, RUSSIA

Collaboration and trust relationships are important success factors in supply chain management. However, in practice, relationships between counterparties in the supply chain face conflicts preventing the companies from building an ideal supply chain collaboration. This paper proposes a conceptual framework of agent-based model that helps to understand how individual behavior of counterparties in conflict situations and collaboration strategy affect supply chain efficiency in dynamics. The research is based on a Russian retail case study describing a grocery sector where the key market stakeholders are retailers and suppliers (manufacturers). The important feature of the Russian grocery sector is a dominating power of the retailers over the suppliers. The author investigates the

main drivers of conflicts in the retaile–supplier relationship and offers a specification of the agent-based model.

DIGITALIZATION IN RUSSIAN REGIONS
YULIYA AVERYANOVA, ANGEL BARAJAS — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

Digitalization is a key trend in the global economy. There have been several changes in the technological development of companies, government institutions, and business companies. In this study, we investigate the level of digitalization of Russian regions in different perspectives by using the Russian Statistics Bureau. We describe the stages of digitalization in the year 2012 and in the year 2017 in Russian regions and compare them. Using descriptive statistics, we analyze the major changes in Russian regions from 2012 to 2017 in order to understand digitalization breakthrough in Russian regions.

TRANSFORMATION OF JOBS IN BANKING: EVIDENCE FROM E-BASED ADVERTISEMENTS
POLINA ARTAMOSHINA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

The aim of this research is to analyze the impact of digitalization on the skills transformation presented in the job advertisements of Russian banks. Using the panel data set of 22,401 vacancies in the Russian banking industry, the paper shows how the skills have transformed due to the digitalization process during 2005–2017, as well as explores the most desirable sets of skills for IT and accountant specialists in three periods (before, during, and after the global financial crisis). In addition to this, based on the isomorphism theory, professional skills sameness regardless of the industry and country was indicated. By applying text mining, the bulk of job advertisements during 2005–2007, 2008–2010, and 2011–2017 was restructured and analyzed. The logit regression conducted in the study indicates not only the ambivalent influence of the digitalization on the banking job advertisements but also a significant impact of the global financial crisis as a trigger for the intensive development and changes in the corporate strategies of Russian banks.

INSTITUTIONS OF PUBLIC SECTOR: EMPIRICAL EVIDENCE

FIRM EFFICIENCY, EXITS, AND GOVERNMENT PROCUREMENT CONTRACTS
EVGUENIA BESSONOVA — *BANK OF RUSSIA, RUSSIA*

This study provides evidence that productivity growth trends in Russia are similar to those in other countries where technology leaders enjoy productivity growth with a gap increasing between them and other companies. A survival analysis suggests that the most efficient firms quit the market at a faster rate than firms in other efficiency groups in the Russian economy. Survival functions of the least efficient firm do not always differ significantly from those of other companies. Results based on public procurement data provide evidence that additional financing from government contracts helps both the most and the least efficient firms to survive and shelters them from competitive pressure. In the short run, the positive effect of winning government procurement contracts for leaders seems to be only observed in their home regions, providing indirect evidence that the public procurement system supports not all types of firms with growth potential but only those affiliated with the local authorities. Intervention in the mechanism of market selection through the system of public procurement could have a strong negative effect on economic growth as it provides incentives for inefficient firms without growth potential to stay in the market longer.

TAX AUDIT DATA ANALYTICS USING POWER BI: A PROOF-OF-CONCEPT WITHIN AN INDONESIAN CASE
AGUNG DARONO, FEBRIAN DANI — *INDONESIAN MINISTRY OF FINANCE, INDONESIA*

Tax audit is a measure to ensure that taxpayers have complied with tax laws. Tax auditors are now almost certainly dealing with electronic data, whose size is getting bigger and whose format is becoming very diverse and complex. Consequently, the tax auditor must have reliable tools to deal with this situation. This paper, using the tax audit setting in Indonesia, seeks to present a proof-of-concept (PoC) that explores various possibilities for using Power BI as tax audit data analytics tools. This study, by limiting its scope to descriptive and predictive analytics, found that Power BI could be used to conduct tax audit data analytics for several areas, including: (1) collecting and transforming data from various formats and sources with relatively large sizes; (2) saving applied-steps related to data transformation, as well as audit test to be re-deployed on different audit tasks, at the same time also establishing audit logs; (3) performing analysis in the form of data matching to find audit findings that require further confirmation from tax auditors with taxpayers.

INFORMATION TECHNOLOGY, ORGANIZATIONAL CULTURE, AND SERVICE QUALITY: THE MEDIATING EFFECT OF PERSONNEL PERFORMANCE
TIGOR SITORUS, PALMA FITRIA FAHLEVI, JAROT PRIANGGONO, RAHMAT SENTIKA — *INDONESIAN POLICE SCIENCE COLLEGE, INDONESIA*

This study aims to investigate and develop a model of empirical research on Information Technology, Organizational Culture and Personnel Performance to Service Quality by proposing Personnel Performance as a mediating variable. The study was conducted by surveying 100 police officers and 100 community Personnel in the cooperation office between Police with Local Government of the city of Bandung, and the data were analyzed by the structural equation model, using Smart PLS. The results are that all the hypotheses are accepted, and the result of the study proves that personnel performance acts as an intervening variable on the influence of Information Technology and Organizational Culture on Service Quality.

VOLUNTARY PENSION INVESTMENT IN A THREE-PILLAR SYSTEM: PARTICIPATION AND CONTRIBUTION
KARSTEN STAEHR, MAGNUS PIIRITS — *TALLINN UNIVERSITY OF TECHNOLOGY, ESTONIA*

This paper studies the decision of individuals to invest in the voluntary private pension pillar of a three-pillar pension system. A three-pillar pension system typically consists of a government-run first pillar, a private but compulsory second pillar, and a private but voluntary and tax-exempt third pillar. We ask which factors that make individuals choose to join the third pillar pension investment and which factors affect the monetary contribution to the pension investment when they have already joined.

The paper seeks to provide insights of use for on-going debates on how to reform pension systems amid aging societies and rapidly increasing old-age dependency ratios. It has frequently been argued that private pension savings must play a greater role in ensuring the adequacy of pensions, but this makes it important to gain detailed knowledge of the factors that lead individuals to prepare for their own retirement through voluntary third-pillar investment.

Numerous studies have considered contributions to 401(k) accounts, the main private pension scheme in the USA. These studies have reached a number of general findings although there is no consensus regarding the effects of gender and education on 401(k) saving. Very few studies have considered the factors driving voluntary private pension investment in Europe, presumably because adequate data have generally not been available. The fact that the voluntary contributions are administered by private funds typically implies that although aggregate data have been collected, information on individual characteristics are not available.

We have access to a very fine-grained dataset that is constructed by merging several Estonian data registers using data from 2014 (or 2013 for a few variables). The merged dataset consists of data from the pension fund register, the population register, and the education register. The merged dataset contains information on

how much (if at all) an individual contributes to third-pillar pension investment in 2014, background information on all individuals in Estonia, and detailed information on their education. The dataset contains data on the full population in the relevant age group living in Estonia (around 700,000 individuals), although the education data are only available for a subset of the population (around 250,000 individuals).

The paper presents detailed summary statistics to provide a detailed picture of the data. The empirical analysis takes into account the fact that the voluntary pension contribution is a variable truncated at zero. The main methodology used is Heckman's selection model, which distinguishes between the participation choice of whether or not to invest in a voluntary third pillar pension fund and the intensive choice of how much to invest (given the individual participates). Various other methodologies are used in robustness analyses.

The paper contributes to the literature on voluntary pension investment in several ways. First, it is among the very first to use European data to estimate the effects of individual characteristics on voluntary pension saving. Second, it considers both the extensive choice of whether or not to participate and the intensive choice of how much to contribute. Third, it includes a large number of individual characteristics in the estimations, including the educational attainment. Fourth, the analysis uses population-wide data and thus avoids possible selection biases stemming from survey data. Last, but not least, the analyses are for voluntary pension investment in the three-pillar system where individuals also will receive pension payouts from the first and second pillars. No studies have previously analyzed voluntary third-pillar investment in a three-pillar system.

Preliminary results show that the factors or individual characteristics driving the participation choice are quite different from those driving the contribution choice. The key factor driving the participation choice is whether or not the individual has earlier opened a voluntary pension saving account, although this does not appear important for the contribution choice. We find as expected that high-income earners contribute more than low-income earners, but the effect of income on the participation choice is less certain, perhaps reflecting that a non-negligible share of low income earners also makes contributions. The age enters linearly in the participation choice but in a U-shaped manner in the contribution choice. Finally, the gender does not appear to be of importance for either the participation choice nor the contribution choice. Further analysis will provide further information on these findings and other research questions.

NEW HR TRENDS AND PEOPLE ANALYTICS

INTEGRATION OF PERFORMANCE ASSESSMENT INSTRUMENTS IN PERFORMANCE MANAGEMENT PERSPECTIVE IN WEST JAVA REGIONAL POLICEVITA

MAYASTINASARI, CHRYSHNANDA DWILAKSANA, NOVI INDAH EARLYANTI, BENYAMIN LUFPI — *INDONESIAN POLICE SCIENCE COLLEGE, INDONESIA*

The performance of the Indonesian National Police personnel is assessed not only by the leadership within the internal institution but also by the public or an external institution. Therefore, the accuracy of performance assessment instruments is important, because errors in setting and using performance assessment instruments would effect an inaccurate placement of personnel in positions, which potentially negatively affects the performance of the personnel and would influence organizational performance. This study aims to learn the perceptions of National Police personnel regarding the performance assessment in National Police and how to propose performance assessment instruments in Indonesian National Police. The research mix method is the approach chosen in this study, along with the survey method and a descriptive analysis. The research area in this study is West Java Regional Police. The study involved 223 respondents of National Police personnel. Data was collected by questionnaire distribution techniques, Focus Group Discussion (FGD), and document collection. The instruments of data collection in this study were questionnaires, interview guides, and document check list sheets. The results of study indicated that Performance assessment instruments of Indonesian Police personnel vary, namely: Performance Management System, evaluation of assessment, talent, personnel records, education and training, officer duty period, duty Period in rank, and other assessment instruments determined specifically relating to the determination of personnel who get awards on duty. Those elements would determine the promotion of personnel in some positions. Therefore, the accuracy in determining performance assessment instruments is very important.

CREATING A COMPETENCY MODEL FOR AN HR-ANALYST
ALEXANDRA OSIPOVA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

Currently, the corporate world is undergoing the process of digital transformation, and the implementation of data analysis in managerial decisions is gaining popularity every year. HR as a business function has a great potential in incorporating of data analysis practices, and it is only on the way to catching up with such functions as marketing and finance (SHRM foundation, 2016).

Although in the literature the term "HR-analytics" appeared about 15 years ago, scholars still struggle to differentiate between HR-analytics, workforce analytics, human capital analytics, and people analytics. However, according to Marler & Boudreau (2017), all terms have a common semantic core consisting of three elements: analysis of various data types in HR and in related functions, reporting, and the support of managerial decisions.

As for necessary competencies that should be acquired by HR-analysts, McIver et al. (2018) identified four areas, which are (1) mathematics and statistics, (2) programming and work with databases, (3) business acumen, (4) data visualization and presentation skills.

According to the recent PwC study (2017), 86% managers consider the creation or development of HR analytics department to be one of the highest priorities for the next 1–3 years, while 69% of them are firmly convinced that their employees do not have sufficient skills to meet that goal.

Consequently, a large body of literature is devoted to theoretical aspects of HR-analytics and necessary background for that field. However, there are few empirical papers that explore the labour market need for competencies necessary for HRanalysts.

This paper aims to shed light on the content of a competency model for an HRanalyst and is is based on labour market analysis and business experts' views.

A mix-method approach was chosen to conduct this exploratory study. Data were collected using a focus group with 30 HRexperts from both Russian-owned firms and MNCs. A content analysis of 40 vacancies from both the largest Russian job board HeadHunter and the global GlassDoor was also conducted.

Findings from the focus group revealed two types of competency models for an HRanalyst. The first type is referred to as a "customer" HRanalyst competency model. Such an employee should understand the research methodology and programming code, interpret data analysis results, and outline managerial recommendations. The second type is called an "expert" HRanalyst, who should acquire such competencies as data collection, processing, analysis, and visualization. But these two profiles have some shared competencies, which are design thinking, conducting research, and business acumen. Moving on to digital skills, HRexperts pointed out that HRanalysts should be proficient in Excel, SQL, SPSS, Python, and R-studio.

As for the content analysis of vacancies, it is necessary to point out that in Russia, there were 22 jobs for HRanalysts available on HeadHunter, but worldwide, this figure was higher — 8221 listings on GlassDoor. In other words, the number of HRanalysts vacancies in Russia amounts to approximately 0.3% of that in the world. Turning to what the Russian labour market requests in terms of competencies, the most sought-after ones are reports preparation, HR processes automation, and data analysis. As for the international labour market, companies search for HRanalysts who are also able to create reports, analyze data, and administrate HRIS. Interestingly, the most frequently requested digital skills are MS Office proficiency and HRIS administration in both job boards HeadHunter and GlassDoor, while no

solid data mining competencies are obligatory. Another interesting observation is that on the Russian labour market, some employers search for HR-analysts who are skilled in web-development, web-design, Power BI and PHP, while on the international labour market there were no signs of such diverse IT backgrounds. It can be explained by the fact that Russian employers struggle to define job description of an HRanalyst, because currently, this profession is only in its infancy.

Overall, this study outlines the core competencies of an HRanalyst, which are practically the same in Russia and in the world, and they are report creation, data analysis, MS Office proficiency, and HRIS administration. As for differences in competencies, in Russia, there can be found digital skills that are quite untypical for an HRanalyst, which are webdesign, webdevelopment, BI, and programming. Moreover, the results of focus group revealed two competency models for an HR-analyst: an "expert" model that contains data analysis competencies and a "customer" model that includes results interpretation and provision of managerial recommendations. The main limitation of this research is that only open job-boards were used as a resource for vacancies analysis, while no internal labour market was explored. In the next research step, it is planned to conduct a series of in-depth semi-structured interviews with HR analysts to extend the results obtained in this exploratory study.

IMPROVING THE "WORK PERFORMANCE" AND "INNOVATIVE PERFORMANCE" OF THE INDONESIAN NATIONAL POLICE (POLRI) APPARATUS THROUGH LEADERSHIP STYLE FOR THE PURPOSE OF INTERNAL TRUST AND PUBLIC TRUST

CHAIRUL MURIMAN SETYABUDI, M. ERWAN, RAHMADSYAH LUBIS —
NATIONAL INDONESIAN POLICE COLLEGE, INDONESIA

This study of Improving Work Performance and Innovative Performance through Leadership Style for the Purposes of Internal Trust and Public Trust aims to provide explanations of: a. the effect of directive leadership on job satisfaction; b. the effect of transactional leadership on job satisfaction; c. the effect of transformational leadership on job satisfaction; d. the effect of job satisfaction on work performance; e. the effect of job satisfaction on innovative ideas; and f. how great an effect POLRI personnel's work performance has on Public Trust and Internal Trust. The survey method was used in this study was accompanied by selective interviews involving purposive sampling with accident sampling. The total sample was 2,266 personnel (Lampung Regional Police — 866, South Kalimantan Regional Police — 637, and North Sumatera Regional — 763). Through the Structural Equation Modeling (SEM), it is known that directive leadership has no effect on Job Satisfaction (JS); Transactional Leadership (TL) has an effect on JS; Transactional Leadership (TRC) affects JS; JS influences In Role Performance (IRP); JS has an effect on Innovation Performance (IP); IRP has an influence on Public Trust (PT); IP is influential to PT; IRP has an impact to Internal Trust (IT); and IP affects IT.

THE IMPORTANCE OF TRAINING FOR BUSINESS SKILLS TO THE SUCCESS OF A BUSINESS VENTURE. EMPIRICAL CHILEAN CASE STUDY

JUAN TAPIA, LIONEL VALENZUELA, FERNANDO ROWLAND — *UNIVERSIDAD TECNICA FEDERICO SANTA MARIA, CHILE*

In many countries, entrepreneurship has been a key motor of economic growth, increasing competitiveness (Porter, 1991) and creating jobs (Kane and Edwin, 2010).

Heller (2010) explains that "entrepreneurs are individuals who start new businesses, and are crucial to a country's growth and development. Entrepreneurial skills involve the ability to identify and take advantage of opportunities for new business ventures."

Until recently, entrepreneurship was more of an art than a structured process. There were few models to followand a dearth of mentors and information (Musso, 2018). Now there are a plethora of books dealing with theories of entrepreneurship, such as Lean Start Up (Ries, 2011), Business Model Generation (Osterwalder, 2010), Slicing Pie (Moyer, 2012), Crossing the Chasm (Moore, 1995), and The Valley of Death (Musso and Echecopar, 2012).

Starting a business is always difficult, but in developing countries, it's even harder. This is principally due to the fact that these countries import methodologies and practices which have been succesful in developed countries but which have not always found success in emerging countries, as has been the case in Chile (Musso, 2018). For example, emerging countries' universities have not made entreneurship a central pillar of their curriculum, although there have been a few nascent efforts at some universities.

To sucessfully start a new business in an underdeveloped or developing country, it's critical to utilize business practices that best suit this business landscape. Thus, it's critical to understand the differences between developed and developing countries (Musso, 2018):

— Most people are not widely banked and do not have strong financial standing.

— Local talent has not had sufficient training in the theories of entrepreneurship. This is due to a lack of business experience in the country, as well as a lack of pertinent information, either because the available information is not in the native language or does not apply to local markets.

— In the corporate sector, established companies have not been forced to prove themselves. Without fierce competition, they have not had to innovate.

— Universities have not yet developed mechanisms with which to fluidly transfer intellectual property to the private sector to help give new companies a boost.

— A sluggish regulatory system does not effectively protect intellectual property via patents, except in a few exceptions in the Chilean case (Official Journal of the Republic of Chile, 2008).

— The entrepreneurial ecosystem is a shallow pool. There are exceptions in the Chilean case, particularly institutions supporting new business ventures, such as Corfo (Corporation for Fomenting of Production) (Official Journal of the Republic of Chile, 1940). Other institutions include the Technical Cooperation Service and the Solidarity and the Social Investment Fund (Official Journal of the Republic of Chile, 1990).

With entrepreneurs facing more financial and governmental restrictions in developing countries, how important is investing in training to the new business venture?

This study looks to supply data to further this line of inquiry, analyzing 337 Chilean entrepreneurs' experience. A survey was used to gather the data, and was carried out with the cooperation of Corfo, using their applicants for funding as the survey population, irrespective of whether they received funding or no.

The importance of developing a sales team's commercial expertise was looked at in particular, and how said training affected the success of a venture during the company's first year. Success was defined as having broken even within the first three years.

A Probit model was used to look for a correlation between the company's success and whether it had given its sales team business skills training in the first year. Factors controlled for include the type of business, the number of full time workers (the size of the venture), the gender, the education level, and the age of the entrepreneur.

The results showed that investing in developing a team's commercial expertise in the first year of a new business venture made a statistically significant difference to the success of said venture, increasing the chance of success by almost 4%.

The study also analysed whether this increased chance of success varied depending on the entrepreneur's gender or education level. With respect to education levels, a clear relationship was found between a business' success and the entrepreneur having completed some univeristy education, irrespective of whether he or she graduated. However, no correlation was found at lower levels of education. With regards to gender, after controlling for other variables (such as education or business type), there were no appreciable differences.

These results are a useful contribution to the existing literature in this area. One might have already intuited the importance of training, but this study empirically validates its importance to the success of a new business.

This study confirms how crucial developing one's team's business expertise is for the venture's success. This becomes even more important when considering the

financial restrictions faced by entrepreneurs in underdeveloped and developing countries, an area which needs to be supported and strengthened.

THE CAREER-LIFE CONCORDANCE MODEL (STUDY OF WOMEN LECTURERS AT JAKARTA)
SYLVIA DIANA PURBA, BELLA CARISSA — *ATMA JAYA CATHOLIC UNIVERSITY OF INDONESIA, INDONESIA*

This research aims to extend a model research of Career life concordance (CLC) with 97 woman lecturers as respondents in Jakarta. The data is analyzed by the Structural Equation Model. The research proves that the model has a good Goodness of Fit, so the CLC variables with their dimensions as new variables can be declared as valid and reliable. The research result shows that all independence variables have positive and significant influence the dependence variable, excluding Career Management toward Job Satisfaction not significantly, so we may conclude that CLC variables are intervening variables in the influence of career management and organizational support in increasing job satisfaction for female lecturers in Jakarta.

POST-MERGER INTEGRATION OF LABOR RELATIONS IN INTERNATIONAL M&AS, EXEMPLIFIED BY THE AUTOMOTIVE INDUSTRY
JHON PICCIONE — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

During the last few decades, companies' business has become more and more globalized and internationalized. This trend has been closely followed by the globalization of the relations between companies. In the last decades, the relationships between companies, whose headquarters can be considerably far, have flourished, giving birth, sometimes, to complex configurations. The main manifestation of this increase consists of the flourishing of international mergers and acquisitions (M&As). Usually, in case of M&A, companies pay particular attention to the possible frictions that may come out between the employees and managers of the interested companies that are going to merge (Gomes, 2012). Of course, it is an important matter as frictions may sometimes lead to uncooperative behaviour within the workforce of the companies.

Although industrial relation is a day-to-day matter for the company, it is an aspect that is usually neglected when it comes to international M&As. Even between scholars, the two subjects are usually treated separately, and it's hard to find a correlation between the two scholarly traditions. As we will highlight in the paper, this unfortunate neglect may lead to a suboptimal performance in some cases.

Starting from Jirjhan's (2014) hypothesis that states that employees will be more uncooperative when a foreign owner succeeds the previous (national) one because are afraid of new policies regarding labour arrangement. The research question, then, is: does this happen in every case? Is the value creation (that is pursued

through the merger or the acquisition) always infringed by differences in labour relations' practices?

Our hypothesis is that there are some specific combinations of labour relations systems or approaches that decrease the severity of the infringement of value creation of a merger or an acquisition and, in some cases, may lead to value creation. Our main goal is to provide a schematic description of what a company from a specific country should expect (and, thus, how it should behave, accordingly) when it decides to merge with or to acquire another company from a specific country.

In order to prove our hypothesis and to analyze the topic properly, we decided to focus on the automotive industry. We chose the automotive industry because it is "the industry of industries" (Holweg, 2008), meaning that it is the most labour-intensive industry (Jurgens and Krzywdzinski, 2009). Furthermore, the automotive industry has gone through a lot of changes during the last few decades.

In order to build a thorough understanding of the peculiarities of a specific labour-relations system, we decided to proceed with a labour law comparison. Nevertheless, we did not limit ourselves to a simple comparison of the letter of the law of different states (which are the U.K., the U.S., Germany, and Italy). We, in fact, compared the crystallized practices of labour relations subjects and the evolution of the pertinent jurisprudence. In particular, we focused on four specific legal aspects:

— Degree of labour representation

— Degree or labour participation

— Degree of labour activity protection

— Degree of centralization of labour regulation

In our opinion, these four elements are crucial for the creation of a detailed profile of each system.

Later, we analysed four cases of M&As in the automotive industry in the selected countries trying to stress — in particular, the reasons that led to the merger (or acquisition), the reasons that led to the failure of the merger (or acquisition), and the role and the relationships of the labour representatives during this period. The M&As considered are:

— FIAT–Chrysler

— Daimler–Chrysler

— BMW–Rover

— General Motors–Opel

After this empirical study, we proceed, sustained by the labour law comparison, to discuss the cases and to provide a description of the dynamics that were into play in each case. We will try to highlight which behaviours are due to legal enforcement and which ones could be considered native of that specific country. This distinction is crucial as the latter element is harder to force. In the end, we finally draw conclusions regarding the specific dynamics and provide suggestions regarding the approach that a company from a specific country should take when merging or acquiring a company from another specific country. We discovered that there are some general rules that every company, regardless of its origin and the target country, should take into considerations and other rules that apply to specific combinations. We finally add a fifth case, which is the acquisition of Volvo by Geely. It is interesting, in fact, for us to note how the Chinese company, even though it does not have any particular labour law policy in the home country, decided to pursue an expansive labour policy with the Swedish car producer.

COMPARATIVE ANALYSIS OF RECRUITMENT AUTOMATION TOOLS
KSENIA SMIRNOVA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

In the modern world, new technologies are extensively used in all the spheres of our lives, including business industry. One of the most popular trends now is automation, which helps to reduce routine and monotonous tasks. As the recruitment process, which is part of human resources management, is considered to be a very important part of every business, science and technologies are changing it as well. Nowadays, one can find a huge variety of different programmes and apps for hiring automation, so it is not easy to choose the most suitable and effective among them all.

The purpose of the research is to compare several modern instruments for hiring automation in order to find out which one is the best to use. There are several tasks that were stated for reaching the aim of the research:

1. State the reasons why it is necessary to automate the hiring process;

2. Determine the criteria for the comparison;

3. Set a number of hiring automation processes and analyse them in order to find out if they match the criteria;

4. Do the comparison and analyse the results.

The research may be conceived of as a current interest because of several reasons. The first of them is the amount of information that a recruiter faces on the daily basis and the number of routine tasks which demand a lot of time and concentration. Moreover, nowadays, it is possible to find lots of similar software, and it is hard to make a choice.

The first part of the research is a theoretical one, where the literature and other information sources are studied in order to define the premises for recruitment automation.

The second part is necessary to prepare the data for the analysis. In this part, software is chosen for the comparison and analysed according to the criteria, which are also defined in the chapter.

The comparison is done in the third chapter. Two methods are chosen for the comparison: with the grade based on the formula and with the pairwise comparison using the programme in the Python language.

Afterwards, the conclusion of the research is made.

Several hypotheses are stated by the author before the research:

1. Basic features required for the recruitment automation are represented in every piece of softwatre analysed;

2. The best piece of software is the most expensive one;

3. The best piece of software has been developed abroad (not in Russia).

The key sources for the theoretical part of the research are "Recruitment: tools and techniques" by Terentieva T., "Automated recruiting and human factor" by head of ManPower Group, Kate Donovan and "We can now automate hiring. Is that good?" by Peter Capelli. A research devoted to mathematical counting of possibility for the automation to replace human specialists is also used to prove that new technologies are not going to be a threat to HR specialists. Several premises for automation use are stated:

1. Decreasing the amount of time spent on hiring;

2. Financial profit;

3. Competition on the talent market;

4. Lack of the threat of total replacement of recruiters with the software;

5. Possibility to standardize recruitment and structure the data.

Several software products, which are the most popular on the market, are chosen for the comparison, both Russian and foreign. They are:

1. E-staff

2. Experium

3. Talantix

4. FriendWork

5. CleverStaff

6. HelloTalent

7. Potok

8. Huntflow

Several criteria are chosen based on the premises stated in the previous part of the research and on the hypothesis. These criteria can be defined in several groups, such as:

1. Basic features required for the recruitment automation;

2. Design;

3. Price;

4. Additional features.

Criteria are prepared for analysis, and chosen software products are described according to them. The binary table with products and criterions is made in order to simplify the analysis and comparison.

Afterwards, the comparison is made. First of all, the formula is made and described, so that every piece of software can be assessed and after counting the grade for every product, the best ones are chosen. In my case, they are Potok and E-staff — their grades are the highest. The next step is a pairwise comparison. The principle is described, and the programme in Python is written in order to simplify the process of comparison: my goal was to compare each product with each other on every criterion. In the current research, both methods show the same results, according to which E-Staff and Potok may be considered the best software products for recruitment automation.

All of three hypotheses turn out to be false: both best software products have been developed in Russia; also, there are several products that do not have basic functions such as "automated vacancy publishing", for example, which are necessary for routine automation; in addition, two best products are not the most expensive ones.

HR BUSINESS PARTNER COMPETENCIES: INSIGHTS FROM JOB ADVERTISEMENTS ACROSS SIX COUNTRIES

EKATERINA VLAKH, NATALIA VOLKOVA —*INTERNATIONAL LABORATORY OF INTANGIBLE-DRIVEN ECONOMY, HIGHER SCHOOL OF ECONOMICS, RUSSIA*

Purpose: Over the past decades, Russian businesses have demonstrated rapid growth that has lead to an urgent need for developing Human Resource (HR) management knowledge.

However, there is a lack of details about the similarities or the differences between HR practices in Russia and other countries. The aim of this study is to identify the key job requirements and skills for HR business partners sought by employers in both Russia and five English-speaking countries (Australia, Canada, India, UK, and USA), as well as to classify them with a consideraton of cultural values.

Design/methodology/approach — Job ads in both English and Russian were collected from two sources (www.hh.ru and LinkedIn) over a two-month period in 2018. We randomly selected 1,800 vacancies, following the proportion of 300 job posts for each country. The 6-D model of national culture developed by Hofstede was used to explore the features of cultural values. This framework comprises six dimensions, namely Power Distance, Individualism vs Collectivism, Uncertainty Avoidance, Masculinity vs Femininity, Long Term Orientation vs Short Term Normative Orientation, and Indulgence vs Restraint. To measure the occurrence of keywords, reflecting job requirements and sought-after skills, we employRapid automatic keyword extraction (RAKE) based on R-Studio for Windows.

Findings. Based on the RAKE analysis, the findings have indicated that Russian job ads frequently emphasize employment law and recruitment activities that reflect the high Power Distance (93) and Uncertainty Avoidance (95), together with a low level of Individualism (39). While countries with a sizable level of Individualism (80–91), low rate of Uncertainty Avoidance (35–51) and Power Distance (35–40) (UK, USA, Australia, and Canada) have demonstrated successful background in working on Employ relations or Performance Management as key job requirements for HR business partners. As for India, Employee engagement has occurred most frequently in the job ads that could be relevant to a middle rate of Individualism (48) and a sufficient level of Power.

Distance (77). Notably, communication skills have been widespread for HR business partners across all these countries with varieties of keywords relating to them, and managerial skills are typical mostly for Russian and the United States ads. It is not surprising that communication skills are the most important for HR business partners across studied countries. However, the RAKE analysis identified different keywords describing them that also highlight the meaningfulness of cultural values.

HR professionals can use these findings to prepare job advertstaking into account job roles and expectation under particular national context.

Originality/value. This is the first study to analyze Russian jobs ads of HR business partners by using the content analysis techniques and comprise them with cultural values of other countries.

MULTIDIMENSIONAL INVENTORY OF STUDENTS' QUALITY OF LIFE — SHORT VERSION (MIS-QOL-S). STRUCTURE, PSYCHOMETRICS, AND

RESULTS FOR THE POLISH SAMPLE
ROBERT SZYDŁO, MAŁGORZATA ĆWIEK, SYLWIA WIŚNIEWSKA, MAREK KOCZYŃSKI — *CRACOW UNIVERSITY OF ECONOMICS, POLAND*

Quality of life is a subject of research in various disciplines, such as medical, social, and economic science. Although the first use of the term "quality of life" is attributed to American President Johnson (1964), the beginning of the use of statistical data to assess the living conditions of members of society and conduct analyses based on them dates back to the 1930s. Studies on the subject literature point out the diversity of the definitions of the concept of quality of life. According to M. Abrams (1973), quality of life is "the degree of satisfaction or dissatisfaction felt by people with various aspects of their lives". One of the broader definitions indicates that the quality of life is a comprehensive range of human experiences linked to one's overall well-being (Revicki and co-workers 2000).

An analysis of the literature regarding the measurement of quality of life revealed a gap in the scope of research tools to study the quality of life of the so-called young adults. According to the theory of emerging adulthood, people aged 18–25 significantly differ from people in other age groups not only in demographic terms but also in the shaping of identity and the perception of themselves (Chisholm, Hurrelmann, 1995; Arnett, 2000). The aforementioned gap became a motive for the construction of Multidimensional Inventory of Students Quality of Life (MIS-QOL). This tool meticulously examines students' quality of life in 14 aspects, including finance, health, family, but also university, volunteering, technology and others. The sheet shows very good psychometric properties, including PCLOSE = 0.35, Cronbach's alpha 0.802, r-sb = 0.858. However, due to the relatively large number of questions (100), it was decided to build a short version. Selection of questions for the short version was conducted using exploratory factor analysis (EFA). The short version contains 30 questions and shows a very strong correlation with 0.971 with Multidimensional inventory of students' quality of life.

The aim of the article is to present the procedure of creating of a shorten version of the questionnaire for a multidimensional examination of students' quality of life (MIS-QOL-S), its structural and theoretical validity, as well as reliability. The article also presents the results of a study conducted among students from Poland.

The psychometric properties of the MIS-QOL and MIS-QOL-S were checked using the following techniques and research methods:

1.   the reliability of the questionnaire was estimated using Cronbach's alpha coefficients and the split-half coefficient,

2.   internal validity was examined using a confirmatory factor analysis (CFA) with CFI, RMSEA and PCLOSE measures,

3.   the correlation with Flanagan Quality of Life Scale (QOLS), Satisfaction with Life Scale (SWLS) and Questionnaire from World Health Organisations Quality of Life Tool (WHO-QOL) was calculated to estimate the external validity of the questionnaire.

The questionnaire was prepared in the Computerized Self-Administered Questionnaire (CSAQ), so that respondents could give their answers directly. The proper use of this technique excludes the problem of missing data, because the program does not allow to move to the next group of questions if a mandatory question is not answered yet. Both the full (MIS-QOL) and the short version (MIS-QOL-S) of the inventory used Likert's response scale with answers 1 – Definitely dissatisfied, 2 — Not satisfied, 3 — Rather dissatisfied, 4 — It is hard to say, 5 — Rather satisfied, 6 — Satisfied, 7 — Very satisfied. Due to the fact that not every aspect of life concerns every respondent, it was decided to extend the scale of the answer to 0 — not applicable.

Initial research results indicate differences in terms of central tendencies and dispersion rates in the assessment of students' quality of life in particular aspects. Diversity of selected aspects of quality of life was also observed due to gender, place of residence, and field of study.

Further activities in the field of studying the quality of students' lives with MIS-QOL and MIS-QOL-S include normalization and standardization of results, as well as translation of the questionnaires into foreign languages (planned translation into English, Russian, Spanish, and Italian) and checking the psychometric properties of the language versions of questionnaires in pilot groups of students in Russia, Spain, and Italy.

THE DOWNSIDE OF A HIGH PRICE: OVERVALUATION PRESSURE IN FOOTBALL
PETR PARSHAKOV, ELENA SHAKINA — *INTERNATIONAL LABORATORY OF INTANGIBLE-DRIVEN ECONOMY, HIGHER SCHOOL OF ECONOMICS, RUSSIA*

People who face high expectations may suffer from them. Football provides a lot of examples of such situations. Expensive transfers of star players, like the €105 million transfer of Paul Pogba from Juventus to Manchester United, cause debates in the media on whether the player is worth his price. Such discussion in the media, between fans or even teammates put external pressure on the player. Some players are pressure-resistant, but for the others, this pressure affects performance. In this paper, we use football data to test this effect. Our preliminary results demonstrate the negative effect of high-performance expectations. Our plan is to test the robustness of the results, and evaluate how the size of the effect depends on the age of the player assuming that older players are more pressure-resistant.

IMPLEMENTATION OF IT SYSTEMS IN LACK OF DIGITAL LABOR CONDITIONS: EVIDENCE FROM LARGE RUSSIAN COMPANIES
SOFIA PAKLINA, IULIIA NAIDENOVA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

Contemporary information technologies register, codify, and store huge amounts of information about processes internal and external to the company. This information can be used to provide the company's management with comprehensive decision-making tools. However, successful implementation of IT systems also requires a qualified labor force.

The current research examines the impact of IT on firm performance, taking into account the change in demand for new, digitally skilled labor. We consider the conditions under which the IT provide the company with the benefits and whether there is a substitution or complementation effect between IT and digitally skilled labor.

PUBLIC PROCUREMENT

CORRUPTION BY COLLUSIVE UNDERPRICING IN PROCUREMENT AUCTION

SÜMEYRA ATMACA; RICCARDO CAMBONI — *UNIVERSITY OF PADOVA, ITALY*; ELENA PODKOLZINA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*; KOEN SCHOORS — *GHENT UNIVERSITY, BELGIUM*; PAOLA VALBONESI — *UNIVERSITY OF PADOVA, ITALY*

We model a sophisticated form of reserve price underpricing in public procurement and provide evidence for the existence of this corrupt equilibrium in Russian public procurement. Setting the reserve price at a relatively low level can prevent the waste of government funds and may discourage inefficient firms from participating. We however show theoretically that, given the right conditions and market structure, reserve price underpricing may also be a corrupt equilibrium that makes the corrupt procurer-seller pair better off. Moreover, this equilibrium can be sustained without side-payments. Our data analysis reveals that this strategy is also applied in Russian public procurement auctions. We indeed find cases of underpricing which are characterized by less competition and an increased likelihood of having only one bidder. Corrupt sellers are also more likely to win auctions and there often, but not always, still is a small rebate, as predicted by the model.

WHAT FACTORS DETERMINE THE SUCCESS OF MANUFACTURING FIRMS IN PUBLIC PROCUREMENT IN RUSSIA?

ANDREI YAKOVLEV, YULIYA RODIONOVA — *INSTITUTE FOR INDUSTRIAL AND MARKET STUDIES, HIGHER SCHOOL OF ECONOMICS, RUSSIA*

State demand is important for manufacturing enterprises in any economy. The value of this factor increases significantly in 'bad times' for national economy. After the 2008–2009 global financial crisis, the next negative shock for enterprises in the real sector in Russia was the crisis of 2014–2015. A number of interrelated processes led to the deterioration of the situation in Russia in 2014: geopolitical changes and the ensuing anti-Russian sanctions, the fall in oil prices, the sharp devaluation of the ruble and the outflow of capital from the country. However, despite the significant contraction of the consumer market and harder budget constraints, the public procurement market held steadfast.

A broader array of studies has focused on various factors affecting the success of firms' entering public procurement process: firm's size (Flynn, McKevitt & Davis, 2015; Loader, 2005), presence of a foreign owner (Weiss & Thurbon, 2006; Branco, 1994), reputation and previous experience in public procurement (Kachour, Mamavi & Nagati, 2016; Decarolis, Pacini & Spagnolo, 2014), size of the procurement (Alexandersson & Hultén, 2007), additional non-price requirements (Coviello et al., 2011), strict terms of contract execution (Boehm, Olaya & Polanco, 2005), politically connected boards of directors (Goldman & Rocholl, 2013), potential corrupt relationships in public auctions (Boehm & Olaya, 2016). However, only a few empirical studies on public procurement and firm behavior using micro-

level Russian data have been conducted (Yakovlev & Demidova, 2010; Demidova & Yakovlev, 2012; Mironov & Zhuravskaya, 2016; Szakonyi, 2018).

Taking into account previous studies on Russia we assume that under harder budget constrains in corrupt environment firms with "political connections" will get access to public procurement contracts more often comparing to other bidders. To test this hypothesis, we use data of two large surveys of manufacturing firms conducted by Institute for Industrial and Market Studies (IIMS) in 2014 and 2018. As the indicators of political connections, we consider: governmental stakes in firm capital, membership in business associations, assistance provided to local and regional authorities for the social development of a region. The analysis was carried out separately for small and for medium/large firms because of special preferences for small enterprises in Russian procurement policy.

We obtained the following main results. Before the 2014-2015 crisis, small manufacturing enterprises with government stakes were given preferences in the awarding of contracts. After the crisis, government property gives the small firm no additional chances for receiving government orders. However, their assistance to local and regional authorities in the social development of a region started to play more important role in access to government orders.

Before the 2014-2015 crisis, government orders were more often given to medium and large manufacturing enterprises that are members of business associations and medium and large enterprises with government stakes. After the crisis these firms retain their advantages in access to government orders. At the same time, business group and assistance to authorities in the social development of a region has begun to positively influence their access to public procurement.

We show that public procurement become more integrated into the "elite exchange model" in the relations between the state and business described in Russian context first time by Frye (2002). After the 2014-2015 crisis the manufacturing firms that provides assistance to authorities have wider access to government orders.

MECHANISM CHOICE IN SCORING AUCTIONS
PAVEL ANDREYANOV — *UNIVERSITY OF CALIFORNIA LOS ANGELES*

A first-score auction requires weighing the price-bid against non-price characteristics of the firm. In this paper, I theoretically and empirically study the welfare implications of switching between the two leading designs of the scoring rule: linear ("weighted bid") and log-linear ("adjusted bid"), when the designer's preferences for quality and money are unknown. Motivated by the empirical application, I formulate a new model of scoring auctions, with two key elements: exogenous quality and a reserve price, and characterize the equilibrium for a rich set of scoring rules. The data is drawn from the Russian public procurement sector

in which the linear scoring rule was applied from 2011 to 2013. I estimate the underlying distribution of firms' types nonparametrically and simulate the equilibria for both scoring rules with different weights. The empirical results show that for any log-linear scoring rule, there exists a linear one, yielding a higher expected quality and rebate. Hence, at least with risk-neutral preferences, the linear design is superior to the log-linear.

EXPERIENCE IN PUBLIC PROCUREMENT

NIKITA GERMAN; ELENA PODKOLZINA — *CENTER FOR INSTITUTIONAL STUDIES, HIGHER SCHOOL OF ECONOMICS, RUSSIA*; ANDREY TKACHENKO — *INSTITUTE FOR INDUSTRIAL AND MARKET STUDIES, HIGHER SCHOOL OF ECONOMICS, RUSSIA*

Can experienced buyers achieve better outcomes? In this paper, we address this question by studying the ability of public organizations to arrange competitive procurement with proper contract execution. We argue that higher experience enables public buyers to set adequate contract terms and requirements, so they can attract 'good' suppliers and probability to execute the contract on time increases. We introduce a dynamic measure of relevant experience by estimating for each auction the number of successfully closed contracts of the buyer within the same interval of the reserve prices. Using data on the population of road construction contracts in Russia, concluded by public buyers of federal, regional and municipal level, we show that relevant experience increases the probability to execute contract on time, but it decreases the competition and this effect is stronger for the regions with higher perception of corruption.

DETECTING AUCTIONEER CORRUPTION: EVIDENCE FROM RUSSIAN PROCUREMENT AUCTIONS

PAVEL ANDREYANOV — *HIGHER SCHOOL OF ECONOMICS, RUSSIA; VASILIY KOROVKIN, UCLA*

This paper develops a novel method for detecting auctioneer corruption in first-price sealed-bid auctions. We study the leakage of bid information by the auctioneer to a preferred bidder. We construct a formal test for the presence of bid-leakage corruption and apply it to a novel dataset of 4.3 million procurement auctions in Russia that occurred between 2011 and 2016. With bid leakage, the preferred bidder gathers information on other bids and waits until the end of the auction to place a bid. Such behavior creates an abnormal correlation between winning and being(chronologically) the last bidder. Moreover, the probability of winning changes discontinuously as the bidder switches between last and second-to-last. We construct an RD-style estimator indicating 7-14% of corruption in auctions and calculate the associated damages.

IDENTIFYING BID LEAKAGE IN PROCUREMENT AUCTIONS: MACHINE LEARNING APPROACH.

DMITRY IVANOV, ALEXANDER NESTEROV — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

We propose a novel machine-learning-based approach to detect bid leakage in first-price sealed-bid auctions. We extract and analyze the data on more than 1.4 million Russian procurement auctions between 2014 and 2018. As bid leakage in each particular auction is tacit, the direct classification is impossible. Instead, we reduce the problem of bid leakage detection to Positive-Unlabeled Classification. The key idea is to regard the losing participants as fair and the winners as possibly corrupted. This allows us to estimate the prior probability of bid leakage in the sample, as well as the posterior probability of bid leakage for each specific auction. We find that at least 16% of auctions are exposed to bid leakage. Bid leakage is more likely in auctions with a higher reserve price, lower number of bidders and lower price fall, and where the winning bid is received in the last hour before the deadline.

QUANTITATIVE CORPORATE AND INTERNATIONAL FINANCE

ENVIRONMENTAL AUDIT AS A MEASURE OF CORPORATE SOCIAL RESPONSIBILITY

ANNA KRAEVA, ELENA KUZMINA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

This article is devoted to the investigation of environmental audit in Russia as a subject of corporate social responsibility in the context of the current ecological situation. The fourth highest level of carbon emissions in the world and the fifty-second place in environmental performance index rank in 2017 set an agenda of sustainable development in Russia, the ground zero for which is the evaluation of business entities' activities in terms of their environmental impact. Thereby, the purpose of this study is to reveal the mechanisms for stimulating environmental audit as part of corporate social responsibility. In the first place, the notion of "environmental audit" is determined regarding the type of its beneficiary. On this basis, operational and managerial nature of this term are distinguished, concerning the procedure regulations and the economic benefit for organizations, respectively. The research also provides patterns of environmental audit proceeding from its stakeholders' interests. The methods applied for the investigation include theoretical modelling, benchmark analysis of Russian and foreign practices, and statistical review of the non-financial reporting publications. Thereby, the main results of the study suggest that the development of environmental audit as a social responsibility requires the introduction of a legislative framework governing the binding nature of the audit in particular cases and providing a certain relief of ecological licensing procedure for those companies, which have performed the audit. The other solution implies the harmonization of non-financial reports carried out through the promotion of the practice of using the GRI guidelines.

THE DECISION-MAKING PRACTICES WHILE DOING FINANCIAL TECHNOLOGIES PRACTICES ANALYSIS

ARTEM CHIBISOV — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

The polygraphic equipment market is increasing in its size and intensity of negotiations. To minimize financial screening costs, companies are integrating their own specific scoring solutions. However, numerous specialists are working on detecting the initial conclusion about sustainability of any client. This requires a large volume of sources and has unpredictable effect because of, firstly, time lags and, secondly, very high propensity for changing the suppliers and conditions of negotiations. The existing scoring systems have numerous weaknesses such as, for example, the connection of negotiations absence.

They only available knowledge is on the previous client's behaviour, but potential profitability of future projects is unpredictable. The paper's goal is to analyse the realization of the client evaluation practices aspect in the practice of supply of units

of polygraphic printing equipment with the help of financial solutions, provided with the help of leasing financial mechanism on the example of the R-Print Company. The research provides new investigations in the solution for analysis of the client sustainability on the basis of its behavior in leasing payment discipline. As a result, the list of recommendations will be given for reorganizing client behavior in the upgrade of the existing scoring practices and its methods on the basis of generalized design of the best practices.

THE EFFECT OF WORK MOTIVATION AND LOAD ON THE PERFORMANCE OF MAJALENGKA REGIONAL POLICE TRAFFIC UNIT MEMBERS IN SAFEGUARDING THE ELECTION OF MAJALENGKA REGENT 2018

NOVITA RINDI PRATAMA, NOVI INDAH EARLYANTI — *INDONESIAN POLICE SCIENCE COLLEGE, INDONESIA*

This research was motivated by the completion of work in the period of securing the district head election through several concurrent activities in Majalengka District, West Java. The research was conducted at the Majalengka Regional police station with a total sample of 75 members of the Majalengka Police Traffic Unit. Data analysis techniques use validity and reliability tests, the classic assumption test, and the hypothesis test. The results showed a significant workload and motivation on performance while F-Count 21,342 was greater than F-table 3,124. Thus, it can also be seen from the equation $Y = 15,691 + 0,825 X1 + 0,360 X2$, which means that it needs a fixed or zero motivation and workload variable, then the fixed performance value is 15,691. But if there is an increase in value, the motivation and workload variable is 1 point, it will increase the member performance average by 0.825 + 0.360.

BANKS' LEGAL PROVISIONS AND FINANCIAL CRISIS: THE INFLUENCE OF CORPORATE GOVERNANCE AND INSTITUTIONAL ENVIRONMENT

FÉLIX J. LÓPEZ ITURRIAGA, JORGE GALLUD CANO, ÓSCAR LÓPEZ DE FORONDA — *UNIVERSIDAD DE VALLADOLID, SPAIN*

We study the legal provisions of 92 European systemic banks from 18 countries in the years 2008–2017. Since legal provisions can be viewed as a mechanism for disclosing information to capital markets, the creation of legal provisions is determined by two main factors: the risk taken by the bank and the managerial incentives to disclose the information on the risk taken. Our results show an initial negative relationship between free cash flow (our measure of managers' discretionary investments) and legal provisions even when we control for the risk taking. We also find that some internal and external mechanisms of corporate governance do play a mediating role. In this vein, we find that the independence of the board of directors has a moderating effect, so independent boards lead to create more provisions as a caveat for future lawsuits. Similarly, we also find that a better

institutional framework (both in terms of quality of the laws and lack of corruption) amplifies the positive influence of the board of directors.

DETERMINANTS OF TAX REVENUE: A PANEL ANALYSIS OF BRICS
ARUN SHARMA, POONAM SHARMA, JASPAL SINGH — *GURU NANAK DEV UNIVERSITY, INDIA*

The question of enforcing compliance for tax laws and regulations has been an Achilles heel for the governance structures around the world. The tax revenue statistics moves in tandem with certain important structural-politico-economic parameters of a nation's economy. Variations in these parameters have an important bearing on the tax revenue collection efforts in the economy. Traditionally, a couple of reasons are held responsible for the low responsiveness of direct tax collections to GDP across countries, namely structural factors, unofficial activities, and policy initiatives. The panel data analysis of BRICS countries revealed that parameters, namely industry's growth rate, tax rate, currency with public, income inequality, and degree of openness have been found to be significantly impacting the tax potential among the BRICS grouping. While Brazil, China and Russia have been the leading countries in bringing economic activities to tax net, India and South Africa have been found lagging behind during the sample period. The statistical results provide improved policy inputs for a holistic perspective of drivers of tax potential across emerging economies.

DO CORPORATE SERIAL ACQUIRERS OUTPERFORM SINGLE BIDDERS? THE EVIDENCE FROM THE FRENCH MARKET
ELENA ROGOVA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*; OMAR OUFAMA — *UNIVERSITÉ 20 AOÛT 1955-SKIKDA, ALGERIA*

This study examines the gains of French acquiring firms, following the announcement of takeovers, and compares them with those from the corporate acquisition programs by the same acquirers. The results of our previous study (Boufama, 2016) reveal that these programs maximize neither the value of the firm nor the stockholder's wealth. In addition, it is shown that frequently acquiring firms do not realize their gains in profitability growth. This result contradicts those that were obtained by researchers on the American corporate acquisition market (Croci and Petmezas, 2009). This difference in results is one of the reasons that inspired us to make an evaluation of the takeovers operations, considering them as individual deals, under the hypothesis that they do not belong to any corporate acquisition program.

The empirical studies by Franks, Harris and Titman (1991), Higson and Elliot (1998), Fuller et al. (2002), Agrawal and Jaffe (2010), Guest et al. (2010) report that the average abnormal returns are not statistically different from zero. In a sample concerning 1298 takeover operations, Loderer and Martin (1992) revealed that on average, acquiring firms do not perform less than a control portfolio over a period of five years following the acquisition (though they underperform at a three-year horizon).

On the other hand, Loughran and Vijh (1997), who used both methods of the control portfolio and buy-and-hold abnormal returns over five years, reveal that returns depend greatly on the mode of the deal. Though the overall sample of 947 acquisitions had, pn average, five-year buy-and-hold return of less than of matching firms (88.2 and 94.7 percent), the difference was larger for mergers (81.2 percent compared to 97.1 percent for their matching firms). As for tender offers, their average positive return equaled 131.7 percent over five years, while those of the control firms was only 88.7 percent.These researchers also stress that the method of payment has an effect in the takeovers' operations. In case of cash payments (mostly associated with takeover bids), the shareholders of the acquiring firms gained 61.7 % more than shareholders of the matching firms. In the case of exchange offer, they lost 36.1 %, in comparison with their peers.

The majority of previous research has been held at the American, UK, or emerging markets, with the lack of evidence from other European markets. Our study addresses the French market. In our previous research (Boufama, 2016), we got the results that for frequent acquirers, around the date of a takeover announcement, the change in wealth for the acquirer's shareholders was insignificant. The shareholders of target companies are always beneficial, and their gains are higher in the case of hostile takeovers. On the other hand, the shareholders of acquirers either loose in the case of mergers, or win insignificantly in the case of takeovers.

In this study, we pose the question of whether corporate acquisition programs of French acquirers bring more value to their shareholders than single acquisitions. To answer this question, we test three hypotheses relating to the wealth of French acquirers. We use the event study to capture the effect of single takeovers. The results of this study are compared with those of the study that assess the gain of acquisition programs initiated by the same firms.

The study tests the hypothesis of value maximization for shareholders of French acquiring firms. The hypothesis of value maximization assumes that takeovers occur to maximize the market value of the companies involved in the acquisition.

Our results demonstrate that shareholders of frequent acquirers do not benefit. Indeed, the results expressed in value show that there is only one case out of a sample of 46 firms, which has proved the hypothesis of value maximization. This hypothesis predicts that abnormal returns in a period of non-announcement must be negative. For the sample of this study, the average of this variable is 169 milion euros — but with a positive sign.

CONTINGENT CLAIMS ANALYSIS IN CORPORATE FINANCE
ZVI WIENER — *THE HEBREW UNIVERSITY OF JERUSALEM, ISRAEL*

The Contingent Claims Analysis (CCA) is a general approach to analyze the stakeholders of a corporation who have contingent claims on the future, uncertain cash-flows generated by the operations of the firms. The CCA allows valuing each stakeholder's claim and also to assess the risk incurred by the stakeholders. The CCA highlights the potential conflicts of interest among the various claimholders. In this paper we review applications of CCA including valuation of various forms of debt, rating, credit spread, probability of default and corporate events like dividends, employee stock options and M&A. The CCA framework is shown to be useful to address all these financial questions. In this paper the starting point is that the value and the risk of the firm's assets are given. The future distribution of the assets' rates of return is also known and given. The focus is on the liability side of the balance sheet, i.e., the funding sources of the activity of the firm, and more generally on the financial claims of the various claimholders of the firm.

CORPORATE AND INTERNATIONAL FINANCE

THE IMPACT OF CSR REPORTING ON THE PERFORMANCE OF RUSSIAN AND DUTCH COMPANIES

OLGA VOLKOVA, ANASTASIA KUZNETSOVA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

The corporate Social Responsibility (CSR) concept has become one of the main business trends over the last few years. CSR approach refers to companies' voluntary initiatives to take responsibility for both positive and negative impacts on society and environment caused by their core business activities.

This paper aims to investigate the impact of Corporate Social Responsibility reporting on Russian and Dutch companies' corporate financial performance (CFP). CSR–CFP relations have been statistically examined in multiple studies since 2011. Even though most studies have determined positive relations between these variables, there exist several papers where the authors managed to find negative, neutral, or U-shaped relations.

As econometric models are the most common way to measure correlation between two variables, a multiple regression analysis is performed to obtain a quantitative evidence and examine CSR–CFP relations. For this purpose, companies' CSR involvement is measured by a reputation index — CSRhub. The return on equity (ROE) has been chosen as a measurement of business financial performance. The research sample includes 45 Russian and 55 Dutch listed companies. All companies are either listed on national stock exchanges (Euronext Amsterdam and MOEX) or officially register and have corporate headquarters in The Netherlands and Russia. Our sample also contains the data from the firms operating in different industries, such as oil/gas, energy, mining, consumer goods, transport, and financial services. Nevertheless, this study does not provide a cross-industry analysis due to quite a small number of companies related to a particular industry.

The research variables were calculated based on the information from financial reports of sampled firms for the year 2017. All the data are presented in euros to enable comparison of our findings between Dutch and Russian organizations. The results of modelling have a reasonable level of validity after we conducted two robust tests.

Our findings demonstrate a weak positive correlation between CSR and the companies' ROE. A small impact of sustainable activities on corporate performance measured by ROE may be explained by the choice of our independent variable — ROE may not fully reflect expectations of investors about future business

performance, which may be adversely affected by the negative news about unethical or unsustainable corporate actions. We also justified a small effect of sustainable activities by a possibility of their low perception as being an important element for high business performance. That is why our analysis demonstrates quite a low ability of CSR to explains the variation in ROE.

This research also determined a higher CSR impact on the performance of Russian companies in comparison with the Dutch. This phenomenon is justified by different levels of business risk and companies' transparency in those countries. Thus, while deciding on the investment in Russian businesses, which is less transparent and more risky comparing to the Dutch, investors are more likely to require additional information aboutthe companies' core operations. Hence, the value of CSR reports of Russian organizations becomes higher and, consequently, the information disclosed in those reports affects business performance more substantially than it does for Dutch companies.

The research findings may become useful for companies' corporate management while it chooses a strategy of CSR disclosure and assesses its financial return from the investment in CSR practices. This work also provides an alternative way for a quantitative operationalization of companies' social performance, which is especially important for further statistical research. Moreover, our evidence of positive correlation between CSR and CFP might encourage more companies to disclose information about their social practices and, consequently, add more transparency to their operations. Additionally, the research contributes to the existing literature by providing a possible way of CSR operationalization, which can be used during the further statistical investigation of this topic.

The delimitations and further avenues for the research are discussed, too. We realize that this study does not examine the effect of CSR reporting over time, which can be quite considerable, given the fact that CSR strategies may not provide an immediate return. A cross-industry analysis will be possible to perform, in order to determine business spheres that are especially sensitive to CSR activities. Finally, to support credibility of our findings, a research with a different way of CSR operationalization should be performed. Since this study is conducted only for two particular countries with a specific business culture, our results may not be generalized over the determined sample framework.

COOPERATIVE GAMES FOR JOINT WORKING CAPITAL MANAGEMENT IN DISTRIBUTIVE SUPPLY NETWORKS

ANASTASIIA IVAKINA, EGOR LAPIN, NIKOLAY ZENKEVICH — *GRADUATE SCHOOL OF MANAGEMENT, RUSSIA*

Working capital management (WCM) is increasingly recognized as an important means of liquidity and profitability improvement [Talonpoika et al., 2016], specifically in terms of globalization and growing competition between supply chains. At the same time, rising financial risk in supply chains (SCs) stimulated

management to recognize that the financial side of supply chain management (SCM) is a promising area for improvement. Nevertheless, companies still focus on their individual SC issues and take their own interests into account rather than understanding the whole SC and cooperating with their partners [Wuttke et al., 2016]. We address this gap by developing a cooperative game of working capital management aimed at minimizing total financial costs associated with each SC stage. The model is verified on the grounds of the combination of game-theoretical modeling and a case study of Russian collaborative SC. The suggested model analyses the working capital management process for a three-stage supply network. The focal network is a distributive supply network consisting of N suppliers, one distributor, and M retailers connected through material, information and financial flows. The members of the network can form coalitions with the distributor. Each member's working capital position is constrained by his liquidity and profitability requirements. As such, he or she faces the need to control and manage financial costs associated with each stage. We construct a cooperative working capital cost game. For this cooperative game, we investigate the Shapley value as an optimal imputation. Theoretical results are illustrated with the numeric example of a real-life supply network from the ICT industry. The investigated model provides a financial illustration for the motivation of SC partners to cooperate in order to simultaneously achieve target levels of working capital investments and improve individual financial performance through collaborative actions.

THE DETERMINANTS OF CREDIT CYCLE AND ITS FORECAST
NATALYA DYACHKOVA, ALEXANDER KARMINSKY — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

In our research, we study what macroeconomic factors drive and influence the credit cycle. Also, our study contains four sections with theoretical and empirical parts, in which we describe how to measure credit cycles for developed and developing countries, and then we introduce an important indicator credit gap. Our results show the comparative analysis of credit cycles between different countries with various economic growth, and we built up an econometric model, which shows us the impact of macroeconomic factors according to credit cycles for developing and developed economies.

THE RELATIONSHIP BETWEEN CORPORATE SUSTAINABILITY PERFORMANCE AND EARNINGS MANAGEMENT: AN EMPIRICAL STUDY ON THE TRIPLE BOTTOM LINE
LINH THI XUAN NGUYEN — *GHENT UNIVERSITY, BELGIUM, THE UNIVERSITY OF DANANG, VIETNAM*; ANH NGOC PHI DOAN — *THE UNIVERSITY OF DANANG, VIETNAM*; MICHAEL FRÖMMEL — *GHENT UNIVERSITY, BELGIUM*

This study examines whether managers in sustainable firms are really ethical, thereby providing transparent financial reporting for their stakeholders.

Specifically, we explore the relationship between corporate sustainability performance and earnings management. Based on the triple bottom line, we propose a measurement of corporate sustainability performance that addresses the balance of economic, social, and environmental performance. By using fixed-effects estimations on a sample across the emerging East Asian economies from 2010-2016, we find that firms with better sustainability performance are less likely to engage in earnings management. Our findings support the limited research in suggesting the link between corporate sustainability performance and earnings management under the ethical perspective. Thepractical implications place emphasis on the role of sustainability performance in constraining earnings management and on the role of ethics in providing transparent financial reporting.

APPLIED NETWORK ANALYSIS FOR BUSINESS AND MANAGEMENT

DOES THE FOREIGN BOARD MEMBERSHIP HAVE ANY IMPACT ON PERFORMANCE IN RUSSIAN LISTED COMPANIES? THE EFFECT OF SANCTIONS

ANNA BYKOVA, MARINA ZAVERTYEVA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

Using panel data from more than 100 Russian public companies during 2009-2018, applying methods from social network analysis (SNA), this paper aims to assess the role of such foreign connections and discover whether foreign outside directors (board interlocks) could enhance firm value, as well as changing their role before and after sanctions. We use the information from key SNA metrics allowing us to understand how well-connected the network is, whether foreign directors are the active members of it, how valuable they are for firm performance. Our findings provide evidence of the effectiveness of having large and active foreign members of the board as part of a firm's international political corporate strategy. The paper confirms that board independence reinforces the positive impact of foreign directors on firm value.

JOB OFFERS CLUSTERING IN LABOR MARKET ANALYSIS

PAWEL LULA, RENATA OCZKOWSKA, SYLWIA WIŚNIEWSKA — *CRACOW UNIVERSITY OF ECONOMICS, POLAND*, ANNA KOVALEVA — *SAINT PETERSBURG STATE UNIVERSITY OF ECONOMICS, RUSSIA*

Cluster analysis of job offers available on a labor market is the crucial topic of the paper. We assume that i-th job offer consists of three elements: a) job offer identifier (id_i), b) job offer metadata describing a position name (p_i), an employer name (e_i), a sector identifier (s_i), and a description of company location (l_i), c) description of competencies expected by an employer (C_i), where C_i can be defined as a set of competencies: $C_i = \{c_1, c_2, \dots, c_M\}$. It leads to a following definition of a job offer: $o_i = \{id_i, p_i, e_i, s_i, l_i, C_i\}$. We also assume that the set of job offers: $O = \{o_1, o_2, \dots, o_N\}$ is available. Attributes related to position, sector, location and competencies are defined by an ontology and can have flat (list-based) or hierarchical (three-based) structure. The ontology allows to verify equality or inequality of concepts and to calculate distance and similarity measures between them.

Performing the analysis of the labor market with the use of cluster analysis of job offers is the main goal of the research. During the study four different schemas of analysis will be considered: 1. cluster analysis of job offers (represented by id_i) with respect to one attribute (chosen from: p_i, e_i, s_i, l_i, C_i),

2. two-mode clustering of job offers with respect to *idi* and one other attribute,

3. cluster analysis of competencies based on competency co-occurrence graph,

4. two-mode clustering of attributes describing job offers (two attributes taken from: pi , ei , si , li , Ci) based on bipartite graphs with nodes representing chosen attributes and edges indicating the fact of simultaneous appearance of connected values in the same job offer.

During the first stage of the research ontologies describing attributes should be built. It seems that these ontologies can have hierarchical or flat character. For every ontology a measure of similarity between concepts should be delivered. Due to complex character of competency attribute (one value is described by a set of competences derived from an ontology) also a measure of similarity between sets ought to be defined. The analysis is composed of several stages:

1. employers' expectation extraction – during this stage, using exploratory approach, the analysis of offers will be performed and employers' expectations towards candidate's competencies will be identified. Through the comparison of phrases describing candidates' competencies with patters assigned to concepts defined in a given ontology, the content of every job offer will be represented by a set concepts corresponding to competencies;

2. performing cluster analysis of:

a. clustering of job offers – in this case a set representation of job offers will be used. As a result, a set of homogenous groups of offers will be produced. During the study, distance-based and model-based approach of clustering will be tested. The distance between sets of competencies corresponding to consecutive offers will be calculated with the use of ontology-based measures;

b. job offers clustering performs simultaneously with clustering of one additional attribute. It is worth to notice that values of an additional attribute can have nominal, ordered, overlapping or hierarchical character;

c. clustering of competencies – for this analysis, the corpus of job offers will be transformed to a weighted co-occurrence graph of competencies. Weights assigned to edges inform about the number of offers in which two given competencies appear in the same offer (this value can be adjusted by the measure of ontology-based similarity between these competencies). The cluster analysis of co-occurrence graph can be treated as its decomposition to competency schemas representing groups of strongly related competencies (where the strength of relations reflects the proportion of offers in which connected competencies are expected simultaneously);

d. clustering of competencies performs simultaneously with clustering of another attribute related to job offers. This type of analysis will be based on bipartite graphs with nodes corresponding to chosen attributes.

3. implementation of the results – it seems that presented above different approaches to the problem of job offer clustering can produce results interesting from theoretical and practical point of view which can be useful for solving different types of problems:

a. job offer clusters allows to explore employers' expectations related to vacancies; the results can be compared with data representing the supply existing on a given labor market described by applications of candidates analyzed in the same way as text of job offers;

b. job offer clusters presented with respect of clusters created for one other attribute; data set studied from this perspective allows to formulate detailed information concerning demand side of labor market and can be considered with corresponding clusters describing the supply side (for example for applications prepared by candidates from a given region or related to a given sector)

c. clusters of competencies generalize the information about the labor market. The results are not related to given positions but rather to the whole market. Therefore, they should not be compared with detailed description of the supply representing by candidates, but rather with generalized information about the supply side of the labor market (for example represented by university curricula);

d. clustering of competencies performs together with clustering of nother attribute. This approach allows to identify bipartite competency schemas describing in the generalized way existing on the labor market expectation towards competencies according to another factor (for example position, sector, region). The theoretical aspects presented above will be illustrated by calculations describing the Polish labor market. All calculations will be implemented in R language.

HOW DIGITALIZATION AFFECTS THE JOB REQUIREMENTS: THE CASE STUDY OF AN ACCOUNTANT ON THE RUSSIAN LABOR MARKET OVER THE LAST 10 YEARS

ALEKSANDER BRYUSHININ, ANTON SKOROBOGATOV — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*; NATALIA VOLKOVA — *INTERNATIONAL LABORATORY OF INTANGIBLE-DRIVEN ECONOMY, HIGHER SCHOOL OF ECONOMICS, RUSSIA*

Purpose - Over the last decade, the development of technology has demonstrated significant progress. As a result, the requirements for job seekers changed dramatically. However, the impact of digitalization on the sphere of accounting in Russia remains still open and practically unexplored. This study aims to examine the changes which occurred with an accountant position in the Russian labor market over the past 10 years. Design/methodology– It has been studied more than 12,000 accountant vacancies from 100 cities over the past 10 years from one of the largest Russian job sites. To measure the occurrence of keywords and simple noun phrases in the job ads, Rapid automatic keyword extraction (RAKE) based on R-Studio was

employed. Findings – Every year more and more vacancies require knowledge of special software, and the leader is 1C (more than 70% of vacancies in 2017 demand skills of 1C). The number of vacancies in the regions has increased significantly. Besides, the demand for specialists with working experience from 1 to 3 years is more popular among employers. In general, the demand for the profession of the accountant has fallen, as evidenced by the reduced real salary for candidates and the overall number of vacancies. Practical implications – HR practitioners can use these findings for workforce planning, while the institution managers could refine the educational program to provide relevant knowledge for young specialists. Originality/value –the paper fills in the gap between researches and formulates overall picture about accounting from recruitment side.

GAMES ON MULTIPLEX NETWORKS
MARINA KALUGINA — *SAINT PETERSBURG STATE UNIVERSITY, RUSSIA*

The paper introduces a game on the multiplex network. We consider a case when the game is played on a few layers. The total payoff of a player is a weighted sum of payoffs on each layer. In these settings, two different approaches are considered. The first approach is a case when the payoff of a player depends on the structure of the network. Actors play a cooperative game on each layer. To determine the total payoff, we introduce a player splitting method. Then, we consider another case when the payoffs of every player depend on his or her strategies and externalities. In this situation, we consider a cooperative game and apply some optimality principles. Numerical examples are provided for illustration.

AN ATTEMPT OF EVALUATION OF RESEARCH PROJECTS FUNDED BY THE EUROPEAN COMMISSION AND ITS IMPACT ON THE POSITION OF UNIVERSITIES IN SELECTED INTERNATIONAL RANKINGS
ANNA DRABINA, JANUSZ TUCHOWSKI — *CRACOW UNIVERSITY OF ECONOMICS, POLAND*

Nowadays, higher education institutions play a significant role as centers conducting research activities. It seems that currently, most of the leading universities in Europe carry out research tasks within international consortia funded by external sources.

In Europe, there is the EU Research and Innovation Programme Horizon 2020 (the eighth framework programme funding among others research), available over 7 years (2014 to 2020) with the budget of 77,028,3 million euros. The horizon 2020 Programme is described as the biggest and the most important EU project regarding research and innovation.

The paper analyses the importance of the cooperation within international research projects and its impact on universities' research position, focusing on the Horizon 2020 Programmes.

The author of the paper considersthe following issues the main goals:

1. An assessment of European universities' engagement in research activity regarding international research projects.

2. An assessment of the impact of universities' international research cooperation within international research projects and international research projects' impact on universities scientific development.

3. The identification of cooperation patterns regarding universities consortia realizing international research projects.

The conducted research will include European universities participating in the implementation of research projects within the Horizon 2020 Programme in the years 2014–2018.

Research methodology:

The planned research procedure includes the following stages:

1. An assessment of the universities' scientific development — this stage will be conducted based on universities rankings and will take into consideration the level of the scientific development, such as The Academic Ranking of World Universities (Shanghai Ranking) or rankings held by The Center for World University Rankings (CWUR). Data obtained through various rankings will be aggregated using multicriteria analysis methods.

2. Building a network that describes cooperation among European universities — data describing European universities' cooperation regarding the H2020 Programmes will be used. The nodes of the created network will represent universities, while the edges will indicate the fact of cooperation among the inter-connected universities within international research projects. The weights assigned to the edge will describe the amount of funding received from the European Commission. The network described will be created on the basis of a complete dataset covering the period of 2014–2018, and at the same time, similar models will be created for each year separately (to analyze changes over time).

3. Determining the importance of nodes representing universities on the basis of the cooperation network mentioned in point 2. It seems that due to the nature of the studied phenomenon, particularly useful will be the measurement of universities importance based on betweenness centrality.

4. Identifying cooperation patterns characteristic of the leading European universities. The realization of this research stage will be mostly based on node degree analysis and the change of this parameter over time. At the same time the university's strategy of partner selection within international research projects will be analyzed (the results of this analysis will indicate whether the leading

universities — acting as research projects' coordinators — create research consortia consisting of an unchangeable set of partners, or build further consortia based on the changing sets of partner universities).

5. Analysis of the relationship between the evaluation of the university development (point 1) and the assessment of the university importance indicated based on the cooperation network built for the realisation of international research projects.

The data provided by EU Open Data Portal and concerning projects funded within Horizon 2020 Programmes will be used for the calculation. All calculations will be made using the R programming language.

SOLVING THE PROBLEM OF THE INEFFECTIVE SUBSIDIARY: THE IMPACT OF INTRA-ORGANIZATIONAL NETWORKS
ELENA ARTYUKHOVA, ANTONINA MILEKHINA, VALENTINA KUSKOVA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

The problem of effective management of company subsidiaries has been on the forefront of strategic management research since the early mid-1980s. Of late, special attention is being paid to the effect of headquarters — subsidiary conflicts on the company performance, especially in relation to the subsidiaries' resistance, both active and passive, to following the directives of the headquarters. A large number of theoretical approaches have been used to explain the existence of intraorganizational conflicts. For example, Strutzenberger and Ambos (2013) examined a variety of ways to conceptualize a subsidiary, from the individual up to the network level. The network conceptualization, at present, is the only approach that could allow one to explain the dissimilarity of the subsidiaries' responses to headquarters' directives, given the same or very similar distribution of financial and other resources, administrative support from the head office to subsidiaries, and the levels of subsidiary integration. This is because social relationships between different actors inside the organization, the strength of ties and the size of networks, as well as other characteristics, could be the explanatory variables that researchers have been looking for in their quest to resolve varying degrees of responsiveness of subsidiaries, and — in fact — headquarters' approaches – to working with subsidiaries. The purpose of this study is to evaluate the variety of characteristics of networks formed between the actors in the headquarters and in the subsidiaries, and their effects on a variety of performance indicators of subsidiaries, as well as subsidiary–headquarters conflicts. Data are being collected in two waves at a major Russian company with over 200,000 employees and several subsidiaries throughout the country.

HOW TO EXPLORE THE POTENTIAL OF A TENNIS PLAYER USING TOOLS OF SNA?
ANTONINA MILEKHINA — *INTERNATIONAL LABORATORY FOR APPLIED NETWORK RESEARCH, HIGHER SCHOOL OF ECONOMICS, RUSSIA*

Professional sport is a world of high dedication and high investments. We would like to concentrate on the sport of tennis because tennis has some unique features. First

of all, we would like to regard tennis as an individual sport, which means that the results for each player can be measured rather directly as opposed to those in team sports. In an individual sport, only the player on the court is responsible for the result. The second feature is the fact that a tennis match is played till the last point is won. Psychological momentum plays an important role in a champion's mind setup. Another feature of tennis is the longevity of the tennis player's career. In order to go far in the sport, one has to start doing it from the very childhood. Since raising a tennis star costs a lot of money, it is very important to be able to recognize a future champion among many young players.

To do this, we need to understand the main features of the player that help him to achieve results. In the short term, the player's result could be examined at the level of a point [Klaassen, 2001; O'Donoghue, 2009], a match [Knottenbelt 2012; Ovaska 2014], and a tournament [Serwe, 2006]. In the longterm, tournament results bring points and are expressed in ranking progress. Some obvious characteristics, such as winning tournaments, achieving a high ranking early may not be enough. We propose to evaluate the characteristics of players based on the outcome of matches and the characteristics of the opponents. We would like also inspect trajectories of some young promising stars and look for the constellation of features that makes one a champion with the help of a temporal network analysis of the matches he or she played.

Our hypothesis is that future stars do show any significant results early in their career. As such results, we can regard the fact of winning a match against a significantly higher-ranked player, the ability to win close matches (the player's mental toughness), the ability to win long matches (the player's endurance), the ability to change momentum. Additionally, to those abilities, the network structure of match played by the player provides us historical information about the player's abilities against other players. We can represent the whole massive of tennis matches as a directed graph and apply tools of social network analysis. As nodes of such a graph, there will be players. The links will represent the matches played. It is obvious that the graph of matches is not random and some matches are more probable than the others. The goal of the study is to predict the direction of potential link and its strength based on node characteristics and embeddedness and edge characteristics.

To measure the potential of the player, we have to suppose that all of the current null links of the player could be missing links and we can measure them with a Link propagation method based on existing information. The existing information is updated with each link added. The probability of adding a link is the probability of having a match with the player, which we can measure from the degree of the opponent player. The potential of the player is the sum of potential links.

We should take limitations of the proposed analysis into consideration. First of all, for analysis, some match history is necessary. The prediction for two players with no history will most closely resemble a random choice with a 0.5 probability of each player to win. Some history (e.g. the player's history before a professional tour, on junior level, or in other tours) is not included in this analysis; however, it may be significant.

TOURISM

MUSEUM VISITORS SEASONAL FORECASTING MODEL: THE UK CASE
EKATERINA PAVLOVA — HIGHER SCHOOL OF ECONOMICS, RUSSIA

In recent years, an increase in interest in museum activities has been observed; the number of museum visitors shows a stable positive trend. According to the official statistics, over the period from 2013 to 2017, the total number of museum visits in Russia increased by 22.5%, and, what is especially important from the point of view of managing the flow of visitors, the greatest growth is observed in the segment of individual visits, as well as in the number of organized exhibitions. At the same time, there was an increase in those areas of the museum activities that are easier to manage: excursions and lecture services have a 14.5% increase and a 4% decrease, respectively. It is also important to note that according to statistical data, the volume of museums assets, such as the exposition and exhibition space of museums and the number of employees, which determine the museum's maximum capacity to receive visitors, despite the growth in demand, remain at the same level. In addition, the demand for museum services is highly seasonal in nature, both at the level of the month, of the day of the week, and of the hour. In this regard, it is obvious that it is necessary to introduce tools of museum management to reduce the uneven distribution of the flow of museum visitors over time. In this regard, the necessity to introduce tools of museum management in order to reduce the uneven distribution of the flow of museum visitors over time becomes obvious. However, for taking management decisions about services, events, pricing policies, and other tools to regulate the flow of visitors over time, it is necessary to determine the peak periods of maximum and minimum attendance at the museums. The research question of this paper is as follows: which months have maximum and minimum attendance rates for museums? The aim of the research is to predict the number of visitors of United Kingdom museums per month, both at the macro level (country) and at the level of individual museums.

Based on the analysis of domestic and foreign literature sources devoted to the question of demand volume forecasting, the model used to predict demand for museum services in the UK is determined and the model validity indicators are selected.

A sample of the research is statistical data by month on the number of visitors to UK museums at the two levels: gross figures for the country, as well as data for the 24 largest museums in the UK. For gross attendance values, the model is constructed on the basis of 129 observations (from April 2008 to December 2018); for the individual museums ,177 observations are used (from April 2004 to December 2018). Each observation is the number of museum visitors over the month. Observations are divided in a ratio of 70% and 30% into data, which are used for

modeling (70% of observations) and data used, which is used to evaluate the accuracy of the model (30% of the observations, group "test data").

For forecasting purposes, a seasonal multiplicative forecasting models with a linear and logarithmic trend are used. The used model makes it possible to identify the seasonal component of each month in the structure of demand for museum services. Three indicators are used to assess the accuracy of the model: Mean Error (ME), Mean Average Percentage Error (MAPE) and Root Mean Square Error (RMSE).

Based on the developed model and the calculated seasonal components of the forecast, peak periods of attendance of museums in the UK are identified, namely July and August for the maximum demand peaks with seasonal components of 16% and 33% relative to the logarithmic trend, respectively, as well as periods of minimum attendance of museums: December and January (- 25% and -19%, respectively). It is interesting to note the sharp drop in demand in September after the peak values of summer to -12%, which requires further analysis and interpretation. The calculated model has high reliability, for example, at the country level, for test data, the MAPE error is 4.8%, the RMSE offset is 145 thousand visitors (with the number of visitors in this period 155 million visitors).

Regarding the results of modeling at the level of individual museums, the model's accuracy indicators are lower than the model's accuracy indicators for the country, and the model's predictive ability decreases as the museum size decreases. In general, it can be noted that, on average, the MAPE indicator for the seasonal model based on the linear and logarithmic trend for the 24 largest museums in the UK was 13.8%.

The obtained results allow us to use the developed model for a point forecast of the number of visitors to UK museums for the month. In addition, seasonal components of each month were identified. These indicators make it possible to identify the most active and passive months of visiting museums, and can be used to arrive at managerial decisions concerning the organization of work with museum visitors. addition, since the accuracy of the model at the level of individual museums is significantly lower than the accuracy at the gross level, this model requires further work to determine the factors that influenced the attendance of museums in those periods where the difference between the calculated value and the actual turned out to be maximal.

CITY HERITAGE AND PLACE BRAND ARCHITECTURE: THE CASE OF ST. PETERSBURG, RUSSIA
ELENA ZELENSKAYA, ELENA ELKANOVA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

The article discusses the problem of place brand architecture based on heritage of a place. The authors claim that the wide-spread approach when place is promoted as a unified single brand for various tangible and intangible assets it possesses, may lead to inevitable generalization in brand identification and exclude some valuable stakeholders from branding processes.

Brand architecture as a concept originated in commercial branding and denotes a process of creating and managing a portfolio of brands so that each sub-part benefits the whole [Kapferer, 2001]. Brand architecture started to receive attention in scientific literature in 1990-ies, primarily in discussions on brand portfolio structures, while prior to these brands had been viewed as stand-alone entities [Dooley, Bowie, 2005]. 'Dynamic market contexts with the emergence of new sub-categories make it necessary to adapt and stretch brands, putting additional strain on their ability to deliver the needed support' [Aaker, 2004]. Thus, brand architecture becomes a powerful strategic tool for marketers used to cope with pressures and complexities of the environment [Aaker, Joachimsthaler, 2000].

Existing literature on brand architecture has been mostly focused around a seminal work by Aaker and Joachimsthaler [2000] who introduced the brand relationship spectrum with four strategies. The spectrum is a continuum based on the strength of relationship between different brands and the driver role in leading consumers to purchase decision that brands play. The four strategies are: house of brands (unbound relationship), endorsed brands, master/sub-brands, branded house (tight relationship). While being widely adopted, the approach has several limitations. As Dooley and Bowie [2005] note, the spectrum focuses on brand relationships within the firm ignoring co-brand relationships and draws on the assumption that brand architecture is predominantly influenced by a firm's strategy, thus giving little attention to external market-related factors.

So far little research has been done covering both brand architecture and place/destination branding [Harish, 2010; Datzira-Masip, Poluzzi, 2014]. Moreover, there are few real cases where brand architecture strategies have been thoroughly planned and managed [Datzira-Masip, Poluzzi, 2014]. However, as Morgan and Pritchard [2001] state, brand architecture concept should be applied to place branding: '...destinations are often composite brands (being composed of many different places)... a destination's brand architecture should enable marketers to clearly see the elements and contributions of these various composite brands. It is a device that is critical to the development of destination supra- and sub-brands'.

In this paper we follow the brand architecture strategies approach by Aaker & Joachimsthaler [2000] and extrapolate it to place branding using the case of St. Petersburg (Russia), a city of outstanding cultural heritage.

In existing literature on place brand architecture the concept is approached from a geographical perspective: by a master/supra-/umbrella brand a bigger geopolitical territory (such as a supra-national entity, country, region, etc.) is understood while by a sub-brand a smaller territory (such as a municipality, a city, etc.) is meant. In this article we propose a new approach to place brand architecture from the standpoint of various stakeholders within the same territory (in our case, the city of St. Petersburg, Russia). We believe that there exists more than one brand within one

territory, such as brands of different tourist sites, gastronomic brands, brands of events, and famous corporate or product brands. In order to achieve synergies, these sub-brands should correspond with the master place brand. For example, Hollywood can be viewed as a sub-brand of Los Angeles, Louvre – as a sub-brand of Paris, Oktoberfest – as a sub-brand of Munich, Dijon mustard – as a sub-brand of the town of Dijon in Burgundy, etc.

The authors' approach is largely based on two assumptions related to the difficulty of implementing place branding. Firstly, a large number of heterogeneous stakeholders, 'each of them promoting their own product brand' [Datzira-Masip, Poluzzi, 2014, p. 2014], are involved in creating and delivering place brands [Harish, 2010] and 'even if the scope of place branding is limited to tourism, its complexity is not reduced as the tourism industry is composed of a number of public and private players – all of whom have different sizes, objectives and resources' [Freire, 2016, p. 79]. Secondly, place brands are usually targeted at several market segments for whom the benefits should be clearly articulated [Freire, 2016]. Moreover, different sub-brands of a place can be targeted at different segments. Thus, to achieve consistency and coherence of place branding efforts, a system of managing a portfolio of brands of a place should be developed and implemented.

The research focuses on the city of St. Petersburg (Russia) to see whether the sub-brand architecture strategy can fit the case. We focus on this type of brand architecture strategy due to its key benefits mentioned in [Dooley, Bowie, 2005]. Firstly, its flexibility allows sub-brands to keep their individuality while modifying the master brand. Secondly, 'it allows the master brand to leverage certain sub-brands to attract niche markets' [p. 407].

Empirical study is based on expert interviews of key stakeholders involved in brand formation and maintenance in St. Petersburg. The results demonstrate the potential of using master/sub-brand architecture strategy for the following reasons: wide range of current and potential target groups of city brand; rich variety of place attributes for brand formulation (historical background, cultural heritage, famous citizens); and disconnection and lack of common action among various groups of brand stakeholders on the supply side.

RUSSIAN FESTIVALS: TRENDS AND IDENTIFICATION OF PATTERNS
ZARINA YAKUBOVA, NAILYA SHAYKHULOVA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

The paper focuses on the features and the development of festival event management in Russia. The goal is to analyze how Western trends influence Russian festivals. Research questions: What do Russian organizers implement from Western festival experience? What are the trends that affect the industry? How is the festival movement in Russia developing? As the purpose is descriptive and exploratory, qualitative data were used: interviews with experts in the field (organizers of "O, Da, Eda!", STEREOLETO, and EUBEA festivals), comparison of festivals, a survey among students. The results of this applied research are valuable for start-ups, large, and medium event companies, as this paper will explain Russian audience preferences

in festivals. Moreover, the PR campaign of any festival may use the results of this study.

BIG DATA FOR BUSINESS AND ECONOMICS STUDIES

INFORMATION AND ANALYTICAL SOLUTIONS FOR ASSESSING MANAGERIAL IMPACTS ON THE FUNCTIONING OF SUPPLY CHAINS OF NETWORK RETAILERS
RIMMA KARAPETYAN, NOVIKOV VLADIMIR — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

The article examines topical issues of information and analytical solutions for assessing the management effect on the functioning of retail network operators supply chains in order to increase the profitability of the business. For this purpose, special attention is paid to the use of visual analytics information systems, Visual Data Discovery (VDD).

It is crucial to note the importance of creating a harmonious man-machine complex, providing a synergetic effect in improving the efficiency of supply chain management of the logistics network. Solutions are suggested for a number of analytical tasks to identify trends in the functioning of supply chains, as well as the assessment of control effects on the logistics network using matrix methods of analysis is proposed.

The aim of the article is to create an information model to strengthen the analytical support of decision-making in network retail supply chain management.

In the authors' opinion, it is extremely difficult to achieve high-quality supply chain management in network trade companies in present-day conditions, and, as a consequence, to get competitive advantages of the company without information-analytical support of management processes.

An Optimal Choice of Location for a Franchised Restaurant.
Stepan Gogolev, Evgeniy Ozhegov — *Higher School of Economics, Russia*

One of the most important features of the paper deals with franchise restaurants that impose special restrictions on freedom of choice of some restaurant characteristics: type of restaurant, its development model, and other conditions. From this point of view, the main question of the franchisee is where to locate the restaurant, while almost all other problems can be solved by franchiser. It keeps our analysis in demand and especially relevant in the time of the sharp franchising system spreading.

The main aim of this paper is to choose an optimal location in terms of city for specific franchise restaurant. We will achieve it through a comparison of the target financial indicator that corresponds to the franchisee's interests. We select

econometric models and methods of its estimation, collect appropriate additional data for the research and, using on the results of previous steps, make conclusions about relations between the city's characteristics and financial indicators (revenue and profitability). It will allow us to decide where the restaurant should be opened.

As for the data selecting, we pay a special attention to the demographic characteristics. The most common way of their measurement is combining of population size, population density, the average wage, and the size of different age groups. Non-linear relations are discovered at different markets between the market size and the pattern of competitiveness, and the quality of the product. There are some reasons to explore cities with a low or a medium population size separately from cities with a high population size. We check if there are any significant distinctions on the markets in small cities and others. Crucial variables are population size, as it reflects market size and the average wage that shows the ability consumers to pay as the restaurant is aimed at the rich middle class. We expect that the higher average wage, the better it is to open the restaurant in the city as it works in the segment with a high price.

To achieve the goal, we collected three datasets that contain the general information about competing restaurants, demographic information about the cities, and some internal information about operating performance of the already open restaurants of the franchise.

The first dataset is aimed at defining the level of market competitiveness, so, according to the literature review, it should include factors that reflect the degree of spatial, price, and non-price competition. We measure spatial competition for the city through total the number of cafés and restaurants operating in the city. For this goal, we collected for each place of public catering its type (cafe or pizza), the average bill (if available), and the city where it is located. The result is cross-sectional data with 54,460 observations at the end of 2018. The source of data is the open database "2-GIS", which has the policy of providing information for the 100 biggest cities in Russia and other 199 cities. As for the description of the data, 75% percent of the found places are cafes, the average bill is 512 rubles with the median equal to 400. About 40% of the places are located in the cities that are not included in 2GIS.

The next step was to link the current data to the cities' characteristics. We collected the data about the average wages and population in cities from gks.ru and integrated it with the previous dataset. As a result, we know that our data is about cities with the population from 5 thousand to 12 million of people and with the average wage from 19,800 to 91,800 rubles.

The last dataset describes popular financial indicators of working franchise cafes: the revenue and the profitability of sales. It is necessary to consider the inflation, so

here we recounted values in terms of 2018 prices. The result is a panel dataset that contains monthly values for all the 305 franchise restaurants from January 2015 to July 2018. It is worth noting that the panel is unbalanced due to the fact that almost the half of the branches were opened after 2016. In the final dataset, the unit of observation is a franchise restaurant in one month.

The next important point is choosing the model with its specification. First of all, we estimate linear elastic net regressions (in particular, LASSO-regression and Ridge-regression) via OLS and WLS, where the weights are taken as the Minkowski distance between training and test samples in the space of restaurants characteristics. The distinction between characteristics is measured by absolute differences in appropriate principal components of independent variables. Such differences are unbiased as they are not correlated with each other and reflect the most valuable differences through all variables. It should improve the explanatory power of the model due to training more at the observations that are objectively similar to the test observation.

As a result, we get conclusions agreeing with those of the previous researchers. We find an interesting relation between the revenue and population with the average wage. More careful comparative analysis of models showed quadratic dependence between indicators of competitiveness, population, and pizza's revenue. The novelty of the results is in simultaneous analysis of environment competitiveness and city's characteristic for catering points. It is achieved via accessing wide database for the country franchise with elimination variation in catering points' characteristics: size, price, etc. At the same time, it is also a limitation of the work: it is possible to spread findings to the cafes or restaurants with the similar average bill and prevalence only.

SELF-ASSESSMENT OF SOFT DIGITAL COMPETENCIES OF STUDENTS OF ECONOMIC UNIVERSITIES IN THE CONTEXT OF EMPIRICAL RESULTS

MAŁGORZATA TYRAŃSKA, LILIANNA TOMASZEWSKA-KACZOR, KATARZYNA WÓJCIK, ROBERT SZYDŁO — *CRACOW UNIVERSITY OF ECONOMICS, POLAND*

This article is an attempt to analyse digital competencies, which has recently become a key element of a discussion on knowledge and skills that should be acquired by people living in a knowledge-based economy. Media convergence and the massive use of devices connected to the Internet are the hallmarks of the information society. On the one hand, progressive development and dissemination of information and communication technologies is visible, and on the other hand, the use of these opportunities requires appropriate competences. Automation of work processes and increasing their efficiency contributes to replacing people's work with machines and software. Man's cooperation with the algorithm — artificial intelligence, whose task is to implement and streamline business processes in the Big Data model — is becoming more and more challenging.

The demand for some of the competencies decreases, with new ones appearing at the same time. There is also a change in the way new generations learn and access

knowledge, such as generation Z. Digital competences for generation Z are becoming indispensable for the generation to face the challenges of the information society.

Digital competences are understood broadly. On the one hand, these will be hard competences, which include IT competencies related to hardware and software skills, usage of various applications, as well as information competences related to the ability to find the necessary information in various sources — both electronic and traditional, in order to process them and use according to the current need. Digital competencies also include a certain level of knowledge of legal regulations and mechanisms of media economics, as well as the ability to use new technologies in an ethical way. The digital literacy therefore covers a very wide set of skills that condition the efficient and conscious use of new technologies and active participation in the life of the information society.

However, digital competences are not only connected with reaching desired information through various media, but are also connected with soft skills, such as creative use of the opportunities provided by digital media, the ability to communicate and build relationships with the use of electronic media, to collaborate in teams and between teams, analytical skills, as well as the ability to think critically which is very important from the point of view of the growing information overload of employees. It should be emphasized that soft skills are universal — important in every job and are the key to success. In addition, many research results confirm the existence of a competence gap among employees in this area, and the reasons of this state are to be in the curricula implemented at all levels of education, including the level of higher education.

However, it should be noted that the structure of digital competencies for specialists in various fields is not harmonized. No specific professional needs are taken into consideration, as they should be reflected in curricula and training materials designed to enable the development of digital competences.

The aim of the article is to present the results of research in the area of soft digital competencies conducted on students of economic universities in Poland with the use of the self-assessment questionnaire. The article presents features of the 4.0 economy as the main determinants of the development of digital competencies. A review of the digital competences definition will be presented as well as digital competence models and a review of the results of previous research in the area of shaping digital competencies of students. Based on this background, own-created digital competence model will be presented, followed by a discussion on the results of surveys in the field of self-assessment of soft digital competencies of students of economic universities.

In the face of dynamic development of information and communication technologies, and in addition to business competencies and hard digital competencies, students of economic universities should learn soft digital competencies during the education process. Lack of the knowledge and skills in this area may cause difficulties in professional work. This may justify the need to enrich the teaching process at economic universities with new methods, such as gamification, which increases motivation and commitment to the implementation of tasks and shapes soft digital competences, such as group collaboration, communication, analytical skills, and critical thinking skills.

DIGITAL EVOLUTION: FROM A COMPANY MANAGED BY PEOPLE TO AN AUTONOMOUSLY MANAGED COMPANY
VADIM KOREPIN — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

If one wants to explain what is happening in business now in a few words, it will be "Everything is changing". With coming technologies, such as AI (including ML/DL), IoT, blockchains, etc., according to the 4th Industry Revolution, companies are beginning to change their business processes, their goals, their points of view on the company's future, their HR, and IT strategies, etc.

Most of the companies now are at the different stages of a digital transformation process. But this process does not have a final destination point; companies will be working in infinitely changing environment and will be evolving again and again. Currently, all new technologies are used as a supportive tool which significantly increases employee efficiency; new management roles that were created in an organization structure, such as CDO (Chief Data Officer) and CDTO (Chief Digital Transformation Officer), are also oriented at including new technologies as a support for existing processes.

But what will be the next stage? What will happen if we begin thinking beyond today? From our point of view, as the next step, companies will include AI as an independent object of business processes and start delegating final decision on operation layers to it. In an organization structure, we will have a new top management role, CAIO (Chief AI Officer), which will be not a human role. We will have a business processes revolution which will lift companies to a new level of management and efficiency. The new object will bring new management strategy, which will switch roles of all AI tools from supportive to business and technical decision-making ones. But it is not about long-term future: companies, during their digital transformation activities, have to keep in mind that they have to create new business process foundation which will take care not only of their current needs, but also their future needs to support autonomous management strategy.

DO YOU READ ME? TEMPORAL TRENDS IN LANGUAGE COMPLEXITY OF FINANCIAL COMMUNICATIONS
YEVGENY MUGERMAN, LEV MUCHNIK — *THE HEBREW UNIVERSITY OF JERUSALEM, ISRAEL*

Regulators, practitioners and researchers express their growing concern regarding the readability of financial disclosures. Several recent regulatory guidelines are aimed specifically to simplify the language of financial reporting to ensure that they could be consumed by the broad public. However, quantitative scientific evidence of the evolution of the language complexity in finance is scarce. It is by all means essential since financial texts could become comprehensible only for a very small group of elite professionals. In this work we introduce a battery of methods that measure linguistic complexity of financial texts. Some of these methods rely on advanced Natural Language Processing (NLP) techniques, which were not available to earlier studies. We apply these methods to decades of financial texts from different domains. In particular, we analyze a) a sample of 115,306 10-K textual disclosures spanning a period of 20 years since 1997; b) all 1.6M articles published in the Wall Street Journal since 1982; c) 198,124 articles published in business sections of the NY Times between 1997 and 2016, and 739,725 articles of the NY Post 1997 to 2017. We find that financial reporting has become substantially longer, more complex and less readable. This trend turned steeper following the 2008 financial crises. Across industries we reveal that healthcare, industrial, and finance sectors reports are significantly more complex than reports in consumer, energy, basic materials and utilities sectors. Similar pattern of increasing language complexity is observed in all corpora we have analyzed. The latter founding seems to suggest that *basic* financial language is becoming more difficult to comprehend.

CORPORATE INNOVATIONS AND COMPETITIVE ADVANTAGES

GROWING INNOVATIVENESS OF POLISH ENTERPRISES AND THE ECONOMY

TOMASZ ROJEK, MAREK DZIURA — *CRACOW UNIVERSITY OF ECONOMICS, POLAND*

One of the problems relevant to research on innovativeness is a difficulty to establish a precise definition for the following constructs: innovation, invention, creativity, and entrepreneurship: definitions that would allow quantification of these constructs. Scholarly discourse on these definitions has created a dizzying array of differing and sometimes contradicting explanations. Some attribute this state of affairs, at least in part to miss-definitions, or misinterpretations of what above mentioned constructs denote. There seems to be agreement on considering innovation to be a novelty applied to something which already exists. The disagreement arises as to whether the change should be new to the market in general or only to a particular company. The former, denoted for the purposes of this discussion as the Frascati approach suggests that innovation is rooted in notion of novelty in global terms. These novelties are assessed indirectly by the level of various educational attainment statistics, R&D expenditures EIS, and patent counts. The latter, the Oslo Manual approach, takes a more micro perspective. It deals primarily with implementation and adaptation of solutions, and is oriented on a practitioner's viewpoint. This approach conceptualizes innovation as an application for commercial purposes. It has been observed, that several items from the composite indexes, that may relate to the notion of innovativeness, deal primarily with inventiveness (e.g., on the Input side - expenditures on R&D and S&E graduates, or on the Output side - patents and trademarks). Thus, these indicators fall more towards Frascati interpretation of innovations (hence inventions), quite a difference from innovations as interpreted by Oslo Manual. Consequently, it is arguable, whether these common composite indexes serve the needs of practitioners oriented towards the interpretation of innovations of enterprises aimed at improvement of economic prosperity at a "shop floor level", or are primarily a manifestation of pro-innovation policies and mechanisms at the macro-economic level. Further difficulties lie awaiting the researchers when they try to formulate plans for stimulating innovativeness and creativity, as well as entrepreneurship enhancement, along with attempting to improve economic performance of firms. And as if this is not enough, differences regarding interpretations are further amplified when micro and macro-economic perspectives are taken into account. It is observed that two perceptions of innovativeness can be identified; they refer to the same phenomenon, though from varying perspectives. One deals with a macro-economic view, suitable for big inventive companies, and levels of innovativeness are measured by composite indexes. The second perspective is more "shop-floor" oriented and deals with problems of changing ideas into commercial success. The first is leaning towards inventiveness, the second towards commercialization. Micro- and macro- perspectives are somewhat different 'worlds' – explained by state policies and international competitiveness determinants on one side, and a

drive to increase competitive position and profits of an enterprise on the other. These two 'worlds' coexist, and more coordination of their principles and related activities may bring positive results. It would be incorrect to attempt to discuss the two as the same phenomena, and there is a need to identify means to bridge the gap between 'macro' and 'micro' perceptions and interpretations of innovation. Hence, a comparison of concepts of innovativeness from the viewpoint of macro-economic indicators (e.g., as expressed by the EIS, with opinions/perceptions of entrepreneurs that will provide a micro-economic perspective to the problem is warranted. These considerations are expected to aid in finding better means to assist companies in enhancing their performance, thus contributing to economic progress at the macro-economic level. An analysis of Eurostat data shows that there was a noticeable outflow of entrepreneurs from innovative activities during the period of 2010- 2012 in most EU countries (including Poland) – this amounted to 28% in 2009-2011 and 23% in 2010-2012. The CSO data showed a small rebound for the years of 2011- 2013, but this was only in the case of industrial enterprises (increasing from 17.7 to 18.4% in the share of innovators). Service enterprises again reduced their share in innovative companies (from 13.9 to 12.8%). In the case of a drop in the percentage of innovative companies in highly developed economies with accumulated innovative potential, this is not a threat as it in the case of countries such as Poland, where such a return can make it difficult to catch up. Despite the falling percentage of innovative companies, we can observe an increase in the outlays per enterprise among those Polish enterprises that are innovative. In 2010, the average level of innovative expenditure for a company in Poland was slightly lower than the average for the 28 EU countries (€1.15 million in 2012). Unfortunately, the latest CSO data is not optimistic in this case. In 2017, industrial enterprises spent 2.7% less on innovation than they did in 2016, and service companies spent as much as 21% less. Will this trend be maintained? For several years, it has been clearly visible that a small group of innovative companies has been formed in Poland that constantly increases its expenditures on innovation activities, including research and development. In addition, the expenditures incurred are at a very decent level when compared to the EU average, which suggests that these companies are competitive not only at the country level but also outside it. Otherwise, they would not have the motivation to increase their expenditures having only national competition as their "opponent." In addition, the data presented in the part on the effects of the Innovative Economy Operational Program confirm that, if companies in Poland are involved in innovations, they really do it. The group of OP IE beneficiaries proved to be a positively selected group. As various evaluations show (including the on-going evaluation of the PARP [Polish Agency for Enterprise Development] Barometer of Innovation), the innovative instruments in the OP IE reached those companies that had already demonstrated contact with innovation during their histories. As a result, their results are very good after the project's implementation and during its durability – starting from the increase in the number of innovations introduced after completion of the project through the

development of R&D departments and even employment growth. Will these companies be able to catch up in the field of innovation in the near future? So, we already have a strong but small group of innovators that have been identified by public statistics. This includes an even smaller group of beneficiaries of public support that achieves aboveaverage results in terms of innovative activity against the background of the total population of enterprises. This group and its sub-group of beneficiaries is small, but it seems to have very promising potential in the area of innovation. These companies are innovative and competitive on a European or global scale, and the basic question is this: how do we strengthen the innovation ecosystem in Poland so that the group of these enterprises will grow? Of course, this question requires a broader discussion and analysis of which activities are basic and which are supportive; such a discussion goes beyond the scope of the current paper. An interesting issue as well as an important element of activity in the context of business and innovation is cooperation with the external environment. Like larger entities, the smallest companies (which results from other research; e.g., as part of the Global Entrepreneurship Monitor international project in which PARP participates) primarily cooperate with other business partners – that is, a company from the same capital group or with another unrelated company. This applies to both ongoing cooperation and cooperation in creating innovations. Although entrepreneurs still intend to cooperate mainly with other companies, however, they want to cooperate with universities more often than now as far as future cooperation plans are concerned (7% currently cooperate, and 12% plan) and technology incubators (2% now cooperate, and 8% plan). Less often than now, they plan to cooperate with domestic and foreign scientific units; this may indicate that entrepreneurs are more and more able to see the dependence of their company's development on the quality of human capital. Certainly, some of the companies in Poland have already reached the limit of their development potential in their current shape (e.g., the further lowering of costs will not bring any effects and will even worsen the company's situation) and know that their competitiveness will start to fall without good employees. If such an awareness begins to enter microfirms (which may be indicated by the desire for increased cooperation with universities and incubators), then we stand a chance for the real development of this sector and the expected innovation in action. When will this happen? These considerations can be summarized by the following statement: quantitative data from public statistics as well as research carried out by PARP indicate the existence of a significant innovation potential among a small group of companies dealing with innovation (about 23% of the companies identified in public statistics, which translates to approximately 17,000 small, medium, and large companies). Moreover, very good results in terms of selected innovation parameters are achieved by companies using public support (data from the Innovation Barometer). At the same time, it should be remembered that this group of companies (apart from micro, which are also financed from public funds) also feeds the ranks of the group identified in the public statistics. Finally, we have a significant group of microemployers, of which three out of five declare the introduction of innovations. Microemployers in Poland are a significant group of nearly 700,000 companies, and 60% of those declare innovations (nearly 420,000 entities). The other side of the coin is a potential that we do not use or see or simply do not have. In the public

discussion on Polish innovation, there is already a solid common element of the message that we will not develop further using the easiest resources – i.e., cheap labor and imitating technologies (even the best ones). This is what should be added to the second statement: it is not enough to increase expenditures on research and development, as such activity will not translate into market products and services. The key (and a huge challenge for the current development policy) is to remodel the current development paradigm towards large civilization projects involving partners from many sides and, above all, responding to the identified social needs. Here the question arises – how can such a system be built, existing schemes be remodeled, or a completely new approach be proposed? The answer to this question and those posed earlier is to form the basis of this article. The paper presents the problems concerning the evolution and development of innovativeness of Polish enterprises and the economy. The empirical part presents the effects of research on the state of innovation measured in various areas and using various measures. The purpose of the paper is to present contemporary concepts of innovation models used in Polish enterprises and the economy as well as to assess their effectiveness. In the theoretical part of the paper, a review and critical analysis of the literature related to the proposed topic was made, while in the empirical part, individual research in the field of innovativeness of Polish enterprises and the economy was carried out. This research is designed to facilitate the decision of Polish entrepreneurs in the selection of the right business model and indication of the resulting consequences.

DIRECTORS' AND TOPMANAGERS' PROPENSITY TO INNOVATE AND INVESTMENT HORIZON IN DEVELOPED AND EMERGING COUNTRIES

MARIIA EVDOKIMOVA, ANASTASIA STEPANOVA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

There are different points of view regarding the efficiency of innovations, and one branch of research analyzes the board of directors and top management decision-making power role in innovation activity and profitability. The current paper presents a mix of two different types of study: the experimental behavioral approach and the classical regression analysis. The aim of this paper is to reveal key personal characteristics that increase investment in and profit from innovations in developed and developing countries, which allows one to compare risk-aversion preferences of top managers and ordinary people. We suppose that apart from its input in science, the work will also be valuable for researchers and managers.

POLITICAL DETERMINANTS OF ECONOMIC BACKWARDNESS: FIRM-LEVEL EMPIRICAL INVESTIGATION

DINA ROSENBERG, EVGENY SEDASHOV — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

Economic backwardness, i.e. slow rates of technological progress in certain states, constitutes one of the central topics in political economy of development. Still, researchers have not yet reached a shared consensus regarding the causes of technological stagnation. In this paper, we argue that firms can use two strategies to gain an edge in competition: to innovate themselves or to block innovations developed by the competitors. The choice between these two strategies is a function of a set of firm-level and institutional characteristics. At the firm level, state-owned firms tend to invest in blocking rather than innovate because marginal returns to blocking, especially via political connections, exceed those of investments in R&D. At the country level, democratic institutions incentivize firms' investment in innovations, rendering returns from R&D higher than those from political connections because politicians in democracies are more limited in their abilities to arbitrarily block certain technologies. All else equal, a firm's decision to innovate is largely mediated by political institutions: while democratic settings incentivize firms to invest into innovations, authoritarian settings incentivize firms to block innovations. We employ the Bayesian multi-level model that allows us to test both the firm-level and the country-level hypotheses within a unified framework and thereby to provide one of the most comprehensive assessments of political determinants of economic backwardness. The empirical results corroborate our hypotheses.

POLITICAL ECONOMY: RUSSIAN EVIDENCE

CHANGES IN PRIORITIES OF GOVERNMENTAL SUPPORT FOR FIRMS IN THE RUSSIAN MANUFACTURING SECTOR: EMPIRICAL EVIDENCE FROM TWO SURVEYS — BEFORE AND AFTER THE 2014–2015 ECONOMIC CRISIS

ANDREI YAKOVLEV, NINA ERSHOVA, OLGA UVAROVA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

During the last decade Russian economy has faced a period of crises and stagnation, while the government is trying to support manufacturing enterprises at different levels. Our research analyzes the priorities of providing state support depending on the characteristics and behavior of industrial enterprises. We analyze the factors that determine the fact of receiving state support (financial or organizational) at different levels (federal, regional and local) by medium and large manufacturing companies.

The methodology is based on the paper Yakovlev 2011, which uses 2009 survey results and divides explanatory variables into 3 groups: basic characteristics of enterprises (enterprise size, ownership structure — the presence of state or foreign shareholders), parameters of their "corporate social responsibility" (helping the authorities in the development of the region as well as participation in business associations) and the parameters of their "modernization" activity (investment, innovation activity, export availability). The results of 2009 survey showed that there was a system of "elite exchange" (in terms of Frye 2002) between enterprises and the state at all levels of government.

In our work we compare the results of two surveys conducted in 2014 and 2018 to show the shifts in government support priorities amid the crises of 2008–2009 and 2014–2015. By 2014 the overall level of support has shrunk and the rest was concentrated on enterprises with lobbying power (state capital in ownership and participation in business associations). The results of 2018 survey showed that the scale of support recovered, firms that were engaged in exports and investment begun to receive state support at all levels. At the same time the factor of state capital in the ownership structure becomes insignificant.

TO RUSSIA WITH LOVE? THE IMPACT OF SANCTIONS ON ELECTIONS

MICHELE VALSECCHI — *NEW ECONOMIC SCHOOL, RUSSIA*

Do economic sanctions weaken the support for incumbent governments? To answer this question, we focus on the sanctions imposed on Russia after 2014 and estimate their effect on voting behavior in both presidential and parliamentary elections. For identification, we use cross-regional variation in (pre-determined) trade exposure to sanctioning and non-sanctioning countries and before-after voting data at both

regional and district level. The sanctions caused an increase in support for the incumbent. This result is robust to alternative measures of sanction exposure, including a measure of trade loss, i.e., the difference between observed trade flows and counter-factual trade flows computed via a full-general-equilibrium gravity model. Absence of pre-trends, as well as several placebo estimations, supports the validity of the identification assumption. We then explore several potential mechanisms, including propaganda, electoral fraud as well as standard demand-supply effects. Overall, while it is hard to evaluate all the potential motives that sanctioning countries might have had, our results suggest that economic sanctions are not an effective tool for reaching one of their primary goals and can actually backfire.

DOES NATIONALIZATION WORK? EVIDENCE FROM GOVERNMENT TAKEOVERS IN RUSSIA
CARSTEN SPRENGER — *NEW ECONOMIC SCHOOL, RUSSIA*

After the decade of large-scale privatization in the 1990s, many emerging market economies have undergone a policy shift towards consolidation and extension of the state sector, partly through selected nationalizations. Also, the Russian government has been increasing its role as an owner in several sectors of the economy since the 2000's. We study the factors that drive nationalization of private companies and find economic factors such as profitability or revenue growth to be irrelevant while industry affiliation, in particular, an indicator variable for strategic industries, is a good predictor of nationalization. We further study the effects of nationalization on firm-level outcomes such as revenues, investment, leverage, employment, wages, and operational performance (profitability) of target companies. To address these questions, we use a comprehensive hand-collected data set of more than 250 government takeovers in Russia between 2004 and 2013 and a carefully matched sample of companies that stayed under private ownership. Preliminary results for a subsample of transactions from 2004 to 2008 show a neutral effect of nationalization on performance and increased financial leverage. We further distinguish companies that have been bailed out (based on low values of equity and losses in consecutive years) from companies that have been nationalized to supposedly strategic or other reasons. Finally, we highlight changes in sources of funding from private to state-owned banks, subsidies, CEO turnover, and the composition of the board of directors going along with nationalization and how they affect match-adjusted performance changes.

POLITICS AND BANKING IN AN ELECTORAL AUTOCRACY
ZUZANA FUNGÁČOVÁ — *INSTITUTE FOR ECONOMIES IN TRANSITION (BOFIT), BANK OF FINLAND*; KOEN SCHOORS — *GHENT UNIVERSITY, BELGIUM*; LAURA SOLANKO — *BOFIT, BANK OF FINLAND*; LAURENT WEILL — *UNIVERSITY OF STRASBOURG*

We test the hypothesis of a political interference in election times in electoral autocracies. Electoral autocracies provide possibilities and incentives to exert pressure on banks, both state-owned and private, so that lending would increase before elections. We employ monthly data on individual banks to study whether

Russian banks increase their lending before presidential elections during the period 2004-2018. We find that all Russian banks increase lending before presidential elections. This result stands for all loans but also separately for firm and household loans. State-owned banks do not significantly differ from private banks in their lending behavior in election times. We test that the increase of loans before elections is not related to exogenous economic events: the surge in loans is followed by higher amount of bad loans in the following year, while increased lending concerns predominantly larger banks and banks most involved in the lending activity. Our main conclusion is that all banks increase lending before presidential elections in the Russian electoral autocracy. This supports the view that the authorities in an electoral autocracy can influence lending of both private and state-owned banks.

CIVIC CULTURE VS. APOLITICAL SOCIAL CAPITAL: THE CASE OF MOSCOW APARTMENT BUILDINGS
LEONID POLISHCHUK — *CENTER FOR INSTITUTIONAL STUDIES, HIGHER SCHOOL OF ECONOMICS, RUSSIA*; ALEXANDER RUBIN —*HIGHER SCHOOL OF ECONOMICS, RUSSIA*; IGOR SHAGALOV, — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

We propose a theory that shows that generic social capital and civic culture complement each other in the case of civic collective action, and counteract each other, when a collective action is uncivic. We test these predictions by contrasting two types of collective action in the contemporary urban setting. In the first one, tenants of an apartment building collectively manage funds designated for the building upkeep. In the second, tenants build fences and gates around their building turning it into a "gated community". Data on 30,000 apartment buildings in Moscow, Russia confirm the above conjectures.

VOICE, EXIT, AND CO-PRODUCTION: POLITICAL ECONOMY OF CITIZEN ENGAGEMENT
LEONID POLISHCHUK — *CENTER FOR INSTITUTIONAL STUDIES, HIGHER SCHOOL OF ECONOMICS, RUSSIA*

In her groundbreaking studies of co-production, Elinor Ostrom emphasized the "technological" importance of complementarity between government and society's inputs as a condition for synergy that co-production could yield. We take this argument a step further by emphasizing the political significance of such complementarity, which strengthens government performance incentives. We propose a political economy theory of co-production, which incorporates communities' capacities for political and apolitical self-organization, and bring to bear data on urban activism and self-organization in contemporary Russia to illustrate and confirm the theory's main findings.

TERRITORIAL SELF-MANAGEMENT: PREREQUISITES, OPERATION, AND OUTCOMES

ALEXANDER RUBIN, IGOR SHAGALOV — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

Territorial self-management (TSM) in Russia is an officially recognized mode of community self-organization with support of municipal government. We use multiple sources of data to study TSM operating in the city of Kirov, Russia, where this model is particularly popular. We show that TSM creation is predicated on a unique combination of social traits, blending civic culture and paternalism. While TSM demonstrate their efficiency in dealing with various urban development issues, they can also be used to strengthen loyalty of population to local authorities.

PROPER PUBLIC PARTICIPATION: CAN PARTICIPATORY BUDGETING BE EFFECTIVE IN SOLVING LOCAL ISSUES?
LEV SHILOV — *EUROPEAN UNIVERSITY, RUSSIA*

In the past 30 years, participatory budgeting has become a popular policy for urban development. Implemented in more than 40 countries, it is seen as a means to improve urban environment, solve local issues and empower local communities. However, public participation is not a universal blessing – its success depends on the objectives of local officials and appropriate use of participatory methodology. We analyze success stories of participatory budgeting, including the program "Your budget" implemented in St. Petersburg.

CORPORATE FINANCE: OWNERSHIP AND MANAGEMENT

RELEVANT FINANCIAL KPI'S IN THE AIRLINE INDUSTRY: THE CASE OF EUROPEAN COMPANIES
YULIA LEEVIK, IYA CHURAKOVA, EVA REUT — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

Nowadays, airlines are striving to achieve a competitive advantage on the market by introducing strategic efficiency measurement systems. It is well-known that the airline industry uses two types of performance measurements: cost-driven (per-kilometre) or revenue-driven (per-passenger) metrics. The driver preference is not so closely related to the business model type as it has been traditionally considered. We examine the case of the European airline industry, in which several models were tested regarding different types of companies. For low-cost companies, the most reliable is the per-passenger model, which completely supports previous investigations. For full cycle network companies, we expected to find using the per-kilometre model more appropriate, but we find strong evidence indicating that the per-passenger model shows better results for the full cycle companies. We suppose that some of these companies are in a kind of transitional stage between the LCC and FSNC, making a step towards new realities.

FAMILY CONTROL AND FIRM PERFORMANCE: EVIDENCE FROM RUSSIAN LISTED COMPANIES
ANASTASIA SUBBOTKINA, ANASTASIA STEPANOVA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

The paper investigates whether family involvement has an influence on the firm performance of Russian listed firms over the period 2011–2017. The topic is worth exploring as there is a dearth of similar empirical works in the setting of Russia due to difficulties in obtaining data. Moreover, there is still no common view on how family control influences the performance of companies, so further research is necessary. The relevance is also proved by the fact that nowadays, family companies are growing faster and creating more jobs than their peers. Furthermore, the possible shift to family-oriented business is confirmed by the growing number of startups.

Therefore, a more detailed picture of Russian business is presented, and the research helps entrepreneurs to understand whether they should employ more qualified managers with new fresh ideas on their companies' development or increase the involvement of themselves and their family in the business.

The family control effect is analysed under three main theories: Agency Theory, Stewardship Theory, and the Socioemotional Wealth Preservation one. The regression model with fixed effects of year and industry evaluates the impact of family control on market and accounting efficiency (Tobin's Q and ROA), controlling for specific company characteristics (age, volatility, growth, size, and leverage). The sample consists of 116 Russian companies. The basic definition of the family company is taken from Villalonga & Amit's research (2006) and is one of the most widespread ones nowadays: "A family company is a company in which the founder or a member of his or her family by either blood or marriage is an officer, a director, or a blockholder, either individually or as a group". But as a lot of Russian companies went through the process of nationalization or were created by the government and then privatised, the founder condition is modified. If the company is still run by its first owner after the privatisation, it is also called a family company, and the owner becomes a "founder". It is demonstrated that 40.2% of the companies are family companies; the number is exactly between the share of the family businesses in weak emerging countries and highly developed ones.

Our findings illustrate that overall, family involvement does not influence the performance of Russian companies and the result is the same for several family firm definitions. Nevertheless, there is a positive effect of family ownership in young companies due to fresh and relevant ideas of their founders. Moreover, active family control presented by the family CEO helps the family company to outperform nonfamily companies as in this way, family members publicly prove that they are highly interested in company development, and the agency problem is solved. Unexpectedly, the family Chairman destroys market performance. Probably the market believes that there may be too much pressure on minority shareholders. But the negative effect may be reduced by attracting more independent directors on board. Surprisingly, the model reveals that descendant control is also beneficial to accounting performance. If the founders are sure that their relatives are qualified enough to lead the company, the next generation will be really devoted to the business. So it is recommended to keep families involved in business, and an active CEO position is especially important for outperformance.

CORPORATE GROWTH, CAPITAL STRUCTURE AND PROFITABILITY: THE ROLE OF INVESTMENT OPPORTUNITIES
TIGOR SITORUS, OWEN HIUS FELANO, TONNY HENDRATONO, RUSTONO FARADY MARTA — *UNIVERSITY OF BUNDA MULIA, INDONESIA*

This research was conducted to investigate the mediation effect of investment opportunity and company growth on capital structure toward profitability. This research is a quantitative research with the following variables: capital structure, investment opportunity, company growth, and profitability. The sampling technique is non probability with SmartPls 3.0 for data processing. The data of Firm of Consumer Sector used in this study is secondary data obtained from the financial statements of the Indonesia Stock Exchange, for the period of 2012–2015. The results showed that the variables of profitability influenced by the capital structure are negatively significant; the company's growth variables influenced by the capital structure are positively significant; the investment opportunity influenced by the

capital structure is positively significant; the profitability variables are affected by the company's growth negatively and insignificantly; the profitability variables are influenced by positive and significant investment decisions. So, we may conclude that investment opportunity may act as an intervening variable because the indirect influence is stronger than direct influence.

FIRM-LEVEL EVIDENCE ON INNOVATION AND DIGITAL TRANSFORMATION IN EMERGING ECONOMIES

DIGITAL TRANSFORMATION OF RUSSIAN COMPANIES: FEATURES AND LIMITATIONS

YURI SIMACHEV, MIKHAIL KUZYK, SERGEY SHUVALOV — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

Currently, many industries are experiencing significant changes and shifts due to the introduction of new digital technologies. Digitization provides companies with significant potential benefits but at the same time increases uncertainty and risk. The introduction of digital technologies often requires a significant investment. However, in the conditions of rapid technological development and the emergence of new digital applications on the market, it is not always clear which technologies should be relied upon. In addition, with the introduction of digital technology, there is a risk of technological gaps between enterprises in the production chain. The specific problems of digitization of many traditional industries in Russia lie in the low innovative susceptibility of firms, weak science-business cooperation, and the insufficient development of engineering services.

The study addresses the following issues:

•   The main innovation channels for Russian firms;

•   The main types of digital technologies introduced by Russian companies, as well as the areas of their use;

•   Barriers to digital adoption at the firm level;

•   The relationship between the digitalization of firms and their dependence on the import of technologies and equipment.

The data used was collected as part of the research project "Factors of Competitiveness and Growth of Russian Manufacturing Enterprises", implemented in 2018 within the framework of the Basic Research Program at the National Research University Higher School of Economics. In addition, results of in-depth interviews with representatives of firms and research organizations are used.

Some preliminary results of the study:

•   The main incentive for innovation activities of Russian firms is the change in consumer needs. The supply of technology by research organizations and universities weakly stimulates Russian businesses to innovate;

• With a fairly wide spread of digital technologies in the Russian manufacturing as a whole, their use is more typical for large businesses than for SMEs. The most popular digital technologies and solutions are the digital signature, cloud technologies and services, systems CRM, EPR, etc., as well as the industrial Internet of Things. Firms most often use digital technologies in their relations with their suppliers and consumers. The most significant problem in introducing digital technologies is lack of financial resources. In addition, for innovative firms and long-standing companies, the shortage of required specialists is also significant.

R&D, INNOVATION AND INTERFIRM COOPERATION OF RUSSIAN MANUFACTURING FIRMS
ANNA FEDYUNINA, YULIYA AVERYANOVA — HIGHER SCHOOL OF ECONOMICS, RUSSIA

The study focuses on two questions: the first question is identification of intensity of interfirm cooperation that Russian manufacturing companies created for different purposes; the second question is to determine what are the differences in the characteristics of companies involved in different types of interfirm cooperation. In particular, we pay attention to the role and features of innovative firms in interfirm cooperation in comparison with non-innovative firms.

Interfirm cooperation differs significantly for different types of economies (developed, developing, emerging), different types of industries (resource-intensive, capital-intensive, knowledge-intensive). The papers investigating interfirm cooperation are quite rare, since they require unique survey data on the status and intensity of cooperation at the level of individual firms. A number of studies have shown that interfirm cooperation has a significant impact on productivity and some other indicators of a firm's activity. For example, it was found that horizontal cooperation influence firm's product innovation, and vertical cooperation may increase the productivity of production (Mesquita & Lazzarini, 2008). At the same time, effect of cooperation differs for firms of different sizes (Nieto & Santamaría, 2010). R&D conducted by firms in cooperation with universities complements but doesn't substitute own R&D of innovative firms (Hanel & St-Pierre, 2006).

Empirical studies of interfirm cooperation in Russia are extremely rare (Golovanova, Avdasheva, Kadochnikov, 2010; Bykova, Molodchik, 2009; Gonchar, Kuznetsov, 2008).

In particular, (Golovanova, Avdasheva, Kadochnikov, 2010) suggest that, compared with European practice, forms of cooperation in Russian companies are less diverse and less common.

We distinguish between five types of cooperation: the strategic partnerships with Russian and foreign companies, the presence of long-term relationships with customers, long-term relationships with suppliers of raw materials and semi-finished products, cooperation with other industrial companies and, finally, cooperation with universities and research organizations.

The study uses survey micro-level data from the 2018 RuFIGE Russian Companies in the Global Economy project. Linear regressions and probit regressions are used for empirical estimation. The following variables are used as dependent variables: the number and share of the company's customers, which have been working with for more than 5 years; conflicts with customers; the number and share of suppliers of the company, cooperation with which is more than 5 years; conflicts with suppliers; presence of strategic partners in Russia and overseas; an experience of R&D cooperation with academic institutions; an experience of interfirm R&D cooperation.

We describe the state of interfirm cooperation of Russian manufacturing firms. As expected, networking of Russian firms is a rare phenomenon. We build an empirical model and estimate the relevance of firm's characteristics for each individual type of cooperation and pay attention to the role of innovative firms. We find that customer networks are less common for innovative firms. The latter, instead, are more reliable on long-term cooperation with producers. Firms within holdings and exporters more often form strategic partnerships. This is especially common for hi-tech holdings and exporters of innovative products. Regarding the size, it is found that larger firms more often enter interfirm cooperation networks.

In general, our results show that interfirm cooperation is less common than has been thought. There is no stable demand for innovative products, interfirm R&D cooperation has spurious character. Based on empirical evidence, we discuss the results from the point of view of economic and structural policy.

SUPPLY CHAIN MANAGEMENT AND ORGANIZATIONAL ISSUES

GLOBAL SUPPLY CHAIN ENGINEERING: ASSESSMENT OF NATIONAL CULTURE PARAMETERS

ALEKSANDR DEMIN, ANASTASIA IVANOVA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

The current economy tends to increase the influence of digital technologies and diminish the human role in management. However, it is impossible to deny that a person still leads a business with its own set of values and priorities. Predominantly, the values are determined by the national culture of the person, his/her upbringing, and the language he/she uses for communication. In order to provide a solid base for further results and prove a specified coherence, the characteristics of the national culture should be quantifiable. Such scholars as Hofstede, House, and others have already assessed the parameters of national culture. Nevertheless, there is a question of how to apply the numerical values obtained in the managerial mathematical models. The report aims to solve this problem and to show the potential to incorporate the peculiarities of the national culture and the characteristics of the supply chain by using the quantitative values of the national culture obtained by the scholars designated.

Global supply chain development depends on the peculiarities of the core company in the chain. If the company considered is a transnational corporation, the team often consists of the representatives of different countries. A competent management of such a team tends to reach the three following goals: 1) to reduce the cultural gap between the participants in the project team (if the supply chain development is considered a global project); 2) to improve the efficiency of task completion set by the top management; 3) to minimize the costs of the project implementation. The authors of the report propose an approach that integrates the concept of "Team Management Wheel" developed by Margerison and McCann, the national culture parameters offered by Hofstede, and the supply chain business process model the Global Supply Chain Forum. For each process in a supply chain, the report has determined the importance of a certain role in the team and calculated the significance of the national culture parameters in the process if different roles interact with each other. The principle suggested makes it possible to create a mathematical model in order to reduce the cultural differences between the project participants under the given level of selected managers' compliance with their roles in the team and to minimize personnel management costs.

Having studied the role of national culture in determining the priorities of a logistics service, foreign research has revealed which of the national culture parameters have

an impact on components of the logistics service and which of the components are more important for a particular stakeholder. In order to evaluate the link defined, the authors of this report have developed an approach with the following steps:

firstly, the importance of logistics service components in a particular industry is ranked using the extreme value of each national culture parameter;

secondly, the integral evaluation of the criterion is calculated by taking into account the real values of the parameters for the national culture in the country considered;

thirdly, the value of the integral criterion for each of the countries under consideration is ranked;

fourthly, the most and the least important components of the logistics service are determined.

This approach proposed should be used to choose the main strategy of developing a distribution network in a transnational corporation.

In order to improve supply chain performance, the authors have proposed a methodology for assessing the effectiveness of internal or vertical integration in the upstream or downstream supply chain. The literature review has determined that various integration practices affect the achievement of key supply chain management objectives in different ways depending on the parameters of the national culture (introduced under the GLOBE project). The authors have compiled a table of national culture parameters influencing the effectiveness of the integration practices in achieving the various goals of the supply chain management, among which are the reduction of costs, the increase in operational flexibility, and the timeliness of delivery. The degree of influence was defined as positive, neutral, or negative. The developed methodology has been applied to assess the interaction in the supply chain. There has been calculated the absolute deviation of the closeness of the participants' interaction under various integration option for each parameter of the national culture from the world average level. Based on the predefined effects of the national culture impact, the relative efficiency of integration in different parts of the supply chain (their functional goals to be achieved) were able to be calculated. The developed methodology tends to identify areas where the integration leads to the most valuable solution of tasks in the supply chain and to point out purposes to which the integration with other parties is more applicable.

Thus, both the report and the list of methods elaborated prove the necessity of taking national culture into account at all stages of building a supply chain for transnational corporation, integrating its parameters into a mathematical tool.

SUPPLY CHAIN MANAGEMENT MATURITY RESEARCH
VADIM KOREPIN, MARIA ERMOLINA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

The purposes of the intended research are:

— to define the logistics and SCM IT maturity level in companies working on the Russian market;

— to group logistics and SCM technologies into qualifiers and oder winners;

— to develop a tool for express assessment of IT support of logistics and SCM processes.

We intend to survey companies working in different industries on Russian market provided they have a logistics or SCM department within their structure. These would be enhanced by opinions on market development of IT vendors, thus making up a multidimensional picture of the IT maturity. Pilot stage will include up to 10-15 respondents, while further plans are to encompass as many companies as possible.

The main hypotheses are the following:

1.   Logistics and SCM IT support are distributed unevenly among the companies on Russian market.

2.   Company's success on the market and logistics and SCM IT maturity are correlated.

3.   Prospective view on the logistics and SCM IT support on Russian market differs from such a view on the Western markets.

The methodology itself includes collecting data from companies about logistics and SCM technologies used and deemed useful; matching this information to the vendors' view on the market development; and comparing the results with international surveys on perspective IT in logistics and SCM (Gartner, DHL etc). The data would be then analyzed with help of statistical tools and conclusions would be made.

The following outputs are expected based on the analysis:

1.   Overview of the logistics and SCM maturity level on the Russian market and their impact on business.

2.   Defining the most promising IT in logistics and SCM.

3.   Comparison of the current state and trends in the logistics and SCM technologies on the Russian and the Western market.

ECONOMIC HISTORY

THE PRESERVATION OF ECONOMIC AND POLITICAL ELITES IN TIMES OF TRANSITION: EVIDENCE FROM RUSSIA
KOEN SCHOORS, TOM EECKHOUT — *GHENT UNIVERSITY, BELGIUM*

In this paper we pose the question to what extent economic and political elites persisted after the fall of the Soviet Union. In the literature arguments have been made both in favour of continuity of elites and in favour of their replacement. The argument for continuity has been based on the importance of old "nomenklatura" social capital for economic success during the early nineties, when the assets of Russia were privatised often to the benefit of the best connected economic agents and specific groups could get access to various types of special treatment by the government. But there have also been strong arguments in support of more than normal elite replacement, that would be driven by the massive socio-economic shock of transition and the ensuing "Putin shock", where many of the elites were again replaced after Putin's ascent to power in 2000. We study this question using very large datasets covering tens of millions of individuals. Using surname analysis methods inspired by Gregory Clarke's work and employing innovative measures of eliteness, we find that the Soviet elites of 40-ies strongly persisted until the late eighties and that both of these cohorts of elites survived relatively well not only the shock of transition, but also the Putin shock. The old Soviet elites, that is, have managed to reproduce themselves surprisingly well throughout transition. The results also suggest that this persistence may be largely driven by culture or nature, rather than existing connections.

ALL ALONG THE WATCHTOWER: DEFENSE LINES AND THE ORIGINS OF RUSSIAN SERFDOM
ANDREA MATRANGA; TIMUR NATKHOV — *CENTER FOR INSTITUTIONAL STUDIES, HIGHER SCHOOL OF ECONOMICS, RUSSIA*

Why did Russia enserf its previously free peasants, just as Western Europe was undergoing the opposite transition? Domar (1970) famously argued that Russia's low population density would have resulted in a high equilibrium wage, and, therefore, created incentives for the landowners to restrict labor mobility. While this theory account for the cross-sectional pattern between Western and Eastern Europe, it does not address the timing of the enserfment, and unable to explain why serfdom was not reintroduced in the West after the Black Death. In this paper we propose a new theory, arguing that Russian serfdom was an institution imposed to ensure stable and effective manning of the defense lines against the nomad's slave raids from the south. To test the theory we employ, for the very first time, unique data on the structure and distribution of Russian population in late 17th century. We show that the highest proportion of serfs in 1678 was on the Tula fortification line (*Tul'skaya zasechnaya cherta*), which was the first in a sequence of defense lines built to protect the southern frontier against the nomad raids. The location of other types of peasant (free, church, state), and citizens was not associated with the defence line. We also deploy spatial methods and terrain data to calculate the

optimal invasion routes for nomads, as well as optimal location of the defense lines to block the raids. Using them as an instrument for Tula defence line we confirm our OLS estimations.

TECHNOLOGY ADOPTION IN AGRARIAN SOCIETIES: THE EFFECT OF VOLGA GERMANS IN IMPERIAL RUSSIA

TIMUR NATKHOV, NATALIA VASILENOK, CENTER FOR INSTITUTIONAL STUDIES — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

This paper examines the adoption of advanced agricultural technology in pre-industrial societies. We use the case of the spatially concentrated German minority in Saratov province of the late Imperial Russia as an empirical setting to test the 'costly adoption'' hypothesis, which predicts that the adoption of different types of technologies depends on the associated communication costs. We document significant concentric spatial pattern of technology adoption among Russian peasants regarding advanced agricultural equipment (heavy ploughs and fanning mills) and easily observable techniques (wheat production) in the areas located closer to the German settlements. Moreover, we show a significant rise in agricultural productivity measured by wheat yield per capita associated with heavy plough adoption. However, we do not find any evidence of the adoption of 'know-how' requiring the transmission of non-codified knowledge - specifically, artisanal skills. Our findings suggest that the failure to adopt non-observable techniques from the technological frontier may be the key to the problem of catching-up economic growth.

SMART MARKETING AND CUSTOMER ANALYTICS

THE EFFECTIVENESS OF PERSONALIZED PROMOTION: SOME EVIDENCE FROM THE FIELD EXPERIMENT FOR THE RESTAURANT INDUSTRY
IRINA SHAFRANSKAYA, DMITRIY POTAPOV — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

Various marketing channels are usually utilized for customer development and relationship expansion (Choi et al., 2011; Kang and Lee, 2015). Such direct touch points as email marketing, web, and mobile push notifications are gaining popularity. From the company perspective, these means of communication are considered low-cost and effective, but consumers find them irritating and irrelevant (Hartemo, 2016). To overcome this obstacle, these touch points allow for personalization, which is highly practiced in the service sector (Kumar and Reinartz, 2012). Using previously collected customer data, a company is able to tailor its offer in order to increase response and provide customer engagement (Arora et al., 2008).

Personalization as a new communication practice attracts special attention from researchers' side. It creates an opportunity for advanced customer analytics — for instance, Fong (2016) shows that targeted offers generate higher rates of purchase of the advertised product and estimates the causal effect of targeting via personalized emails on sales, using a field experiment. Though experiment is quite a popular research method in digital marketing, existing literature lacks actionable insights, supported through replicable experimental research and rigorous empirical analysis, which uncovers the drivers of repeated purchases in the restaurant industry. Moreover, less is known about the efficiency of personalized marketing communications in a multibrand portfolio setting. With the focus to fill these gaps in existing literature, we present the results of a field experiment which was been organised for the customer development of a multibrand restaurant chain.

Experiment Setting and Preliminary Results

A field experiment was conducted in cooperation with a Russian multibrand restaurant chain, the leader of the dining-out segment with a 10% market share and 200 restaurants throughout 10 major Russian cities. The chain is organised as a "house of brands" (Aaker and Joachimsthaler, 2000): four strategic and three peripheral brands are differentiated through their naming and their products but are associated with common company brand.

The loyalty program covers all seven brands; it includes more than a million clients and gives rewards for orders and visits regardless of the individual's behaviour. Usually, the company uses a set of both direct and indirect marketing communications and employs email, the web, and mobile push notifications without any elements of personalization.

In general, the customers vary considerably in their purchasing patterns. The experiment is aimed at expanding customer experience in those strategic brands, which customers are not familiar with yet. For the purpose of our experiment, we selected a group of the so-called 'mono-customers', those who meet two requirements simultaneously:

—   They have had three and more transactions within the chain during their whole lifespan;

—   Their share of wallet in one of the strategic brands is 75% (or higher), and at the same time their share of wallet in all the other three strategic brands is 0% (this means that the last 25% of their consumption within the chain is formed by the peripheral brands).

The total selected number of clients is 68,197. To identify the propensity to expand the consumption of 'mono-customers' within the brand portfolio, a test group of 47,757 customers (70% of the sample) was randomly selected. An intervention in the form of personalized emails was sent to this group. Regarding the level of personalization, Malthouse and Elsner (2006) provide support for segment personalization, which is possible when reliable data are available. Given that, we personalize the offer according to the food products consumed by the customer.

The experimental setting allows for the estimation of the causal relationship between treatment (cross-brand marketing campaign) and the resulting behaviour (Activation, Arrival, Number_of_Checks and Revenue metrics). As currently we have only data for the experimentation period, we are not able to analyse any long-term effects, but we intend to add this analysis by the time of the conference.

We also observe heterogeneity in response: for instance, higher CLV customers have more chances to respond to promotion and demonstrate a higher revenue uplift. This finding partly supports the results of Kumar et al. (2006), which state that high-CLV customers contribute more than medium/low-CLV customers to the impact of the CRM strategy. Some aspects of consumer behaviour have a significant but small effect on the Activation metric.

All these aspects are important for further communications — using behavioural metrics, one could construct personalized campaigns, which could drive the customer behaviour in the projected way. Thus, experimental research design could be combined with a survey to obtain more specific information on consumer insights.

DEEP LEARNING FOR CUSTOMER CHURN PREDICTION
KRISTOF COUSSEMENT — *IESEG, FRANCE*

This presentation introduces the topic of deep learning in the context of customer churn prediction. In particular, we describe the added value of incorporating customer emails into customer churn prediction models. In particular, we benchmark convolutional neural networks (CNNs) against standard approaches for analyzing textual data in churn prediction using real life data from a European bank. The results confirm that the inclusion of customer emails improves the predictive performance. Second, deep learning methods outperform current best practices for text mining. Third, textual data are an important source of data, but unstructured data alone cannot create churn prediction models that are competitive with models that use traditional structured data. Managerial implications are discussed.

SENSITIVITY ANALYSIS IN IDENTIFICATION OF CAUSAL EFFECTS OF MEDIATION IN TAM: MASEM APPROACH

MARIUSZ GRABOWSKI, ADAM SAGAN — *CRACOW UNIVERSITY OF ECONOMICS, POLAND*

One of the objectives of scientific research is to identify causal relationships based on correlations or using regression methods. The structural equations model (SEM) plays a special role in this approach. It is particularly important in scientific research in which causal relationships result from theoretical assumptions and outcomes of previous research work.

In view of the above, the critical literature review and meta-analysis is a frequently used method of analyzing published data, allowing a theoretical generalization of the results based on hard evidence (evidence-based). In modern marketing and consumer research (especially in the area of market and consumer metrics), the emphasis is placed on the necessity of making decisions based on hard data, diagnostically oriented results, and verifiable conclusions. Taking medical science (evidence-based medicine) as a point of reference, they are based on the principle of evidence-based marketing.

This medical rule of methodologically appropriate diagnostic tests requires that the basic principles of scientific research be met; they involve the following: comparability and replication of research in a population, theoretical-bout research hypotheses (to avoid the HARK effect), and controlling the causal claims (to avoid spurious causal effects based on correlational research). The principle of replication of research is one of the basic conditions for the development of a given scientific discipline. The possibility of repeating the test and thus verifying the obtained result is particularly important in scientific research using an experimental and model-based approach. The research shows that replication research in 1974–1989 included only 2.4% of all published research in the leading marketing magazines, and in 1990–2004, this share dropped to 1.7% (Evanschicky, Baumgarth, Hubbard and Armstrong, 2007; Hubbard and Armstrong, 1994). Based on exploratory research (Sagan 2009), it appears that in Polish marketing magazines, there are basically no publications that allow replication research to be based on them. In the analyzed 43 articles on the reports on empirical research in the journal "Marketing and Market" and "Marketing in Practice" from 1997–2007, only a few of them contained information allowing full replication of the research or data analysis.

Meta-analysis is the leading research procedure for comparing the published results of replication research; it is widely used in medical and social research. It is a statistical procedure for combining and analyzing data from multiple studies from different sources. It represents a quantitative approach to the systematic review of research results. The bases for the meta-analysis are complete, thematically homogeneous, comparable, and substantively relevant data, published and analyzed in many available publications and sources (Borenstein, Hedges, Higgins and Rothstein, 2009; Card, 2012; Cooper, Hedges and Valentine 1994).

In the area of marketing and consumer research, meta-analysis of data is most often associated with the analysis of (quasi-)experimental data and testing of data measurement and analysis tools. It allows for statistical evaluation of the results and a degree of publication bias. In relation to the confirmatory structural models, it allows a stronger grounding of the results existing in the literature.

The aim of the paper is to identify and test causal relationships with respect to technology acceptance models (TAM) (Davis 1989, Davis, Bagozzi and Warshaw, 1989) based on an integrated approach to SEM using data meta-analysis and diagnosis causal mediation effects on the basis of sensitivity analysis.

TAM (Davis, 1989, Davis, Bagozzi and Warshaw 1989) is one of the most commonly used theoretical models explaining user behavior in the context of information technology (Arteaga-Sanchez and Duarte-Hueros, 2010; Chen, and Chen, 2011, Ducey and Coovert 2016, Sagan and Grabowski, 2016). The theoretical basis of TAM is the theory of reasoned action (TRA) (Fishbein i Ajzen, 1975, 1980) and the theory of planned behavior (TPB) (Ajzen, 1985, 1991). Based on theoretical assumptions, attitudes toward the behavior are derived from the technology acceptance model (TAM) used in the studies on the IT/IS acceptance and use.

The identification of causal relationships in meta-analytic TAM is based on directed separation approach (d-separation) (Pearl, 2000, Pearl, 2009) and sensitivity analysis (Imai, Keele and Yamamoto, 2010; Tingley, Yamamoto, Hirose, Keele and Imai , 2013). Sensitivity analysis facilitates an assessment of the influence of unknown disturbing variables (confounders) affecting both the mediation and the focal dependent variables in the SEM model.

The confounding effect in the mediation results from the assumption that the unobservable common cause can affect both the mediation and focal dependent variables in the model. Correlation of disturbances (residuals in the model) allow to control the influence of unobserved common cause. In common applications, however, such a model is non-identifiable (negative number of degrees of freedom). The correlation coefficient between disturbances (rho) for mediating and dependent variables determines the degree of influence of the unknown common

cause and model parameter bias. If rho = 0, then there is no disturbance of the causal effect (no correlation between residuals / disturbances in the model).

The sensitivity analysis is an attempt to understand the mechanism of causal effect (through mediation mechanism). The evaluation of the causal effect is performed in the simulation analysis for various fixed levels of rho coefficient. It allows comparing the effect of mediation for rho = 0 with the coefficient rho when total indirect effect (TIE) = 0. If the values of the rho coefficients are "unreasonably" high compared to TIE, for which coefficient rho = 0, then it can be assumed that the total effect indirect is significant and there is no impact of disturbances correlation on the causal mediation effect. On the other hand, if the values of rho are "reasonably" low compared to the TIE for which coefficient rho = 0, then it can be assumed that the total indirect effect is irrelevant and there is the influence of disturbances correlation on the causal mediation effect (Muthen and Asparouhov 2015).

The paper presents the results of a meta-analysis of TAM published in journals related to information systems. On this basis, the structural model TAM was built. Based on sensitivity analysis, the level of causal bias of secondary data published models as well as the authors' model on primary data was assessed. Selection of papers contains results of TAM modeling published in the three leading scientific journals of Information Systems (IS) community: MIS Quarterly, Information Systems Research and Information Systems Journal. The collection consists of 29 papers. As it was previously stated, the presented research includes also primary data. The primary data were based on quota sample of 150 students of Cracow University of Economics using Moodle platform.

In meta-analytic SEM (MASEM) model estimation, a two-stage approach was used (Cheung and Chan, 2005; Cheung, 2015; Jak, 2015). The two-stage estimation of SEM models was based on pooled correlation matrix. Pooled correlation matrix estimation involved both univariate approach – calculation of weighted correlations or weighed Fisher – z scores and multivariate approach – two-stage structural equation modelling (TSSEM) based on all correlation coefficients. Three types of MASEM models were estimated: 1/ fixed - effect SEM (correlations, covariances, path coefficients, etc. are assumed to be homogeneous across studies), 2/ random-effect SEM (effect sizes may vary due to differences in samples and methods used in different studies) and 3/ mixed-effect SEM (models with covariates and both fixed and random effects).

In order to perform the sensitivity analysis for causal mediation effect, a limited version of TAM model for meta-analytic SEM was tested that involved the relationships between perceived ease of use (E), perceived usefulness (U) and behavioral intention of use (B). TAM structural equation model based on pooled correlation matrix was estimated using Mplus and weighted least squares (WLSMV) estimation. The parameters of the MASEM model are used as a priori information for Bayesian SEM model on primary data. The use of a priori information is a distinctive advantage of Bayesian models (Rossi, Allenby and McCulloch, 2005). Pooled covariance matrix was used for simulations of the disturbances correlation bias effect on causal mediation.

THE USAGE OF GAMIFICATION IN MARKETING SURVEYS: OPPORTUNITIES AND CHALLENGES

SNEZHANA MURAVSKAIA, DANIIL MURAVSKII, MARIA KUZNETSOVA, *IBS-MOSCOW (RANEPA) — GSOM SPBU, RUSSIA*

The current technologies bring a number of opportunities to make marketing research more effective. Still, the main issue with surveys in marketing research is the response rate and the quality of data, despite the fact that reaching respondents is easier now than it has ever been before. One of the reasons, according to research, is the participants' lack of interest both in the process and in the topic. Gamification in modern business is considered a problem-solving solution to the intrinsic motivation issue. However, gamification is still an emerging field of study, and there is no established approach to gamified marketing surveys. In this paper, the authors presente an analysis of the existing approaches to gamification and its suitability for the creation of marketing surveys.

LIMITING AND DRIVING FACTORS OF E-COMMERCE MARKET DEVELOPMENT IN RUSSIA: EVIDENCE FROM EMPIRICAL RESEARCH

ANNA DAVIY, VERA REBIAZINA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*, MARIA SMIRNOVA — *GSOM SPBU, RUSSIA*, MARIA SMIRNOVA — *GSOM SPBU, RUSSIA*

Purpose: The main objective of this paper is to reveal the limiting and driving factors for development of the e-commerce market in Russia from the firm perspective. Methodology: 60 in-depth interviews with representatives of Russian internet businesses to consider firms' view of the driving and limiting factors were conducted in February – November 2015. Companies comprising the sample represent different industries, and vary in size and location. In order to identify limiting and driving factors of e-commerce market development in Russia, content analysis was employed. Findings: In reviewing a literature, we identified a quite general approach to structuring limiting and driving factors that comprise such groups of factors as environmental, organizational/ store-related and product-related/service-related factors. Interviews with Russian companies complement current structuring by adding market in particular highlighting the role of consumers and industry-related factors as one of the most frequently mentioned by firms' representatives. Also, firms point out the trust and security concerns as limiting factors. Originality/value: One contribution of this study is to identify limiting and driving factors that are specific for the Russian e-commerce market. Besides, we discover some factors that can supplement the current frameworks for structuring limiting and driving e-commerce market factors.

CAN THE MERE NOTION OF A GAME INCREASE CONSUMER WILLINGNESS TO PARTICIPATE IN GAMIFIED LOYALTY PROGRAMS?

DANIIL MURAVSKII, SNEZHANA MURAVSKAIA — *IBS-MOSCOW (RANEPA), RUSSIA,* KSENIYA GOLOVACHOVA, MARIA SMIRNOVA — *GSOM SPBU, RUSSIA*

In this research, we suggest that applying gamification in a gamified retail loyalty program context may result in consumers realizing that the company is trying to elicit a game. We showcase that this perception has a strong impact on whether the consumers are entertained by the gamified loyalty program and, coincidentally, on their willingness to participate in the program. Further, we empirically show that perception of gamification can mitigate the negative effect of consumer persuasion knowledge, and illustrate the moderating role that prior gamified loyalty program experience of the consumer plays in the establishment of these effects.

PART 2. SELECTED PAPERS

EFFECTIVENESS OF ASYMMETRIC CONGLOMERATE ALLIANCES IN REFINING INDUSTRIES: A GAME THEORY APPROACH
POLINA SIDOROVA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

The core objective of the study is to provide an evidence on the conceivable effectiveness, being considered as external stability, of asymmetric conglomerate coopetitive agreements in oil refining. Asymmetric is a scale measure. One leader and several niche players cooperate in technological aspect (mutual CAPEX) and compete in the market.

Game structure:

Players: leader (one); niche players; buyers (competitive market).

Strategies:

Costs optimization – technological cooperation;

Sales competition (long-term agreements, adjusted quality, min price).

We consider utilities to be estimated as a companies' values surplus from this game simulation. The gain is supposed to be estimated discretely in dynamics.

Recently there has not been yet provided any theoretical solution and an empirical evidence for the asymmetric conglomerate alliances to be effective, i.e. externally stable in the long-run, the coopetitive relations being considered. We would try to reach this objective by derivation of the Nash bargaining solution for two and several players, by estimating their conceivable surplus to the expected market value of the companies. Stochastic characteristic function of market values could be derived for the expected gain to be estimated. We consider an oil refining company to coopete with chemicals producers. Thus, we are looking for a theoretical justification on such kind of alliances to be long-term effective.

Introduction

Research context: The oil refining companies worldwide have been facing the company value growth decline nearly for the past 10 years now since the restricted amount of intrinsic positive factors to be considered and influenced in order to accelerate their potential. The increasing oil price volatility makes for the riskier strategic decisions to be considered. In search for the challenges they struggle for innovations either in their core field or in any diverse ones. The positive matter is that they constantly generate rather stable free cash flow which provides them

financial strength for the new growth opportunities to be discovered. According to the recent book (2018) of Saudi Aramco history and strategical perspectives, the development of conglomerate alliances in petrochemicals and even more general chemicals is considered to be one of the main company's directions. This issue seems to be even more effective, i.e. provides sufficient company value growth potential, so as to, on the one hand, it stands on the application and development company's core technological competencies and, on the other hand, opens new and conceivably sound market segments to conventional oil refining businesses.

Gap in the knowledge: Many aspects of the topic being considered in this research are actively discussed in the academy. For instance, the coopetition concept has been re-increasing its popularity since 2010 now (Carfi et al., 2010, 2011, 2012, 2014, 2018). However, conglomerate alliances engaging in refining industries seems to become very important, new trend which needs to be considered in terms of cooperation and coopetition agreements. The Nash bargaining solution for such games, where both players realize diverse kinds of strategies (maximization of scale and niche) within a coopetition statement, being implemented to stochastic realization of the expected companies' values stands for the new theoretical solution to be derived.

My study (goal, research question): The current study is supposedly narrowed to that of conglomerate alliances with asymmetric participants, i.e. with different revenues and CAPEX volumes. This restriction plays for the pure 'opportunity' case, when particular oil refining company is not definitely sure about the positive result of such cooperation or coopetition (when both players act cooperatively by one competences and competitively – by others. This case could be considered to be similar to that of real options. However, the solution which could be derived here is seemed to be more general, without such strong assumptions being considered. Regarding the measure of such alliances effectiveness, the expected intrinsic company value based on stochastic implementation of market components could be considered (Cygler et al., 2018).

Main research objectives: The main research question of this study is: why companies with unequal market position, being realized as difference in their revenue and capex volumes, and from unrelated industries could be involved in the coopetitive agreements? Therefore, the possible economic effect from such business relations needs to be estimated. The intrinsic value of a group of companies operating coopetitively is considered to be an adequate measure for the conceivable economic effect (Cygler et al., 2018). This stands for the economic objective of the research being implemented. The question being arisen is incorporated into the research framework of the coopetitive games. The discussion on coopetitive games had been initiated by Nalebuff and Brandenburger (1996). The first economic preview of coopetition being applied to actual business conditions had been studied by Walley (2007): this research considered the cooperation between the oil companies in upstream activities and competition in downstream activities. The purposes of such kind of integration could be diverse. The only distinction is the one which implies simultaneous realization of cooperative and competitive strategies.

Literature review

To set a definition of the alliance in oil refining industry the most recent papers should be considered, so as to the mere phenomenon has been developing approximately for a year and has been explicitly formulated as one of the main growth factors in Saudi Aramco's current strategic plan up to 2030 (Ramady, 2018). The game structure implies both cooperation and competition concerning different competencies of participants. At first pure cooperation case should be considered. Thus, alliance here is considered as non-merge agreement between two or more participants from unrelated refining industries (Scipes, 2018). Cooperation is realized on technological basis provided conceivable gain on costs efficiency. However, market strategies of the participants are different. In case of two participants, one realizes maximization of scale, another is considered to be a niche player, who specializes on some of the chemicals (currently set but not limited to petrochemicals). Thus, major oil refining companies suppose more distanced from their core business branches provide opportunity growth and additional value to their shareholders in the middle- and long-run.

Firstly, the cooperative formation should be considered, because the main effect is supposed to be provided on cooperation basis. Hereinafter, under cooperation the technological cooperation is being implied. The following researches (Petrosi a n, Mazalov & Zenkevich, 2018) provide general description and solutions for diverse cases concerning technological cooperation. In this paper, more specific case of non-transferable utilities is to be considered. This restriction seems to be adequate with regard to further coopetition game structure consideration.

New intensive discussion on coopetition has been re-engaged in 2010 (Carfi, 2012; Carfi & Okura, 2014). Particularly, it was concentrated around technological alliances, which has been mainly distinguished by hi-tech specialization. However, the case of conventional industries being considered to imply some effect from such form of business relations has not been considered yet. This aspect is supposed to provide sufficient outcome both for academy and business practice. Effect of coopetition for conventional oil refining companies is needed to formulate the current research question: why does coopetition in refining industries could be effective/efficient? Here the asymmetric case, with one participant getting surplus value from yield side and the other from costs side, is to be considered, as well. So as to the latter could provide more evident effect on cooperation. For instance, within the consortium between an oil refining giant and one or several significantly smaller chemical companies seems to be effective for the giant and efficient for the smaller participants (Baglieri, Carfi & Dagnino, 2012), the higher investments in technology renovation having been implied.

One of the probable variables which is considered here as a measure of effectiveness could be expected external stability of such alliances, described above, being estimated on the 5-10 years horizon. In this paper, three logical steps should be made: cooperation, cooperation with non-transferable utilities (which allows making a shift towards coopetition), and coopetition (Carfi & Perrone, 2012; Petrosi a n, Mazalov, & Zenkevich, 2018; Venkatasubramanian & Luo, 2018).

Because of external stability has been chosen as a measure of effectiveness it seems to be reasonable to consider stochastic characteristic function for the utilities to be derived. Two main factors could be: expected companies market value and the second could consist of several commodities prices, i.e. chemicals. Nash bargaining solution is considered to provide conceivable outcome on coopetition among two or several participants with one leader.

To set it shortly, recent researches have not yet provided explicit theoretical solution and empirical evidence for the asymmetric conglomerate alliances to be effective, i.e. externally stable in the long-run, the coopetitive relations being considered. We would try to reach this objective by derivation of the Nash bargaining solution for two and several players who perform coopetitively, by estimating their conceivable surplus to the expected market value of the companies. Stochastic characteristic function could be derived for the expected gain to be estimated.

Methodology

Recently, there has not been yet provided an explicit theoretical solution and an empirical evidence for the conglomerate alliances in oil refining to be effective. In this research we propose a formal solution and a numerical example. We consider effectiveness here to be an external stability in the long-run (Zenkevich & Reusova, 2017). We derive the Nash bargaining solution for several players.

We consider a major oil refining company to conceivably coopete with chemicals producers in order to develop further its petrochemicals business-segment. Thus, we are looking for a theoretical justification on such kind of alliances to be long-term effective.

We investigate upon a coopetition agreement between a leader (A), being considered as oil refining giant, a niche player (B), being considered as specialized chemicals producer, and their joint venture (C) within the market of petrochemicals and other chemicals consumers (D). A and B are realizing cooperative strategies in technological competences, while they are acting competitively on the market. Thus, C is considered to be a cooperative manufacturing venture of A and B.

Strategies: both players are sharing their manufacturing between their individual core business and joint venture, according to the expected prices' estimates of the products which are estimated discretely by the end of a period of three years. Such a period length is considered to be an adequate interval for the effectiveness to be estimated in dynamics. Thus, we divide the whole expected life duration of an alliance by three years' intervals.

Then, both players are selling final products on the market (D) which is considered to be oligopolistic. The products are non-homogenous. The expected gain is

considered to be a difference between the total revenue from both individual and cooperative production and fixed/variable costs with the investments in the foundation of a joint venture.

Assumption 1: such alliance implies both horizontal and vertical integration, so as to the petrochemical segment development is achieved by vertical integration, whereas, more distracted from the core oil refining, other chemicals business is considered to be horizontal conglomerate integration.

Assumption 2: A and B join parts of their capital expenditures within the C in order to proceed with both petrochemicals and other chemicals products. They are shared between the product range, according to the expected price estimate of each of the products.

Assumption 3: A and B compete on the market, which is considered to be oligopolistic and could be described by the following equation:

$D : Q \times P \to R$,

defined by

$$D(p,q) = \sum_{i=1}^{N} E(p_i) \cdot q_i + \sum_{j=1}^{K} E(p_j) \cdot q_j$$

for every (p,q) in Q x P, where:

• Q is a compact interval of the real line, and is shared between Q1 (petrochemicals) and Q2 (other chemicals);

• P is a compact rectangle of the Cartesian pane.

Utilities of the players could be described by the following equations:

$$U_A = \frac{\sum_{i=1}^{N1}(p_i \cdot q_i - v_i \cdot q_i) - \sum_{i=1}^{N1} F_i + \sum_{k=1}^{N2}(p_{k1} \cdot q_{k1} - v_{k1} \cdot q_{k1}) - \sum_{k=1}^{N2} F_{k1}}{\sum_{t=1}^{T} CAPEX_{A_t}}$$

$$U_B = \frac{\sum_{j=1}^{N3}(p_j \cdot q_j - v_j \cdot q_j) - \sum_{j=1}^{N3} F_j + \sum_{k=1}^{N2}(p_{k2} \cdot q_{k2} - v_{k2} \cdot q_{k2}) - \sum_{k=1}^{N2} F_{k2}}{\sum_{t=1}^{T} CAPEX_{B_t}}$$

$$U_C = \frac{\sum_{k=1}^{N}(p_k \cdot q_k - v_k \cdot q_k) - \sum_{k=1}^{N} F_k}{\sum_{t=1}^{T} CAPEX_{AB_t}}$$

Here we consider the situation when both players create a joint venture in order to manufacture petrochemicals and other chemicals. The share is set according to the expected price estimate. Thus, we consider prices to be fixed, while the production volumes to be variable. Both technological lines are prepared for production purposes (capacity is fixed), but each production line loading is adjusted by three years interval.

How do we estimate the whole production capacity?

By the end of coopetitive agreement between three players the payoff could be estimated as follows:

$$z_A = \sum_{t=1}^{T}\sum_{i=1}^{N}(p_t \cdot q_i - v_i \cdot q_i) - \sum_{i=1}^{N}F_i + \sum_{k=1}^{N2}(p_{k1} \cdot q_{k1} - v_{k1} \cdot q_{k1}) - \sum_{k=1}^{N2}F_{k1}$$
$$- \sum_{t=1}^{T}CAPEX_{A_t}$$

$$z_B = \sum_{t=1}^{T}\sum_{j=1}^{N}(p_t \cdot q_j - v_j \cdot q_j) - \sum_{i=1}^{N}F_j + \sum_{k=1}^{N2}(p_{k2} \cdot q_{k2} - v_{k2} \cdot q_{k2}) - \sum_{k=1}^{N2}F_{k2}$$
$$- \sum_{t=1}^{T}CAPEX_{B_t}$$

$$z_C = \sum_{t=1}^{T}\sum_{k=1}^{N}(p_t \cdot q_k - v_k \cdot q_k) - \sum_{k=1}^{N}F_k - \sum_{t=1}^{T}CAPEX_{AB_t}$$

$$q_k = q_{k1} + q_{k2}$$

Strategies:

- A -> max z_A and max z_C, if:

$$\sum_{t=1}^{T}\sum_{i=1}^{N}(p_t \cdot q_i - v_i \cdot q_i) \geq \sum_{i=1}^{N}F_i + \sum_{t=1}^{T}CAPEX_{A_t}$$

and

$$\sum_{t=1}^{T}\sum_{k=1}^{N}(p_t \cdot q_k - v_k \cdot q_k) \geq \sum_{k=1}^{N}F_k + \sum_{t=1}^{T}CAPEX_{AB_t}$$

- B -> max z_B and max z_C, if:

$$\sum_{t=1}^{T}\sum_{j=1}^{N}(p_t \cdot q_j - v_j \cdot q_j) \geq \sum_{i=1}^{N}F_j - \sum_{k=1}^{N}p_k \cdot q_k - \sum_{t=1}^{T}CAPEX_{B_t}$$

and

$$\sum_{t=1}^{T}\sum_{k=1}^{N}(p_t \cdot q_k - v_k \cdot q_k) \geq \sum_{k=1}^{N}F_k - \sum_{t=1}^{T}CAPEX_{AB_t}$$

- D -> max z_D, if:

$$\sum_{k=1}^{N}F_k - \sum_{t=1}^{T}CAPEX_{AB_t} \geq \sum_{t=1}^{T}\sum_{k=1}^{N}(p_t \cdot q_k - v_k \cdot q_k)$$

The estimated CAPEX volume for the consequent joint venture manufacturing depends on the volumes of petrochemicals vs chemicals in the joint venture manufacturing, which are supposed to be constant during the forecasted period of three years. The whole CAPEX is shared between the players according to proportionate share of petrochemicals vs chemicals in the production volume of the joint venture.

For the decision on the joint venture production has been taken, the prices are assumed as current to be constant for the next three years.

However, the players can realize their own investments by themselves at any time, according to the changes in prices within the three years' period.

Data & empirics

For the current research we have chosen oil refining companies & chemicals producers to build our group sample:

We are going to make an empirical research on historical data (estimate of an expected external stability);

We are going to test an *a priori* solution for two/several companies: the leader being taken from oil refining (a numerical example);

The leader is defined as one of the major oil refining corporations (estimated by yearly sales' volumes).

Results & Implementation

We are looking for estimating a conceivable terms under which the alliance would not be effective anymore;

The model could be applied for strategic decision making concerning diverse types of asymmetric conglomerate agreements in refining industries;

The solution could be generalized for other refining industries.

Discussions and conclusions

This study has both theoretical and empirical perspectives. The first one is the formulation of the new game statement for the asymmetric conglomerate alliances in order to derive the Nash bargaining solution for the agents with unequal revenue and capex volumes from unrelated industries who perform coopetitively, i.e. simultaneously cooperate and compete in separate business aspects. The gain obtained by the companies in such sort of alliances needs to be derived. The final objective is to estimate conditions of such alliance stability, i.e. the economic effectiveness. We consider external stability (Petrosi a n, Mazalov, & Zenkevich, 2018; Parilina & Tampieri, 2018) to be the measure of the alliance to be realized as being effective.

The current research is focused particularly on the economic effect of the technological competences of one company to be implemented in unrelated industry. It could reduce the related risk by the investment volume. Therefore, it could propose a sort of cooperation to the smaller agent in another industry, although, acting competitively, so as to the advantage of its market position to provide additional effect.

The issue of coopetitive business relations stands for a large challenge of the current business environment: when most of the companies realize the actualized need of being together, i.e. of proceeding with cooperative strategies, but simultaneously acting competitively in particular sense. Thus, they are performing coopetitivly. This form of business relations is rather common and could be suspected to derive strategic opportunities for each of the players. Here, the task is to derive and explain a sort of economic solution for such alliances. Therefore, the economic sense of the problem being considered is sufficiently relevant.

One of the possible solutions in order to explain the coopetitive result of such alliances is to suppose that large companies consider this business relations mostly as real options. They realize to make small investments in the unrelated industry in order to try whether they could become successful enough to proceed with more intensive development in this field. Thus, concerning technological aspect of such alliance: the resource competition between two markets is realized. On the other hand, both business 'hands' cooperate in order to give additional company value surplus. Such type of coopetition is directly opposite of the one which has been considered between oil companies, i.e. when they cooperate in resources (upstream) and simultaneously compete in downstream activities. In this particular

sense, it is not necessary to consider pure alliances: when both firms stay to be separate business entities. Hereinafter, we are going to consider conglomerate M&A deals as another form of such business alliances along with the same economic sense, so as to the corporation with a stronger market position can any time realize the opportunity to sell the unsuccessful subsidiary. The latter could be considered as temporary merge of two business players.

The possible intrinsic economic surplus should be, finally, defined for the asymmetric coopetition alliances of conglomerate type. Thus, the conceivable gain from such coopetitive game in directly unrelated industries realization could be finally estimated. Moreover, whether the effectiveness is realized as long-term external stability of an alliance, there should be derived a dynamic model and evaluated the conceivable effect of such relations.

References

Adeleke, B. S., Onodugo, V. A., & Akanji, O. J. (2018). Does horizontally integrated firm enjoy competitive advantage in the value-chain? Evidence from the Nigerian financial sector. Retrieved from: http://www.ijoart.org/docs/DOES-HORIZONTALLY-INTEGRATED-FIRMS-ENJOY-COMPETITIVE-ADVANTAGE-IN-THE-VALUE-CHAIN.pdf.

Baglieri, D., Carfì, D., & Dagnino, G. B. (2012, July). Asymmetric R&D alliances and coopetitive games. *In International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems*, Springer, Berlin, Heidelberg, pp. 607-621.

Baumard, P. (2009). An asymmetric perspective on coopetitive strategies. *International Journal of Entrepreneurship and Small Business*, *8*(1), 6-22.

Brandenburger, A. M., & Nalebuff, B. J. (2002). Use game theory to shape strategy. *Strategy: critical perspectives on business and management*, *4*, 260.

Bengtsson, M., Eriksson, J., & Wincent, J. (2010). Co-opetition dynamics: an outline for further inquiry. *Competition Revue*, vol. 20, pp. 194–214.

Bengtsson, M. & Kock, S. (2013). A systematic review of coopetition; levels and effects at different levels. *In Proceedings of the 13th EURAM Conference, Instanbul, Turkey, 26–29 June 2013*.

Caiazza, R. (2018). Internationalisation strategies of emerging markets firms. *International Journal of Comparative Management*, *1*(1), 19-25.

Campbell, M. & Carfì, D. (2017). Speculative and Hedging Interaction Model in Oil and U.S. Dollar Markets—Phase Transition. *Journal of Statistics and Physics*, vol. 170, pp. 165–205.

Carfi, D. (2009). Payoff space in C-games. *Applied Sciences (APPS)*, vol. 11, pp. 1-16.

Carfi, D. (2012). A model for coopetitive games. *MPRA paper.*

Carfi, D., Donato, A., & Panuccio, D. (2018). A game theory coopetitive perspective for sustainability of global feeding: agreements among vegan and non-Vegan food firms. In *Game Theory: Breakthroughs in Research and Practice*, IGI Global, pp. 71-104.

Carfi, D., Musolino, F. (2014). Speculative and hedging interaction model in oil and US dollar markets with financial transaction taxes. *Economic Modelling*, vol. 37, pp. 306–319.

Carfi, D. & Okura, M. (2014). Coopetition and Game Theory. *Journal of Applied Economic Science*, 9, 458–469.

Carfi, D. & Perrone, E. (2012). Game complete analysis of symmetric Cournot duopoly. *MPRA paper.*

Carfi, D. & Schiliro, D. (2011). Crisis in the Euro area: coopetitive game solutions as new policy tools. *TPREF-Theoretical and Practical Research in Economic Fields*, summer issue 2011, pp. 23-36.

Carfi, D. & Ricciardello, A. (2010). An algorithm for payoff space in C-games. *AAPP*, LXXXVIII(1).

Carfi, D. & Ricciardello, A. (2013). An algorithm for dynamical games with fractal-like trajectories. *Fractal Geometry and Dynamical Systems in Pure and Applied Mathematics II*, 95-112.

Cozzolino, A. & Rothaermel, F. T. (2018). Discontinuities, competition, and cooperation: Coopetitive dynamics between incumbents and entrants. *Strategic Management Journal*. Retrieved from: https://onlinelibrary.wiley.com/doi/abs/10.1002/smj.2776.

Cygler, J., Sroka, W., Solesvik, M., & Dębkowska, K. (2018). Benefits and drawbacks of coopetition: The roles of scope and durability in coopetitive relationships. *Sustainability*, 10(8), pp. 26-88.

Glaister, K. W. (1998). Strategic Motives for UK International Alliance Formation. In *International Strategic Management and Government Policy*, Palgrave Macmillan, London. pp. 40-77.

Lado, A.A., Boyd, N.G., & Hanlon, S.C. (1997). Competition, cooperation, and the search for economic rents: a syncretic model. *Academy of Management Revue*, vol. 22, pp. 110–141.

Li, K. K. H. (2018). *A Study on Alliance Factors That Influence Firm Performance: Alliance Strategy, Alliance Diversity and Alliance Capability* (Doctoral dissertation, King's College London).

Link, A. N., & Antonelli, C. (Eds.). (2018). *Strategic alliances: leveraging economic growth and development.* Routledge.

Luo, Y.D. (2005). Toward coopetition within a multinational enterprise: a perspective from foreign subsidiaries. *Journal World Business*, vol. 40, pp. 71–90.

Mori, O. (2018). Two simple characterizations of the Nash bargaining solution. *Theory and Decision*, 85(2), pp. 225-232.

Padula, G. & Dagnino, G.B. (2007). Untangling the rise of coopetition: the intrusion of competition in a cooperative game structure. *International Studies of Management Organisation*, vol. 37, pp. 32–52.

Pant, V. (2018). Strategic coopetition – a conceptual modeling framework for analysis and design. Retrieved from: http://ceur-ws.org/Vol-2234/paper1.pdf.

Parilina, E. M., & Tampieri, A. (2018). Stability and cooperative solution in stochastic games. *Theory and Decision*, 84(4), pp. 601-625.

Petrosian, L.A., Mazalov, V.V., & Zenkevich, N.A. (Eds.). (2018). *Frontiers of Dynamic Games: Game Theory and Management, St. Petersburg, 2017.* Springer.

Rao, B. P., & Reddy, S. K. (1995). A dynamic approach to the analysis of strategic alliances. *International Business Review*, 4*(4)*, 499-518.

Scipes, K. (2018). Another type of trade unionism IS possible: The KMU Labor Center of the Philippines and social movement unionism. *Journal of Labor and Society*, 21(3), 349-367.

Walley, K. (2007). Coopetition: an introduction to the subject and an agenda for research. *International Studies of Management & Organization*, vol. 37(2), pp. 11-31.

Venkatasubramanian, V., & Luo, Y. (2018). How much income inequality is fair? Nash bargaining solution and its connection to entropy. *arXiv preprint arXiv:1806.05262*.

Yeung, D. W., & Petrosjan, L. A. (2006). *Cooperative stochastic differential games.* Springer Science & Business Media.

AN OPTIMAL CHOICE OF LOCATION FOR A FRANCHISED RESTAURANT
STEPAN GOGOLEV AND EVGENIY OZHEGOV — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

Introduction

The rising level of competitiveness motivates firms to start business expansion in order to take a better position at the market. Opening a branch in another city, region or country is one of the ways to expand. It is a common practice to start a promising business in a far unpopular region due to the attractive business environment there. We discuss the most common factors that influence the decision to start a business in small cities and try to create the model helps to decide where to start a business.

In this work we analyze a business at the food market. Consumers' preferences but not the price of resources or technologies plays the most important role in forming of equilibrium at such market. Also we deal with franchise restaurant what impose special restrictions on freedom of choice some restaurant characteristics (the type of restaurant, its development model and other conditions). From this point of view, the main question of the franchisee is where to locate the restaurant. Almost all other problems can be solved by the franchiser. It keeps our analysis in demand and especially relevant in the time of sharp franchising system spreading.

The main aim of this paper is to create the model chooses from the list of cities the most profitable one for an opening franchise restaurant. We pay special attention to solve two problems: data heterogeneity and a high number of correlated features.

For this purpose, we define a weight function for observations via Mahalanobis distance in the space of features and show its advantages. Next, we discuss pros and cons the use of some special methods: weighting least squared, estimating a model on subsamples, elastic net method, support vector regression, and random forest regression.

The paper is organized as follows. The first section is devoted to a review of relevant economic literature for this study. The second part provides a description of the problem statement and data used in the work. In the third part, the methodology of the work is described in detail. The fourth section discusses the results of models' evaluation and their comparison with each other. Finally, the last part is devoted to the general conclusions and some limitations of the model.

Literature Review

We start with defining some specific terms. The franchisor is the organization that creates and administers the business model. The franchisee is responsible for

managing day-to-day operations. Usually, the franchisor defines a list of cities, where a franchisee is granted to start a business by the franchise.

We choose a franchise fast-food industry in order to minimize quantitative distinctions between restaurants and focus on distinctions between cities. Franchise system guarantees equal costs and profitability of restaurants in different cities (Hing, 1996). The reason is in a common technology of production and similar pricing on raw materials. It allows concentrating efforts on comparison of cities suggesting other factors being equal. Moreover, the number of clients visiting a restaurant almost does not depend on the quality of management, costs at the period and other. As the number of clients visiting a restaurant is closely related to sales, we can come to the conclusion that revenue prediction is a proper aim of the franchisee.

Generally, the process of choosing a restaurant location consists of many steps: making a choice about the country, city, street, building, *etc*. It is important to decide all of them correctly as they respond to different factors of business success (Chiang *et al.*, 2007). Location inside the district answers for traffic and intraday sales pattern, country's choice is reflected on management and state control features. In this paper, we do not raise an issue about all levels of location decision so we are not able to answer the question about the precise optimal location of the firm. We estimate the attractiveness of location at the city level.

We introduce an assumption about restaurants revenue's homogeneity among cities. That is to say, in further analysis, we assume intracity revenue factors being equal. It means that the model does not take into account the qualitative difference between cities. For instance, we do not take into account differences in culture and mentality or in additional revenue in restaurants caused by successful location in the city. Nevertheless, it is possible to overcome the limitation. For this aim, the researcher may choose the group of cities the most attractive to start a business and choose the best city from the expert point of view. Now turn on to describing market features.

We face a high level of consumer market power at the food market. Therefore we should explore demand and consumers characteristics in detail.

The food market analysis assumes homogeneous demand when it is more important to know market size than the structure of demand due to the high degree of heterogeneity in supplied products (Beltron *et al.,* 2000). Franchised restaurant makes such concept reasonable as the key groups of consumers are known and it is possible to estimate their size in cities. We take into account the demographic characteristics of the city due to the lack of specific features of potential buyers for fast-food restaurants service.

As far as the demographic characteristics are concerned, the most common way of its measurement is combining of population size, population density, the average wage and size of different income groups. Crucial variables are population size and the average wage in the city. In terms of our work, the first one reflects the market

size, while the second one shows the consumers' ability to pay as the fast-food restaurants are aimed at the rich middle class.

We pay special attention to the effect of population size. Non-linear relations are discovered at different markets between market size and pattern of competitiveness (Wang *et al.*, 2017), quality of the product (Berry, Waldfogel, 2010), *etc*. There are some reasons to explore cities with low and medium population size separately from cities with high population size (Walzer, Blanke, 2018). Hence we use specific methods to check if there are any significant distinctions at the markets in small cities and others.

We turn to the fast-food restaurant market environment analysis. According to basic economic principles, the higher the number, the more competitive the market, the less attractive to enter into it (Arnold, Quelch, 1998). If there are markets with a similar demand function, it is more profitable to choose one with the lowest number of competitors. The problem with practical implementation such rule is in hardly observed demand that differs from market to market. The classical solution of the problem is to find factors that measure backlog demand (excess demand over supply) (Eckstein, Fromm, 1968). Recent research (Poldrugovac *et al.*, 2016) suggests the following observed determinants for analysis: demographic characteristics within the local market and the number of direct and indirect competitors. In the equilibrium its ratio implicitly reflects the share of new firm's potential consumers from the total population.

Further, the characteristics of potential rivals at the local market are quite important factors in choosing an optimal location for the firm. The fast-food restaurant is a quick-service restaurant that competes mostly with similar fast-food restaurants, food delivery companies, and cafes. The degree of competitiveness depends on the difference in prices for a meal (Kim, Gon, 2004). We try to include in the model average bill among all public catering places to count such a difference. The relation between the revenue of the restaurant and the difference in the average bill in the city and the restaurant bill is controversial. The big difference in bills means that the restaurant is in a unique price segment, there are no competitors. On the other hand, the lack of competitors is a sign of the lack of demand in the segment (Knutson *et al.*, 1993).

The last big group of features, that defines potential revenue of the restaurant in the city, is a group of individual consumer characteristics (Kim, Jogaratnam, 2010). Probability density function over the consumer preferences space is used in the big number of recent works. It is crucial for firms oriented on consumers with specific preferences. However, the information at the individual level is unavailable for the external researcher. In this work we choose a fast-food restaurant that aimed almost at the whole population. In this case the distribution of tastes over the population should be the same in different cities.

To sum up, we described the process of forming the attractiveness of the city for a franchisee. Then we discussed groups of factors that define demand at the food market, a key element in the revenue prediction problem, according to the industrial organization literature. Finally, we selected the most relevant observable features that will be used in the research.

Problem Statement

In this work we try to establish the methodology that helps to solve the problem of revenue prediction for franchised restaurants in different cities. In this part we depict the features of the chosen restaurant and appropriate dataset. We select the federal fast-food restaurant, a franchised pizzeria.

The chosen franchise has about 300 restaurants in 184 cities now. We analyze monthly revenue for the last 3 years. Figure one shows the average dynamics of revenue in all restaurants by months and years.
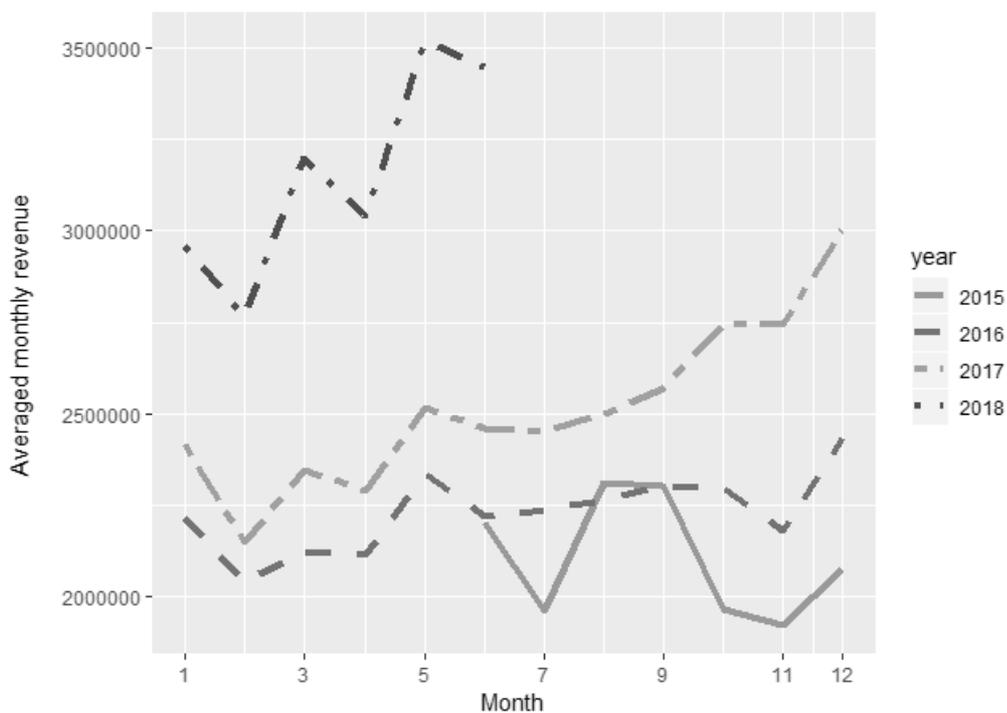
Figure 1. Averaged monthly revenue dynamics

There was an increasing trend in revenue from 2015 up to 2018. Therefore we should take this trend into account. Moreover, the similar fluctuations around a trend in different years have a similar structure. It can be explained strong seasonal revenue determinants. To consider this feature, in the further analysis we eliminate seasonality by adding seasonal factors (year and month) in the model. Then we compare the revenue in cities as the average monthly revenue within the period of work correctly.

Some restaurants were opened less than three years ago, so we collected only 5889 observations. Hence, we have a panel structure of data with 184 objects (cities) in 36 periods of time. The unit of observation is a restaurant in a month. Maintaining a panel structure instead of aggregating revenue by time and cities is necessary to avoid seasonal bias and a different number of restaurants in cities.

According to the main aim of the work, we focus on objects' features (characteristics of cities) and on creating a prediction for an average restaurant in the city. We have three big groups of dependent variables: seasonal factors, specific restaurant characteristics (work period and part of the revenue from delivery), and market environment features. We pay special attention to select variables from the last group of factors.

The market environment features consist of demographic and competitors' characteristics. The first group includes detailed information about consumers: the size of the market, its specific segments, consumer income. The second one describes firms behavior at the market: a number of direct and indirect competitors, average restaurant bill, average estate price, and wage. Large volumes of clients' characteristics information are available and the task of researchers is to find an application for this data.

Fast-food restaurants compete simultaneously in a few markets: some types of cafes, restaurants, food delivery, *etc*. At each market we can collect a lot of useful information: average pricing in the place of public catering, number of such places in the city in absolute and relative units (per capita), *etc*. The problem is that these markets are closely related to each other and, probably, have similar characteristics. Nonetheless, after aggregating characteristic among markets, a lot of information would be lost. We want to show that dealing with a lot of correlated variables allows improving overall results. We turn to describe the process of data collecting and its preliminary analysis.

We collect three datasets that contain the general demographic characteristics within cities, information about restaurants-competitors and some internal information about operating performance of already open restaurants of the franchise.

We gather the data about average wages, cashier's wage and density population in cities from hh.ru and gks.ru respectively. It is crucial for further cities comparison.

The second dataset is aimed to define the level of market competitiveness, so, according to the literature review, it should include factors that reflect a degree of spatial, price and non-price competition. We measure spatial competition for the city through the total number of cafes, restaurants, pizzerias, and places having the service of food delivery in the city. For this goal we collected for each place of public

catering its type, the average bill if available and the city where it is placed. The result is cross-sectional data with 54460 observations at the end of 2018. The source of data is a database *2GIS* which have the policy of providing information for the 100 biggest cities in Russia and other 200 cities. As for the description of the data, 75% percent of found places are cafes; the average bill is 512 rubles with the median equal 400. About 40% of places are located in the cities that are not included in *2GIS*.

The next step was to link the cities' characteristics to the current data. As a result, we know that our data is about cities with the population from 5 thousand to 12 million people and with the average wage from 19800 to 91800 rubles.

The last part of the dataset describes financial indicators of working franchised cafes: revenue. It is necessary to consider inflation, so here we recounted these values in term of 2018 prices. The result is a panel dataset that contains monthly values for all 305 franchised restaurants from January 2015 to July 2018. It is worth noting that the panel is unbalanced due to the fact that almost half of branches was opened after 2016. As there are some errors of measurement, we exclude observations with unusual values of profitability, when it is more than 1 or negative and extremely low. In the final dataset the unit of observation is a franchised restaurant in one month. The description of variables is presented in appendix 1.

Methodology

3.1 Specification of the Model

To answer the question about the optimal location, we want to choose the city with the best prediction of revenue. In this part we build the specification used in further models.

At the first stage we select variables that affect the dependable variable the most. Following similar researchers (Wahlberg, 2016) we analyze the relation between dependent variable and groups of explanatory variables described in the previous chapters that can be provided as some function presented in equation 1.

$$Y_{ijt} = f(X_t^1, X_i^2, X_i^3, X_j^4, \varepsilon_{ijt}), \qquad (1)$$

where:

Y_{ijt} — Revenue in restaurant j in city i in period t;

X_t^1 — Seasonality;

X_i^2 — City's characteristics;

X_i^3 — Competitors' characteristics;

X_j^4 — Restaurants' characteristics.

In this equation we define revenue of the *j* restaurant in *i* city at the *t* period of time. Following researches presented in the first chapter, we have reasons to believe in a linear relation between dependent and all independent variables except variables responding for the city size (population, average wage, the number of places of public catering).

For these variables we analyze relation in detail. We check several common types of relationships between variables (linear, polynomial, and exponential) and choose the significant one. As a result of model comparison by Akaike information criterion, population and wage should be included in the model as a polynomial with the second degree, while other variables should be included additively.

The last possible the model specification improvement is a considering of the logarithmic model. It should be checked for two reasons. Firstly, all dependent variables are non-negative what imposes a restriction on variables distribution. Secondly, explained and explaining variables have different units. Using logarithmic function eliminates the problem of scaling and units occurs in the linear model. We compare of two specifications of model: linear and non-linear, where variables that have integer units are included logarithmic. The second specification is the better as it has Akaike criterion equals 6303, while in the first specification it is 7264.

Summarizing, we use the specification of the model, constructed on the following rules:

- Dependent variable is a logarithm of monthly revenue;
- Independent variables noted above are included additively except population and wage that included with their second degree;
- Independent variables that have integer range of variables are logarithmical.

3.2 Machine Learning Algorithms

In this work we use four different methods of regression estimation: ordinary least squares (*OLS*), elastic net model (*ELNET*), support vector regression (*SVR*) and random forest regression (*RF*) as an example of an ensemble with regression trees. We start with describing methods regarding the problem of a high number of correlated independent variables.

First of all, we make revenue predictions using classical *OLS* model to compare its results with others. In this model we minimize the sum of squared errors among *n* observations by changing *k* beta-coefficients presented in equation 2.

$$Z = \sum_{i=1}^{n} (Y_i - \beta^T X_i)^2 \underset{\beta}{\to} min, \qquad (2)$$

One possible way of eliminating the problem of a high degree of partial multicollinearity in the least squares model is an elastic net regularization method (Lee, 2011). It minimizes absolute and squared values of estimated coefficients along with the sum of squared errors. The objective function is in equation 3.

$$= \sum_{i=1}^{n} (Y_i - \beta^T X_i)^2 + \lambda_1 \sum_{j=1}^{k} |\beta_j| + \lambda_2 \sum_{j=1}^{k} (\beta_j)^2 \underset{\beta}{\to} min, \qquad (3)$$

As a result of solving such optimization task, some dependent variables can be excluded from the estimation process (when β_j is close to zero). Therefore, the model does not take into account additional information that excluded variables contain. It brings us to the necessity of analyzing other methods.

SVR suggests another way of estimating coefficients in the model. Unlike least squares methods, *SVR* avoids explicit specification of the regression equation (Cristianini, 2000). *SVR* training process depends mostly on the kernel function that defines the relation between response and predictor variables. Hence, it is crucial to concentrate on the choice of a kernel function. We check following common kernel functions: radial basis kernel "Gaussian", linear, and polynomial. Generally, type of the kernel function can be chosen based on the type of relation between dependent variables if it is known. We use 10-fold cross-validation to select the best kernel function and calibrate its hyperparameters (regularization parameter C, tolerance ε) and degree for polynomial kernel function.

The last method we are talking about is a *RF* regression - an ensemble of regression trees. Training of a tree is an iterative process where the input data is split by predictor variables into small groups with different predicted value in each partition group. Combination of such trees is an ensemble that allows reducing prediction variance and improves out-of-sample prediction power. Another advantage of using regression trees is the revelation of nonlinear relation between dependent and independent variables that researchers does not expect to detect (Liu, 2014).

The quality of *RF* model mainly depends on the following parameters: the number of trees in an ensemble and the number of predictor variables randomly sampled in each split. The former should be large enough to reduce the variance of prediction, raised as a result of correlated variables in input data. The last parameter responds to the quality of the model. The higher the number of variables used, the better the quality of the model and the higher probability of overfitting. We tune both parameters using the out-of-bag estimation of the model. It is based on the sampling of test observations and calculating prediction error for observations which were

not used in the training process of the model. It is proved that out-of-bag error estimations tend to leave-one-out cross-validation estimation what makes them a reliable method for selecting parameters of *RF* (Breiman, 1996).

3.3 Heterogeneity Elimination

After selecting general methods we concentrate on overcoming the second problem observed in our data - that is heterogeneity. Elimination of heterogeneity requires the use of special methods. We use two common ways: weighting observations and training model on subsamples through data partition (Athey, 2016). The first method consists of giving weights to different observations in the process of model training, while the second way assumes reducing objects in training dataset to the most relevant objects.

Both approaches use implicitly a function that assigns to all objects in the dataset (cities in our case) a value that reflects the proximity of named objects. We can define this function as a distance function between two points in the space of objects characteristics. Let us describe steps on implementation heterogeneity overcoming methods for the task of calculating the out-of-sample error.

To create the model that makes a prediction of revenue for the restaurant in some city (let us define it as test city), we should train the model on the remaining dataset (observations related to training cities). After that we calculate distances from each training city to the test city. In the case of weighting observations, the next step is transforming distances into weights and estimating the model. Naturally, we give bigger weight to an observation with lower distance to the test city as it is closer to test observation. Therefore, it is possible to use the inverse function to transform distance into weight. In this work we use inverse power function. The definition of weight is in the equation 4.

$$w_i = \left(\frac{1}{\|X_{test}, X_i\|} \right)^{\gamma} = \|X_{test}, X_i\|^{-\gamma}, \tag{4}$$

Now we turn to another case of training model on a subsample. We introduce the rule that defines an interval of values of distance that indicates whether to include the city in training dataset or not. We define bounds of the interval so that there are 75% of observations the most similar to the test city. The percent of observations that will be included in the training dataset is chosen according to the size of the overall dataset. That is to say, we include observations related to object *i* in training dataset if $\|X_{test}, X_i\| \leq Q_{0.75}$ where $Q_{0.75}$ is a 75% quantile of the $\|X_{test}, X_i\|$ distribution among all *i.*

After that we define a space of characteristics and a distance function between objects. As we can distinguish the most heterogeneous variables, a possible solution is to consider all of them in distance function. We can construct overall distance as a sum of distances in all dimensions only if dimensions are orthogonal. Otherwise, distances in dimensions responding for correlated variables would be overfitted. Mahalanobis distance function allows solving the problem, including values from different dimensions with different weights (Neale, 2000). It measures the difference between the object and the distribution of other objects in terms of standard deviations. The vector of distances for training observations with covariance matrix Ω is presented in equation 5.

$$\left\|X_{test,}, X_{train}\right\| = \sqrt{(X_{test,} - X_i)^T \Omega^{-1}(X_{test,} - X_{train})}, \tag{5}$$

Mahalanobis distance is applicable to correlated values of variable. Hence researcher can choose any combination of variables that make up a space of objects characteristics. In this work we include three the most heterogeneous variables in weighting function: population, average wage and the number of restaurants-competitors in the city.

After describing two procedures of heterogeneity eliminating it is necessary to discuss the compatibility of these procedures with 4 ML methods, starting with the simplest *OLS* and *ELNET* methods. The addition of weighting function to them modifies objective functions presented in equations 2 and 3 into the forms presented in equations 6 and 7 respectively.

$$Z = \sum_{i=1}^{n} w_i (Y_i - \beta^T X_i)^2 \underset{\beta}{\rightarrow} \min, \tag{6}$$

$$Z = \sum_{i=1}^{n} w_i (Y_i - \beta^T X_i)^2 + \lambda_1 \sum_{j=1}^{k} |\beta_j| + \lambda_2 \sum_{j=1}^{k} (\beta_j)^2 \underset{\beta}{\rightarrow} \min, \tag{7}$$

where: $w_i = \left\|X_{test,}, X_{train}\right\|^{-\gamma}$.

Implementation of estimation on subsamples for these methods is acceptable but has a significant drawback. Subsampling reduces the size of the dataset. Strict selecting of observations in training dataset may results in the poor model due to insufficient information in selected data. At the same time, soft selection, can keep training dataset unchanged and does not give any improvement in the model.

Turning to *SVR* model, the use of weighting there is not recommended. Algorithm of *SVR* assumes estimation of the model, based on the training-data points nearest to

the hyperplane. It means that the model is automatically trained on observations closest to the "average" observation, while outliers are ignored. The most suitable way to get *SVR* model, adapted to some test object, is estimating on a subsample, where test object represents average observation. Such a model shows better predictive power despite the small training sample size.

The problem of heterogeneity in *RF* regression is eliminated automatically due to splitting input data into small groups. In this model quality of prediction mostly depends on the number of training objects similar to test ones. If it is enough, regression trees are able to divide observations into groups better than other methods. However, in the lack of similar objects and observations, RF regression often does not show good results due to low ability to extrapolate relations.

3.4 Comparison of Models

The next important step is choosing the technique for assessing the prediction power of the models. We compare out-of-sample predictions due to overfitting problem via the procedure of leave-one-out cross-validation. It allows considering errors of predictions for atypical cities in the best way (Chang, 2005). Now we move to describing the steps of leave-one-out cross validation in detail.

The main idea of the method is averaging the error of prediction among all available objects through predicting new data that was not used in estimating. For this, we choose one city as a test and exclude appropriate observations from the dataset. After that, we calculate distances from other (training) cities to test city and weights (for *OLS* and *ELNET*) or create a subsample (for *OLS*, *ELNET* and *SVR*). Finally, we train the model and create a prediction for the test observations. After that we repeat these steps for all cities in the dataset changing test city. As a result, we get a vector of out-of-sample predictions for all cities in the dataset. Then we should compare predictions with the actual values and decide if the model gives the best results. In order to do this, we choose a measure of the model quality.

We use the mean absolute percentage error (*MAPE*) to compare the predictive power of models. It reflects averaged absolute error value of the model and does not have the property of underestimation the biggest errors like mean squared error or other metrics using squared errors (Willmott, 2005). It is calculated according the equation 8.

$$MAPE = \frac{1}{m}\sum_{i=1}^{m}\frac{\sum_{t=1}^{Ti}|Y_{it} - \hat{Y_{it}}|}{\sum_{t=1}^{Ti}Y_{it}} = \frac{1}{m}\sum_{i=1}^{m}\frac{\frac{\sum_{t=1}^{Ti}|Y_{it} - \hat{Y_{it}}|}{T_i}}{\bar{Y_{it}}}, \tag{8}$$

where: m –the number of objects in the dataset;

T_i – the period of work for *i* restaurant

As we calculate errors for all objects, *MAPE* shows the average absolute error of the model in percent of the average value of the dependent variable in our case. In other words, MAPE is the ratio of average error of average month revenue prediction to average month revenue. The more predictive power of the model has, the lower *MAPE* is. It will be useful for further interpretation of the metric.

Empirical results

We turn to the results of our work in terms of comparison quality of revenue prediction for restaurants. Out-of-sample prediction for a city assumes creating a training model on the sample that does not contain any information about the city for what we make a prediction for. Table 1 shows measures of accuracy (*MAPE*) for out-of-sample prediction as an error percentage of mean overall monthly revenue.

Table 1 Prediction power of estimators

	Mean (in rubles)	SD (in rubles)	MAPE
y_{test}	2 643 306	1 571 221	-
Model for $\hat{y}$:			
OLS	2 367 107	1 476 862	38.2%
OLS on subsample	2 332 341	1 622 088	41.3%
OLS with weighting	2 365 270	1 461 773	**36.6%**
ELNET	2 324 616	1 123 046	34.5%
ELNET on subsample	2 453 445	1 518 215	37.7%
ELNET with weighting	2 296 467	1 096 400	**33.3%**
SVR	2 387 787	1 271 85	**32.8%**
SVR on subsample	2 353 508	1 301 179	33.4%
RF	2 379 884	959 41	**30.7%**
*Number of observations (*n*)*		5 889	

Number of objects (m)	184
Number of predictors (k)	43

The model estimated with the best least squared method gives the worst prediction in comparison with other methods. The lowest *MAPE* is 33.29% there. The main weakness of the method is inflexibility when only the model specification is versatile. Nevertheless, there are some ways to improve the result, using special techniques.

With the improvement model from *OLS* to *ELNET*, *MAPE* decreases from 38 to 34.5%. It proves the benefits of regularization methods usage in the case of the high number of correlated variables. Modifying the least squares method with weighting function (optimal value of parameter γ is equal to 0.8) also improves the predictive power of the model. It decreases the variability of predictions (*SD* falls) with error level. Estimating model on a subsample does not improve any model. The possible reason is in a small number of objects in the dataset when uncommon observations give additional information rather than damage it. Similar conclusions are associated with estimating *SVR* on a subsample. Overall, combining several methods (elastic net method and weighting function) allows achieving the best quality of out-of-sample prediction for the least squared method.

SVR and *RF* regressions regression outperforms results of other methods: *MAPE* is 32.8 and 30.7% respectively. The random forest method works better than other models at the regression problem with heterogeneity by construction. *RF* does not reveal averaged relations and does not extrapolate relations between variables to uncommon values of these variables. That is the reason why it is useless for predictions revenue in atypical cities. However, it is the best among the considered method for predicting. That is to say, for our sample with 299 cities the *RF* regression model has the best predictive power. It gives the prediction differs from the actual value on 30.7% (up or down) of average monthly revenue in the city.

To sum up, we compare the predictive power of some models on the dataset with heterogeneity problem and correlated variables. Results show that random forest regression has properties to overcome both problems and has the lowest mean absolute error. Moreover, we show the advantages of weighting observations in the estimating process and possible drawbacks of estimating models on subsamples.

Conclusion

In this work we tried to describe the methodology of constructing a model with the best predictive power to forecast revenue in the restaurant.

Creation a model allows narrowing down a list of cities where it is possible to make the choice of optimal restaurant location, to start a business and to save time and resources. Researchers should be careful in using the results of the model as a number of restrictions exist. There are some unobservable and hardly measured differences between cities that model does not take into account, hence the additional analysis of results by an expert is necessary. It is worth to note that the model compares cities without using any information about locations inside the city. Therefore, the model works under the assumption that inside each of cities the best locations are equally profitable and again researcher have to check availability profitable location inside the chosen city and if it is not available to go to the second preferred by the model city and so on.

We described methods of heterogeneity elimination in the model: weighting observations and data partition with the following estimation on subsamples. Additionally, we suggested some ways of dealing with partial multicollinearity: an elastic net method, support vector and random forest regressions.

We showed advantages of those methods under different assumptions and proved some statements at the problem of revenue prediction. Generally, estimating the model with an ensemble (for example, random forest, bagging or boosting) is the most effective way to overcome heterogeneous features.

Basically, the work can be extended in two ways. First of all, it is possible to consider other methods of solving data problems: for instance, principal component analysis for reducing the number of correlated variables or more detailed analysis of ensemble algorithms (bagging, boosting, *etc.*). The second way is to use a more accurate approach to compare model prediction power. For each model we can calculate the MAPE confidence interval using the bootstrapping method. Computing such intervals allows comparing the predictive power of models with more certainty.

The results of the work can be naturally extended to a wide range of similar problems with a high number of correlated variables and heterogeneity among observations. These problems often occur in fields of medicine, biology, sociology, and economics. We suggest general methods that can be applied to each of these problems.

References

Arnold D., Quelch, J. New strategies in emerging markets // MIT Sloan Management Review. 1998. No. 40(1). P. 7-20.

Athey, S., Imbens, G. Recursive partitioning for heterogeneous causal effects // Proceedings of the National Academy of Sciences. 2016. No. 113(27). P. 7353-7360.

Berry S., Waldfogel J. Product quality and market size // The Journal of Industrial Economics. 2010. No. 58(1). P. 1–31.

Breiman, L. Heuristics of instability and stabilization in model selection // The annals of statistics. 1996. No. 24(6). P. 2350-2383.

Chang, M., Lin, C. Leave-one-out bounds for support vector regression model selection // Neural Computation. 2005. No. 17(5). P. 1188-1222.

Chiang W. *et al.* An overview of research on revenue management: current issues and future research // International Journal of Revenue Management. 2007. No. 1(1). P. 97–128.

Cristianini N., Shawe-Taylor J. (2000) An introduction to support vector machines and other kernel-based learning methods. Cambridge university press.

Eckstein O., Gary F. The price equation // The American Economic Review. 1968. No. 58(5). P. 1159–1183.

Hing, N. An empirical analysis of the benefits and limitations for restaurant franchisees // International Journal of Hospitality Management. 1996. No. 15(2). P. 177-187.

Kim K., Jogaratnam, G. Effects of individual and organizational factors on job satisfaction and intent to stay in the hotel and restaurant industry // Journal of Human Resources in Hospitality & Tourism. 2010. No. 9(3). P. 318-339.

Kim W., Hong-Bumm K. Measuring customer-based restaurant brand equity // Cornell Hotel and Restaurant Administration. 2004. No. 45(2). P. 115–131.

Knutson, B. *et al*. Consumers' expectations for service quality in economy, mid-price and luxury hotels // Journal of Hospitality & Leisure Marketing. 1993. No. 1(2). P. 27-43.

Lee D. *et al*. Sparse partial least-squares regression and its applications to high-throughput data analysis // Chemometrics and Intelligent Laboratory Systems. 2011. No. 109(1). P. 1-8.

Liu, S*. et al*. Learning accurate and interpretable models based on regularized random forests regression // BMC systems biology. 2014. No. 8(3), P. 17-32.

Nataasha R., Yash S., Mehul D. Restaurant Revenue Prediction using Machine Learning // International Journal of Engineering And Science. 2016. No. 6. P. 91–94.

Neale, M. (2006) Individual fit, heterogeneity, and missing data in multigroup sem. Modeling longitudinal and multiple-group data: Practical issues, applied

approaches, and specific examples. Hillsdale, NJ: Lawrence Erlbaum Associates.

Norman W. Factors affecting retail sales in small and mid-size cities // Community Development. 2018. No. 49(4). P. 469–484.

Wahlberg O., Small town center attractiveness: evidence from Sweden // International Journal of Retail & Distribution Management. 2016. No. 6. P. 465–488.

Berthon P. *et al*. Beyond market orientation: A conceptualization of market evolution // Journal of Interactive Marketing. 2000. No. 14. P. 50–66.

Poldrugovac K. *et al.* Efficiency in the hotel industry: an empirical examination of the most influential factors // Economic research. 2016. No. 29(1). P. 583-597.

Willmott C., Matsuura, K. Advantages of the mean absolute error (MAE) over the root mean square error (RMSE) in assessing average model performance // Climate Research. 2005. No. 30(1). P. 79-82.

Appendix

Appendix 1

Descriptive statistics of key variables

VARIABLE	TYPE OF VARIABLE	MINIMUM	MAXIMUM	MEAN
REVENUE (IN 2017 RUBLES)	Continuous	95	9867720	2664819
PROFITABILITY OF SALES	Continuous	-0.3	1.0	0.3
YEAR	Factor	2015	2018	-
MONTH	Factor	1	12	-
QUARTILE	Factor	1	4	-
PART OF REVENUE FROM DELIVERY IN TOTAL REVENUE	Continuous	0.0	1.0	0.6
MONTHS AGO IT WAS OPENED	Integer	1	86	59.0

CURRENT MONTH OF WORK	Integer	1	87	17.1
POPULATION (IN PEOPLE)	Continuous	5223	12184015	1225651
AVERAGE WAGE (IN 2017 RUBLES)	Continuous	19800	91800	39979
AVERAGE CASHIER WAGE (IN 2017 RUBLES)	Continuous	11000	45000	24844
COMMERCIAL REAL ESTATE PRICE (IN 2017 RUBLES)	Continuous	12500	90000	24822
THE NUMBER OF COMMERCIAL REAL ESTATE ADS	Integer	1	51	6.07
DUMMY IF THE CITY IN 2GIS	Factor	0	1	-
NUMBER OF OPENED FRANCHISED RESTAURANTS IN THE CITY	Integer	1	31	4.1
NUMBER OF ALL OPENED PIZZERIAS	Integer	0	587	113.6
PROPORTION OF CHEAP PIZZERIAS AMONG ALL PLACES IN THE CITY	Continuous	0.00	0.70	0.24
PROPORTION OF EXPENSIVE PIZZERIAS AMONG ALL PLACES IN THE CITY	Continuous	0.00	0.71	0.26
PROPORTION OF CHEAP PIZZERIAS PER 100 THOUSAND PEOPLE AMONG ALL PLACES IN THE CITY	Continuous	0.00	4.92	0.14
PROPORTION OF EXPENSIVE PIZZERIAS PER 100 THOUSAND PEOPLE AMONG ALL PLACES IN THE CITY	Continuous	0.00	5.58	0.18

SOLVING THE PROBLEM OF INEFFECTIVE SUBSIDIARY: THE IMPACT OF INTRAORGANIZATIONAL NETWORKS

ELENA ARTYUKHOVA, ANTONINA MILEKHINA, VALENTINA KUSKOVA

Abstract

The problem of effective management of company subsidiaries has been on the forefront of strategic management research since early mid-1980s. Recently, special attention is being paid to the effect of headquarters - subsidiary conflicts on the company performance, especially in relation to the subsidiaries' resistance, both active and passive, to following the directives of the headquarters. A large number of theoretical approaches have been used to explain the existence of intraorganizational conflicts. For example, Strutzenberger and Ambos (2013) examined a variety of ways to conceptualize a subsidiary, from an individual up to a network level. The network conceptualization, at present, is the only approach that could allow explaining the dissimilarity of the subsidiaries' responses to headquarters' directives, given the same or very similar distribution of financial and other resources, administrative support from the head office to subsidiaries, and levels of subsidiary integration. This is because social relationships between different actors inside the organization, the strength of ties and the size of networks, as well as other characteristics, could be the explanatory variables that researchers have been looking for in their quest to resolve varying degrees of responsiveness of subsidiaries, and – in fact – headquarters' approaches – to working with subsidiaries. The purpose of this study is to evaluate the variety of characteristics of networks formed between actors in headquarters and subsidiaries, and their effects on a variety of performance indicators of subsidiaries, as well as subsidiary-headquarters conflicts. Data is being collected in two waves at a major Russian company with over 200,000 employees and several subsidiaries throughout the country.

Introduction

In today's management studies, a lot of attention is devoted to the subsidiary autonomy and its impact on the interaction with the headquarters of large companies [1,2]. Beginning from the 1990s, it was on the forefront of strategic management studies [3,4], and the wide variety of studies have examined the questions of conflict between parts of organization (e.g., [5]), and more importantly, the refusal of the subsidiaries to comply with headquarters' requests [5].

The importance of this topic cannot be underestimated, as subsidiary performance has been shown to have an impact on the overall company's strategic development [6,7], and the subsidiary autonomy especially was shown as one of the most important factors affecting that performance. In turn, there are a number of factors, shown to have an impact on the subsidiary autonomy: access to resources and long-term commitments [8], level of headquarters' formalization and related control mechanisms [8,9], level of innovativeness, and subsidiary size. While multiple factors of the relationship between subsidiary autonomy and overall company performance were examined, most studies examined the effects of tangible

attributes, such as finances (e.g., profitability [10], level of competition [11], etc.), very little is known about the impact of individual employees and their relationships on subsidiary effectiveness. Some studies have shown that an important factor in the subsidiary-headquarters relationship is the social networks built between the main office and its branches [12], but at this point, the exact mechanisms of subsidiary performance that individual relationships affect, remain unclear.

Especially interesting is the idea that social networks built within a subsidiary may help or harm its relationship with headquarters. Several studies have looked at the role of social capital in subsidiary-headquarters conflict (e.g., [3,5]). Other studies looked at the relationship between social networks and knowledge transfer [13]. Yet another group of studies have examined the role of human resource management practices [7]. To the best of our knowledge, however, previous studies have not looked at the employee perceptions of relationships with headquarters, formed within social networks, and how these perceptions affect the headquarters-subsidiary relationships. Understanding the roots of conflict - where they start on personal relationship level - can help the management build more effective professional networks, and as a result, more effective companies.

This paper reports on a study designed to fill an important gap in our understanding of the relationship between organizational social structure subsidiary headquarters relationship. The study was conducted in a large energy distribution company in Russia and all of its subsidiaries throughout the country. Employees provided data on their communication networks and important organizational and job characteristics, previously shown to be related to perception of conflict and justice. This is the first study of several, designed to address the important gaps in understanding listed above.

Headquarters-Subsidiary Relationship: Theoretical Considerations

According to the broad body of literature on the relationship between company divisions, headquarters (HQ) play a number of important roles, identified by Ghoshal and Bartlett [4]: *implemementor, black hole, contributor, and strategic leader.* These roles are developed based on the dependence of the subsidiary on its environment and access to resources. While this approach is well-established and researched, it leaves very little in terms of the understanding of how the HQ and the subsidiaries formulate their unique relationships.

Another approach describes the closeness of the relationship between HQ and subsidiaries: the more they are dependent on each other, the more of an advantage the company has in the uncertain industry environment. HQ are responsible for creating a unified vision of the company's goals and objectives among its subsidiaries and establish a system of organizational learning [14]. The correspondence between HQ and subsidiaries is established on both the formal and

the informal levels. On the formal level, it's the collection of company's rules and procedures; on the informal - trust, personal development, and other intangible human relations constructs that establish the unique organizational culture. Kostova and Roth [14] also establish each subsidiary as a unique network, where there are certain people, called *boundary spanners*, who act as bridges between headquarters and subsidiaries. At first they form their individual social capital, which later, through the mechanisms of knowledge transfer, turn into *public social capital* [14]. This shared vision of the company's goals and objectives allows to increase the level of personal motivation and the resulting company performance.

The "headquarters-subsidiary relations" were also examined from the standpoint of the agency theory [15], where the HQ is the principal and the subsidiary is the agent. This theory is mostly concerned with assymetry of information, where formal rules may create lack of proper communication, and lack of control can generate moral hazard. Several methods are recommended as measures of control from the HQ, taking into account both the formal and the informal relationships between company parts. However, this theory completely ignores the personal relations between managers and employees and the role of social capital.

A large body of literature is devoted to another approach to the HQ subsidiary relationship, explained by role theory [16]. From this approach, every part of the organization has people who disseminate information in the network. Also, there are network brokers, who coordinate the actions of others in the network; then - innovation sponsors, who generate and distribute new ideas, network structuring agents and many others. This theory makes it possible to explain why and how the organizational network can be managed, and the HQ can use the knowledge generated by testing this theory in order to manage the subsidiary more effectively.

Social networks play an important role in understanding the structure of social exchange [17]. For example, Burt [18] looked at competitive advantage that is created by social capital, and both the positive effects of such capital and negative effects (in case of gossip). In the relationship between headquarters and subsidiaries, the impact of individual networks has not been thoroughly investigated. According to Harzing and Feely [19] only a handful of studies have examined various network-related communication barriers, information distribution problems, and corporate culture differences. However, the impact of networks between individual employees of different organizational units on the organizational effectiveness remains largely unknown. Therefore, this analysis is largely exploratory, designed to look at the relationship between individuals' network characteristics and various measures of organizational outcomes.

Method and Analysis

<u>Sample:</u> For our research sample was gathered within a Russian electricity supplying firm with 8 regional departments and 41 subsidiaries. Unique feature of the firm is its geographic spread within Russia. The company operates only within one country which minimizes the cultural difference of people in subsidiaries. However its geographical spread is very large due to the fact that company is

represented in 74 regions of Russian Federation. Such geographical spread is typical of multinational companies (MNC).

Respondents were key employees of manager level and above in subsidiaries. We resulted with 201 usable responds. 104 of respondents were female, average age of 37.3 years. Data collection was not anonymous, but respondents were assured of full confidentiality of data. Questionnaire consisted of 3 parts: sociodemographic (or introductory) part, network information part and survey on perception of headquarter by subsidiary employees. In network part respondents were asked to indicate employees of the firm with whom they have a connection. They were also asked to indicate type (friendship, professional, support and boss-subordinate) and strength (on scale from 1 to 7) of connection. In order to induce the respondents to mention not only coworkers from the same subsidiary, but also from headquarters general questions on working with headquarters were asked in introductory part. As third part of questionnaire we used survey on perception of headquarters based on approach suggested by Roth and Nigh [3]. The survey was conducted in Russian language.

Dependent Variables: Questionnaire covered a large number of constructs related to perception of conflict between headquarters and subsidiaries by employees. Basing on the answers of respondents in the second wave, we include in our model 5 constructs: Perception of rules, Manager interactions, Noncontingent reward and punishment, Feedback and Feedback speed.

Perception of Rules. This concept reflects the subsidiary employees' perception of independence level of their actions. The more rules are induced by headquarters the less independent employee feel. This may also lead to the perception of the firm structure as bureaucratic.

Manager Interactions. This construct measures the perception of managers' interconnection within the whole firm. The more interconnection leads to higher level of successful collaboration.

Non-Contingent Reward and Punishment. This construct reflects the subsidiary employees' perception of fair treatment by headquarters. The more reward or punishment is connected to actual effort, the higher is perception of fair treatment.

Feedback Quality. This construct reflects the perception of receiving appropriate feedback from headquarters. Receiving appropriate feedback leads to behaviour correction and performance improvement [20].

Feedback Speed. This construct is also related to feedback as previous one, but it reflects different aspect of feedback, namely timeliness of feedback.

<u>Independent Variables:</u> We use as independent variables characteristics of the communication networks, formed in the first wave. Networks characteristics were calculated for each respondent on both four types of relationship and whole network. Five characteristics included into final model are described below.

Krackhardt-Stern E-I Indices for Network of Friendship and for Network of Support Relationship. Krackhardt-Stern E-I Ratio is a measure of homophily [21]. It measures relationship between external and internal ties. In our research we regard a person from the same region as respondent as internal tie (within-group) and a person from different region as external tie (between-group).

Strength of Ties for Network of Boss-Subordinate Relationship. It measures the weighted degree of nodes in boss-subordinate relationship. Tie weights were measured on 7-point scale of Likert-type.

Closeness to High-Ranked Nodes in Network of Friendship. Closeness centrality was developed by Bavelas [22]. Closeness centrality is a measure of shortest paths between the node and all other nodes in a graph.

Number of Ties (Degree) in Network of Support. Degree is number of ties a person has.

As well we include in the model constructs, which reflect behavior of respondents in the first wave: Perception of rules, Manager interactions, Noncontingent reward and punishment, Feedback and Feedback speed.

Analysis

All data were analyzed using structural equation modeling (SEM) in Lisrel 8.8 and network structure was analyzed using R. Network characteristics were then used as inputs into theime-series structural model. The resulting general estimation procedure for the structural model followed the standard SEM algorithm [23].

Preliminary results

When we have only the data from the first wave, we have conducted one-period analysis. The results obtained were:

-        Having established rules and understandable practices have a good influence on perception of headquarters and its' practices by subsidiaries.

-        Having a big and diverse network of friends and support may influence negatively the perception of headquarters and its' practices.

But this model explores the relationship at only one time period. Now we use time series approach to obtain more generalized results.

References

1. Ferner, A., et al.: Dynamics of central control and subsidiary autonomy in the management of human resources: case-study evidence from US MNCs in the UK. Organ. Stud. 25, 363–391 (2004). https://doi.org/10.1177/0170840604040041

2. Edwards, R., Ahmad, A., Moss, S.: Subsidiary autonomy: the case of multinational subsidiaries in Malaysia. J. Int. Bus. Stud. 33, 183–191 (2002). https://doi.org/10.1057/palgrave.jibs.8491011

3. Roth, K., Nigh, D.: The effectiveness of headquarters-subsidiary relationships: the role of coordination, control, and conflict. J. Bus. Res. 25, 277–301 (1992). https:// doi.org/10.1016/0148-2963(92)90025-7

4. Ghoshal, S., Bartlett, C.A.: The multinational corporation as an interorganizational network. Acad. Manag. Rev. 15, 603–626 (1990). https://doi.org/10.5465/amr.1990.4310825

5. Schotter, A., Beamish, P.W.: Performance effects of MNC headquarters-subsidiary conflict and the role of boundary spanners: the case of headquarter initiative rejection. J. Int. Manag. 17, 243–259 (2011). https://doi.org/10.1016/j.intman.2011. 05.006

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6. Andersson, U., Forsgren, M., Holm, U.: The strategic impact of external networks: subsidiary performance and competence development in the multinational corporation. Strateg. Manag. J. 23, 979–996 (2002). https://doi.org/10.1002/smj.267

7. Fey, C.F., Bj¨orkman, I.: The effect of human resource management practices on MNC subsidiary performance in Russia. J. Int. Bus. Stud. 32, 59–75 (2001). https://doi.org/10.1057/palgrave.jibs.8490938

8. Hedlund, G.: Autonomy of subsidiaries and formalization of headquarterssubsidiary relationships in Swedish MNCs. In: Otterbeck, L. (ed.) The Management of Headquarters-Subsidiary Relationships in Multinational Corporations, pp. 27–76. Gower Publishing, Aldershot (1981)

9. Egelhoff, W.G.: Patterns of control in US, UK and European multinational corporations. J. Int. Bus. Stud. 15, 73–83 (1984)

10. Delios, A., Beamish, P.W.: Survival and profitability: the roles of experience and intangible assets in foreign subsidiary performance. Acad. Manag. J. 44, 1028–1038 (2001)

11. Birkinshaw, J., Hood, N., Young, S.: Subsidiary entrepreneurship, internal and external competitive forces, and subsidiary performance. Int. Bus. Rev. 14, 227–248 (2005)

12. Nell, P.C., Ambos, B., Schlegelmilch, B.B.: The MNC as an externally embedded organization: an investigation of embeddedness overlap in local subsidiary networks. J. World Bus. 46, 497–505 (2011)

13. Inkpen, A.C., Tsang, E.W.K.: Social capital, networks, and knowledge transfer. Acad. Manag. Rev. 30, 146–165 (2005)

14. Kostova, T., Roth, K.: Social capital in multinational corporations and a micro-macro model of its formation. Acad. Manag. Rev. 28, 297–317 (2003)

15. O'Donnell, S.W.: Managing foreign subsidiaries: agents of headquarters, or an interdependent network? Strateg. Manag. J. 21, 525–548 (2000)

16. Knight, L., Harland, C.: Managing supply networks: organizational roles in network management. Eur. Manag. J. 23, 281–292 (2005)

17. Emerson, R.M.: Social exchange theory. Annu. Rev. Soc. 2, 335–362 (1976) 1

8. Burt, R.S.: Bandwidth and echo: trust, information, and gossip in social networks. In: Casella, A., Rauch, J.E. (eds.) Network and Markets, pp. 30–74. Sage, New York (2001)

19. Harzing, A.W., Feely, A.J.: The language barrier and its implications for HQ subsidiary relationships. Cross Cult. Manag. Int. J. 15, 49–61 (2008). https://doi. org/10.1108/13527600810848827

20. London, M., Smither, J.W.: Feedback orientation, feedback culture, and the longitudinal performance management process. Hum. Res. Manag. Rev. 12, 81–100 (2002). https://doi.org/10.1016/S1053-4822(01)00043-2

21. Krackhardt, D., Stern, R.N.: Informal networks and organizational crises: an experimental simulation. Soc. Psychol. Q. 51, 123–140 (1988)

22. Bavelas, A.: Communication patterns in task-oriented groups. J. Acoust. Soc. Am. 22, 725–730 (1950). https://doi.org/10.1121/1.1906679

23. Bollen, K.A., Long, J.S.: Testing Structural Equation Models, vol. 154. SAGE Publications, Newbury Park (1993)

TAX AUDIT DATA ANALYTICS USING POWER BI: A PROOF-OF-CONCEPT WITHIN AN INDONESIAN CASE

AGUNG DARONO — *MINISTRY OF FINANCE - INDONESIA*; FEBRIAN DANI — *DIRECTORATE GENERAL OF TAX – INDONESIA*

The views expressed in this paper are those of the authors and do not represent the institution with which the authors are affiliated

Abstract:

Tax audit is a measure to ensure that taxpayers have complied with tax laws. Tax auditors are now almost certainly dealing with electronic data, whose size is getting bigger and the format becomes very diverse and complex. Consequently the tax auditor must have reliable tools to deal with such situation. This paper, using the tax audit setting in Indonesia, seeks to present a proof-of-concept (PoC) that explores various possibilities for using Power BI as a tax audit data analytics tools. This study, by limiting its scope to descriptive and predictive analytics, found that Power BI could be used to conduct tax audit data analytics for several areas, including: (1) collecting and transforming data from various formats and sources with relatively large sizes; (2) saving applied-steps related with data transformation as well as audit test to be re-deployed on different audit tasks and at the same time this also establishing the audit logs; (3) performing analysis in the form of data matching to find audit findings that require further confirmation from tax auditors with taxpayers.

Keywords: analytics, descriptive, data integrity, predictive, tax audit

Introduction

In a self assessment tax system, as used in Indonesia in the case of this study, tax audit is a measure to examine the taxpayer compliance. Tax audit in Indonesian tax administration, referring to Law Number 6/1983 (hereinafter "Law of KUP"), is defined as a series of activities to collect and process data, information, and/or evidence carried out objectively and professionally based on an inspection standard to examine compliance of tax obligations and/or for other purposes in order to implement the provisions of tax laws and regulations. The most important thing should be pointed out from such definition relevant to this paper's theme is that tax audit aim to collect evidence. If the term evidence is explored furthermore, in the present time evidence related with a tax audit most likely involves electronic data. In Indonesia, electronic data has been recognized as evidence the current tax administration system as stipulated in Article 28 Law of KUP. On a broader scope there has also been Law 11/2008 concerning Electronic Information and Transaction which regulates the existence of electronic data as evidence can be used in court or litigation procedure.

The issue that arises later is how the tax authorities, or more specifically the tax auditors, deal with audit evidence in the form of electronic data. The results of a study conducted by EY (2016) show that most tax authorities have transformed their business processes towards use of electronic data as well as digitalization for most of tax documentation. For the situation in Indonesia, the Minister of Finance as mandated by the Law of KUP has issued the tax audit standard as part of the overall tax administration legal framework. Minister of Finance Regulation Number 17/PMK.03/2013 concerning Tax Audit Guidelines (hereinafter PMK-17) which some parts of it specify tax audit standards. PMK-17 stipulates that in an audit fieldwork the tax auditors are authorized to obtain electronic data from the taxpayer being audited. Furthermore, for operational purposes, the Director General of Taxes as the tax authority in Indonesia has issued a Director General of Tax Circular Number: SE-25 / PJ / 2013 concerning e-Audit Guidelines (hereinafter SE-25) which regulates how tax auditors obtain and process electronic data to be processed and analyzed to become a tax audit report. SE-25 does not explicitly specify what audit software should be used to process electronic data. This circumstance can be interpreted that the selection of audit tools (i.e. software), by referring to current audit standards, should be decided by the tax auditors themselves based on their professional judgement.

An audit involving financial statements as one of the audit evidence, at all levels and sizes of the audited entity, is now almost certainly in an environment that uses electronic data (AICPA 2017). Included in this scope is a tax audit. In line with that condition, there is an emerging field related to electronic data as audit evidence processing tools and techniques, which is called audit data analytics (Tschakert *et al.* 2016; FRC 2017). This term then defined *as a body of knowledge developed to identify, extract, and recognize patterns or find various anomalies from a group of data so as to provide insights related to all audit activities/stages through various techniques such as analysis, modelling, and visualization* (ISACA 2011; FRC 2017; AICPA 2017; Power et al. 2018; Richardson et al. 2019). One area that can take advantage of the development of audits data analytics is a tax audit (Richardson *et al.* 2019, Pijnenburg *et al.* 2017, Microsoft and PwC 2018). The tax term in this context covers both the taxpayer's side as well as the tax authority. Deloitte (2016) expounds that tax data analytics is a combination of tax technical knowledge, technology, and data in very large sizes to present a deep understanding related to tax management. The use of audit data analytics principles in this tax audit/examination/supervision then referred in this paper as tax audit data analytics.

In connection with the implementation of this audit data analytics, the issues related to it are computational environments such as what can support this activity. There are several software that have been developed natively for the purpose of audit data

analytics, for example: IDEA, ACL, Arbutus or more general data analytics tools such as Hadoop, SAS, R, Python, Alteryx which are applied as audit data analytics (KPMG 2015; OECD 2016:12; De Bonhom *et al.* 2018; Richardson *et al.* 2019:208-231). On the other hand, in the authors's view, there is also a business analytics tool that can be considered as a tax audit for data analytics, namely Power BI Desktop (hereinafter "Power BI").

An interesting point to explore further from the situation as described above is the detailed technical steps of using Power BI as a tool for tax audit data analytics. For this purpose, this paper will deploy proof-of-concept approach, to explore opportunities in the use Power BI as tax data audit analytics tool. Microsoft as owner of this product claims that Power BI is a business analytics tools to enable a fast decision making that supported by adequate information[1]. Power BI is available in two versions, namely desktop and subscription-based. This article will use the desktop version. Power BI is an application that can be obtained freely from the Microsoft website which functions to retrieve, transform, process, model and visualize data from various types of data sources and formats[2].

The next part of this paper will organized as follows. Section two explores the concept of tax audit data analytics and some related literature in this field. Section three will give a brief explanation about Power BI. Section four describes the "proof-of-concept" as method ology of this study. Section five presents discussion and findings. Section six contains conclusions and recommendation on the further development of data analytics in tax audit.

Tax audit data analytics

Power et al. (2018) explains that "analytics" is different from "analysis". The suffix "-ics" in "analytics" means as a body of knowledge while "analysis" means an activity. Meanwhile Davenport and Harris (2007) define "analytics" with the "extensive use of data, quantitative analysis, explanatory and predictive models, and fact-based management to drive decisions and actions". The use of the term "data" indicates the emphasis that this activity involves data. The use of data in analytics is mainly also associated with the term big data analytics as an area of analytics that handles large-scale data with various formats. Sometimes the term "data" is replaced or added to the area related to the implementation of analytics itself so that it appears for example the terms *marketing analytics, business data analytics, forensic analytics,* and so on. There are studies concluded that this analytics is actually a further development of what is previously popular with business

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[1] Business intelligence like never before, https://powerbi.microsoft.com/en-us/

[2] What is Power BI Desktop?, https://docs.microsoft.com/id-id/power-bi/desktop-what-is-desktop

Part 2. Selected papers

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intelligence with several improvements, especially those related to the technology side and the relationship between users from the business area side with ICT specialists in an organization (Kromer and Yu 2008; White and Imhoff 2010; Scherbak 2019).

There are several studies that mention levels in analytics. This level indicates the complexity of the objectives of the data analytics itself. Tschakert et al. (2016) distinguishes this term into three, namely as descriptive ("what is"), predictive ("what will be"), and prescriptive ("what should we do?"). Meanwhile, Richardson et al. (2019) propound four types of analytics, they are:

(1)   descriptive: summarizes activity or masters data based on certain attributes;

(2)   diagnostic: detects correlations and patterns of interest;

(3)   predictive: identifies common attributes or patterns that may be used to identify similar activity;

(4)   prescriptive: recommends action based on previously observed actions.

Using a somewhat different perspective, Scherbak (2019) places more emphasis on what will be revealed from the data analytics performed, by dividing it into three types, namely: know the known, know the unknows, and unknown the unknowns. KPMG (2015) explicates that data analytics related with some tasks to (1) finding patterns and associations between data from a group of data; (2) identification of inappropriate or suspicious data; (3) a combination of data from various types of sources to obtain patterns and relationships between the data so as to obtain an understanding that can support the decision.

Analytics then also influences the overall audit discipline, including financial audits, internal audits, compliance audits or tax audits (AICPA 2017; EY 2017; De Bonhom et al. 2018). This then raises the term audit analytics or auditing data analytics. These two terms are sometimes exchanged. Data analytics audit is a further development of the implementation of computer assisted tools and techniques (AICPA 2017; FRC 2017). A study conducted by FRC (2017) that embraced some public accounting firms in the UK as respondents found that audit data analytics were used to:

(1) analysing of all transactions for stratification and outliers which require further testing;

(2) retesting calculations relating to financial statements;

(3) testing the separation of duties;

(4) comparing internal data with external data;

(5) testing the impact due to differences in assumptions.

AICPA (2017) argues that data analytics auditing is a data analysis method that is used to perform risk assessment, substantive procedures, or concluding audit procedures. Audit data analytics are needed to improve audit quality due to major changes in the business environment related to the use of extensive information technology, the presence of big data and availability of analytics tools.

By using the audit data analytics framework as explained above, tax audit data analytics basically is the application such framework into a tax audit engagement. Tax analytics, tax data analytics or tax audit analytics are terms that are exchanged for use either from the taxpayer side as well as the tax authority. This term illustrates how the development of this analytical framework can be applied from these two perspectives. KPMG (2017) proposes a framework that enables business entity as taxpayer to gain a clear and in-depth understanding of their tax footprint on a global scale. Tax data analytics are expected to identify anomalies and anticipate various tax consequences as part of business decisions. The main task of the tax management function in the business entity is the fulfillment of tax compliance. As part of this area, tax planning is often found as an effort to minimize the tax burden while taking into account the applicable legal provisions. The same thing is conveyed by Deloitte (2016) who affirms that tax data analytics provides some opportunities for taxpayers to understand key drivers and risks related to the taxation aspects of the business entity or even to help tax legal rules interpretation.

Thought that spell out how data analytics should be used by tax authorities are also expressed by Microsoft and PwC (2018) which argues that data analytics have been used either in descriptive or diagnostic way in purpose to provide dashboard or reporting, but not many have used it for predictive or prescriptive purposes. Meanwhile EY (2016) explained that the tax authority can use data analytics on a broader scale because of the amount and availability of data for supervision of compliance or audits because various required reports are in the form of electronic data. A study by OECD (2016) mentions tax authority deploys predictive or prescriptive analytics for various tax administration areas, among others are: audit case selection. In line with this, Pijnenburg et al. (2017) explicates that tax authorities may use data analytics, for examination of formal matters like whether tax payments made by taxpayers are in accordance with tax provisions.

Part 2. Selected papers

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Power bi desktop: a brief description[3]

Principally, Power BI is a software installed on personal computers to read various types of data from various data formats as well as sources like text files, spreadsheet file, XML files, database servers, online services, and then transforms such data into a particular model and then presents it as business intelligence equipped with visualization such as graph or chart. In general, the work of Power BI as an analytics device are

(1) connect to data;

(2) transform and load to a data model;

(3) analysis and reporting using a built-in function or user-defined function including data visualization support

The use of Power BI can be collaborated with the use of MS-Excel. This needs to be emphasized because in certain situations, MS-Excel can also be used as an audit tool but with some limitations (see for example see Darono and Ardianto 2016). But still it must also be noted that for certain jobs such as making confirmation letters or preparing audit reports, auditors will still need MS-Excel (Darono 2010). Table 1 presents the difference between capabilities between MS-Excel compared to those supported by with Power BI. Users can make their own choices, whether using spreadsheet software like MS-Excel as well as native audit software such as: ACL, IDEA or Arbutus, or using Power BI instead. The important differences in features for choosing when users should use Excel native or with the help of Power BI can be seen in Table 1. Two important features provided by Power BI that can be used by auditors to support the work of data analytics that they do are M language and DAX. M language is a part of Power BI that functions to filter and combine, that is, to "mash-up" data to build a data model (Webb 2014; Microsoft 2016) . Whereas DAX is a collection of functions, operators, and constants that can be used in a formula, or expression, to calculate and return one or more values. Stated more simply, DAX helps you create new information from data already in your model[4].

Table 1. Microsoft Excel and Power BI: some relevan features as audit data analytics tool

Features	*MS-Excel 2016*	*Power BI Desktop*

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[3] adapted from https://docs.microsoft.com/id-id/power-bi/desktop-what-is-desktop

[4] https://docs.microsoft.com/en-us/power-bi/desktop-quickstart-learn-dax-basics

Data size	1.048.576 rows by 16.384 columns	using Data Model, depends on RAM provided
Data type	Fixed-width, delimited, XML	Fixed-width, delimited, structured report
Data source	Text file (delimited or fixed-width), database	Text file (delimited or fixed-width), database, web-query, open data, social media platform
Data manipulation		
• *sort & filter*	yes	yes
• *query*	somewhat	yes, with various advanced feature
• *data entry*	yes	yes
Data processing	cell-based	table-based
Data integrity	read, write	read-only
Scripting language	Visual Basic for Applications (VBA)	M-language and DAX
Applied steps	using macro or VBA scripting	built-in (native in M-language) and can be treated as "audit log" as well

source: authors' analysis, adapted from specification provided by KPMG (2015)

Based on the specifications described above, the authors argue that Power BI can be promoted as a tax audit of data analytics because:

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(1) the ability to read various types of data either in a native way or by using M-language or DAX scripts (Data Analysis Expressions);

(2) there is an "Applied-Steps" feature which by default will be formed to store each command so as to facilitate the reuse of the command and on the other hand it can also be used as an "audit-log";

(3) availability of Data Models that can handle very large amounts of data.

Proof of concepts: our approach

The study used a proof-of-concept approach. In authors' view, this approach was chosen because it provides an opportunity to explore various Power BI features that are relevant for the work of tax audit data analytics. Proof of Concept (or PoC) is an exercise to test an idea about a product design. The purpose of a PoC is to show that a function of such tested-products has been working properly and at the same time result form this PoC may be used as a verification of a theory or proposition. PoC places more emphasis on what features will be developed. This is slightly different from "prototyping" which emphasizes more on how the product will be made (Davis 2003; Ferdiana *et al.* 2010; Singaram dan Jain 2018). PoC applied in this study is to adapt various series of data analytics audit procedures which have been developed by AICPA (2017) and Richardson et al. (2019).

PoC is implemented using simulation data of general ledger from dummy company XYZ Corp. The dataset used is a one-year general ledger tax in the format of a fixed-width text file or print-out file. In summary the procedure that will be carried out on tax audit data analytics will show how Power BI can do data analytics so that it can assist the tax auditor and can efficiently obtain audit findings from the data obtained from the taxpayer. Audit data analytics in this PoC only covers descriptive and predictive, not prescriptive analytics.

Discussion: the proof of concepts and findings

This section will explain the implementation of the PoC tax data analytics using Power BI. The data analysis procedure performed is as follows:

(1)   identify taxpayer's data structure

(2)   Power BI initial setup

(3)   extract, transform and load data

(4)   validating for data completeness

(5)   performing tax audit data analytics

1.1.Identify data structure

The step aims to understand the data structure provided by the taxpayer to the tax inspector. As explained before, this case uses XYZ, Corp. It is fictitious taxpayer data in the form of: (1) general ledger in one tax year covering all transactions; (2) financial statement mapping; (3) list of keywords.General Ledger data is given in the format of a report text file whilst financial statement mapping and list of keywords came in XLSX format.

1.1.1. Identify data structure: General ledger

General Ledger data XYZ Corp with text format consisting of 12 files from January to December 2016 as shown in figure 1.

Name	Date modified	Type	Size
01 January.txt	26/05/2019 12.17	Text Document	79 KB
02 February.txt	26/05/2019 12.20	Text Document	95 KB
03 March.txt	26/05/2019 12.21	Text Document	106 KB
04 April.txt	26/05/2019 12.21	Text Document	171 KB
05 May.txt	26/05/2019 12.28	Text Document	150 KB
06 June.txt	26/05/2019 12.21	Text Document	133 KB
07 July.txt	26/05/2019 12.21	Text Document	136 KB
08 August.txt	26/05/2019 12.22	Text Document	104 KB
09 September.txt	26/05/2019 12.22	Text Document	86 KB
10 October.txt	26/05/2019 12.22	Text Document	93 KB
11 November.txt	26/05/2019 12.22	Text Document	82 KB
12 December.txt	26/05/2019 12.22	Text Document	93 KB

Figure 1 Taxpayer's general ledger file in report text format

In the next steps, we have to specify the regional format and Header-Details of the General Legder data. Regional format is used to determine column formats that contain dates as well as columns that contain numbers in regard with format that used in a specific country. In general there are three types of region formats that are often found in Indonesia, namely Indonesia, English Unites States and English United Kingdom. Comparison of the three types of regional formats can be seen in the table 2.

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Table 2 Data format comparation

Region	Date Format	Number Format
Indonesia	DD/MM/YYYY	1.000.000,00
English (United States)	MM/DD/YYYY	1,000,000.00
English (United Kingdom)	DD/MM/YYYY	1,000,000.00

Whereas the work for determining Headers-Details aims to distinguish which lines contain headers and which lines contain detailed transactions from a data so that it can contain a table that is ready to be processed. To determine both of these, let's open one of the files, for example "01 January.txt" and the results of the determination are like in figure 2.

Figure 2 Determine which lines are either headers or details

From the Figure 2 it is known that in the General Ledger data there is no information about account name. Account name information can be found in the Financial Statement Mapping data. For this purpose, we will combine those two data into single table on the General Ledger.

1.1.2. Identify data structure: Mapping Financial Statement

Mapping Financial Statement data consists of Chart of Account data that has been classified into accounts as spesified in the audit report. This data is already in the form of XLSX format therefore this data already in the form to be further processed. This data is very important to obtained because we need an Account Name that is not available on General Ledger.

Account	Account Name	Mapping	Indeks
10.1.01.001	PETTY CASH	Cash and Bank	1
10.1.01.002	CASH ADVANCED	Cash and Bank	1
10.1.01.003	CASH USD	Cash and Bank	1
10.1.01.004	CASH BATH	Cash and Bank	1
10.1.02.001	DANAMON CURRENT	Cash and Bank	1
10.1.02.003	ABN AMRO	Cash and Bank	1
10.1.02.004	CITI BANK IDR6	Cash and Bank	1
10.1.02.005	CITI BANK IDR14	Cash and Bank	1
10.1.02.006	CITI BANK USD502	Cash and Bank	1
10.1.02.007	CITI BANK USD529	Cash and Bank	1
10.1.03.001	DEPOSIT USD	Deposit	2
10.1.03.002	DEPOSIT IDR	Deposit	2
10.1.04.001	ACCOUNT RECEIVABLE	Account Receivable	3
10.1.05.001	INVENTORY REFRIGERATOR	Inventory	4

Figure 3 Maping Financial Statement data

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1.1.3. Identify data structure: Keywords

This Keywords file contains data about some words that in turn could be used to determine whether every single record of data has its tax consequence or not. Suppose that in the description column there are words that contain word "sales", then this line of transaction should be considered as a tax Value Added Taxes-payable that must be withheld by the XYZ Corp. The Keywords table available in this case, contains the words collected by the authors based on thir audit experience that are often used by various companies in Indonesia. Keywords will be deployed in term of performing prescriptive analytics using sentiment analysis techniques. This data is already in the Excel format, no need any data format adjustments.

Words	TaxId
SALES	Value Added Tax (VAT)
JUAL	Value Added Tax (VAT)
ACCRUED TAXES VAT	Value Added Tax (VAT)
WELFARE	Non Deductible
SCHOOL	Non Deductible
UNIFORM	Non Deductible
COMMUNITY	Non Deductible
POLICE	Non Deductible
WATCHMAN	Non Deductible
ENTERTAIN	Non Deductible
DONATION	Non Deductible
BENEFIT	Non Deductible
FOOD	Non Deductible

Figure 4 List of keywords as taxing parameter of each of General Ledger data

1.2. Power BI Desktop initial setup

Before extracting data, first we set up the Power BI Desktop related to Regional Settings, Autodetect and Autodetect Relationship. This is because every time you open a new Power BI Desktop, the initial settings will follow the default of Power BI Desktop. The setting step are:

a. Open Power BI Desktop → File → Options and settings → Options

b. Regional Settings → select Indonesia

c. Data Load → Uncheck the Type Detection option and Autodetect Relationship

Those steps are done to avoid Power BI automatically validate data types and create relationships due to this step will be done manually

1.3.Extract, Transform and Load Data

After we identify the data structure received from the taxpayer and make initial arrangements for Power BI, we will then process Extract, Transform and Load (ETL) from General Ledger, Mapping Financial Statements and Keywords to Power BI.

1.3.1.Data Extraction and Transformation: General Ledger

The extraction steps and transform the General Ledger file are as follows:

a.   Click Home → Get Data → More → Folder → Connect → Browse to the General Ledger Folder → Ok

b.   In the Overview window select Combine & Edit

c.   In the Combine File window, the Power Query Editor will read one sample data and find out that the delimiter used is a tab. In order to avoid errors in determining the data type in each column for the Data Type Detection option we should select "Do not detect data types", then click Ok.

d.   To check whether all General Ledger data combined by Power Query can be done by looking at the filter column in the Source Name column
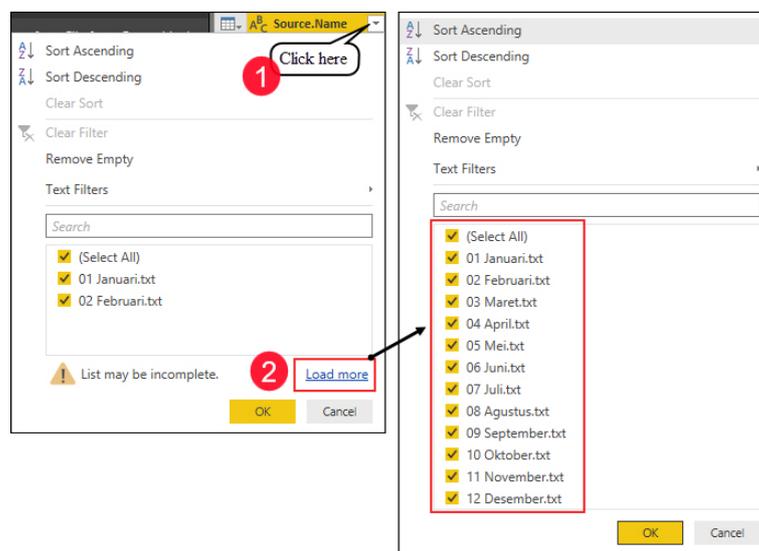
Figure 5 Result of combining 12 files of general legder data

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Based on the Figure 5, shows that the all general ledger data has been combined by Power Query Editor.

e.   Next change the name of the header by clicking 2x on each of the following: Column1 → Account, Column2 → Journal Line, Column3 → Journal No, Column4 → Posting Date, Column5 → Reference No, Column6 → Description and Column7 → Amount.

f.   Then do the filtration with the aim to only display the detailed transaction data in the Posting Date column by selecting Click filter → Text Filters →Ends With →type "2016"→ Ok

g.   When analyzing using the Amount column addition, it will produce a negative value for accounts with a negative normal balance, such as; Sales. To overcome this, then we first validate the Amount column data type to be decimal number (1.2) then create a new column with Absolute (Net) by clicking Add Column → Custom Column → Fill in the Parameters as shown in figure 6
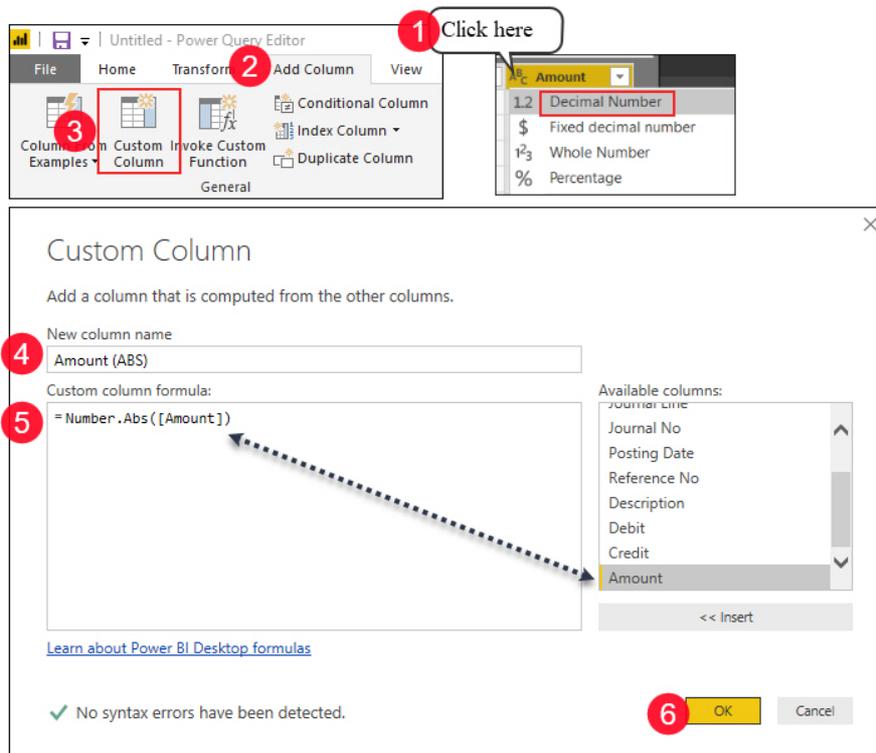
Figure 6 Create "Amount (ABS)" with Add custom column menu

h.   Create a Digit column that contains First Character from the Amount (ABS) column by selecting the Amount (ABS) column → Add Column → Extract → First Characters → Count "1" → Ok Right Click on First Characters → Rename "Digits"

i.   After the extraction data changes to data that only displays the header and details the next step is to validate the data type for each column in the Power Query Editor by clicking the data type button located on the left side of the Headers title of each column. Change the data type of each column to be as follows: Source.Name Text data type (ABC), Account Text data type (ABC), Journal Line Text type (ABC), Journal No Text data type (ABC), Posting Date Date data type, Reference No Text data type (ABC), Description of Text data type (ABC), Amount Decimal Number data type (1.2), Amount (ABS) Decimal Number data type (1.2) and Digit Text data type (ABC)

j.   After that, we create "Debit" column using Add Conditional Column menu by click Add Column → Conditional Column → fill the parameters as shows in figure 7 → Validate the data type to decimal number
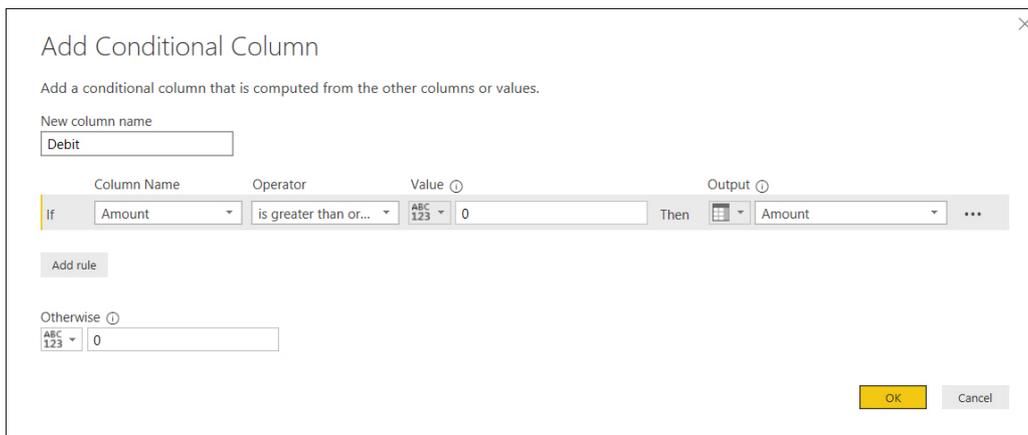
Figure 7 Add Conditional column "Debit"

k.   Then we create "Credit" column using Add Conditional Column menu by click Add Column → Conditional Column → fill the parameters as shows in figure 8 → Validate the data type to decimal number

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Figure 8 Add Conditional column "Credit"

l.   So that the numbers in the Credit column are not negative then we make it become absolute value by right-clicking on the Credit → Transform → Absolute Value

m.   To make it look neater, we move the Amount column to the last by right-clicking on the Amount column → Move → To End header

1.3.2. Data Extraction and Transformation: Mapping Financial Statement

The extraction steps and transform Mapping Financial Statement are as follows:

a.   Click Home → New Source → Excel → Browse to the Financial Mapping File → Open → Navigator, check Mapping Table → Ok

b.   Change the data type of each column to the following: Account Text data type (ABC), Account Name Text type (ABC), Mapping Text data type (ABC) and Index Whole Number data type

1.3.3. Merging General Ledger and Mapping Financial Statement

Next we combine the General Ledger query with the Financial Mapping Statement by using the merge query. The steps are as follows:

a.   Select General Ledger → Home → Merge Queries → Select Matching Column "Account" → Join Kind Left Outer → Ok → Expand "Account Name", "Mapping" and "Index"

b.	To make it look neater, we move the new columns next to the Account to the end by selecting the Account Name, Mapping and Index columns → Drag to the right of the Account

c.	Because the query mapping has been merged with the General Ledger query, we will not load the query to Data Model so we hide it by select Mapping query → "Right Click" → Unchecking Enable Load

1.3.4.Data Extraction and Transformation: Keywords

Extraction steps and transform Keywords files are as follows:

a.	Click Home → New Source → Excel → Browse to the Keyword File → Open → Navigator, check the Keyword Table → Ok

b.	Change the data type of each column to be as follows: Words Text data type (ABC) and TaxId Text data type (ABC)

c.	The query Keyword will not loaded into the Data Model because it will only be used in the Query Editor so we hide it by select Keywords query → Right Click → Uncheck Enable Load

1.3.5.Load to Data Model

After completing the extraction and transformation process, then we load all the data into the Power BI Desktop Data Model by select Home → Close & Apply
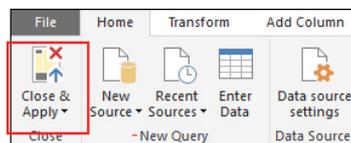
Figure 9 Close & Apply menu

1.4.Validating for Data Completeness

Next first, we create the Trial Balance and Details from the General Ledger to make sure the data to be analyzed is valid and complete.

1.4.1.Create Trial Balance

Creating a Trial Balance that displays data summary Debit, Credit and Net according to Account and Account Name is done by clicking Visualization View → Rename

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"Trial Balance" → select Visualization Table → Enter the columns in the available table in the Value to produce a final look as shown in figure 10
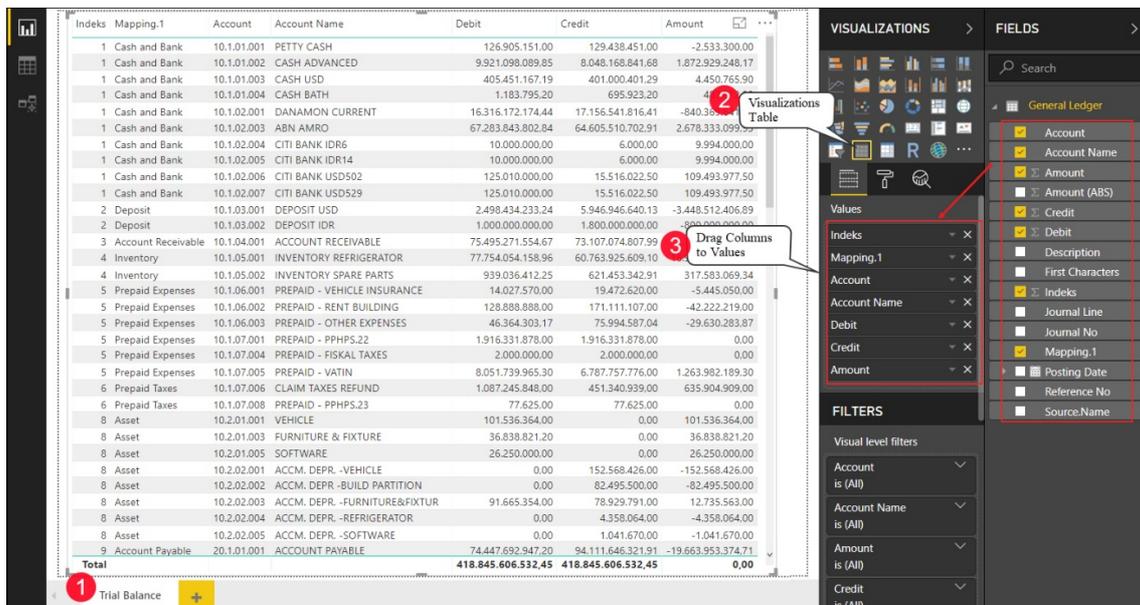
Figure 10 Trial Balance visualization

From figure 10, it is known that the General Ledger data we extracted has been completed which is indicated by the Amount balance value is Rp0.

1.4.2. Create General Ledger details

The step to create a General Ledger Details is to create a new Page → Rename "Details" → Visualizations Table → Enter the columns in the available table in the Values to produce the final look as shown in figure 11
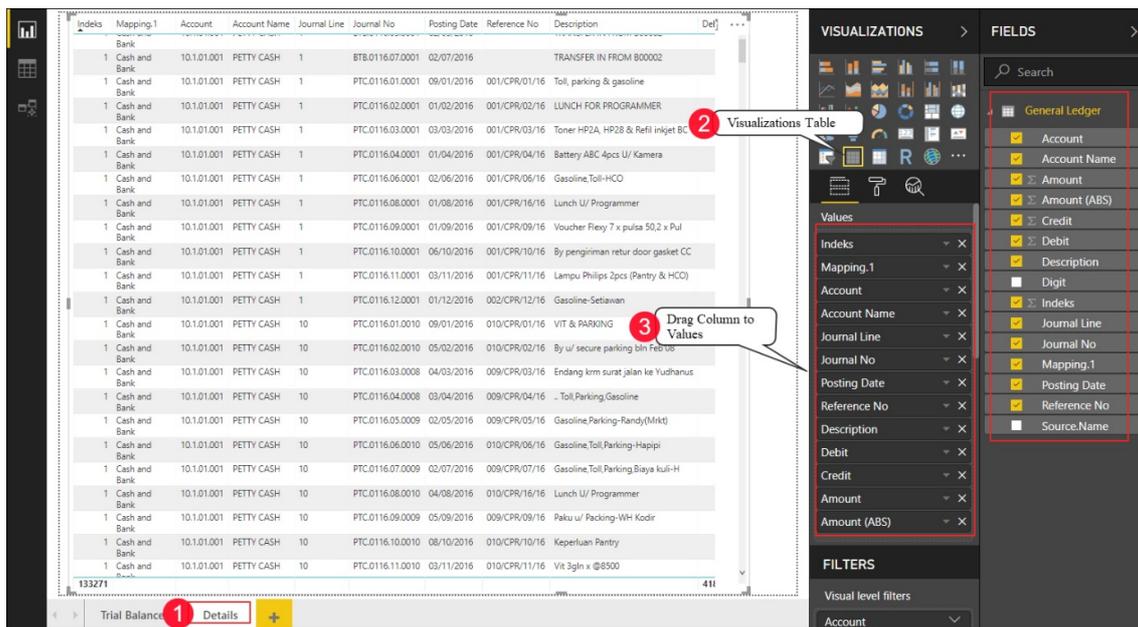
Figure 11 Details visualizations

1.5. Performing Tax Audit Data Analytics

1.5.1. Descriptive analytics

Descriptive Analytics is a type of analytic that provides an overview of data and summarizes a dataset quantitatively. According to (Richardson et al. 2019), these descriptive analytical activity data master elements are based on certain attributes. The auditor may select a number of accounts to verify that they were opened and the documentation exists. Examples of its applications are as follows:

- Age Analysis - groups balances by Date
- Sorting - identifies largest or smallest values
- Summary statistics — mean, median, min, max, count, sum
- Sampling - random and monetary unit

To be clearer, we will deploy summary statistics by using a User Defined Function (UDF) or Custom Function on General Ledger. A custom function is a function that consists of a collection of steps that a user makes to be able to be reused on a data. The following is an overview of the UDF Summary statistics that have been made.

```
1. Descriptive Analytics - Summary Statistics.txt - Notepad                        —    □    ×
File  Edit  Format  View  Help
(Table as table, FieldAccount as text, FieldAccountName as text, FieldAmount as text)=>
let
    #"Grouped Rows" = Table.Group(Table, {FieldAccount, FieldAccountName},
                         {{"Count", each Table.RowCount(_), type number},
                          {"Summarize", each List.Sum(Record.Field(_,FieldAmount)), type number},
                          {"Average", each List.Sum(Record.Field(_,FieldAmount)), type number},
                          {"Median", each List.Median(Record.Field(_,FieldAmount)), type number},
                          {"Min", each List.Min(Record.Field(_,FieldAmount)), type number},
                          {"Max", each List.Max(Record.Field(_,FieldAmount)), type number}}
                          )
in
    #"Grouped Rows"
```

Figure 12 User-defined function "Summary Statistics"

Let's apply it to Power BI Desktop with the following steps

a.　　　Click Home → Get Data → Blank Query → View → Advanced Editor → Copy and Paste UDF "Summary Statistics" An to Advanced Editor → Rename Query 1 → fn Summary Statistics

b.　　　Input Parameters in UDF as shown in figure 13 → Invoke → Rename Invoke Function → Summary Statistics → Home → Close and Apply
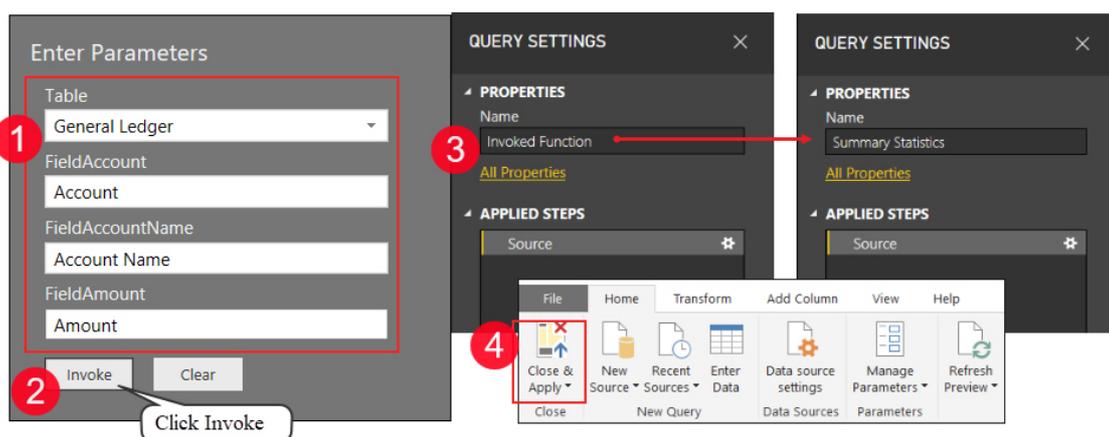
Figure 13 Input UDF "Descriptive Analytics" Parameters

c.   Create a new Page → Rename "Summary Statistics" → Visualizations Table → Drag Columns to Values. The end result is as shown in figure 14. From the results of Summary Statistics, it is known that the total General Ledger records are 15,006 lines.
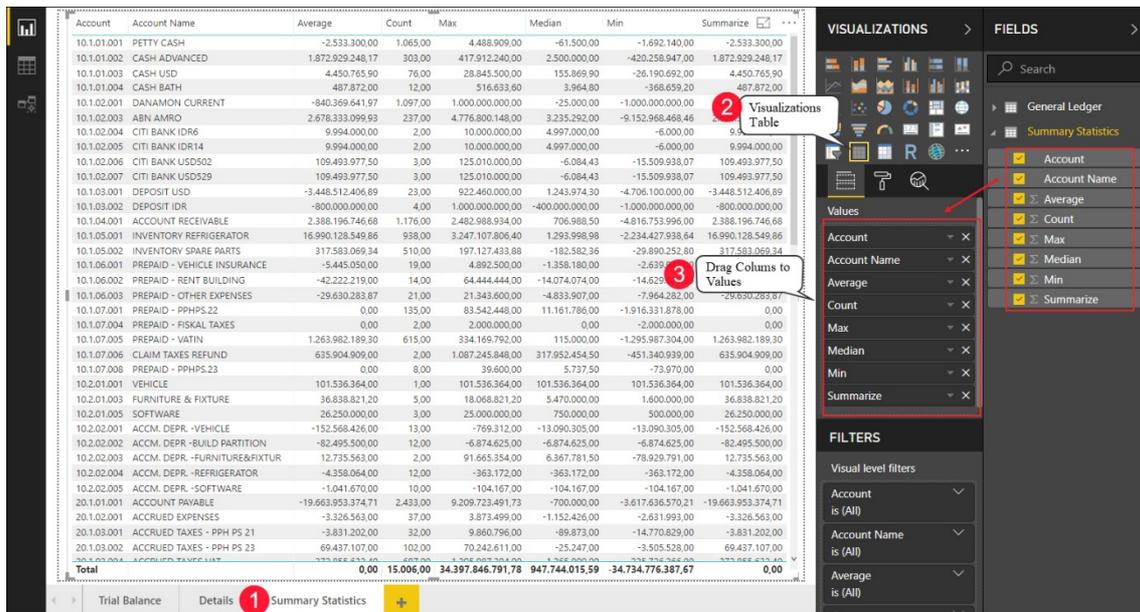
Figure 14 Summary Statistics visualization

1.5.2. Diagnostic analytics

Diagnostic Analytics is kind of data analytic which look for correlations or patterns of interest in the data (Richardson *et al.* 2019). Examples of its applications include:

-        Z-score—outlier detection
-        Benford's law—identifies transactions or users with nontypical activity based on the distribution of first digits
-        Drill-down—explores the details behind the values
-        Exact and fuzzy matching—joins tables and identifies plausible relationships
-        Sequence check—detects gaps in records and duplicates entries
-        Stratification—groups data by categories
-        Clustering—groups records by nonobvious similarities

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To be clearer, we will apply Benford Analysis by using a User Defined Function (UDF) or Custom Function on General Ledger. The following is an overview of the UDF Benford Analysis that have been made.

Figure 15 User-defined function "Benford Analysis"

source: modified from
https://blog.crossjoin.co.uk/2015/03/23/benfords-law-and-power-query/

Let's apply it to Power BI Desktop with the following steps:

a.   Click Home → Get Data → Blank Query → View → Advanced Editor → Copy and Paste UDF "Benford Analysis" to Advanced Editor → Rename Query 1 → fn Benford Analysis
b.   Input Parameters on UDF as shown in figure 16 → Invoke → Rename Invoke Function → Benford Analysis → Home → Close and Apply
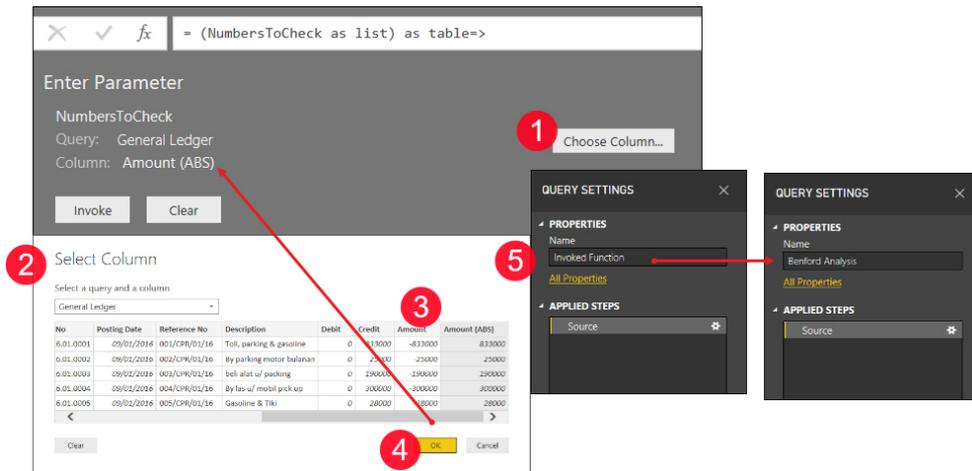
Figure 16 Input UDF "Benford Analysis" Parameters

c.   Create a new Page → Rename "Benford Analysis" → Visualizations Clustered column chart → Drag Columns to Values. The end result is as shown in figure 17
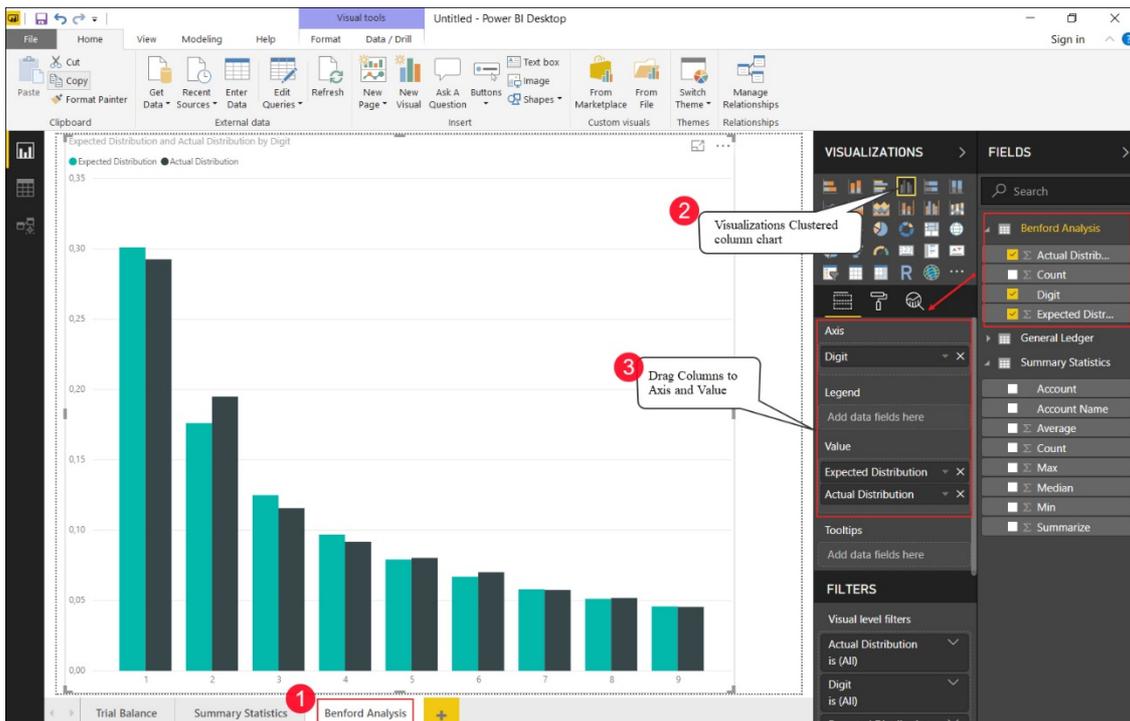
Figure 17 Benford Analysis visualization

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From the results of the analysis it is known that for General Ledger data with digit 2 at the beginning it has a distribution above the Benford Law standard so that it needs to pay more attention to the transaction details.

d.   In order to be able to see all the Details that have digit number 2 at the beginning of the Amount value, we create a relationship between General Ledger and Benford Analysis → Select Details → Drag column Digit to Drillthrough
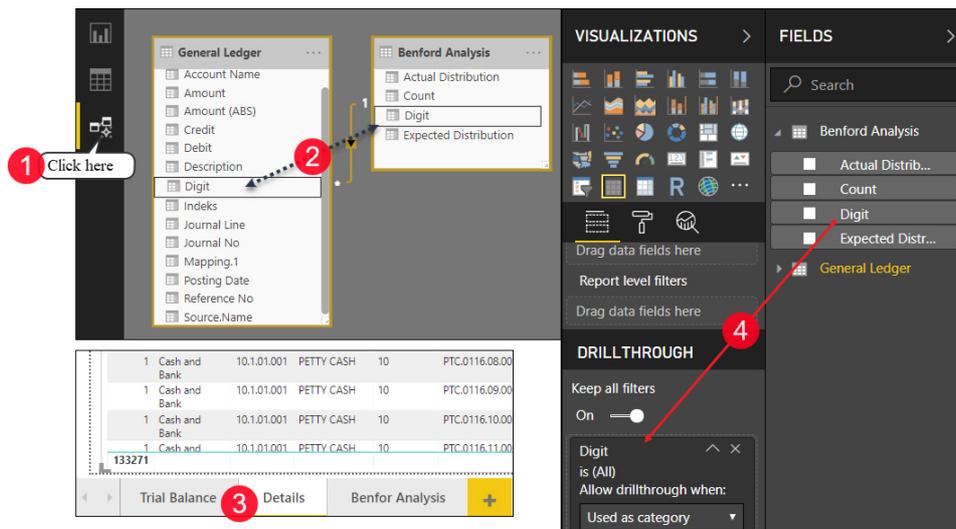
Figure 18 Create relationship between General Ledger and Benford Analysis

Furthermore, select Benford Analysis → Right click on the Actual Distribution number "2" → Drillthrough → Details

Figure 19 Drillthrough to Details

The final result of the display is as shown in figure 20

Figure 20 Result of Drillthrough Digit "2" to Details

1.5.3.Predictive analytics

Predictive Analytics is kind of data analytics that identifies common attributes or patterns that may be used to identify similar activity (Richardson *et al.* 2019). Examples of applications include:

- Regression—predicts specific dependent values based on independent variable inputs
- Classification—predicts a category for a record
- Probability—uses a rank score to evaluate the strength of classification

- Sentiment analysis—evaluates text for positive or negative sentiment to predict positive or negative outcomes

To be clearer, we will implement a Sentiment Analysis that will predict whether a transaction from the General Ledger indicates a tax obligation that arises from the use of words according to the keywords that have been compiled before. This application uses the User Defined Function (UDF) or Custom Function on General Ledger. The following is an overview of the UDF Sentiment Analysis that has been made.

Figure 21 User-defined function "Sentimental Analysis"

Let's apply it to Power BI Desktop with the following steps

a.   Click on Home → Get Data → Blank Query → View → Advanced Editor → Copy and Paste UDF "Sentimental Analysis" to Advanced Editor → Rename Query 1 → fn Sentiment Analysis
b.   Input Parameters on UDF as shown in figure 23 → Invoke → Rename Invoke Function → Sentiment Analysis → Home → Close and Apply
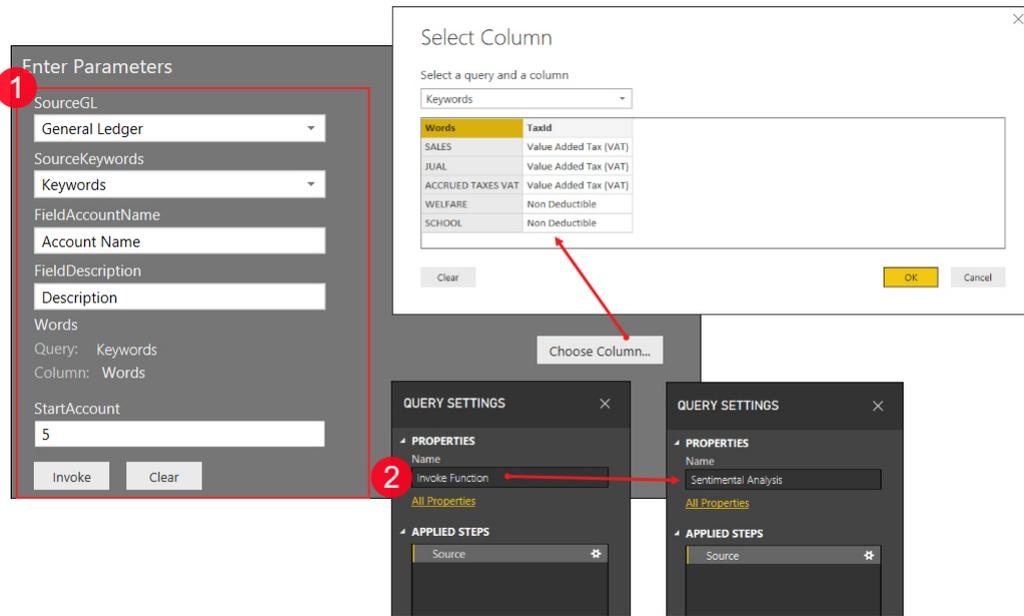
Figure 22 Input UDF "Sentimental Analysis" Parameters

c.   From the results of the analysis using Sentimental Analysis, we can create a Fiscal Report end year by creating a new Page → Rename "Sentiment Analysis Fiscal Report" → Create Visualizations as shown as figure 23
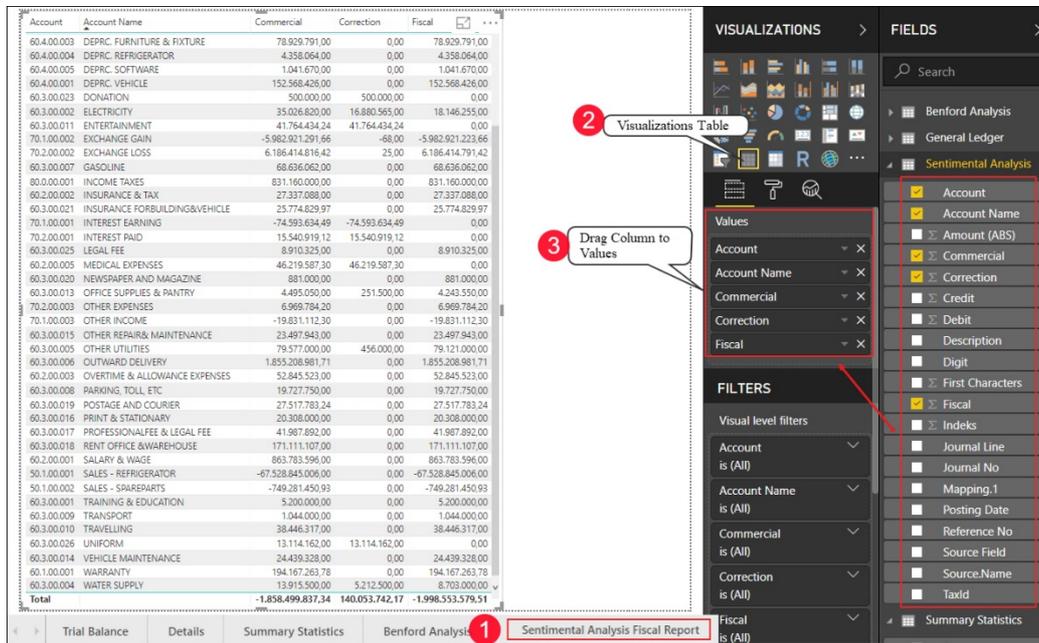
Figure 23 Sentimental Analysis Fiscal Report visualization

d.   In addition, we can also create a list of tax witholding objects, Value Added Taxes and Non Deductibles by creating a new Page → Rename "Sentiment Analysis TaxId" → Create Visualizations as shown in figure 24
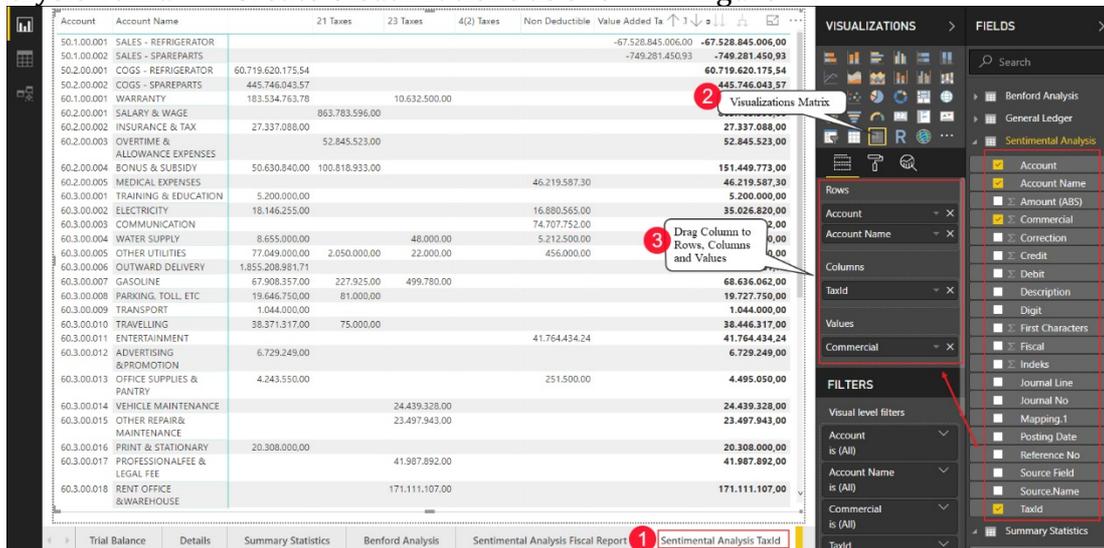
Figure 24 Sentimental Analysis TaxId visualization

Concluding remark

Tax auditors may use BI Power as an alternative in choosing tax audit data analytics tools. Several pivotal advantages of using Power BI as a tax data audit analytics tool are (1) no additional investment due to Power BI licenses; (2) relatively short learning curve for tax auditors to use Power BI because it is not too different from the use of Microsoft Excel. Furthermore, these two software can be combined to complete an audit assignment; (3) the existence of a read only feature as provided by native audit software like ACL or IDEA, so that it will safeguard the data source integrity and validity from unintended actions that may accidentally changed by the tax auditor during audit works, as some parties is worried about this issue wherever the auditor uses Excel as audit tools; (4) "Applied Steps" feature that enable set of codes/setps in an audit case can be deplyoed to another audit case with minimum efforts. The limitations of PoC in this study are that there is still no case as the application of prescriptive data analytics in term of tax audit data analytics works. Based on above conclusions, authors propose the use of Power BI for the purposes of tax audits. On a broader scale, Power BI can be used as a data analytics tool for tax administration. Nor can Power BI be applied as an audit data analytics tool for various types of audits such as financial audits, forensic audits, or internal audits despite audit firm or audited entities size of business.

Referenses

AICPA. 2017. "AICPA Guide to Audit Data Analytics." New York: American Institute of Certified Public Accountants, Inc. (AICPA).

Darono, Agung. 2010. "Use of Data Extraction Analysis Based on Spreadsheet Applications." In *National Seminar on IT Application (SNATI)*.

Darono, Agung, and Danny Ardianto. 2016. "The Use of CAATTs in Tax Audits - Lessons from Some International Practices." *EJournal of Tax Research* 14 (2): 506–26. https://www.business.unsw.edu.au/research-site/publications-site/ejournaloftaxresearch-site/Documents/10_Darono_Ardianto_The_use_of_CAATTs_in_tax_audits.pdf.

Davis, Gordon B. 2003. "Building an International Academic Discipline in Information Systems." In *Exploring Patterns in Information Management: Concepts and Perspectives for Understanding IT-Related Change*, edited by Bo Sundgren, Pär Mårtensson, Magnus Mähring, and Kristina Nilsson. Stockholm, Sweden: The Economics Research Institute.

De Bonhom, Olivier, Erik Gjymshana, Mieke Jans, Daniel Kroes, Marc Marissen, Filip Simpelaere, Jeroen Trumpener, and Sébastien Verachtert. 2018. "Data Analytics: The Future of Audit." Brussel: Instituut van de Bedrijfsrevisoren.

Deloitte. 2016. "Tax Data Analytics: A New Era for Tax Planning and Compliance." Deloitte Development LLC.

EY. 2017. "The Tax Authority of the Future: How Tax Authorities Are Using Analytics to Deliver New Levels of Value." UK: Ernst & Young Global Limited.

Ferdiana, Ridi, Lukito Edi Nugroho, Paulus Insap Santoso, and Ahmad Ashari. 2010. "Learning from the Case Studies, How Global Software Development Process Is Executed in an Agile Method Environment." *Jurnal Buana Informatika* 1 (2): 69–80.

FRC. 2017. "The Use of Data Analytics in the Audit of Financial Statements." Audit Quality Thematic Review. London: Financial Reporting Council (FRC).

ISACA. 2011. "Data Analytics—A Practical Approach." IL, USA: ISACA.

KPMG. 2015. "Data Analytics Basics." presented at the IIA Los Angeles Chapter, Los Angeles.

———. 2017. "Discover the Value in Your Direct Tax Data." Tax Intelligence Solution – Direct Tax. KPMG Australia. kpmg.com/au/taxdataanalytics.

Part 2. Selected papers

TAX AUDIT DATA ANALYTICS USING POWER BI: A PROOF-OF-CONCEPT WITHIN AN INDONESIAN CASE
AGUNG DARONO — MINISTRY OF FINANCE - INDONESIA; FEBRIAN DANI — DIRECTORATE GENERAL OF TAX – INDONESIA

Kromer, Mark, and Daniel Yu. 2008. "Adopting BI in an Organization Using Proof-of-Concept Techniques." *Business Intelligence Journal* 13 (2): 7–12.

Microsoft. 2016. "Microsoft Power Query for Excel Formula Language Specification." Microsoft Corporation.

Microsoft, and PwC. 2018. "The Data Intelligent Tax Administration - Meeting the Challenges of Big Tax Data and Analytics." Netherland: Microsoft and PricewaterhouseCoopers Belastingadviseurs N.V. https://www.pwc.nl/nl/assets/documents/the-data-intelligent-tax-administration-whitepaper.pdf.

OECD. 2016. "Advanced Analytics for Better Tax Administration Putting Data to Work." Paris: OECD. https://read.oecd-ilibrary.org/taxation/advanced-analytics-for-better-tax-administration_9789264256453-en#page1.

Pijnenburg, Mark, Wojtek Kowalczyk, and van der Hel-van Dijk Lissette. 2017. "A Roadmap for Analytics in Taxpayer Supervision." *The Electronic Journal of E-Government* 15 (1): 19–32.

Power, D.J., C. Heavin, J. McDermott, and M. Daly. 2018. "Defining Business Analytics: An Empirical Approach." *Journal of Business Analytics* 1 (1): 40–53. https://doi.org/10.1080/2573234X.2018.1507605.

Richardson, Vernon J., Ryan Teeter, and Katie L. Terrell. 2019. *Data Analytics for Accounting*. New York: McGraw-Hill Education.

Scherbak, Maxim. 2019. "Data Science vs Business Intelligence: Same but Completely Different." *Medium.Com*, 2019. https://towardsdatascience.com/data-science-vs-business-intelligence-same-but-completely-different-1d5900c9cc95.

Singaram, Muthu, and Prathistha Jain. 2018. "What Is the Difference between Proof of Concept and Prototype?" *Entrepreneur.Com India*, 2018. https://www.entrepreneur.com/article/307454.

Tschakert, Norbert, Julia Kokina, Stephen Kozlowski, and Miklos Vasarhelyi. 2016. "The next Frontier in Data Analytics," 2016. https://www.journalofaccountancy.com/issues/2016/aug/data-analytics-skills.html.

Webb, Chris. 2014. *Power Query for Power BI and Excel*. California: Apress.

White, Colin, and Claudia Imhoff. 2010. "Advanced Analytics and Business Intelligence: Term Abuse?" 2010. http://www.b-eye-network.com/view/13797.

THE USAGE OF GAMIFICATION IN MARKETING SURVEYS — OPPORTUNITIES AND CHALLENGES

SNEZHANA MURAVSKAIA, DANIIL MURAVSKII, MARIA KUZNETSOVA — *IBS-MOSCOW (RANEPA), GSOM SPBU, RUSSIA*

Introduction

Consumer survey is one of the most important marketing research methods. Technology development shifted popularity from traditional and phone surveys to online which has several advantages. Thus, online surveys reduce the costs of conducting research, facilitate data processing, and, moreover, allow reaching a wider and more diverse audience of respondents [Evans, Mathur, 2005]. However, despite its advantages, this form of conducting surveys could not solve the problem of low response rate. In contrast, traditional survey forms often have higher response rates [Sax, Gilmartin, Bryant, 2003]. Low response rate may have a negative impact on the quality of data obtained from the results of surveys. For this reason, ensuring high response is an important task in planning and developing research methods.

A number of factors may influence the response rate. Among others are the length of the survey and the interest of the respondent in the research topic [Ray, Tabor, 2003]. For online surveys those factors include personal appeal, indication of importance of certain group participation, indication that respondent was specially selected [Mavletova, 2015] possibility of feedback, subject of the letter, changes in reminders [Manfreda et al., 2008], design, mobile version availability [Dillman et al., 2009], etc. However, these characteristics depend on the design and purpose of a particular study, so their change is not always possible. In some studies, monetary incentives can be used as a stimulating factor. This type of incentive is a common way to increase response to online surveys of various kinds. Some studies show that external stimulation allows you to increase the audience of the survey without shifting the distribution of results [Cantor, O'Hare, O'Connor, 2008; Ryu, Couper, Maran, 2005]. In contrast, there is evidence that the use of external incentives may influence the survey audience, shifting it towards a greater number of female respondents [Parsons, Manierre, 2014]. In addition, such studies do not control the impact of external incentives on the error of the results associated with non-response to the survey (nonresponse bias). An exception is work [Groves, 2005], which did not reveal the effect of stimulation on this error, i.e. the use of incentives did not allow an increase in the representativeness of the responses received. Thus, external stimulation can increase the response of potential respondents to the survey, but at the moment it is impossible to predict exactly how this will affect the representativeness of the results.

Marketing researchers suggest that gamification can be used to create a more enjoyable experience of participating in online surveys [Adamou, 2011; Puleston, 2010]. This aspect is quite important, since the inability to interest the respondent and provide him with a pleasant experience can lead to his undesirable behavior, namely: accelerated survey, random answers, incomplete filling of the questionnaire or insufficient attention [Guin et al., 2012; Puleston, 2010]. At the

same time, a number of studies have shown that the use of gamification can have a positive effect on the perception of the experience of participating in a survey. So gamified polls can be perceived as more pleasant (Guin et al., 2012; Warnock, Gantz, 2017; Cechanowicz et al., 2013).

Gamification can also influence the behavior of respondents. The work of Bailey, Pritchard, Kernohan (2015) revealed that gamification can have a positive effect on the length of responses to open-ended questions. In addition, gamification can also positively affect the number of questions that the respondent answered (Cechanowicz et al., 2013). In contrast, a number of other works could not reveal similar effects when using gamification (Guin et al. 2012, Harms et al., 2015; Brownwell, Cechanowicz, Gutman, 2015). These differences in research results may be partially attributed to the gamification design features in each individual study. So Puleston (2011) noted the positive effect of using the dynamics of time limitation, which is given when answering a question. In contrast, other authors pointed out the negative impact of such a timer associated with the creation of an unnecessarily complex task for the respondent (Cechanowicz et al., 2015). In both cases, the same game dynamics was used, however, differences in its characteristics (2 minutes per question versus 15-30 seconds per question) could determine differences in the behavior of research respondents.

It is also worth noting that various authors define the boundaries of the concept of gamification in various ways in the context of surveys. So Puleston (2011) includes the use of functional-visual elements in this concept (for example, sorting answer options using drag and drop). At the same time, Adamou (2011) assumes that the creation of a game in which the survey is fully integrated should be considered a gamification of polls. These differences should be taken into account when interpreting the results of various studies.

This represented research focuses on the analysis of the application of gamification in the field of marketing surveys. The first part of the section is devoted to defining the boundaries of the concept of gamification as a whole, as well as the distinction between the concepts of game and gamification. The following is an overview of the various approaches that can be used to create gamified surveys, analysis of its pros and cons. Further, for understanding of mechanisms which underlines gamification effects the overview of main theories is presented. Finally, approaches for players' typologies are analyzed in their regard to be used in gamified marketing surveys.

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The study proposes the position that the difference in approaches to gamification is due, above all, to the difference in the assessment of the theoretical foundations of the action and effectiveness of gamification. The paper presents an overview of these theoretical foundations and assesses their potential connection with the effectiveness of gamified systems, in a particular case, marketing surveys. Among the theoretical foundations, there are two main areas: theories of motivation and the theory of the influence of the individual characteristics of the user in the game context (player). Both directions are located at the intersection of such scientific areas as consumer behavior and information management. The work compares more specific theories within the selected areas with their applicability in the context of developing and evaluating gamified marketing surveys, and also raises a discussion about the possible challenges and opportunities gamification brings to marketers.

Analysis of approaches to gamification of marketing surveys

Gamification is a fairly extensive and fruitful field of study in modern management research [Koivisto, Hamari, 2019]. It lies on the intersection of several fields of study: information management, marketing, human-computer interaction, user experience, design-thinking, innovation management and knowledge management. Analysis of literature has been done among publications in ABS-list journals in all above-mentioned areas (e.g. Journal of Interactive marketing, MIS Quarterly, Computers in Human behavior, Research policy, Technovation, International Journal of Research in marketing, etc.). In each area there were chosen journals of A and B categories and its publications for the last ten years were analyzed by keywords: "gamification", "gamified systems", "games in human behavior", "survey gamification", "marketing surveys efficiency". Derived results were sorted by topic relevance, quality and connection with online marketing surveys. Results were organized in two parts: theories of motivation and interconnection between gamification and marketing survey design. Results of the analysis is presented in a research below.

The concept of gamification arose as an attempt to apply the results of research in the field games' study to create a more pleasant user experience in non-game systems. Despite the fact that gamification is intended to create an individual's feelings similar to those experienced during the game, gamification is not a full-fledged game, but only adapts some features of games to increase the motivation of individuals to perform certain actions [Huotari, Hamari, 2019]. In the context of surveys, the goal of applying gamification is to increase the response rate, their involvement, and also to create a pleasant experience of participation in the study.

To define the gamification is necessary to go back for definition of a game itself. The very concept of games is not uniquely defined nowadays, especially with rapid development of mobile games industry which has changed gaming landscape

sufficiently. There are at least 60 different definitions of games, each of which describes the personal views of its author (Stenros, 2017). Differences in definitions are caused by the author's idea of which activities should be included in the concept of the game.

It should be noted that the concept of games in the Russian language includes 2 different types of game activities, only one of which is associated with the concept of gamification. In Caillois (1958), these 2 types are called paidia and ludus. The first of these paidia refers to the term "play" in English and defines a free, expressive and improvisational form of play activity. In contrast, ludus defines activity, structured by rules and pursuing a specific goal. The latter type of game activity is associated with the concept of game in the English language and, accordingly, with the concept of gamification. Thus, in the future, only the last type of gaming activity will be considered.

The very concept of games is quite often defined through a set of certain conditions or characteristics that together can determine it. Based on the analysis of various definitions of the game, Juul (2003) identified 6 characteristics that are common to different games. Its definition prescribes the following characteristics for games:

1. The game is based on the rules.

2. The outcome of the game is different.

3. Game outcomes correspond to different levels of value.

4. The playing individual makes an effort to achieve the desired outcome.

5. Players are committed to achieving the result, i.e. experiencing positive emotions when winning.

6. The consequences of the same game can both affect the outside world and have no influence on it.

According to Huotari and Hamari (2012), most of these definitions have 2 common characteristics that can be defined by games: the *system component* and the *user experience* component, which describes the individual's voluntary involvement in the game process. In addition, they also identified a number of features that may be characteristic of certain types of games: the presence of rules, the presence of conflicting goals, the uncertainty of the outcome, hedonistic pleasure, suspense and a feeling of playfulness that relates to the experience user have in games like *ludus*.

However, in this research, the games will be determined in accordance with the definition of Juul (2003), because this definition describes not only the game system, but also how a person can interact with it. In addition, this definition refers to the

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fact that an individual takes part in games for pleasure, which is an important aspect when separating the concepts of game and gamification.

The term "gamification" was firstly used in 2008 on the Bret Terryl blog. He defined this concept as «borrowing game dynamics and using them in other web resources to increase engagement of [users]». In 2011 it was proposed to define gamification as the use of game elements in a non-player context [Deterding et al., 2011]. This definition is the most frequently cited in scientific papers, but some researchers believe that the definition has several serious flaws. Werbach (2012) and Huotari, Hamari (2012) presented their versions of the definition, considering gamification in the context of persuasive design and marketing of services, respectively. However, the scientific community still did not reach agreement on the meaning of the term gamification.

According to the article by Huotari et al. (2017), only 3 reviewed definitions are presented in the academic literature: Deterding and Werbach, as well as the definition from the earlier work of the authors of the article. In view of the most frequent use of the definitions presented in the work of Huotari et al. (2017), they will be subjected to further analysis.

Deterding et al. (2011) draw a line between serious games (games used for educational purposes) and gaming. According to the authors, gamification is not a full-fledged game. Instead, gamification uses only game elements, which separates it from games. At the same time, gamification is also intended to engender a gaming experience and the corresponding state of playfulness that occurs in games like ludus. In that definition, gamification only adapts the game elements in its design and provides a structured gaming experience.

This definition has been criticized by other researchers for several reasons. Werbach (2012) indicates that there is no universal list of game elements. Huotari, Hamari (2012), Seiler et al. (2017) and Werbach (2012) also point out that this wording does not take into account the importance of user experience. According to Werbach, certain activities correspond to the definition, which obviously cannot be considered gamified. So passing exams can be an example of gamification: firstly, the exam is held in a non-player context, secondly, the score obtained can be regarded as an example of a game element.

In order to eliminate the shortcomings of the previous definition, Werbach proposed the following formulation of gamification – 'the process of changing activities towards greater gameplay". This definition focuses on creating game-like experience. This also eliminates the inaccuracy of the wording of previous definition, associated with the need to identify game elements.

Unlike the previously presented versions, Huotari and Hamari based their definition on the theory of marketing services. In their opinion, the design elements of games can be considered as services, and the games themselves as a system of services. Accordingly, they define gamification as "the process of enriching a service with gaming experience with the goal of creating additional value for the user." The advantage of this definition compared to the definition is the focus on the user involved in gamification, as well as ensuring the creation of additional value for him. Despite its merits, the definition of Huotari and Hamar is criticized by other researchers. Thus, according to some authors, the relationship between the theory of marketing services and the concept of gamification is uncertain [Dimec, 2017]. In addition, according to Werbach, the definition of Huotari and Hamari is difficult to understand, which complicates its use (Werbach, 2012).

In the context of gamification in marketing surveys, the definition of Deterding et al. (2011) seems to be the easiest to understand and use when creating gamified surveys. It is also allowing to separate the definitions of a game and gamification in the context under study. Moreover, in the attempt to make gamified survey it is almost inevitable are made to avoid game elements, which allow to improve the experience of participation in the study and compare the efficiency by changing nothing but that element. In this sense, gamification is intended to ensure the desired behavior of respondents when participating in a survey by improving the experience of passing it, and not to create a full-fledged game, in which respondents would take part purely for pleasure.

Usage of gamification in developing of marketing surveys usually come to two approaches: soft and hard gamification [Bailey, Pritchard, Kernohan, 2015]. The presented approaches differ from the approaches to gamification, used in studies of the use of gamification in other areas. Most of the works that investigate the influence of gamification on the motivation of users of crowdsourcing platforms and intranets rely on the introduction of various game elements into the existing system (for example, points, trophies, rating systems) [Morschheuser et al., 2017; Baptista, Oliveira, 2017; Morschheuser et al., 2018; Koivisto, Hamari, 2019; Hassan, Hamari, 2019]. A similar approach was adapted in the field of research of online surveys [Harms et al., 2015; Schacht et al., 2017].

Soft gamification describes the change of individual questions so that they give rise to an experience similar to a game. The author of this approach is John Pouleston (2011). One of the possible techniques of gamification in this case is the use of personalized questions suggesting that the respondent is in a certain scenario (for example, buying products without any restrictions from the budget). In addition, an example of soft gamification can be the use of functional-visual elements when designing a survey, for example, the possibility of assigning response options to a certain category by dragging them into the appropriate window.

Hard gamification is an approach to surveys' gamification, which is based on the creation of a game into which the survey itself is integrated. In some cases, the respondent may not be aware that he is actually participating in the study. A similar approach was developed by Betty Adamou as a method of encouraging participation in commercial marketing research. In her opinion, the use of games in marketing research allows us to improve the experience of participating in a survey, and also allows us to make the survey more attractive to a children's audience, which otherwise might not be interested in participating [Adamou, 2011].

Each of the existing approaches to surveys' gamification, however, has its limitations. In the case of soft gamification, these limitations are the validity of the answers when changing the wording of the questions, as well as the simultaneous use of a high number of different techniques, which complicates the assessment of the influence of each of them separately.

The limitation of hard gamification is the complexity of the interface being created, which may interact with the respondent's gadget incorrectly. In addition, the development of such a survey may require a significantly larger amount of time and money than the development of a non-gamed questionnaire.

The approach of Harms et al. (2015) correlates with the approach to the study of gamification used in other areas. Its use allows to somewhat correlate the results of research in the field of gamification of online surveys and research on the use of gamification in other areas. For this reason, this approach seems to be more promising when developing game-based surveys.

To sum up, despite the perceived similarity of the concepts, the game and the gamification are different constructs. The game is a voluntary activity, the motivation for participation in which is to receive pleasure. At the same time, gamification is intended only to improve the experience of participation in marketing surveys to ensure higher response rates, a lower proportion of respondents who have not completed the survey, as well as a positive perception of the survey as a whole. At the same time, the respondent should not take part in the survey purely for playing pleasure. Such behavior may lead to a lower level of attention to the survey, and as a result, reduce the quality of the data obtained [Keusch, Zhang, 2015].

There are several approaches to gamification of surveys [Harms et al., 2015; Bailey, Pritchard, Kernohan, 2015; Schacht et al., 2017], but each of them has its disadvantages amongst which are potential complexity, over-gamification and neglecting personal characteristics of participants. Therefore, it is necessary to consider underlined assumptions of respondents' behavior in gamified systems due to find out alternative solutions for effective marketing research structure.

Theories of motivation in gamification research: due to the small number of research in the field of gamification of surveys that would be based on any theory of motivation when studying the behavior of respondents, this section presents an analysis of studies about the use of gamification in other areas. In this case, the research was selected in such a way that the field of application had any general characteristics using gamification in surveys. The choice was made in favor of research on the use of gamification in the field of crowdsourcing, mobile applications, as well as intranets, because these platforms provide incentives for the user to create any data (for example, drawing up figure captions, sharing knowledge, etc.).

Technology adoption models: the technology adoption model is one of the most frequently used theories to explain the intent to use gamified systems [Hamari, Koivisto, 2015; Landers, Armstrong, 2017; Rodrigues et al., 2016; Aparicio et al., 2019]. This model describes characteristics that determine the adoption of a certain information technology by users. These characteristics are the perceived utility of the technology and the perceived ease of use [Davis, 1989; Venkantesh et al., 2003]. It should be noted that the model focuses not on the objective characteristics of the technology, but on the perception of its users. Thus, the technology adoption model overlaps with the theory of motivational capabilities, which also suggests that the subjective experience of using the system may differ from the one intended by the creator of the system.

The perceived utility of the technology is a value that reflects the degree of user confidence that the technology used will increase its performance. In the context of gamification, the perceived utility of a technology can be considered as matching the goal of gamification and user behavior. In the context of a gamified system focused on promoting a certain brand, the perceived usefulness can be considered to be how successfully the system forced the user to think about the products of a certain brand [Yang, Asaad, Dwivedi, 2017].

In the context of adopting non-game technologies, perceived utility is a stronger predictor of intent to use the system [Smith, 2008; Davis, Bagozzi, Warshaw, 1989]. Corresponding results were obtained when studying the use of gamification in a marketing campaign [Yang, Asaad, Dwivedi, 2017]. In contrast, some research did not reveal the effect of perceived utility on the intention to use the system [Rodriguez, Oliviera, Costa, 2016 (a); Rodriguez, Oliviera, Costa, 2016 (b)] or revealed a stronger influence of perceived ease of use on this parameter [Herzig , Ameling, Schill, 2015; Hamari, Koivisto, 2015).

Some authors suggest that using the technology adoption model in the context of gamification is unreasonable [Lee, 2014]. Since the introduction of gamification is supposed to be an improvement of the already existing systems through the introduction of opportunities to create a fundamentally new experience of use. For

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this reason, the focus in the design of gamification should be shifted from the characteristics of the system to the pleasure that the user receives when interacting with it. Thus, the technology adoption model may explain the intention to use the original system, however, the motivation for adding gamification should be measured using other parameters, for example, perceived enjoyment from use, perceived fun, or gaming experience in use.

The concept of flow: the concept of flow was proposed by M. Csikszentmihályi in the book "Flow: The Psychology of Optimal Experience" [Csikszentmihályi, 1990]. In the field of gamification research this work also received some attention [Kasurinen, Knutas, 2018]. In fact, some papers indicate that the flow state can be achieved using gamification but does not fully reveal its effect on the gamification user [Nicholson, 2015; Hamari, Koivisto, 2014].

The concept of flow itself describes the state in which a person is fully involved in the execution of the current task. In a state of flow, a person loses the sense of time and is distracted from any other thoughts [Csikszentmihályi, 1990]. At the same time, optimal experience is achieved when the human mind is completely immersed in the activity being performed, and the person himself feels pleasure from this activity.

Presumably, the state of the flow should have a positive effect on the individual's intention to use the gamified system, as well as on the duration of use of this system. However, research in the field of gamification, based on the concept of flow, revealed that the state of flow is a weak predictor of intention to use the gamified system [Herzig, Ameling, Schill, 2015; Suh et al., 2017]. It is worth noting, however, that various studies used different methods for measuring flow, which makes the comparison of results not completely unreliable.

The state of the stream is more suitable for describing long-term activities such as learning, playing sports or participating in computer games. At the same time, the duration of participation in the survey is incomparable with the amount of time that is usually allocated to these types of activities. From this point of view, the flow concept is suitable for studying the behavior of users of gamified systems, but not gamified surveys.

However, some of the conditions necessary to achieve the flow condition must be taken into account when creating gamified surveys, since their absence may adversely affect the intention to participate in the survey. The list of these conditions may include the presence of precise instructions regarding interaction with a gamified survey [Brownwell, Cechanowicz, Gutman, 2015], and also suitability of the task to the respondent's skills (if there is no such balance the quality or number of responses may decrease [Cechanowicz et al., 2013].

Self-determination theory: number of gamification research use the theory of self-determination and its sub-theories as a theoretical basis [Kapp, 2012; Aparicio et al. 2016; Nicholson, 2015; Seaborn, Fels, 2015]. In accordance with this theory, motivation is divided into 2 types: internal (intrinsic) and external (extrinsic) [Ryan, Deci, 2000 (a)]. Intrinsic motivation refers to actions performed because their performance brings satisfaction rather than the consequences of the actions themselves. In contrast, extrinsic motivation appears in situations where certain actions are performed in order to achieve a certain result [Ryan, Deci, 2000 (a)].

The basis of intrinsic motivation is the satisfaction of 3 basic needs: the need for autonomy, the need for competence and the need for interrelations with other people.

The theory of self-determination theory includes 5 sub-theories, some of which can be associated with the motivation of users of gamification [Mekler et al., 2017]. So the theory of cognitive evaluation claims that events that contribute to the emergence of a sense of competence, positively affect internal motivation. This effect, however, will be made only in the case when a person also experiences a feeling of autonomy. This feeling depends on how the individual interprets events external to him, for example, receiving feedback about his actions. The same events can be perceived by different individuals as controlling (i.e., undermining the sense of autonomy) and informing depending on the individual's casual orientation [Ryan, Deci, 2000 (b)].

Self-determination theory is the basis for several frameworks for creating gamification. Nicholson proposes to use this theory to create meaningful gamification for the user, which will stimulate intrinsic motivation [Nicholson, 2012]. In another research a gamification implementation model that takes into account how the needs of the self-determination theory can be satisfied with the help of various game elements was developed [Aparicio et al., 2012].

It was revealed that the gamification of feedback changes its perception, making it less controlling in the opinion of the individual [Kumar, 2013]. Accordingly, the introduction of gamification has a positive effect on the satisfaction of the need for autonomy [Kim, Ahn, 2017]. Other studies have shown the positive impact of certain game elements on the need for competence, autonomy, as well as in interrelation with other people [Seiler et al., 2017; Suh, Wagner, Liu, 2016].

Part of the research has focused on the effect of satisfying domestic needs on the intent to use the gamified system. For example, it was revealed the positive effect of satisfying domestic needs on the pleasure gained by using the system, as well as on the intention to use this system [Suh, Wagner, Liu, 2016]. However, such work recruited respondents from among the current users of gamified applications or platforms, which could have caused a slight shift in results. Thus, such studies can't

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predict the experience of those users who chose to abandon the use of the application or platform.

It should be noted separately that many works that take the theory of self-determination as a theoretical basis investigate the behavior of users of gamification, not dividing them depending on the characteristics of their personality. According to some researchers, this approach does not allow to accurately determine the individual user experience [Ferro et al., 2013]. In fact, the game elements that form the basis of a gamified system only set the possibilities of the gaming experience [Van Vugt et al., 2006]. At the same time, the user experience itself depends on the perception of these possibilities, i.e. whether the user is aware of their existence, as well as whether he uses these capabilities. Thus, different game elements can in different ways influence the motivation of different users, which is currently not taken into account in such studies.

Summarizing, we can say that at the moment, studies based on the theory of self-determination have shown a positive effect of satisfying internal needs on the intention to use gamification [Kim, Ahn, 2017; Sailer et al., 2017]. Other works have assured the influence of game elements on the satisfaction of these needs [Nicholson, 2012; Mekler et al, 2017; Buckley, Doyley, 2016]. At the same time, such studies do not take into account the individual experience of using and the influence of game preferences on the intention to participate in gamified activity. These aspects can predict not only the intention to use the system, but also the intention to refuse to use it, as well as identify elements, the absence of which may affect the failure. Thus, the study of the individual characteristics of users will more accurately predict the success of gamification.

Individual characteristics of participants in gamification: player's type as motivational factor

In the context of the study of full-fledged games, the separation of individuals occurs on the basis of their type. It is assumed that different types of individuals, in this case called player types, can be more or less motivated by different game elements [Busch et al., 2016]. The division of players into types proceeds from the premise that there are some differences between individuals who remain stable over time and explain the individual preferences [Bush et al., 2016]. In the field of gamification research there are several main approaches to define player's type, amongst which: Lazzaro types of fun, Bartle's classification, Brainhex model, Hexad model, Gamification Octalysis, etc. In the following chapter we consider specifics of these typologies in details. Comparative analysis of described types is presented in Appendix.

<u>Lazzaro types of fun:</u> the typology of the Lazzaro was created by its author to describe the reasons why people play games. According to the survey, Lazzaro

identified 4 types of behavioral patterns or types of fun: hard fun, easy fun, collective fun (people fun), and serious fun.

Hard fun refers to the pleasure obtained by improving the skills necessary to achieve game goals. Hard fun can cause frustration to the player, but as a result leads him to the feeling of triumph from overcoming difficult tests. Getting pleasure in this case depends on the balance of the player's abilities and the difficulty of the task he performs.

Easy fun is associated with the pleasure obtained by exploring and expressing curiosity. Such an experience implies the existence of implicit aspects in the game that would generate interest and curiosity in the player.

Serious fun refers to the pleasure obtained from a change in the internal state associated with the game process. In this case, the focus is on the emotions and feelings of the player, generated by the game.

People fun is based on the emotions that an individual experience when competing or collaborating with other players. People fun includes the joy of others' failures, pride in the achievements of their charges, and other emotions associated with the social side of the game.

Lazzaro types of fun describe a number of factors that can motivate an individual to participate in various games. At the same time, this typology can hardly be applied when creating gamified surveys. So, the motivation for changing the internal state can be realized in the framework of large-scale games with a complex plot, however, the creation of gamified surveys of such complexity can significantly increase the research budget. In addition, a change in the respondent's state can potentially affect the quality of responses.

Bartle's typology of players: types of Bartle are one of the most well-known player typologies. This model was developed by Bartle in 1996 based on an analysis of the discussions of gamers from the early synthetic MUD (multi user dungeon) worlds [Bartle, 1996].

The initial version included 4 types of players: killers, achievers, socializers, explorers. These types are allocated depending on the preferences of the player, determined by two scales. The first scale determines what the player's actions are oriented to. Players can be focused on the game world or on other players. The second scale determines whether the individual prefers to interact or act within the game.

In the future, Bartle proposed an extended typology consisting of 8 types of players, where each of the initial types is divided into 2 subtypes, depending on the indicator on a scale of implicitness-explicitness. In the context of Bartle's typology,

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explicitness means a preference for the known to the unknown, a preference for achieving the goals in accordance with the plan for the intuitive movement, a preference for clear procedures for action on the flow

Bartle player types is one of the most well-known existing typologies [Tuunanen, Hamari, 2012]. However, its use in the context of studying the motivation of respondents in a gamified survey has a number of limitations. The possibility of direct social interaction can have a negative impact on the validity of the data obtained, as well as cause a bias of answers towards socially acceptable. In addition, the types of social interactions that generate a negative affect may affect the respondents' intention to take part in a gamified survey in the future.

The first demographic game design model (DGD1) andthe second demographic game design model (DGD2)

The DGD1 study was the first attempt to create a model of gaming motivations that would not be associated with a specific genre of games, as was the case with the Bartle typology. As part of the study Myers-Briggs typology was used to assess differences in the personalities of the players [Bateman at al., 2011]. A prerequisite for the study was the assumption that players with different degrees of commitment to games (hardcore and casual gaming) have different personality characteristics. According to this assumption, individuals who identify themselves as avid players should demonstrate such characteristics of the Myers-Briggs typology as introversion, thinking and judgment.

According to the results of the analysis, the original assumption about the differences between the avid and ordinary players was rejected. While avid players did show a greater propensity for introversion, the rest of the predicted personality traits could not be linked to the degree of commitment to the games. According to study, in this case the player's avidity relates not to the desire to win at any price, but to whether the games are a hobby of a particular individual [Bateman et al., 2011]. Such individuals are more inclined to use their imagination during the game process to create a complex game experience (for example, for understanding the character's personality, his history and connection with the game world).

Despite the fact that the initial assumptions were rejected, according to the results of the analysis, it was able to identify 4 types of players: conqueror, manager, wanderer and participant. A follow-up study of DGD2 did not resort to Myers-Briggs typology. Instead, the authors preferred the theory of temperament [Berens, 2000]. On its basis, the appearance of 4 different types of game skills that players may possess, namely tactical, strategic, diplomatic and logical skills, was predicted. The results of the DGD1 and DGD2 studies, according to their authors, are only a basis for further analysis of the players' behavior. For this reason later, the results of

DGD2 were used as the basis for the Breinhex typology, which will be discussed later.

Brainhex typology: the prerequisite for its creation was precisely the absence of a universal typology of players capable of describing the behavior of players of any kind of games. The authors adapted the "top-down" approach, building on existing research in the field of neuroscience to highlight possible types of gaming experience [Bateman, Levengaupt, Nake, 2011]. Subsequently, these types were certified by empirical data using a specially developed questionnaire [Nake, Bateman, Mandrik, 2011]. At the moment, the Breinhex typology has been used not only in the context of games that focus solely on pleasure, but also in studies of games in the field of health games [Orji et al., 2013], as well as in studies of gamification [Monterrat et al., 2015].

In accordance with the typology there are 7 types of players: achievers, conquerors, survivors, socializers, masterminds, seekers and daredevils.

The Breinhex typology is generally perceived by the scientific community more positively than other player typologies. Firstly, this typology was created to study games in general, which makes it more effective compared to typologies created to analyze certain genres of games. Secondly, Breinhex continues to research the types of players DGD1 and DGD2, taking into account the shortcomings of these studies. In addition, more than 60 thousand respondents took part in the Breinhex study, which makes the findings of the study fairly reliable.

In the context of gamification of marketing surveys, the use of this typology has limitations similar to other typologies mentioned. Many aspects of motivation, voiced in this typology, can be implemented in the framework of full-fledged games, but are hardly suitable as a motivating factor for a survey respondent. So daredevils and survivors are focused on changing their state. The production of such states through participation in a survey can affect the quality of the data obtained. In addition, such game-specific motivation factors may attract those respondents who may not be interested in the survey itself, which may result in random responses. Similarly, a conqueror-type motivation, a feeling of triumph, cannot be realized within a gamified poll without the possibility of a negative impact on the quality of the data received. Thus, this typology is more focused on the creation of full-fledged games with a complex plot, which could produce a complex range of emotions for the player. In the case of a survey gamification, producing additional emotions is an undesirable aspect.

The typologies presented (with the exception of Brainhex) are criticized by the academic community due to the narrow application context [Huotari, Hamari, 2015; Koivisto, Hamari, 2019], the incorrectness of the research method (Bartle types) or

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adaptation of theories that have no obvious connection with the game context (DGD1, DGD2) [Rubinstein, 2016].

These typologies have intersections with each other. So the motivation of communication is presented in all the typologies voiced. In addition, common motivation factors for research, achievement of goals within the game, and testing are also common. A number of motivations are presented exclusively in certain typologies.

The typologies mentioned have limitations on the application both in the context of gamification in general, and gamification of surveys in particular. When using gamification in surveys, the respondent's motivation to participate in game-like activity should not attract excessive resources of attention to themselves. In the case when the respondent participates in a survey only for the realization of his game motivation, the responses received may demonstrate an inadequate level of quality. In addition, a change in the state of the respondent can lead to a shift in results. Similarly, direct social interaction is undesirable in gamified surveys. Thus, the most popular gaming motivations have significant limitations in terms of gamification of polls. For this reason, typologies focused exclusively on studying the motivation of users of gamification have a great relevance to study the behavior of respondents of such surveys.

Players types with focus on motivation: many of the player typologies presented earlier were created on the basis of studying a certain type of games, for example MMORPG. According to some researchers, this aspect makes their use in the context of gamification unjustified [Tondello et al., 2016]. Moreover, the use of such typologies makes sense in the study of only certain types of games, but not games in general [Tondello et al., 2016; Bateman, Levengaupt, Nake, 2011]. For this reason, the typologies of players that were either specially created to study gamification users are considered separately.

Hexad model: to determine the type of user gamification Andrew Marczewski created a typology Hexad [Marczewski, 2013]. In accordance with this classification, players of different types can be motivated by external or internal factors to varying degrees. Thus, the division into types occurred not on the basis of the observed behavior, but on the basis of motivation factors, which were adapted from the self-determination theory, and were also partially identified by the author himself. This "bottom-up" approach (from theory to behavior) differs from the approach used in the compilation of most existing typologies. This difference lies in the fact that previous works have tried to post factum justify the observed behavior of players using psychological theories, which, according to some authors, can lead to unreliability of the resulting models [Bateman, Levengaupt, Nake, 2011].

Each of the selected types of Marczewski associated game elements that, in his opinion, should best motivate such users. According to this typology, there are 6 types of players: philanthropists, socializers, free spirits, achievers, players and disruptors. Graphically, the Hexad model is illustrated with a hexagon, where each of the faces is associated with a motivator. The motivational hexagon is surrounded by a larger hexagon, on the edges of which are indicated player types corresponding to the motivation factors.

Later with team of authors Hexad model has been tested on the basis of survey which has been developed earlier [Tondello et al., 2016]. They also conducted a study to check the correspondence between the type of user and the most optimal game elements. They revealed the presence of preferred game elements for players of all types with the exception of philanthropists.

When creating the Hexad typology, the top-down approach was adapted, which distinguishes it from the others presented earlier for the better. In addition, this typology has a questionnaire designed to determine the type of player, the validity of which was tested by its authors [Tondello et al., 2019].

The use of the Hexad typology allows us to avoid a number of limitations that exist within the framework of typologies aimed at studying full-fledged games. Thus, such typologies suggested the presence of direct social interaction, which may be undesirable when gamification of polls. In the case of the type of social worker Hexad, the interaction with other users is not necessarily implemented directly. Instead, the needs of social workers can be met by integrating elements of social comparison and social research, in which the respondent can be provided with data on the number of survey participants, their distribution by basic demographic characteristics, etc. In addition, within this approach, the respondent can also get data on survey results after its completion. Motivation of philanthropists can be realized by pointing out the value of the respondent's participation in this study. Similarly, the motivation of all types of Hexad typology can be affected by various elements of the gamified poll, which makes this typology more relevant for studying gamification of polls than typologies aimed at studying full-fledged games.

Gamification Octalysis: the gamification model Octalysis was developed by gamification specialist Yu-Kai Chou based on his many years of experience in this field. This model includes 8 basic drivers that motivate users of gamification: self-importance, achievement, self-improvement (mission), ownership, social influence, limited resources, secrecy and the avoidance of negativity [Choi, 2015].

It should be noted that 4 out of 8 elements of the Octalysis model have no analogues among other player typologies. These elements: avoiding negativity, secrecy, limited resources and a sense of ownership, have a strong business orientation, as they can encourage consumers to take part in a gamified program in a timely manner. In

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contrast, other typologies are oriented either to the widespread use of gamification in various fields, or to the creation and improvement of games, which does not necessarily require user participation in a strictly limited period of time.

Graphic designation of the model Octalysis is an octahedron, at the apexes of which motivators are located. The motivational octahedron is surrounded by a larger octahedron, which is used to assess the quality of the application of gamification in a single case. Deleting a vertex of an external octahedron from the verge of an internal one shows how elaborated a particular motivation driver is in the example under study.

Yu-Kai Chou divided all drivers of participation in gamification into 2 types: drivers of the left and right hemispheres. Drivers related to logic, analysis of alternatives and ownership belong to the left hemisphere. These drivers are related to the player's external motivation. By the right hemisphere are drivers associated with creativity, self-expression and social interaction. The components of the right hemisphere are motivating in themselves, i.e. cause the internal motivation of the individual.

In addition, the factors of motivation for Octalysis are divided into black and white. White factors are presented at the top of the model. These factors allow users to show their creativity, achieve mastery, overcome difficulty, etc. The impact of white factors is based on positive emotions. In contrast, black factors can give rise to negative emotions associated with the fear of loss, the inability to get what you want, etc.

Thus, the model Octalysis is not a typology of the player in its pure form. Instead, it is a framework for developing high quality gamified services. The model is often used to assess the quality of gamification in various areas. However, there are other methods of applying the model. There was a study which utilized this typology and questionnaire has been developed to determine the extent to which each driver describes the motivation of an individual [Freitas et al., 2017]. The disadvantage of this questionnaire is a small number of questions (1 for each driver). Thus, the Octalysis model can be used to determine the types of users of gamification, but there is a need to develop and test a special questionnaire.

Conclusion

Currently online consumer surveys are one of the most frequently used marketing research tools. Using such a tool has several advantages, such as low development costs, the possibility of reaching a wider audience, as well as ease of data processing [Evans, Mathur, 2005]. However, this form of surveys shows lower response rates than other forms of consumer surveys [Sachs, Gilmartin, Bryant, 2003]. Low response rate may have a negative impact on the quality of data obtained from the

survey results. Thus, marketers are faced with the need to find ways to increase the response rate to online surveys. One of the possible methods to increase the motivation to participate in the survey is to use gamification.

Various studies in the field of gamification of surveys revealed the positive impact of gamification on the pleasure obtained by participating in a survey, the perceived ease of passing the survey, as well as the number of answers to various questions and the length of answers to open questions. Thus, gamification stimulates the desired behavior of the respondents by improving the experience of participating in the survey. At the same time, an increase in the motivation to participate in the survey may be associated with various psychological aspects of the respondent's experience. So, some research by users of gamification associates the intention to use gamified information systems with the characteristics of perceived ease of use and perceived utility of the system. These aspects may describe the features of the experience of participating in complex gamified surveys with a large number of game elements, but are not suitable for describing the motivation of respondents as a whole. In addition, gamification can provide opportunities for immersion in a state of flow, as well as to meet internal needs for competence, autonomy and interconnection with other people. Meeting these needs can have a positive effect on the intent to use the gamified system. However, these aspects of motivation describe the experience of the average user, regardless of his preferences for the presence of certain game elements and the possibilities of interaction with them. According to some authors, when creating gamification, the consideration of such personality traits allows you to create more attractive systems for different users.

Existing research in the field of user experience from gamification often use the technology adoption models, the concept of flow, and the theory of self-determination to study the motivation of users of gamification. However, the application of these theories has several disadvantages. The technology adoption model is applicable rather to describe the properties of systems into which gamification is integrated, than to describe gamification itself. This model can be used to evaluate surveys using hard gamification, however, in other cases its use is unnecessary. The application of the flow concept in the framework of gamification of surveys is questionable, since the time of interaction between the respondent and the survey is short. For this reason, achieving a flow condition when participating in a survey is unlikely.

Studies based on the theory of self-determination, revealed the effect of satisfying internal needs on the user's intention to use gamified systems, and also correlated the presence of certain game elements with the satisfaction of these needs. However, such studies do not take into account the peculiarities of the individual experience of the respondents, as well as the influence of their preferences on the intention to use or not to use the system. The study of such preferences may allow

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us to identify the reasons for refusing to participate in a gamified survey, and
accordingly make adjustments to the design of the survey to eliminate them.

In the context of gamification, such preferences are described by player types. This
approach to the study of various users of the system has been adapted from the field
of studying computer games. Thus, the generation of complex emotional experience
that attracts participants to games can have a negative impact on the quality of the
data obtained from the results of the survey.

Therefore, it can be concluded that matching a gamification design to a player's type
can have different effects on different types of respondents. At the same time, the
level of pleasure from participating in might be a predictor for intention to
participate in such a survey in the future. Accordingly, gamification can be used
when creating surveys to increase the level of satisfaction of respondents and as a
result to increase the intention to participate in similar surveys in the future.

Thus, the motivation to participate in gamified marketing surveys may depend on
the type of player and the correspondence of the gamification elements to the type
preferred. For this reason, further research aimed at studying the motivation of
respondents belonging to different types of players is relevant.

Here we can suggest that there are various approaches on gamification
implementation for boosting marketing surveys' efficiency. Emerging character of
gamification as a field of study bring certain challenges into decision-making
process about gamified surveys for marketers. From one hand there are tested
approaches [Harms et al., 2015], which have its disadvantages but proving track of
records and understandable limitations. From another hand there are interesting
and modern approaches [Tondello et al., 2019] which weren't tested in the context
of marketing surveys. Engaging nature of such approaches promise an increase in
pleasant experience among participants, but demands additional customization
costs and leave the question about participant's reaction on manipulation intent and
some techniques impact size. It is important for researchers to pay attention to the
matter of gamified surveys potential and find an optimal solution for its
implementation. It is also necessary to establish what effects each gamification
element has not only on satisfaction of internal need of participant, but how it
correlates with cognitive load suitability, persuasion knowledge and, finally, will it
affect the results of the survey together with the experience participants will get
from it.

References

Aparicio, A. F., Vela, F. L. G., Sánchez, J. L. G., & Montes, J. L. I. (2012, October). Analysis
and application of gamification. In *Proceedings of the 13th International
Conference on Interacción Persona-Ordenador* (p. 17). ACM.

Aparicio, M., Oliveira, T., Bacao, F., & Painho, M. (2019). Gamification: A key determinant of massive open online course (MOOC) success. *Information & Management*, *56*(1), 39-54.

Bailey, P., Pritchard, G., & Kernohan, H. (2015). Gamification in market research: increasing enjoyment, participant engagement and richness of data, but what of data validity?. *International Journal of Market Research*, *57*(1), 17-28.

Baptista, G., & Oliveira, T. (2017). Why so serious? Gamification impact in the acceptance of mobile banking services. *Internet Research*, *27*(1), 118-139.

Bartle, R. (1996). Hearts, clubs, diamonds, spades: Players who suit MUDs. *Journal of MUD research*, *1*(1), 19.

Bateman, C., Lowenhaupt, R., & Nacke, L. (2011, September). Player typology in theory and practice. In *DiGRA Conference*.

Brigham, T. J. (2015). An introduction to gamification: adding game elements for engagement. *Medical reference services quarterly*, *34*(4), 471-480.

Brownell, B., Cechanowicz, J., & Gutwin, C. (2015). Gamification of survey research: Empirical results from gamifying a conjoint experiment. In *Gamification in education and business* (pp. 569-591). Springer, Cham.

Busch, M., Mattheiss, E. E., Hochleitner, W., Hochleitner, C., Lankes, M., Fröhlich, P.,& Tscheligi, M. (2016). Using Player Type Models for Personalized Game Design-An Empirical Investigation. *IxD&A*, *28*, 145-163.

Cantor, D., O'Hare, B. C., & O'Connor, K. S. (2008). The use of monetary incentives to reduce nonresponse in random digit dial telephone surveys. *Advances in telephone survey methodology*, 471-498.

Cechanowicz, J., Gutwin, C., Brownell, B., & Goodfellow, L. (2013, October). Effects of gamification on participation and data quality in a real-world market research domain. In *Proceedings of the first international conference on gameful design, research, and applications* (pp. 58-65). ACM.

Chou, Y. K. (2015). *Actionable gamification: Beyond points, badges, and leaderboards*. Octalysis Group.

Csikszentmihalyi, M. (2014). Toward a psychology of optimal experience. In *Flow and the foundations of positive psychology* (pp. 209-226). Springer, Dordrecht.

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Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: a comparison of two theoretical models. *Management science*, *35*(8), 982-1003.

Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness: defining gamification. New York, NY: ACM.

Dillman, D. A., Phelps, G., Tortora, R., Swift, K., Kohrell, J., Berck, J., & Messer, B. L. (2009). Response rate and measurement differences in mixed-mode surveys using mail, telephone, interactive voice response (IVR) and the Internet. *Social science research*, *38*(1), 1-18.

Evans, J. R., & Mathur, A. (2005). The value of online surveys. *Internet research*, *15*(2), 195-219.

Ferro, L. S., Walz, S. P., & Greuter, S. (2013, September). Towards personalised, gamified systems: an investigation into game design, personality and player typologies. In *Proceedings of The 9th Australasian Conference on Interactive Entertainment: Matters of Life and Death* (p. 7). ACM.

Freitas, S. A. A., Lacerda, A. R., Calado, P. M., Lima, T. S., & Canedo, E. D. (2017, October). Gamification in education: A methodology to identify student's profile. In *2017 IEEE Frontiers in Education Conference (FIE)* (pp. 1-8). IEEE.

Guin, T. D. L., Baker, R., Mechling, J., & Ruyle, E. (2012). Myths and realities of respondent engagement in online surveys. *International Journal of Market Research*, *54*(5), 613-633.

Hamari, J., & Koivisto, J. (2014). Measuring flow in gamification: Dispositional flow scale-2. *Computers in Human Behavior*, *40*, 133-143.

Koivisto, J., & Hamari, J. (2019). The rise of motivational information systems: A review of gamification research. *International Journal of Information Management*, *45*, 191-210.

Huotari, K., & Hamari, J. (2012, October). Defining gamification: a service marketing perspective. In *Proceeding of the 16th international academic MindTrek conference* (pp. 17-22). ACM.

Huotari, K., & Hamari, J. (2017). A definition for gamification: anchoring gamification in the service marketing literature. *Electronic Markets*, *27*(1), 21-31.

Landers, R. N., & Armstrong, M. B. (2017). Enhancing instructional outcomes with gamification: An empirical test of the Technology-Enhanced Training Effectiveness Model. *Computers in human behavior*, *71*, 499-507.

Manfreda, K. L., Bosnjak, M., Berzelak, J., Haas, I., & Vehovar, V. (2008). Web surveys versus other survey modes: A meta-analysis comparing response rates. *International journal of market research*, *50*(1), 79-104.

Mavletova, A. (2015). A gamification effect in longitudinal web surveys among children and adolescents. *International Journal of Market Research*, *57*(3), 413-438.

Mekler, E. D., Brühlmann, F., Tuch, A. N., & Opwis, K. (2017). Towards understanding the effects of individual gamification elements on intrinsic motivation and performance. *Computers in Human Behavior*, *71*, 525-534.

Morschheuser, B., Hamari, J., Koivisto, J., & Maedche, A. (2017). Gamified crowdsourcing: Conceptualization, literature review, and future agenda. *International Journal of Human-Computer Studies*, *106*, 26-43.

Morschheuser, B., Hassan, L., Werder, K., & Hamari, J. (2018). How to design gamification? A method for engineering gamified software. *Information and Software Technology*, *95*, 219-237.

Nacke, L. E., Bateman, C., & Mandryk, R. L. (2011, October). BrainHex: preliminary results from a neurobiological gamer typology survey. In *International Conference on Entertainment Computing* (pp. 288-293). Springer, Berlin, Heidelberg.

Nacke, L. E., Bateman, C., & Mandryk, R. L. (2014). BrainHex: A neurobiological gamer typology survey. *Entertainment computing*, *5*(1), 55-62.

Nicholson, S. (2015). A recipe for meaningful gamification. In *Gamification in education and business* (pp. 1-20). Springer, Cham.

Puleston, J. (2011, September). Online research–game on!: A look at how gaming techniques can transform your online research. In *Shifting the Boundaries of Research. Proceedings of the 6th ASC (Association for Survey Computing) International Conference* (pp. 20-50).

Ray, N. M., & Tabor, S. W. (2003). Cyber surveys come of age. *Marketing research*, 32-37.

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Rodrigues, L. F., Oliveira, A., & Costa, C. J. (2016). Playing seriously–How gamification and social cues influence bank customers to use gamified e-business applications. *Computers in human behavior*, *63*, 392-407.

Sailer, M., Hense, J. U., Mayr, S. K., & Mandl, H. (2017). How gamification motivates: An experimental study of the effects of specific game design elements on psychological need satisfaction. *Computers in Human Behavior*, *69*, 371-380.

Sax, L. J., Gilmartin, S. K., & Bryant, A. N. (2003). Assessing response rates and nonresponse bias in web and paper surveys. *Research in higher education*, *44*(4), 409-432.

Schacht, S., Keusch, F., Bergmann, N., & Morana, S. (2017). Web survey gamification–increasing data quality in web surveys by using game design elements.

Seaborn, K., & Fels, D. I. (2015). Gamification in theory and action: A survey. *International Journal of human-computer studies*, *74*, 14-31.

Stenros, J. (2017). The game definition game: A review. *Games and culture*, *12*(6), 499-520.

Suh, A., Cheung, C. M., Ahuja, M., & Wagner, C. (2017). Gamification in the workplace: The central role of the aesthetic experience. *Journal of Management Information Systems*, *34*(1), 268-305.

Tondello, G. F., Mora, A., Marczewski, A., & Nacke, L. E. (2019). Empirical validation of the gamification user types hexad scale in English and Spanish. *International Journal of Human-Computer Studies*, *127*, 95-111.

Tondello, G. F., Wehbe, R. R., Diamond, L., Busch, M., Marczewski, A., & Nacke, L. E. (2016, October). The gamification user types hexad scale. In *Proceedings of the 2016 annual symposium on computer-human interaction in play* (pp. 229-243). ACM.

Venkatesh, V., Morris, M. G., Davis, F. D., & Davis, G. B. (2003). Unified theory of acceptance and use of technology (UTAUT). *Management Information Systems Quarterly*, *27*, 425-478.

Warnock, S., & Gantz, J. S. (2017). Gaming for Respondents: A Test of the Impact of Gamification on Completion Rates. *International Journal of Market Research*, *59*(1), 117-138.

Werbach, K. (2014, May). (Re) defining gamification: A process approach. In *International conference on persuasive technology* (pp. 266-272). Springer, Cham

Appendix

Comparation of studied players' typologies

Octalysis's motivational factor	Hexad model	Brainhex	DGD1	Bartle's typology	Lazzarro's typology	Self-determination theory
Accomplishment	Conqueror	Conqueror	Conqueror	Achiever	Hard fun	Need for competence
Scarcity	Free spirit	Seeker	Wanderer	Explorer	Serious fun	Need for autonomy
Social influence	Socializer	Socializer	-	Socializer	People fun	Need for relatedness
Avoidance	Player	Survivors	Participant	-	-	Extrinsic motives
Ownership	Player	Mastermind	Manager	-	Serious fun	Need for competence
Meaning	Achiever	Philanthropist	-	Achiever	-	Need for relatedness
Empowerment	Disruptor	Daredevil	-	Killer	Hard fun	Extrinsic motives

Adopted from: [Choi,2015; Tondello et al., 2016; Nacke et al., 2014; Bateman et al., 2011; Huotari, Hamari, 2014; Ryan, Deci, 2000]

BANKS' LEGAL PROVISIONS AND FINANCIAL CRISIS: THE INFLUENCE OF CORPORATE GOVERNANCE AND INSTITUTIONAL ENVIRONMENT*

JORGE GALLUD CANO — *UNIVERSITY OF VALLADOLID*; FÉLIX J. LÓPEZ-ITURRIAGA — *UNIVERSITY OF VALLADOLID*; ÓSCAR LÓPEZ-DE-FORONDA PÉREZ — *UNIVERSITY OF VALLADOLID*

Abstract: We study the legal provisions of the 92 European systemic banks from 18 countries in the years 2008-2017. Since the legal provisions can be viewed as a mechanism for disclosing information to capital markets, the creation of legal provisions is determined by two main factors: the risk taken by the bank and the managerial incentives to disclose the information on the risk taken. Our results show an initial negative relationship between free cash flow (our measure of managers 'discretionary investments) and legal provisions even when we control for the risk taking. We also find that some internal and external mechanisms of corporate governance do play a mediating role. In this vein, we find that the independence of the board of directors has a moderating effect, so that independent boards lead to create more provisions as a caveat for future lawsuits. Similarly, we also find that a better institutional framework (both in terms of quality of the laws and lack of corruption) amplifies the positive influence of the board of directors.

Introduction

Slightly more than ten years after the triggering of the financial crisis, the banks worldwide have had to face an endless number of lawsuits, whose risk is supposed to have been covered by legal provisions. Whereas in these latest years we have witnessed some of the consequences of such lawsuits, we still lack enough studies about the drivers of the legal provisions. Some anecdotal evidence may result illustrative.

In 2014, Banco Espirito Santo was rescued by the Portuguese Government and divided into a good one, Novo Banco, and another *bad* one destined to disappear. In December 2015, the bonds belonging to Novo Banco were transferred to the *bad bank*, with the corresponding loss of value. As a result, the legal provisions of Novo Banco reached very high values in this period, jumping from 42.7 million euros in 2014 to 132.9 million euros in 2015. In 2016, international bond holders such as BlackRock and Pimco initiated legal actions against Banco de Portugal. In Spain, in June 2017, the failure of Banco Popular generated a multitude of complaints from different stakeholders. It should be noted the concentration of control in Ángel Ron, being CEO and chairman of the board at the same time, and the risky strategy in mortgage investments. As a consequence, the Santander (the acquiring bank) had to create some legal provisions recognizing the expected increase in litigation. Another example is Lloyds Bank, about which a simple search in Google shows some potential sources of risk for the bank: personal slips of the CEO in 2016 that affected the bank and a computer attack in 2017. In the most recent years there has been a dramatic increase on its legal provisions: to 1.339 million in 2016 and 2.778 million in 2017.

Moreover this anecdotal evidence, there is a growing concern about the legal responsibilities of banks in the aftermath of the crisis. In this context, the legal provisions

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can be seen as the recognition of the legal risks and as a tool to anticipate possible accounting losses due to legal claims. The years prior to the crisis can be characterized by the deregulation and the low interest rates that enabled the availability of money. This abundant money supply could have led some banks to overinvestment and to a wrong risk management (Acharya & Naqvi 2012; Huang *et al.* 2018; Chen *et al.* 2019). Thus, the legal provisions of banks are closely related to the risk taken by these institutions and arise as a topic that calls for research in order to know to which extent the creation of provisions has been a sensible response to the likelihood and estimated impact of the claims.

Most of the firms have had to develop and invest in their compliance departments, as shown by the increase in consulting services (Expansión 2017, 2018e), and banks are not an exception (The Guardian 2017; Expansión 2018b, a, c, f). Partially related to this increasing responsibility, the banking regulation has grown considerably in recent years. Although this regulation aims to improve the health of the financial system, it might have unintended side effects (Barucci & Milani 2018; Danisewicz *et al.* 2018; Expansión 2018d; KPMG 2018). For instance, banks can have been forced to a formal compliance of the capital requirements even at the customers 'expense (Ertürk 2016; Banerjee & Mio 2018).

The managerial motivations to recognize risks and, consequently, to create provisions can be curbed both by internal and external mechanisms of control. In turn, we study the effect that both the board of directors and the legal and institutional framework can have on legal provisions. The board of directors is in the apex of the mechanisms of corporate governance and an effective means to supervise managers discretionary decisions (Jensen 1993). The degree of investor protection and the institutional characteristics of each country can improve the disclosure on banks risk policy. Similarly, the level of corruption in the country can exacerbate a possible discretionary use of legal provisions.

We find an initial negative relationship between free cash flow (our measure of managers 'discretionary investments) and legal provisions even when we control for the risk taking. It means that more discretionary decisions of managers do not mean more recognition of future legal responsibilities. Furthermore, managers seem to hide the risk taken by creating less provisions. Nevertheless, we also find that the independence of the board of directors has a moderating effect, so that independent boards lead to create more provisions as a caveat for future lawsuits. We also find that a better legal framework amplifies the influence of the board of directors.

We contribute in two ways to the literature. First, we pioneer the quantitative analysis of the legal provisions. Although legal provisions must be reported in the annual financial statements, there are not standard requirements on the report format. As far as we are aware, our research is the first step in quantifying the bank legal provisions in the international arena. Second, we go a step forward by analyzing how the recognition of risks is shaped by both the internal and the external mechanisms of corporate governance.

The remainder of the paper study is structured as follows. Section 2 discusses the theoretical arguments and develops our testable hypotheses. Section 3 sets out the empirical design and introduces the data and the empirical method. Section 4 presents the results. Finally, Section 5 concludes by summarizing the most important implications and suggesting some directions for future research.

Theoretical framework and hypotheses

The basic accounting rules for provisions are standardized in the International Financial Reporting Standards (1998), which defines provisions as "liabilities of uncertain timing or amount". The IFRS also establish that "a provision should be recognized when, and only when: (a) an entity has a present obligation (legal or constructive) as a result of a past event; (b) it is probable (i.e., more likely than not) that an outflow of resources embodying economic benefits will be required to settle the obligation; and (c) a reliable estimate can be made of the amount of the obligation". The IFRS note that it is only in extremely rare cases that a reliable estimate will not be possible. [5]

Banks can report different kinds of provisions but, as the IRFS affirm, the legal provisions have a particular unclarity. From this standpoint, provisions can be seen as the recognition of the potential obligations faced by the banks that may arise from prior investment or financial decisions. Thus, legal provisions are driven by two-level motivations: at the firm level, legal provisions are a result of the potential liabilities with the bank stakeholders (employees, depositors, shareholders, customers, etc.). At the managerial level, legal provisions are supposed to be related to managers 'assessment of corporate risk, as "the estimates of outcome and financial effect are determined by the judgement of the management of the entity, supplemented by experience of similar transactions and, in some cases, reports from independent experts"[6]. Consequently, legal provisions are not only affected by the estimation of the consequences of possible claims but also by the managerial interests and incentives to recognize such claims. In turn, our theoretical framework should cover two levels of decision: the corporate disclosure policy and the mechanisms (both internal and external to the bank) that can curb managerial self-interested decisions.

Legal provisions and managerial discretionary decisions

The credit facility and the low interest rates in the years before the 2008 crisis have resulted in an environment with abundant cash flow available for firms, which can have resulted in firms 'overinvestment. High cash flows allow managers to overinvest and make suboptimal investments at the expense of the other stakeholders (Richardson 2006; McNichols & Stubben 2008). While this overinvestment process has been widespread, banks and financial institutions have been charged with being major causes of the

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5 IAS 37, Introduction, n. 2

6 IAS 37, n. 38

financial crisis (Kirkpatrick 2009; Acharya & Naqvi 2012; Akbar *et al.* 2017; Huang *et al.* 2018; Chen *et al.* 2019).

Irrespective of the risk-return relationship, overinvestment in many cases can result in higher corporate risk, which should be reflected anyhow in the financial statements. Given that legal provisions are the recognition of potential obligations arising from prior risky decisions, the provisions should reflect —depending on the impact and the probability— the situation that result from the reactions of stakeholders to the bad investment or excessive risk taking.

Consequently, as managers are supposed to estimate the provisions, the riskier managerial decisions enabled by higher cash flow availability should be translated in more legal provisions. However, the recognition implied by the legal provisions is conditional on the managers 'personal interests. In fact, prior literature shows that managerial personal traits and incentives can moderate the risk taking in banks (Guo *et al.* 2015; Palvia *et al.* 2015). Managers can be reluctant to recognize to have taken excessive risk and the previously stated relationship between discretional cash flows and legal provisions can be blurred by managerial self-interest.

Therefore, we expect that the relationship between managers 'discretional behavior and legal provisions is driven by two opposite forces. On the one hand, the disclosure policy of the bank to provide the stakeholders with relevant information should lead to a positive relationship in the sense that more discretionary risky investments should be translated in more recognition of the risks. On the other hand, managers 'self-interest in order to hide non-optimal investments would lead to a negative relationship. In turn, the relationship between discretional cash flow and legal provisions can be stated in a dual way as follows:

H1a: There is a positive relationship between banks 'discretional cash flows and legal provisions.

H1b: There is a negative relationship between banks 'discretional cash flows and legal provisions.

Legal provisions and boards of directors

As it is widely known, the corporate governance mechanisms can attenuate the discretionary behavior of managers. The board of directors arises among the most effective internal mechanisms of corporate governance. Boards are usually charged with three main duties: managerial oversight, provision of critical resources and strategic guidance (Adams *et al.* 2010). Although conditional on a number of issues, the literature has often underlined the monitoring of managers as the main duty of the board of directors (Huse *et al.* 2011).

There is a number of board characteristics that can impact on their functioning: size, independence, activity, CEO duality (Andrés & Vallelado 2008; Fracassi & Tate 2012; Chou *et al.* 2013; Kim *et al.* 2014; Muravyev *et al.* 2014; Villanueva-Villar *et al.* 2016). As far as risk taking strategies are concerned, previous literature has shown a conflicting relationship between board size and corporate risk (Pathan 2009; Nakano & Nguyen 2012; Huang & Wang 2015), and a negative relationship between board independence and risk taking (Gonzalez & André 2014).

Specifically in the financial industry, the boards of directors of banks have several particular characteristics, among which we highlight the higher independence (Arun & Turner 2004; Andrés *et al.* 2012; García-Meca *et al.* 2015; John *et al.* 2016). Board independence is likely to be one of the most influential issues for managerial oversight (Lei & Deng 2014; Muravyev *et al.* 2014; Akbar *et al.* 2017). Independent directors are supposed to act on behalf of the minority shareholders and to improve corporate transparency. Indeed, organizations with less independent boards and chairman being simultaneously the CEO seem to have lower disclosure (Chen & Jaggi 2000; Eng & Mak 2003; Gul & Leung 2004; Cheng & Courtenay 2006; Huafang & Jianguo 2007; Sihombing & Pangaribuan 2017). Interestingly, Akbar *et al.* (2017) find a negative relationship between independent non-executive directors and corporate risk taking behavior in British banks. In the same vein Erkens *et al.* (2012) underlines the importance of corporate governance in banks performance during the crisis through firms 'risk taking.

We posit that board independence is an effective issue to force managers to disclosure information on risk taking. Since the availability of higher cash flows can lead to more and riskier corporate investments, more independent boards should result in incentives to managers for a timelier recognition of this risk through legal provisions. Thus, the influence of an independent board will be positive in order to strengthen the alignment of interests with other stakeholders. Consequently, our second hypothesis is stated as follows:

H2. The independence of the board of directors positively moderates the relationship between banks 'free cash flows and legal provisions.

Legal provisions and the institutional setting

Corporate risk taking decisions can be affected by legal, institutional and cultural factors from the setting in which the firm operates (Acharya *et al.* 2011; Li *et al.* 2013). Among all these factors, we focus on two of them to which the literature has paid much attention: the legal protection of investors and the legal quality of the environment (La Porta *et al.* 1998; La Porta *et al.* 2000; Djankov *et al.* 2008). These authors classify the countries into two groups (common law and civil law countries), with the former providing better legal protection to investors. Acharya *et al.* (2011), Levine (1998), and Peni and Vähämaa (2012) show that the relationship between investors legal protection and corporate risk taking is conditional on a number of factors. Nevertheless, in terms of disclosure, common law countries are associated with higher financial disclosure compared to firms from civil law countries (Casu *et al.* 2017).

Since legal provisions are a way of corporate financial disclosure, we posit that the effectiveness of internal mechanisms of corporate governance (i.e., the board of directors) is conditional on the external environment. This can be specially applied to banks, given their sensitivity to the environment due to the heavier regulation (Laeven 2013). Moreover, the suitability of the legal provisions can be an outcome of the investors' protection. Thus, we expect that a better legal environment —stronger investors protection, and higher level of legal quality— would lead to a more effective influence of the board of directors on the relationship between managers discretional behavior and legal provisions. In turn, our third hypothesis can be stated as follows:

> H3a. The strength of investor protection moderates the influence of the board independence on the banks 'legal provisions.

> H3b. The legal quality of the environment moderates the influence of the board independence on the banks 'legal provisions.

Empirical design

Sample and method

Accordingly with our aim of analyzing the European systemic banks, we study a sample of 92 listed banks from 18 European countries (Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Republic of Ireland, Italy, Netherlands, Poland, Portugal, Spain, Sweden, Switzerland, United Kingdom) between 2008 and 2017, as shown in Table 1. Initially we have selected the 118 European systemic entities supervised by the Single Supervisory Mechanism. After dropping out the banks whose information on legal provisions was ambiguous or not available, the final sample includes 92 banks. Therefore, our sample can be considered as sufficiently representative of the European bank landscape. The combination of cross-section and time series data gives a final sample of 920 observations. The data regarding the balance sheet, board structure and market prices have been obtained from the *Thomson Reuters Eikon* database. Legal provisions have been obtained after a careful scrutiny of the notes to the financial statements of each entity and each year. The information on the countries, legal and institutional setting, comes from the World Bank databases (Kaufmann *et al.* 2011).

<center>< INSERT TABLE 1 ABOUT HERE></center>

The empirical analysis includes a descriptive analysis of the main characteristics of the sample. Then, we check our hypotheses with the subsequent explanatory analysis. Our database consists of a panel. For its adequate estimation, the panel data technique is applied (Arellano 2003). This technique allows considering the banks fixed effects and the possible problems of endogeneity.

Variables and model

The definition of all the variables is summarized in Appendix A. Our dependent variable is the legal provision in each year (LP). As previously stated, legal provisions are found in the notes of the annual reports of the banks and reflects the risks of litigation, legal proceedings and other claims run by the banks. The provision of each year is scaled by the total assets.

The recollection of values of legal provisions is a challenging process due to the differences among countries and even among banks. For instance, some of them name these provisions as legal provisions, other ones as provisions for litigation or for legal disputes. In many cases, to find the right amount, a deeper search was needed because it was subsumed in other provisions or other liabilities. To show the many issues that are related to legal provisions and to gauge the relative importance of each one, in Figure 1 we show the frequency of the terms used in the annual reports through the size of each word.

< INSERT FIGURE 1 ABOUT HERE>

FCF is the free operating cash flow, calculated as cash from operations for the fiscal period minus capital expenditures and dividends paid for the same period, divided by the total assets. This variable can be seen as indicative of the manager's discretionary power. To test the ability of the board of directors to curb manager's discretionary behavior, we introduce the independence of the board (IND), measured as the proportion of independent directors on the total size of the board. To check the specific effect of the independence of the board, we compute the interacted variable IND*FCF, defined as the product of FCF and IND. We also use the CEO duality (CEOCH), which is a common variable in the literature (Judge *et al.* 2003; Gul & Leung 2004; Stockmans *et al.* 2013; Singh & Delios 2017). It equals 1 if CEO simultaneously chairs the board or the chairman of the board has been the CEO of the company.

We control for the following firm-level issues: ROA measures a company's operating performance and is calculated as EBITDA divided by total assets. MB is the equity market to book ratio (Adam & Goyal 2008). SIZE is a measure of the size of the bank as the logarithm of total assets. LEV is the leverage calculated as total liabilities over total assets. ZSCORE is a measure of risk that captures the probability of default of a bank. It compares the capitalization and returns with the volatility of those returns. As shown in the appendix, it is measured as the return on assets and the weight of equity over assets, both divided by the standard deviation of the return on assets (Boyd *et al.* 1993; Boyd *et al.* 2006). TIER1 is the ratio of Tier 1 capital as a percentage of total risk-weighted assets. The ratio represents high-quality sources of capital which banks and other financial institutions are required to keep in order to be protected against bankruptcy. It is also referred to as the core capital ratio, or as the going-concern capital ratio.

We introduce a number of country level variables. First, PROTECT is the strength of investor protection, provided by World Bank, based on Djankov *et al.* (2008), that measures the degree of minority investor protection to prevent their expropriation. Second, RULELAW reflects perceptions of the extent to which agents have confidence in

and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. Third, REGQUA reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Fourth, CORRUPTCONTROL reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. These three latest variables are collected in Worldwide Governance Indicators (WGI) established by World Bank. Finally, we use CORRUPTSC which collects perceptions of the degree of corruption as seen by business people and country analysts, and ranges between 10 (highly clean) and 0 (highly corrupt). It is obtained from Transparency International website.

Given the similar information provided by the last four variables, to summarize the information related to legal quality of the environment, we apply a factor analysis, which results in the new variable ENVIRON. It represents the level of legal quality by country, quantifying the rule of law, the quality of regulation and the level of corruption as well as how it is controlled. The results are shown in Table 2. The only factor obtained (i.e. ENVIRON) explains 92.74% of the variance of the four indicators. The charges of each variable in the final factor are listed at the top of the Table. All of them have similar values. The Kaiser-Meyer-Olkin (KMO) measure of sample suitability is 0.845, higher than 0.5, and the Barlett test of sphericity is significant at the 99.999% confidence level, meaning that the results obtained provide an adequate basis for the empirical examination of the factorial analysis (Hair *et al.* 1998).

Our baseline model is as follows:

$LP_{i,t} = \beta_0 + \beta_1 \cdot FCF_{i,t} + \beta_2 \cdot IND_{i,t} + \beta_3 \cdot IND*FCF_{i,t} + \beta_4 \cdot ROA_{i,t} + \beta_5 \cdot MB_{i,t} + \beta_6 \cdot SIZE_{i,t} + \beta_7 LEV_{i,t} + \beta_8 ZSCORE_{i,t} + \beta_9 IND*ZSCORE_{i,t} + \varepsilon_{i,t}$

We apply this model to the whole sample to test hypotheses 1 and 2 (the relationship between free cash flow and legal provisions, and the moderating effect of the board of directors). Then, keeping in mind that the role of the board can be conditional on the external framework, we will split our sample into two different groups (depending on the legal quality of the environment) and then apply the model in each sub-sample.

Results

Descriptive analysis

The evolution of the legal provisions is displayed in Figure 2. We can observe an increase in legal provisions. Nevertheless, we could split this period into two different periods: an initial jump in the years 2008-2011, and a flat evolution since 2012. However, this global evolution can hide different patterns across countries. Accordingly, in Figure 3, we report the evolution for common law and civil law countries. Despite beginning at a similar level,

common law countries use less legal provisions than civil law countries. In addition to the different level of legal provisions, there is also a different timing. While in civil law countries the highest increase took place in the first years of the crisis, in common law countries it was not until 2011 that the banks began to create more provisions. Likewise, in spite of the difference in the time-pattern, there is a convergence between both groups of countries.

< INSERT FIGURE 2 AND 3 ABOUT HERE>

Table 3 reports the mean value, the standard deviation, and quartiles (Q25, Q50 and Q75) of the main variables of our whole sample during the period 2008-2017. The mean of legal provision, as it is scaled by 1000, is around 0.064% of total assets. It is remarkable the independence percentage (49.83%) as banks are characterized by highly independent boards compared to nonfinancial firms. Our descriptive statistics are homogeneous and similar to the previous in the literature (Lepetit *et al.* 2008; Farag & Mallin 2017). We even get less dispersed variables. The correlation matrix is displayed in Table 4. The coefficients of correlation are low, so that the multicollinearity is not an issue affecting the reliability of our results.

< INSERT TABLES 3 AND 4 ABOUT HERE>

Explanatory analysis

Based on the Hausman test (not tabulated), we run the fixed effects model. In the first column of Table 5 we report the results of the baseline model. The free cash flow (FCF) is negatively and significantly related to legal provisions. This result supports hypothesis H1b and can be understood as a proof that the discretionary power of bank managers has led to less legal provisions; may be due to the will to hide the legal risks or to managerial overconfidence.

In the second column we test the effect of the independence of the board of directors in the relation between free cash flow and legal provisions. Whereas IND does not have any significant direct relationship, we obtain a positive and significant coefficient for IND*FCF, supporting hypothesis 2. It means that the independence of the board of directors works as a control mechanism, so that the higher managerial power (and presumably higher risks) is translated into more legal provisions in the firms with more independent boards. The results obtained for the control variables ZSCORE and IND*ZSCORE are consistent as they follow FCF and IND*FCF, respectively. The negative coefficient of SIZE could be explained by the diversification and a reputation effect: big banks are more likely to have a diversified portfolio (Demsetz & Strahan 1997; Anderson & Fraser 2000) or to have better reputation (Carnevale & Mazzuca 2014), so that the risk they need to recognize is lower.

To check the effect of the institutional environment in columns 3-6 of Table 5 we run differentiated estimates according to some characteristics of the institutional setting. In columns 3 and 4 we use the PROTECT (strength of minority investors protection) and in

columns 5 and 6 we use the comprehensive variable ENVIRON resulting from the factor analysis. In column 3 we study the observations when the PROTECT variable is under the median and in column 4 when the variable is above the median. While the results reported in column 3 do not show any relationship between the FCF and the legal provisions, the results of column 4 suggest some interesting insights. In this case, both the free cash flow (FCF) and the interaction with the board's independence (IND*FCF) become significantly related to the legal provisions. Both results are in line with our hypotheses H1a and H2. Similarly, when we split the sample based on the quality of the institutional environment (ENVIRON), both the FCF and IND*FCF are significant in column 6, i.e., for the subsample of firms in the environments with better institutional quality. Taken together, the results reported in columns 3-6 confirm our hypotheses 3a and 3b, in the sense that the influence of the board of directors on the legal provisions is affected both by the protection of investors and the quality of the institutional setting.

< INSERT TABLE 5 ABOUT HERE>

Furthermore, since the significance of the free cash flow (either directly or interacted with the independence of the board) only holds in the settings with the best scores, it seems that the internal mechanisms of corporate governance (i.e., the board of directors) require the functioning of the external mechanisms to be effective. In order to build on this idea, in Table 6 we run similar estimates when we divide the sample according to the four variables that were combined in the ENVIRON variable: rule of law (columns 1 and 2), the control of corruption (columns 3 and 4), the regulation quality (columns 5 and 6) and the corruption score (columns 7 and 8). The results are fully consistent with previous ones and corroborate that the independence of the board only affects the legal provisions in the most protective environments, i.e., where the rule of laws prevails or when the corruption is fought (columns 2, 4, 6, and 8). On the contrary, in the least protective settings (columns 1, 3, 5, and 7) the independence of the board does not play any relevant role.

< INSERT TABLE 6 ABOUT HERE>

In Table 7 we run an analogous exam but focusing on the internal mechanisms instead of the external ones. We use the CEO duality to divide the sample. Whereas in columns 1 and 2 we study the firms in which the CEO chairs or has chaired the board of directors, in columns 3 and 4 we report the results when there is a separation of roles in two different people. Once again, the free cash flow and the board of directors only are significantly related to the legal provisions when there is a separation of roles, which means the firms in which there is a more independent oversight of managers by the board of directors.

< INSERT TABLE 7 ABOUT HERE>

To check the robustness of our analysis we change some of the control variables and the method of estimation. In Table 8 we report the results of the baseline model estimations when we control for tier 1 ratio instead of leverage. Results corroborate the previous

ones: the negative effect of free cash flow (H1b), the moderating role of the independence of the board (H2), and the relevance of the institutional environment (H3). We also use the General Method of Moments as an alternative method of estimation (Arellano & Honore 2001). Although we do not expect the endogeneity to be a problem because legal provisions are not likely to affect the independent variables, we use this method to check the robustness of our results. The results, reported in Table 9, confirm the validity of the previous ones.

< INSERT TABLES 8 AND 9 ABOUT HERE>

Conclusions

In the years after the global financial crisis the banks worldwide have had to face a wave of lawsuits due to legal claims. Irrespective of the causes of the claims, in this paper we study the policy that the banks have followed to create the legal provisions, with which they have aimed to cover the liabilities stemming from such lawsuits. Since the legal provisions can be viewed as a mechanism for disclosing information to capital markets, the creation of legal provisions is determined by two main factors: the risk taken by the bank and the managerial incentives to disclose the information on the risk taken.

Our results support both views since we find an initial negative relationship between free cash flow (our measure of managers 'discretionary investments) and legal provisions even when we control for the risk taking. This result suggests that managers seem to hide the risk taken by creating less provisions. Nevertheless, we also find that some internal and external mechanisms of corporate governance do play a mediating role. In this vein, we find that independence of the board of directors has a moderating effect, so that independent boards lead to create more provisions as a caveat for future lawsuits. Similarly, we also find that a better institutional framework (both in terms of quality of the laws and lack of corruption) amplifies the positive influence of the board of directors.

Our research has practical implications both for policy makers, investors and bank directors. Given the role of legal provisions as a mechanism for information disclosure, the accounting and legal norms should foster the fast and accurate recognition of such risks. In turn, the legal and institutional framework of the firms should be designed to ensure that such recognition is done in due course. In so doing, the interests of managers and other stakeholders become aligned, and the possible destabilization effect of the legal claims is short-cut. Given the relevance of the financial system for the economic welfare of the whole society, this issue should be in the agenda of the reforms in capital markets. Investors would also benefit from a more transparent legal provisions policy since they would have more reliable information about the future prospects and the earnings quality of the firm. Finally, our research also underlines the importance of the board of directors as a mechanism for managerial monitoring. Thus, the expertise and attitude of directors can be a valuable asset to improve the reputation of the bank.

Our paper opens several directions for future work. First, new research should address the problem of the subjective assessment of the risk. This subjectivity also affects the

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identification of the provisions since the banks have different ways for naming these accounts, so that the collection of the information on provisions can be subjectively biased. Second, given the prominent role played by managers, as some authors have already begun to investigate (Chiang & He 2010; Allini *et al.* 2016), it would be interesting to study the profile of bank managers —their personal and family relationships, culture, training, professional development, etc.— and how this set of issues impacts the recognition of risks. Other mechanisms of corporate governance, both internal and external, such as the scrutiny by the media or the ownership structure, could also shed some light on this topic.

References

Acharya, V., Naqvi, H., 2012. The seeds of a crisis: A theory of bank liquidity and risk taking over the business cycle. Journal of Financial Economics 106, 349-366

Acharya, V.V., Amihud, Y., Litov, L., 2011. Creditor rights and corporate risk-taking. Journal of Financial Economics 102, 150-166

Adam, T., Goyal, V.K., 2008. The investment opportunity set and its proxy variables. Journal of Financial Research 31, 41-63

Adams, R.B., Hermalin, B.E., Weisbach, M.S., 2010. The role of boards of directors in corporate governance: A conceptual framework and survey. Journal of Economic Literature 48, 58-107

Akbar, S., Kharabsheh, B., Poletti-Hughes, J., Shah, S.Z.A., 2017. Board structure and corporate risk taking in the UK financial sector. International Review of Financial Analysis 50, 101-110

Allini, A., Manes Rossi, F., Hussainey, K., 2016. The board's role in risk disclosure: an exploratory study of Italian listed state-owned enterprises. Public Money & Management 36, 113-120

Anderson, R.C., Fraser, D.R., 2000. Corporate control, bank risk taking, and the health of the banking industry. Journal of Banking & Finance 24, 1383-1398

Andrés, P., Romero-Merino, M.E., Santamaría, M., Vallelado, E., 2012. Board Determinants in Banking Industry. An International Perspective. Managerial and Decision Economics 33, 147-158

Andrés, P., Vallelado, E., 2008. Corporate governance in banking: The role of the board of directors. Journal of Banking & Finance 32, 2570-2580

Arellano, M., 2003. Panel data econometrics Oxford University Press, Oxford.

Arellano, M., Honore, B., 2001. Panel data models: some recent developments. In:Elsevier, pp. 3229-3296.

Arun, T.G., Turner, J.D., 2004. Corporate Governance of Banks in Developing Economies: concepts and issues. Corporate Governance: An International Review 12, 371-377

Banerjee, R.N., Mio, H., 2018. The impact of liquidity regulation on banks. Journal of Financial Intermediation 35, 30-44

Barucci, E., Milani, C., 2018. Do European banks manipulate risk weights? International Review of Financial Analysis 59, 47-57

Boyd, J.H., De Nicolò, G., Jalal, A.M., 2006. Risk-Taking and Competition Revisited: New Theory and New Evidence Prepared. International Monetary Fund, WP/06/297

Boyd, J.H., Graham, S.L., Hewitt, R.S., 1993. Bank holding company mergers with nonbank financial firms: Effects on the risk of failure. Journal of Banking & Finance 17, 43-63

Carnevale, C., Mazzuca, M., 2014. Sustainability report and bank valuation: evidence from European stock markets. Business Ethics: A European Review 23, 69-90

Casu, B., Deng, B., Ferrari, A., 2017. Post-crisis regulatory reforms and bank performance: lessons from Asia. European Journal of Finance 23, 1544-1571

Chen, C.J.P., Jaggi, B., 2000. Association between independent non-executive directors, family control and financial disclosures in Hong Kong. Journal of Accounting and Public Policy 19, 285-310

Chen, I.J., Lee, Y.Y., Liu, Y.C., 2019. Bank liquidity, macroeconomic risk, and bank risk: Evidence from the Financial Services Modernization Act. European Financial Management Forthcoming

Cheng, E.C.M., Courtenay, S.M., 2006. Board composition, regulatory regime and voluntary disclosure. The International Journal of Accounting 41, 262-289

Chiang, H.T., He, L.J., 2010. Board supervision capability and information transparency. Corporate Governance: An International Review 18, 18-31

Chou, H.-I., Chung, H., Yin, X., 2013. Attendance of board meetings and company performance: Evidence from Taiwan. Journal of Banking & Finance 37, 4157-4171

Danisewicz, P., McGowan, D., Onali, E., Schaeck, K., 2018. The real effects of banking supervision: Evidence from enforcement actions. Journal of Financial Intermediation 35, 86-101

Demsetz, R.S., Strahan, P.E., 1997. Diversification, Size, and Risk at Bank Holding Companies. Journal of Money, Credit and Banking 29, 300-313

Djankov, S., La Porta, R., Lopez-de-Silanes, F., Shleifer, A., 2008. The law and economics of self-dealing. Journal of Financial Economics 88, 430-465

Eng, L.L., Mak, Y.T., 2003. Corporate governance and voluntary disclosure. Journal of Accounting and Public Policy 22, 325-345

Erkens, D.H., Hung, M., Matos, P., 2012. Corporate governance in the 2007–2008 financial crisis: Evidence from financial institutions worldwide. Journal of Corporate Finance 18, 389-411

Ertürk, I., 2016. Financialization, bank business models and the limits of post-crisis bank regulation. Journal of Banking Regulation 17, 60-72

Expansión, 2017. Deloitte, PwC, EY y KPMG duplican su negocio de España en diez años. In: www.expansion.com

Expansión, 2018a. Allianz reclama 1.500 millones a Santander y el banco ofrece 500 por su acuerdo de bancaseguros. In: www.expansion.com

Expansión, 2018b. EEUU puede impedir a los bancos operar en bolsas de la UE. In: www.expansion.com

Expansión, 2018c. Golpe del Supremo a la banca en venta de productos financieros. In: www.expansion.com

Expansión, 2018d. La banca culpa a la regulación de haberse llevado por delante el 82% de su rentabilidad. In: www.expansion.com

Expansión, 2018e. Las 'Big Four' registran su mayor ritmo de crecimiento en casi una década. In: www.expansion.com

Expansión, 2018f. Pimco presenta otra demanda por los bonos de Novo Banco. In: www.expansion.com

Farag, H., Mallin, C., 2017. Board diversity and financial fragility: Evidence from European banks. International Review of Financial Analysis 49, 98-112

Fracassi, C., Tate, G., 2012. External Networking and Internal Firm Governance. The Journal of Finance 67, 153-194

García-Meca, E., García-Sánchez, I.-M., Martínez-Ferrero, J., 2015. Board diversity and its effects on bank performance: An international analysis. Journal of Banking & Finance 53, 202-214

Gonzalez, A., André, P., 2014. Board Effectiveness and Short Termism. Journal of Business Finance & Accounting 41, 185-209

Gul, F.A., Leung, S., 2004. Board leadership, outside directors 'expertise and voluntary corporate disclosures. Journal of Accounting and Public Policy 23, 351-379

Guo, L., Jalal, A., Khaksari, S., 2015. Bank executive compensation structure, risk taking and the financial crisis. Review of Quantitative Finance and Accounting 45, 609-639

Hair, J.F., Anderson, R.E., Tatham, R.L., William, C., 1998. Multivariate data analysis. Upper Saddle River, NJ: Prentice Hall

Huafang, X., Jianguo, Y., 2007. Ownership structure, board composition and corporate voluntary disclosure: Evidence from listed companies in China. Managerial Auditing Journal 22, 604-619

Huang, S.C., Chen, W.D., Chen, Y., 2018. Bank liquidity creation and CEO optimism. Journal of Financial Intermediation 36, 101-117

Huang, Y.S., Wang, C.-J., 2015. Corporate governance and risk-taking of Chinese firms: The role of board size. International Review of Economics & Finance 37, 96-113

Huse, M., Hoskisson, R.E., Zattoni, A., Viganò, R., 2011. New perspectives on board research: changing the research agenda. Journal of Management and Governance 15, 5-28

International Financial Reporting Standards, 1998. IAS 37 Provisions, Contingent Liabilities and Contingent Assets.

Jensen, M.C., 1993. The modern industrial revolution, exit, and the failure of internal control systems. Journal of Finance 48, 831-880

John, K., De Masi, S., Paci, A., 2016. Corporate Governance in Banks. Corporate Governance: An International Review 24, 303-321

Judge, W.Q., Naoumova, I., Koutzevol, N., 2003. Corporate governance and firm performance in Russia: an empirical study. Journal of World Business 38, 385-396

Kaufmann, D., Kraay, A., Mastruzzi, M., 2011. The Worldwide Governance Indicators: Methodology and Analytical Issues. Hague Journal on the Rule of Law 3, 220-246

Kim, K., Mauldin, E., Patro, S., 2014. Outside directors and board advising and monitoring performance. Journal of Accounting and Economics 57, 110-131

Kirkpatrick, G., 2009. The corporate governance lessons from the financial crisis. Financial Market Trends 2009/1

KPMG, 2018. KPMG advierte sobre la maraña normativa de la banca hasta 2022. In: cincodias.elpais.com

La Porta, R., López de Silanes, F., Shleifer, A., Vishny, R., 2000. Investor protection and corporate governance. Journal of Financial Economics 58, 3-27

La Porta, R., López de Silanes, F., Shleifer, A., Vishny, R.W., 1998. Law and finance. Journal of Political Economy 106, 1113-1155

Laeven, L., 2013. Corporate Governance: What's Special About Banks? Annual Review of Financial Economics 5, 63-92

Lei, A.C.H., Deng, J., 2014. Do Multiple Directorships Increase Firm Value? Evidence from Independent Directors in Hong Kong. Journal of International Financial Management & Accounting 25, 121-181

Lepetit, L., Nys, E., Rous, P., Tarazi, A., 2008. Bank income structure and risk: An empirical analysis of European banks. Journal of Banking & Finance 32, 1452-1467

Levine, R., 1998. The Legal Environment, Banks, and Long-Run Economic Growth. Journal of Money, Credit and Banking 30, 596-613

Li, K., Griffin, D., Yue, H., Zhao, L., 2013. How does culture influence corporate risk-taking? Journal of Corporate Finance 23, 1-22

McNichols, M.F., Stubben, S.R., 2008. Does Earnings Management Affect Firms 'Investment Decisions? The Accounting Review 83, 1571-1603

Muravyev, A., Berezinets, I., Ilina, Y., 2014. The structure of corporate boards and private benefits of control: Evidence from the Russian stock exchange. International Review of Financial Analysis 34, 247-261

Nakano, M., Nguyen, P., 2012. Board size and corporate risk taking: further evidence from Japan. Corporate Governance: An International Review 20, 369-387

Palvia, A., Vähämaa, E., Vähämaa, S., 2015. Are female CEOs and Chairwomen more conservative and risk averse? Evidence from the banking industry during the financial crisis. Journal of Business Ethics 131, 577-594

Pathan, S., 2009. Strong boards, CEO power and bank risk-taking. Journal of Banking & Finance 33, 1340-1350

Peni, E., Vähämaa, S., 2012. Did Good Corporate Governance Improve Bank Performance during the Financial Crisis? Journal of Financial Services Research 41, 19-35

Richardson, S., 2006. Over-investment of free cash flow. Review of Accounting Studies 11, 159-189

Sihombing, J., Pangaribuan, H., 2017. A study of corporate governance structure, disclosure and information asymmetry in Indonesia banking industry. Jurnal Akuntansi 21, 156-169

Singh, D., Delios, A., 2017. Corporate governance, board networks and growth in domestic and international markets: Evidence from India. Journal of World Business 52, 615-627

Stockmans, A., Lybaert, N., Voordeckers, W., 2013. The conditional nature of board characteristics in constraining earnings management in private family firms. Journal of Family Business Strategy 4, 84-92

The Guardian, 2017. Lloyds shareholders 'mugged' by 2008 HBOS takeover, high court told. In: www.theguardian.com

Villanueva-Villar, M., Rivo-López, E., Lago-Peñas, S., 2016. On the relationship between corporate governance and value creation in an economic crisis: Empirical evidence for the Spanish case. BRQ Business Research Quarterly 19, 233-245

Appendix. Variables definition

Variable	Definition	Source
LP	Legal Provisions reported over total Assets reported, scaled by 1000.	Annual reports
FCF	Free Operating Cash Flow over total Assets reported. Free Operating Cash Flow is calculated as Cash from Operations for the fiscal period minus Capital Expenditures and Dividends paid for the same period.	Eikon
IND	Percentage of independent board members as reported by the company.	Eikon
CEOCH	Does the CEO simultaneously chair the board or has the chairman of the board been the CEO of the company? Equals 1 if true.	Eikon

ROA	EBITDA over Total Assets reported. EBITDA is EBIT for the fiscal year plus the same period's Depreciation, Amortization of Acquisition Costs and Amortization of Intangibles.	Eikon
MB	Equity market-to-book ratio	Eikon
SIZE	The decimal logarithm of total assets reported.	Eikon
LEV	Total liabilities over total assets.	Eikon
ZSCORE	$\frac{ROA+\frac{Total\ Equity}{Total\ Assets}}{ROASD}$; ROASD is de standard deviation of ROA. It is scaled by 100.	Eikon
TIER1	Ratio of Tier 1 capital as a percentage of total risk-weighted assets.	Eikon
PROTECT	The strength of minority investor protection to prevent their expropriation in a given country and year based on Djankov et al. (2008).	World Bank
ENVIRON	The result of factorial analysis of the variables RULELAW, REGQUA, CORRUPTCONTROL and CORRUPTSC.	
RULELAW	Reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	World Bank
REGQUA	Reflects perceptions of the ability of the government to formulate and implement sound	World Bank

	policies and regulations that permit and promote private sector development.	
CORRUPTCONTROL	Reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.	World Bank
CORRUPTSC	Perceptions of the degree of corruption as seen by business people and country analysts, and ranges between 10 (highly clean) and 0 (highly corrupt).	Transparency

Figures

Figure 1. Legal provisions literal account frequency

BANKS' LEGAL PROVISIONS AND FINANCIAL CRISIS: THE INFLUENCE OF CORPORATE GOVERNANCE AND INSTITUTIONAL ENVIRONMENT*
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Figure 2. Evolution of legal provisions

Figure 3. Evolution of legal provisions by legal origin
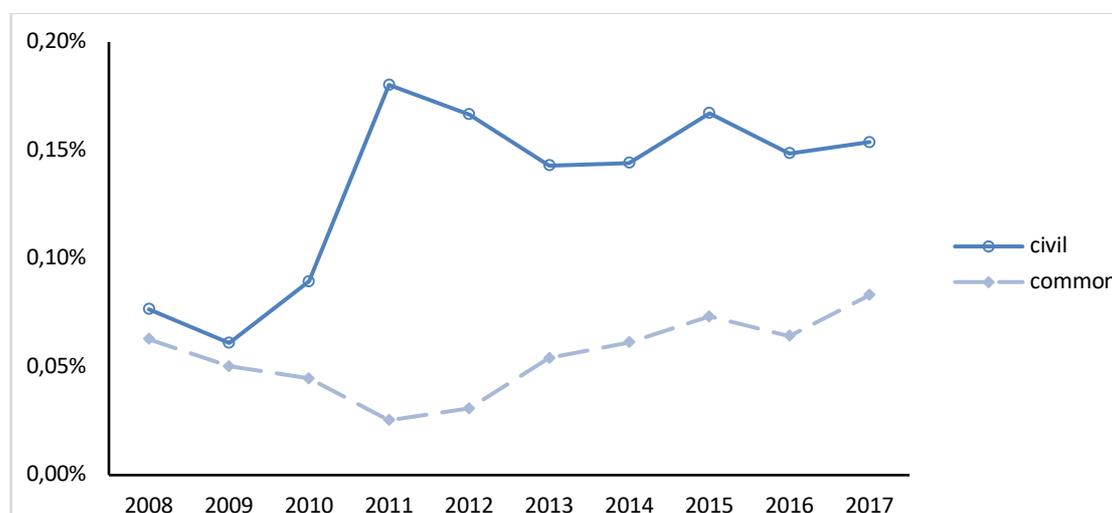
Tables

Table 1. Distribution of the sample by country

Country	Obs.	Percent
Austria	40	4.35
Belgium	10	1.09
Czech Republic	20	2.17
Denmark	50	5.43
Finland	10	1.09
France	30	3.26
Germany	40	4.35
Greece	50	5.43

Hungary	10	1.09
Republic of Ireland	20	2.17
Italy	170	18.48
Netherlands	20	2.17
Poland	100	10.87
Portugal	10	1.09
Spain	80	8.70
Sweden	60	6.52
Switzerland	90	9.78
United Kingdom	110	11.96
Total	920	100.00

Table 2. Factorial analysis

	ENVIRON
RULELAW	0.9712
REGQUA	0.9614

CORRUPTCONTROL	0.9869
CORRUPTSC	0.9316
Accounted variance	92.74%
KMO	0.845
Barlett test (Chi-square)	5874.46
p-Value	0.0000
Observations	920

Table 3. Descriptive statistics of the variables

	Obs.	Mean	Std. dev.	Q25	Q50	Q75
LP	795	0.642	0.740	0.087	0.411	0.873
FCF	785	0.005	0.049	-0.012	0.002	0.022
IND	584	49.828	27.079	28.570	54.200	70.370
ROA	793	0.015	0.023	0.008	0.012	0.019
MB	740	1.229	1.084	0.628	0.987	1.572
SIZE	795	24.950	1.818	23.695	24.788	26.323

LEV	795	0.923	0.050	0.912	0.933	0.949
ZSCORE	524	1.692	2.605	0.522	0.947	1.710
TIER1	725	0.137	0.042	0.110	0.130	0.160

Mean, median, standard deviation, and quartiles (Q25, Q50 and Q75) of the variables. LP is the legal provision divided by total assets, scaled by 1000. FCF the free operating cash flow divided by total assets. IND is the percentage of independent board members. ROA is the return on assets. MB is the ratio between market capitalization and total equity. SIZE is the logarithm of total assets. LEV is the leverage ratio as total liabilities over total assets. ZSCORE is a measure of risk (see Appendix A for the definition). TIER1 represents the ratio of Tier 1 capital as a percentage of total risk-weighted assets.

Table 4. Correlation matrix

	LP	FCF	IND	ROA	MB	SIZE	LEV	ZSCORE
FCF	-0.3206	1.0000						
	0.0000							
IND	0.1081	0.0230	1.0000					
	0.0085	0.5717						
ROA	0.0477	0.0680	-0.0199	1.0000				
	0.1739	0.0467	0.6209					
MB	0.3256	-0.1007	-0.0373	0.3196	1.0000			
	0.0000	0.0048	0.3598	0.0000				

SIZE	-0.2651	0.0459	0.2984	-0.0582	-0.3783	1.0000		
	0.0000	0.1792	0.0000	0.0867	0.0000			
LEV	-0.3323	0.0387	0.1640	-0.0178	-0.2408	0.4476	1.0000	
	0.0000	0.2580	0.0000	0.5997	0.0000	0.0000		
ZSCORE	-0.0336	-0.0435	0.0021	0.1078	0.0903	-0.1312	-0.2466	1.0000
	0.4404	0.3095	0.9636	0.0111	0.0382	0.0020	0.0000	
TIER1	0.0883	-0.1053	-0.0332	0.0341	0.1993	-0.2978	-0.6011	0.1041
	0.0159	0.0031	0.4306	0.3404	0.0000	0.0000	0.0000	0.0194

Correlation ratio and p-value. LP is the legal provision divided by total assets, scaled by 1000. FCF the free operating cash flow divided by total assets. IND is the percentage of independent board members. ROA is the return on assets. MB is the ratio between market capitalization and total equity. SIZE is the logarithm of total assets. LEV is the leverage ratio as total liabilities over total assets. ZSCORE is a measure of risk (see Appendix A for the definition). TIER1 represents the ratio of Tier 1 capital as a percentage of total risk-weighted assets.

Table 5. Results of the estimation

			by PROTECT		by ENVIRON	
	(1)	(2)	(3)	(4)	(5)	(6)

FCF	-1.453***	-5.345***	-1.265	-6.094***	-2.447*	-12.343***
	(0.533)	(1.546)	(2.589)	(2.319)	(1.324)	(3.712)
IND		0.000	0.000	-0.000	0.002	-0.003
		(0.002)	(0.003)	(0.005)	(0.002)	(0.004)
IND*FCF		0.065**	-0.014	0.074*	0.022	0.149***
		(0.027)	(0.046)	(0.038)	(0.034)	(0.053)
ROA	2.184	1.757	1.416	0.007	-1.034	6.780
	(3.302)	(3.675)	(6.148)	(6.117)	(3.036)	(8.357)
MB	-0.104**	-0.057	-0.068	-0.103	-0.114	-0.009
	(0.041)	(0.071)	(0.074)	(0.179)	(0.070)	(0.123)
SIZE	-0.405***	-0.382**	-0.463**	-0.569*	-0.317*	-0.762**
	(0.135)	(0.165)	(0.197)	(0.322)	(0.169)	(0.336)
LEV	-1.799	-0.781	-3.529	4.124	-4.657**	7.643
	(2.433)	(2.890)	(4.146)	(5.286)	(2.287)	(6.814)
ZSCORE	-0.017*	-0.081***	-0.033	-0.148***	-0.015	-0.002***
	(0.009)	(0.019)	(0.024)	(0.036)	(0.016)	(0.000)

IND*ZSCORE	0.001***	0.001	0.002***	0.000	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Intercept	12.807***	11.408***	15.947***	11.682	13.245***	13.702*
	(3.460)	(3.983)	(5.540)	(7.718)	(4.268)	(7.039)
Observations	496	419	228	191	208	211
Adjusted R-squared	0.094	0.130	0.126	0.243	0.198	0.270
F-test	2.763***	2.774***	1.256	2.288***	2.136***	3.253***

Estimated coefficients (standard errors) from the fixed effect estimation. In models (3) and (4) the sample is divided by the median of PROTECT (column 3 for observations under the median and column 4 for observations above the median value). In models (5) and (6) the sample is divided using ENVIRON (column 5 for observations under the median and column 6 for observations above the median value). The dependent variable is LP, the legal provision divided by total assets, scaled by 1000. FCF is the free operating cash flow divided by total assets. IND is the percentage of independent board members. ROA is the return on assets calculated as EBITDA divided by total assets. MB is the ratio between market capitalization and total equity. SIZE is the logarithm of total assets. LEV is the leverage ratio as total liabilities over total assets. ZSCORE is a measure of risk (see Appendix A for the definition). ***, **, and * indicate significance at the 99%, 95%, and 90% confidence level, respectively.

Table 6. Results of the estimation

by RULELAW		by CORRUPTCONTROL		by REGQUA		by CORRUPTSC	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

BANKS' LEGAL PROVISIONS AND FINANCIAL CRISIS: THE INFLUENCE OF CORPORATE GOVERNANCE AND INSTITUTIONAL ENVIRONMENT*

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VARIABLES	LP	LP	LP	LP	LP	LP	LP	LP
FCF	-2.938**	-11.928****	-2.504*	-13.314****	-2.579**	-13.450****	-2.895**	-13.435****
	(1.290)	(3.845)	(1.301)	(3.930)	(1.287)	(3.789)	(1.421)	(3.277)
IND	0.001	-0.003	0.002	-0.003	0.002	-0.003	0.002	-0.001
	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)	(0.003)	(0.003)
IND*FCF	0.033	0.141**	0.028	0.160***	0.025	0.162***	0.034	0.166***
	(0.033)	(0.055)	(0.032)	(0.056)	(0.033)	(0.054)	(0.035)	(0.049)
ROA	-1.300	9.994	-1.236	9.471	-1.365	5.969	-2.221	7.219
	(2.910)	(8.760)	(2.966)	(9.048)	(2.965)	(8.702)	(2.986)	(8.942)
MB	-0.152**	0.070	-0.115*	-0.046	-0.116*	0.016	-0.058	-0.025
	(0.068)	(0.124)	(0.069)	(0.151)	(0.069)	(0.125)	(0.073)	(0.139)
SIZE	-0.256	-0.772**	-0.347**	-0.792**	-0.361**	-0.811**	-0.412**	-0.800**
	(0.165)	(0.336)	(0.162)	(0.358)	(0.166)	(0.341)	(0.196)	(0.320)
LEV	-4.643**	8.757	-4.443**	7.853	-4.811**	7.582	-2.452	9.804

	(2.267)	(7.170)	(2.227)	(7.169)	(2.221)	(6.868)	(2.537)	(7.190)
ZSCORE	-0.016	-0.198***	-0.014	-0.203***	-0.014	-0.199***	0.015	-0.112***
	(0.016)	(0.038)	(0.016)	(0.039)	(0.016)	(0.038)	(0.035)	(0.027)
IND*ZSCORE	0.000	0.002***	0.000	0.002***	0.000	0.002***	-0.000	0.001**
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)
Constant	11.750***	12.819*	13.835***	14.293*	14.543***	15.024**	13.862***	12.226*
	(4.158)	(7.218)	(4.150)	(7.411)	(4.243)	(7.151)	(5.036)	(7.038)
Observations	212	207	218	201	210	209	194	225
Adjusted R-squared	0.192	0.288	0.197	0.282	0.219	0.283	0.202	0.229
F-test	2.091***	3.440***	2.211***	3.232***	2.451***	3.376***	1.901**	2.729***

Estimated coefficients (standard errors) from the fixed effect estimation. In columns 1, 3, 5, and 7 the observations are under the median value of the dividing variable; in columns 2, 4, 6, and 8 the observations are above the median vale. The dependent variable is LP, the legal provision divided by total assets, scaled by 1000. FCF is the free operating cash flow divided by total assets. IND is the percentage of independent board members. ROA is the return on assets calculated as EBITDA divided by total assets. MB is the ratio between market capitalization and total equity. SIZE is the logarithm of total assets. LEV is the leverage ratio as total liabilities over total assets. ZSCORE is a measure of risk (see Appendix A for the definition). ***, **, and * indicate significance at the 99%, 95%, and 90% confidence level, respectively.

Table 7. Results of the estimation by CEO – Chairman duality

	coincide		do not coincide	
	(1)	(2)	(3)	(4)
FCF	1.718	2.901	-1.301**	-6.148***
	(2.341)	(7.069)	(0.592)	(1.709)
IND		0.008		-0.001
		(0.014)		(0.003)
IND*FCF		-0.051		0.078***
		(0.132)		(0.029)
ROA	12.578**	9.217	0.622	0.353
	(4.843)	(7.088)	(4.346)	(4.786)
MB	0.017	0.145	-0.089*	-0.060
	(0.174)	(0.277)	(0.046)	(0.081)
SIZE	-0.996***	-1.195	-0.251	-0.235

	(0.341)	(0.832)	(0.165)	(0.198)
LEV	-6.451	-7.179	-3.328	-0.765
	(3.960)	(6.555)	(3.251)	(3.825)
ZSCORE	-0.015	0.069	-0.022**	-0.096***
	(0.023)	(0.212)	(0.011)	(0.021)
IND*ZSCORE		-0.001		0.001***
		(0.003)		(0.000)
Constant	32.686***	38.203	10.365**	7.698
	(10.910)	(21.855)	(4.281)	(4.688)
Observations	48	42	391	349
Adjusted R-squared	0.803	0.771	0.076	0.138
F-test	4.899***	1.867	1.687*	2.396***

Estimated coefficients (standard errors) from the fixed effect estimation. In models (1) and (2) the CEO is also the board chairman; in models (3) and (4) the opposite holds. The dependent variable is LP, the legal provision divided by total assets, scaled by 1000. FCF is the free operating cash flow divided by total assets. IND is the percentage of independent board members. ROA is the return on assets calculated as EBITDA divided by total assets. MB is the ratio between market capitalization and total equity. SIZE is the logarithm of total assets. LEV is the leverage ratio as total liabilities over total assets. ZSCORE is a measure of risk (see Appendix A for the definition). ***, **, and * indicate significance at the 99%, 95%, and 90% confidence level, respectively.

Part 2. Selected papers

BANKS' LEGAL PROVISIONS AND FINANCIAL CRISIS: THE INFLUENCE OF CORPORATE
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Table 8. Results of the estimation using TIER1

			by PROTECT		by ENVIRON	
	(1)	(2)	(3)	(4)	(5)	(6)
FCF	-1.453***	-5.308***	-1.786	-5.818***	-3.281**	-10.505***
	(0.542)	(1.503)	(2.713)	(2.212)	(1.343)	(3.841)
IND		0.001	0.001	0.002	0.001	-0.001
		(0.002)	(0.003)	(0.005)	(0.002)	(0.004)
IND*FCF		0.069***	-0.007	0.077**	0.035	0.130**
		(0.027)	(0.048)	(0.038)	(0.035)	(0.055)
ROA	2.578	1.476	2.474	-0.890	0.370	1.580
	(3.221)	(3.584)	(5.668)	(6.194)	(3.047)	(8.369)
MB	-0.112***	-0.085	-0.070	-0.195	-0.159**	0.018
	(0.040)	(0.070)	(0.077)	(0.184)	(0.072)	(0.121)
SIZE	-0.538***	-0.486***	-0.522***	-0.676**	-0.401**	-0.632**

	(0.137)	(0.154)	(0.198)	(0.331)	(0.170)	(0.278)
TIER1	-1.207	-1.415	-0.423	-4.155	1.137	-2.290
	(1.087)	(1.232)	(1.331)	(3.064)	(1.846)	(1.749)
ZSCORE	-0.019**	-0.091***	-0.039	-0.158***	-0.012	-0.205***
	(0.010)	(0.020)	(0.027)	(0.035)	(0.018)	(0.038)
IND*ZSCORE		0.001***	0.001	0.002***	0.000	0.002***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Constant	14.731***	13.569***	14.259***	18.946**	10.985**	17.760**
	(3.544)	(4.027)	(5.169)	(8.762)	(4.372)	(7.469)
Observations	460	391	217	174	196	195
Adjusted R-squared	0.110	0.158	0.125	0.283	0.184	0.287
F-test	3.015***	3.193***	1.166	2.431***	1.821**	3.172***

Estimated coefficients (standard errors) from the fixed effect estimation. In models (3) and (4) the sample is divided by the median of PROTECT (column 3 for observations under the median and column 4 for observations above the median value). In models (5) and (6) the sample is divided using ENVIRON (column 5 for observations under the median and column 6 for observations above the median value). The dependent variable is LP, the legal provision divided by total assets, scaled by 1000. FCF is the free operating cash flow divided by total assets. IND is the percentage of independent board members. ROA is the return on assets calculated as EBITDA divided by total assets. MB is the ratio between market capitalization and total equity. SIZE is the logarithm of total assets. TIER1 is the ratio of Tier 1 capital as a percentage of total risk-weighted assets. ZSCORE is a

measure of risk (see Appendix A for the definition). ***, **, and * indicate significance at the 99%, 95%, and 90% confidence level, respectively.

Table 9. Results of the estimation with System GMM

	(1)	(2)
VARIABLES	LP	LP
FCF	-3.496**	-5.577**
	(1.586)	(2.754)
IND		-0.020**
		(0.009)
IND*FCF		0.146*
		(0.075)
ROA	-7.102***	-4.010
	(2.673)	(7.270)
MB	0.074*	0.091
	(0.044)	(0.069)
SIZE	0.197***	0.318***

	(0.045)	(0.107)
LEV	-3.028*	-3.178
	(1.630)	(2.260)
ZSCORE	-0.023**	-0.042
	(0.010)	(0.061)
IND*ZSCORE		0.001
		(0.001)
Constant	-1.413*	-3.501
	(0.835)	(2.157)
Observations	362	305
Sargan test	0.167	0.189
AR(2) test	0.637	0.621

Estimated coefficients (standard errors) from the Generalized Method of Moments estimation. The dependent variable is LP, the legal provision divided by total assets, scaled by 1000. FCF is the free operating cash flow divided by total assets. IND is the percentage of independent board members. ROA is the return on assets calculated as EBITDA divided by total assets. MB is the ratio between market capitalization and total equity. SIZE is the logarithm of total assets. LEV is the leverage ratio as total liabilities over total assets. ZSCORE is a measure of risk (see Appendix A for the definition). The m_2 is a test to check the absence of second order correlation, and the Sargan test is the test for the over-identification of restrictions. ***, **, and * indicate significance at the 99%, 95%, and 90% confidence level, respectively.

CAN THE MERE NOTION OF A GAME INCREASE CONSUMER WILLINGNESS TO PARTICIPATE IN GAMIFIED LOYALTY PROGRAMS?

DANIIL MURAVSKII, SNEZHANA MURAVSKAIA — *IBS-MOSCOW (RANEPA), RUSSIA*;
KSENIYA GOLOVACHOVA, MARIA SMIRNOVA — *GSOM SPBU, RUSSIA*

Introduction

Gamification is an established marketing practice as well as a popular research direction, which is currently concentrated mainly in the areas of studying advergaming, gamified mobile applications, education, and in general – human-computer interactions. According to Rapp (2019) this research field in its current form has already reached maturity and is ready to be spread further, intercepting with other areas of marketing theory and practice, where it has the potential to guide process and product improvements. One such area is retail loyalty program design, where such gaming technics as stickers collections, symbolic tokens and conditioned discounts reception in exchange for a desired purchase behavior have been used a long time before the term and concept of gamification has been established.

Current studies, which study gamification in the context of retail loyalty program design, are generally concerned with mitigation of negative effects of external limitations [Kim, Ahn, 2017] and focus on questions related to effectiveness of consumer engagement and its relation to loyalty formation [Hwang et al., 2019]. The excessive focus of attention on game mechanics has led to one of the most evident current weaknesses of the research field – lack of generalizability. Research shows that consumers may react differently to the same game mechanic depending on the product, context, visual design, game narrative, previous experience and more importantly – the types of player presented in the research sample [Seaborn, Fels, 2015; Sailer et al., 2017; Tondello et al., 2019]. In this paper, we suggest a shift of focus from looking at how consumers react to the implementation of various game mechanics to what they feel about the fact that companies (e.g., retailers) apply gamification as such.

We pose that applying gamification may result in consumers realizing that the company is trying to elicit a game, whereby the consumer is either expected to "play" with the company, with other consumers, or with herself by performing at various individual challenges. This perception of gamification is hypothesized to have an effect on whether they are entertained by the gamified loyalty program and coincidentally - their willingness to participate in the loyalty program. Further, in this paper we empirically investigate how gamification perception relates to consumer persuasion knowledge, and whether prior gamified loyalty program experience plays a role in the abovementioned processes.

The hypotheses are studied based on a survey of 431 Russian consumers, who are the target audience for a fictional gamified loyalty program. The results support the existence of a positive effect of perceived gamification on consumers' willingness to participate in the program. This effect is established by two distinct processes: perceived gamification increases both entertainment and utilitarian value, which in turn positively impacts

consumers' willingness to participate; and by mitigating the negative effect of perceived manipulation intent, which has a negative effect on consumers' willingness to participate in the program.

Theoretical background

Gamification as a rapidly evolving area of scientific research [Koivisto, 2019]. At the moment, researchers generally agree that gamification is the use of game mechanics in a non-game context [Deterding et al., 2011]. Nevertheless, a more detailed definition remains a subject of controversy, and the context and what each company specifically understands by game mechanics can be very different [Rapp et al.,]. Today, there are three large areas of knowledge in management, where the effect of gamification is studied: information management [Koivisto, Hamari, 2019; Berdun et al., 2019; Hamari, Huotari, 2015], education [Aparicio et al., 2019; Freitas et al., 2017] and marketing [Hofacker et al., 2017; Yang et al., 2017; Eisingerich et al., 2019]. Information management gamification is considered as a well-established tool that contributes to the effective transformation of systems and increase their acceptance among users [Huotari, Hamari, 2017]. In particular, it was in this area that the main conclusions were made regarding the essence of gamification [Deci, Ryan, 2000; Sailer et al., 2017; Suh et al., 2017].

In marketing gamification became the "toast of the town" almost from its beginning. The ability to create a more favorable user experience, thereby building relationships and increasing motivation for acquisitions made gamification highly in demand in the business community. The emergence of mobile marketing, which occurred roughly in parallel, added the popularity of gamified advertising and special application design [Eppman et al., 2018].

One of the main issues that has only been analyzed in the last couple of years is the measurement of gamification parameters, namely, degree, intensity, gameful experience and the difference between real and perceived gamification [Rapp et al., 2019; Koivisto, Hamari, 2019]. A number of indices are presented in the literature, which allow one to measure characteristics, but still a lot of areas are under investigation.

Particularly, in marketing gamification became an integral part of loyalty programs [Kim, Ahn, 2017; Hwang et al., 2019]. Loyalty programs that are extensively incorporated into retail practices [Henderson et al., 2011] have always considered some game mechanics. Recent studies, on the contrary, pay attention to which mechanics allow making a loyalty program gamified and which benefits the company and consumers can get from this [Kim, Ahn, 2017].

The main influence of gamification on loyalty programs efficiency can be associated with different indicators, among which the most commonly used are three types of benefits: symbolic, hedonic and utilitarian. If we are talking about the correlation between gamification as a process using mechanics and dynamic of games (video games

predominantly) and loyalty programs elements we can visualize a possibility to match it in a following manner (table 1).

Table 1. Illustration of game mechanics in customer loyalty programs

GAME MECHANICS	DEFINITION	BENEFITS
POINTS COLLECTION	Customers forgo the opportunity to earn points on purchase occasions in which they redeem them.	Cognitive incentive: customers may find redeeming to be "costly," even if the process is effortless. Customers may not perceive points and cash equally. [Smith and Sparks 2009, p. 545]; pain of paying may also vary by the type of currency used to pay for a purchase (cash vs. points). Drèze and Nunes [2011] suggest that firm should set prices using combinations of cash and points that will minimize customers' disutility of paying.
TIERS OR CLASSES (HIERARCHICAL LOYALTY PROGRAM)	Structures, which consist of patterns of classes or tiers that customers reach by spending certain amounts and engaging in other purchase activities [Mimouni Chaabanea , Pez, 2017]	Increasing member loyalty [Bijmolt et al., 2011; Drèze and Nunes, 2011; Kopalle et al., 2012]. Consumers increase their purchases to remain in the same tier or move to the next tier; they experience negative feelings when they lose their status [Wagner et al., 2009]. Fostering feelings of status [Drèze and Nunes, 2009]. Can damage the quality of the customer–firm relationship in case of customer status demotion [Wagner et al., 2009]. May trigger feelings of unfairness [Steinhoff & Palmatier, 2016].

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LEVELS OR MULTILEVEL REWARDS	Introducing loyalty programs offer multiple rewards with respective requirements.	Price discrimination mechanism. Multi-level loyalty programs might be profitable for the firm when customers differ in their purchase frequency or time discounting rates. A variety of rewards or levels are offered for customer convenience; individuals have different preferences or situational factors [Nunes and Drèze 2004].
		Smaller and larger rewards are not meant for different customers; they work together in motivating the customer. Nunes and Drèze [2004]: smaller rewards serve as intermediate and attainable goals and hence can motivate customers to stay with the seller. Larger rewards (vis-à-vis the smaller reward) motivate customers to spend more [O'Brien and Jones 1995].
		Firms can use multiple rewards as a (second-degree) price discrimination mechanism to exploit buyer heterogeneity to increase profits.
MEANINGFUL STORIES	The narrative context in which a gamified application can be embedded contextualizes activities and characters in the game and gives them meaning beyond the mere quest for points and achievements [Kapp, 2012].	Help players experience their own actions as meaningful and volitionally engaging, regardless of whether or not choices are really available [Rigby & Ryan, 2011].
		A story can be communicated by a game's title (e.g. Space Invaders) or by complex storylines typical of contemporary role-playing video games (e.g. The Elder Scrolls Series) [Kapp, 2012].
		Narrative contexts can be oriented towards real, non-game contexts or act as analogies of real-world settings. The latter can enrich boring, barely stimulating contexts, and, consequently,

inspire and motivate players particularly if the story is in line with their personal interests [Nicholson, 2015]

Hypotheses and analysis

H1. Perceived gamification positively impacts willingness to participate in a gamified loyalty program by having a direct positive impact on the program's entertainment value (a) and utilitarian value (b).

H2. Perceived gamification has a positive indirect impact on the program's entertainment value (a) and utilitarian value (b) by decreasing perceived manipulation intent.

H3. There is a significant difference in how perceived gamification impacts entertainment and utilitarian value of a gamified loyalty program between respondents with more prior experience in participating in similar programs and those – with less, whereas the effect is less strong for those respondents with more experience.
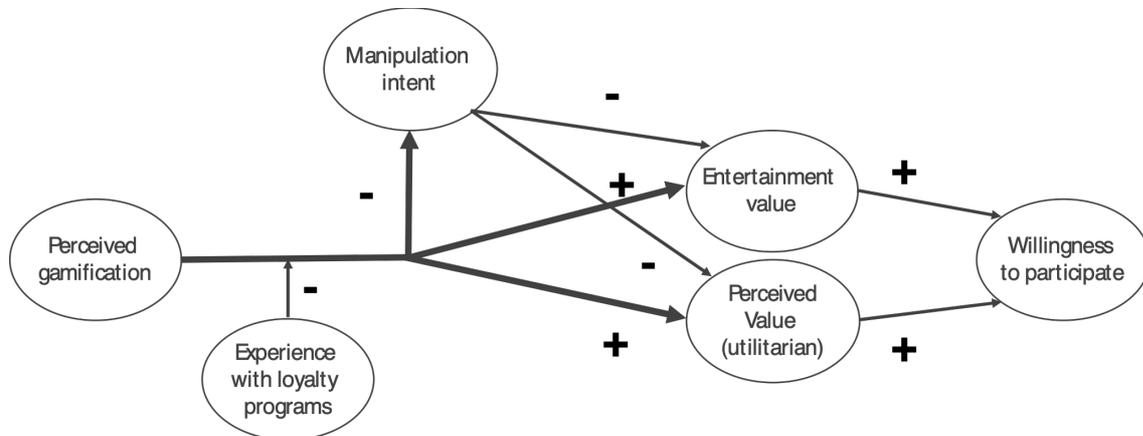
Diagram 1. Research model

To proceed with the hypotheses testing an online survey was conducted, consisting of 431 Russian consumers, who are the target audience for a fictional gamified loyalty program. The sample consisted from women (76%) and men (24%) living in St.Petersburg (47%) and Moscow (53%), aged from 18 to 55 years. They were presented with a stimulus depicting a fictional loyalty program, which asked to collect stickers for a particular amount of purchase in order to get discounts on a new set of dishes. The reliability and validity of the constructs measurements has been insured by maintain recommended values for Alpha Cronbach (>0,8), KMO (>0,8), CR (>0,8) and AVE (>0,7) during exploratory and confirmatory factor analysis.

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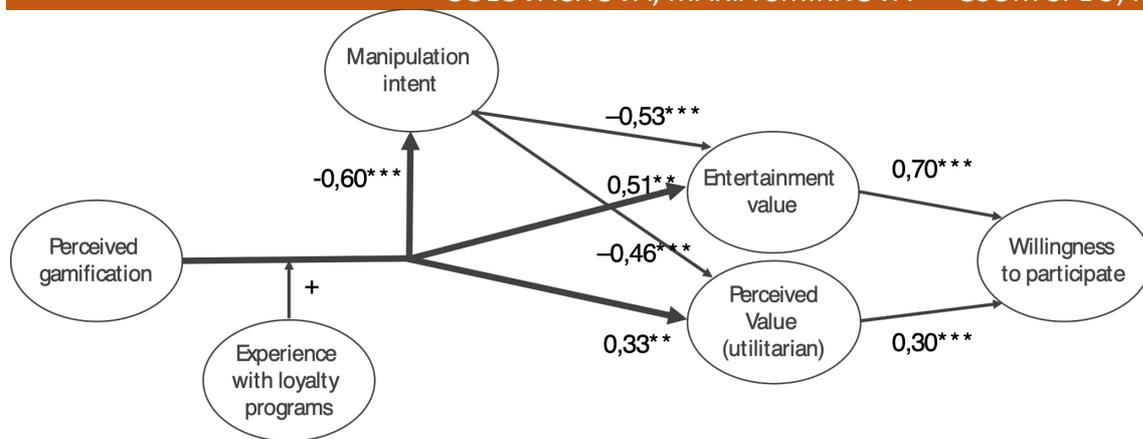
Diagram 2. SEM results

Structure equation modeling was used to confirm the research hypotheses 1 and 2. Multigroup analysis was used to reveal whether there is a significant difference in the effects of perceived gamification for between consumers with more reach or scarce prior experience with gamified loyalty programs. The analysis revealed results contradicting the initial hypotheses 3, whereas the effect of perceived gamification was stronger for the more experienced consumers.

Conclusion

The results of this research represent novelty for both the field of gamification and gamified loyalty program design studies. The construct of perceived gamification has been presented and its contributing role in forming loyalty program attractiveness has been established. Perceived gamification impacts willingness to participate through two processes: by directly increasing entrainment and utilitarian values, and decreasing perceived manipulation intent, which has a negative effect on both entertainment and utilitarian values of the program as indicated by potential users. Both effects get significantly stronger for respondents, who report a vast prior experience in participating in similar loyalty programs. Therefore, while the first two hypotheses were confirmed, the third hypotheses regarding the moderating effect of perceived gamification was disproved. This in fact highlights the importance of gamification as an instrument of increasing the effectiveness of loyalty programs beyond being just a subject of novelty. Consumers apparently appreciate the company's attempts to "play" with them, which leads to them feeling more entertained by the experience and evaluating the program more highly. Moreover, high perceived gamification aids in mitigating the suspicion that the company tries to fool or manipulate the consumer by designing a gamified program.

References

Aparicio, M., Oliveira, T., Bacao, F., & Painho, M. (2019). Gamification: A key determinant of massive open online course (MOOC) success. *Information & Management*, *56*(1), 39-54.

Berdun, F. D., Armentano, M. G., Berdun, L. S., & Cincunegui, M. (2019). Building SYMLOG profiles with an online collaborative game. *International Journal of Human-Computer Studies*, *127*, 25-37.

Deci, E. L., & Ryan, R. M. (2010). Intrinsic motivation. *The corsini encyclopedia of psychology*, 1-2.

Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness: defining gamification. New York, NY: ACM.

Dreze, X., & Nunes, J. C. (2008). Feeling superior: The impact of loyalty program structure on consumers' perceptions of status. *Journal of Consumer Research*, *35*(6), 890-905.

Eisingerich, A. B., Marchand, A., Fritze, M. P., & Dong, L. (2019). Hook vs. hope: How to enhance customer engagement through gamification. *International Journal of Research in Marketing*.

Eppmann, R., Bekk, M., & Klein, K. (2018). Gameful Experience in Gamification: construction and validation of a Gameful Experience Scale [GAMEX]. *Journal of Interactive Marketing*, *43*, 98-115.

Freitas, S. A. A., Lacerda, A. R., Calado, P. M., Lima, T. S., & Canedo, E. D. (2017, October). Gamification in education: A methodology to identify student's profile. In *2017 IEEE Frontiers in Education Conference (FIE)* (pp. 1-8). IEEE.

Henderson, C. M., Beck, J. T., & Palmatier, R. W. (2011). Review of the theoretical underpinnings of loyalty programs. *Journal of Consumer Psychology*, *21*(3), 256-276.

Hofacker, C. F., De Ruyter, K., Lurie, N. H., Manchanda, P., & Donaldson, J. (2016). Gamification and mobile marketing effectiveness. *Journal of Interactive Marketing*, *34*, 25-36.

Huotari, K., & Hamari, J. (2017). A definition for gamification: anchoring gamification in the service marketing literature. *Electronic Markets*, *27*(1), 21-31.

Hwang, J., & Choi, L. (2019). Having fun while receiving rewards?: Exploration of gamification in loyalty programs for consumer loyalty. *Journal of Business Research*.

Kim K., & Ahn S. J. G. (2017). The Role of Gamification in Enhancing Intrinsic Motivation to Use a Loyalty Program. *Journal of Interactive Marketing*. *40 (1),* 41-51

Koivisto, J., & Hamari, J. (2019). The rise of motivational information systems: A review of gamification research. *International Journal of Information Management*, *45*, 191-210.

Mimouni-Chaabane, A., & Volle, P. (2010). Perceived benefits of loyalty programs: Scale development and implications for relational strategies. *Journal of Business Research*, *63*(1), 32-37.

Nicholson, S. (2015). A recipe for meaningful gamification. In *Gamification in education and business* (pp. 1-20). Springer, Cham.

Rapp, A., Hopfgartner, F., Hamari, J., Linehan, C., & Cena, F. (2018). Strengthening gamification studies: Current trends and future opportunities of gamification research.

Sailer, M., Hense, J. U., Mayr, S. K., & Mandl, H. (2017). How gamification motivates: An experimental study of the effects of specific game design elements on psychological need satisfaction. *Computers in Human Behavior*, *69*, 371-380.

Seaborn, K., & Fels, D. I. (2015). Gamification in theory and action: A survey. *International Journal of human-computer studies*, *74*, 14-31.

Steinhoff, L., & Palmatier, R. W. (2016). Understanding loyalty program effectiveness: managing target and bystander effects. *Journal of the Academy of Marketing Science*, *44*(1), 88-107.

Suh, A., Cheung, C. M., Ahuja, M., & Wagner, C. (2017). Gamification in the workplace: The central role of the aesthetic experience. *Journal of Management Information Systems*, *34*(1), 268-305.

Tondello, G. F., Mora, A., Marczewski, A., & Nacke, L. E. (2019). Empirical validation of the gamification user types hexad scale in English and Spanish. *International Journal of Human-Computer Studies*, *127*, 95-111.

CAPITAL STRUCTURE, COMPANY GROWTH, AND PROFITABILITY: THE ROLE OF INVESTMENT OPPORTUNITIES

OWEN HIUS FELANO — *UNIVERSITY OF BUNDAMULIA*; TIGOR SITORUS — *UNIVERSITY OF BUNDAMULIA*, TONNY HENDRATONO; RUSTONO FARADY MARTA — *UNIVERSITY OF BUNDAMULIA*

Abstract

This research was conducted to investigate the mediation effect of investment opportunity and the influence of company growth, capital structure toward profitability. This research is a quantitative approach with variables that are capital structure, investment opportunity, company growth, and profitability. The sampling technique is non probability with SmartPls 3.0 for data processing. The data of Firm of Consumer Sector used in this study is secondary data obtained from the financial statements of the Indonesia Stock Exchange, period 2012-2015. The results showed that the variables of profitability is influenced by the capital structure is negatively significant, the company's growth variables are influenced by capital structure is positively significant, the investment opportunity influenced by the capital structure is positively significant, the profitability variables are affected by the company's growth negatively and insignificantly, and the profitability variables are influenced by positive and significant investment decisions, so we may conclude that investment opportunity may acts as intervening variable because the indirect influence more strength than direct influence.

Keywords: Capital Structure,Invesment Opportunity Set,Company's Growth, Profitability

Introduction

The company in carrying out its business activities in achieving its objectives and business competition between companies is getting stronger, the company needs capital. Capital is an important part of a company, with the existence of capital that the company can easily carry out the company's business activities and achieve maximum profits. In addition to using capital in increasing profitability, companies also need to determine the investment that will be taken by the company and the company's growth can also affect profitability. A survey conducted by The Nielsen Company Indonesia (Nielsen) stated that there was a decline until September 2017, the fast moving consumer good (FMCG) sector experienced a slowdown in growth where growth only reached 2.7% while the average annual growth rate reached 11% (Quddus and Ghina Ghaliya, 2017).

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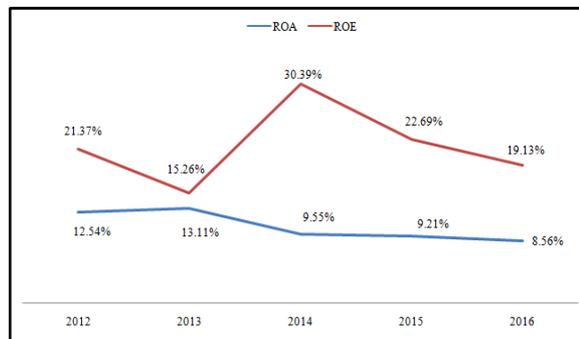
Figure 1 Company Profitability in the Consumer Goods Sector

The problem of the consumer goods sector companies is volatile, while in the figure 1, shows a decrease in the average profitability of the consumer goods sector companies starting from2014-2016 continues to decline both ROA and ROE. Decreased ROA profitability that could reach 30.39% and 9.55% ROE in 2014, but in 2016 only reached 19.13 ROA and 8.56% ROE. (Walfajri and Maizal, 2017).

According to Hafsah et al (2015) Capital structure affects the profitability of companies because companies that have large capital structures using large debt tend to have high growth so that it shows the company's ability to pay the debt of interest, and according to Astuti et al. (2015) by using the capital structure to the fullest, it can maximize the profitability of the company. According to Handriani (2015) the companies need to pay attention to opportunities in investing, where companies are able to manage additional company share capital to increase company growth and company profitability.

Some previous studies showed inconsistencies (research gaps) such as Christiningrum (2015) and Syardiana et al (2015) which found that capital structure had a significant effect on company profitability, while Buniarto's (2008) and those who could not prove that the capital structure had a significant effect on company performance, inconsistency in the results of previous studies regarding the effect of structure on company profitability is thought to be caused by the presence of other variables that mediate the effect of capital structure on company performance, when capital structure increases, it will be responded to by increased growth because companies can become more productive in conducting company business activities. Capital structure with the right company policy will influence the company's investment decisions so that investors see that the company's profitability will also increase.

Based on the description above, the authors are interested in conducting research with the title "The Mediation Effect of Investment Opportunities and the Growth of Companies on the Effect of Capital Structure on Profitability in the Company of the Consumer Goods Sector on the Indonesia Stock Exchange".

This study is different with prior research like Sulistiono et.al (2017) that focused on firm value even Investment Opportunity Sets as the mediating variable.

Regarding the motivation and problem research also research gap that mention above, bellows the authors provide a **research question** such as; 1). Is the profitability influenced by the capital structure, 2).Is the company's growth influenced by capital structure, 3).Is the investment opportunity influenced by the capital structure, 4). Is the profitability affected by the company's growth, 5).Is the profitability influenced by investment decision.

Theoretical background

Capital Structure

Balancing or comparison between foreign capital and own capital, shows the proportion of the use of debt to finance its investment, so that by knowing the capital structure investors can know the balance between the risk and return on investment (Sulindawati, 2017). Capital structure is a mixture of debt and equity, where each level of the mix between debt and equity is different, in order to increase / maximize the value of the company (Brigham, 2008). The capital structure theory which is considered as the beginning of the development of the theory is the theory proposed by Modligiani and Miller (MM) which states that companies cannot replace the total value of a company's securities by changing the proportion of the company's capital structure, in other words the value of the company is equal different capital (Ross, 2010). The development of the theory developed into a Pecking Order theory which discusses how to put yourself in the position of financial manager in a company requires additional capital, so the order of funding sources used is to use the fund cost hierarchy and the tax advantage of debt.

DAR = Total Debt / Total Assets

DER = Total Debt / Total Equity

Investment Opportunity (IOS)

According to Handriani et al (2015), are investment choices available to individuals or companies that can be done by the company. Investment opportunities owned by the company influence the perspective of managers, owners, investors and creditors about the value of the company. IOS gives a broader clue where the value of the company depends on the company's expenses in the future, IOS is defined as a combination of assets owned and investment choices in the future (Syardiana, 2015). According to Kallapur (2001), IOS Proxies are generally classified into three proxies, namely price-based proxy, investment-based proxy and variant-based proxy.

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According to Gaver and Gaver (1993), investment opportunity is the value of the company, the amount of which depends on the expenditures that have been set by management in the future, which at present is still an option, the investment choice that is expected to produce a greater return. This is consistent with research from Christiningrum (2015) and Sun et al (2014) which argue that there is a significant effect between investment opportunities on company performance.

Company Growth

Company Asset Growth is Aktvita which is used for operational activities of a company. The greater the assets, the greater the operational results generated by a company will be expected. Increasing the assets of a company which is followed by an increase in operating results will further increase the confidence of outsiders in a company (Andrian, 2012). According to Sunarto et al (2009), growth can be shown the growth of assets owned by the company. Assets indicate assets that are used for company operational activities, the greater the assets, the greater the expected operational results generated by the company. Company growth is an indicator or measure of how a company develops from the period to another period, where for the growth of the company also requires additional capital from external parties (Purwohandoko, 2017).

The company's growth describes the benchmark or average growth, changes in the company's wealth. A company that is at the stage of growth will generate increased profits and sales so that it will generate profits for the company. This hypothesis is supported by research by Sunarto et al (2009) and Kouser et al (2012) which states that there is a positive significant relationship between the growth of the company and the profitability of the company.

Total Asset Growth = Assets t - Assets t-1 / Assets t-1

Sales Growth = Sales t - Sales t-1 / Sales t-1

Profitability

Profitability is the end result of a number of policies and decisions made by the company (Brigham, 2008). The ultimate goal to be achieved by a company that is the most important is to get profits or profits as much as possible. By gaining maximum profit as targeted, companies can do much for the welfare of owners, employees, and improve product quality and new investment. To measure the profit level of a company, profitability ratios or profit ratios are used.

With the existence of a well-measured capital structure, and the use of debt in improving the company's operations, the company is able to carry out company activities effectively and increase the profitability of the company. The hypothesis of the influence of capital structure on profitability is supported by Fadhilah (2012) and Ratnasari (2016) research

which states that the capital structure and has a significant effect on profitability, also Phan and Kim Chi, (2013).

ROA = Net Profit / Total Assets

ROE = Net Profit / Total Equity

NPM = Net Profit / Sales

Hypothesis, research design and methodology employed

Research design

According to Echdar (2017) based on data and analysis, this research is a quantitative research that is, research that uses quantitative data (data in the form of numbers or data that is predicted). While based on the level of explanation this research is an associative research / relationship where research aims to determine the relationship between 2 or more variables. The relationship in this study is a causal relationship that is cause and effect, where there are independent variables, namely those that influence and variables dependent (gayut), namely variables that are influenced. The dependent variable in this study is profitability. The intermediary variable in this study is Investment Opportunity and Corporate Growth. The free variable in this study is the capital structure.

Population and Samples

In this study there were 37 companies which belonged to the consumer goods sector listed on the Jakarta Stock Exchange during the period 2011 - 2015.

The technique used is non probabilty sampling, which is a sampling technique that does not provide the same opportunity for each member of the population to be selected as a sample member. In this study purposive sampling was used, namely the technique of determining the sample with certain considerations. The sample selection criteria are presented in the table as follows:

Table 1 Sampling Criteria

Stages	Criteria	Amount
1	Recorded as an issuer in the consumer goods sector on the Indonesia Stock Exchange in 2012-2016	37

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2	Issuers who are delisting and relisting during 2012-2016	(2)
Remaining Issuer		35
3	The company did not issue financial statements in a row during the 2012-2016 period	(1)
Remaining Issuer		34
Selected company (Analysis unit)		**34**
Amount of Data (Observation Unit)		**170**

Types and Data Sources

The data used is based on the method of acquisition, the data used is secondary data. Secondary data is a source of data where information is collected from existing sources (Sekaran et al, 2013). This is panel data, panel data is a combination of cross-section data (cross section) with time series data (time series) (Kuncoro, 2011). The data sources used in this study are secondary data obtained from financial statements from the Indonesia Stock Exchange (IDX) for the period 2012-2016.

Goodness of Fit (GoF)

The overall fit index can use the goodness of fit criteria developed by Tenenhaus, et al. (2014) as GoF index. This index was developed to evaluate measurements and structural models while providing simple measurements for the overall prediction of the model. The R-Square value is weak, moderate, and strong if it is 0.02, 0.13 and 0.26. GoF index formula, namely:

$$GoF = \sqrt{} \text{ (AVE average) + (Average R2)}$$

Hypothesis testing

Hypothesis testing is done to see the effect of a variable on other variables by looking at the parameter coefficient and t-statistic value. The basis used in testing the hypothesis is the value found on path coeddiceint to test the structural model. The results of the hypothesis proposed, can be seen from the magnitude of t-statistics. The t-statistical value

compared to the t-table specified in the study is known to be df obtained from the number of samples minus two df = (n-2) and significance of 0.05.

Capital Structure

Data on capital structure variables from 2012-2016 in this study are as follows:
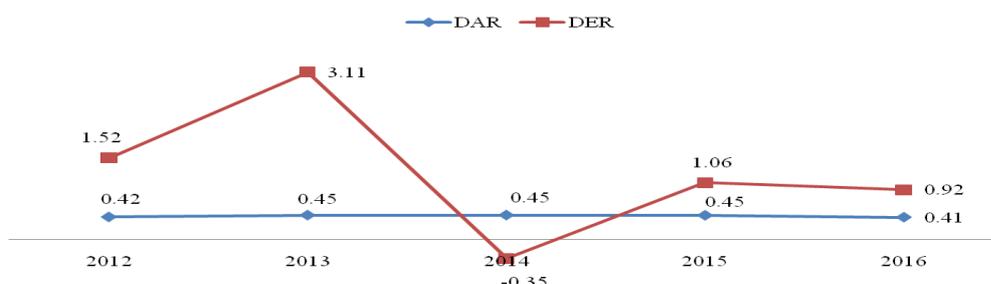
Figure 2 Average DAR and DER

In the average results of DAR and DER calculations in 2012 to 2016 it was seen that it tends to decrease in 2016 by 0.92 for DER and 0.41 for DAR, which shows that consumption sector companies have an increasingly better capital structure in funding company activities . In 2014 there was a sharp decline in DER, which reached a minus, because in one of the issuers of RMBA there was a loss so that equity was minus and began to recover in 2015 and 2016.

Investment Opportunity (IOS)

Investment opportunity variable (IOS) data from 2012 - 2016 in this study are as follows:

Table 2 Average Investment Opportunities (IOS)

	CABVA	CAMVA	PER	MVBVA	MVBVE
2012	0.50	0.12	40.73	3.15	7.47
2013	0.17	0.33	25.20	3.14	8.71
2014	0.09	0.07	40.15	3.20	7.48
2015	0.09	0.06	18.41	2.76	5.75
2016	0.07	0.04	8.91	3.20	6.91

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In the results of the average investment opportunity calculation (IOS), the consumption sector companies, namely CABVA, CAMVA, PER, MVBVA and, MVBVE in 2012 to 2016 were seen to tend to decrease only MVBVA experienced a slight increase. The decline that occurred in CABVA shows that the company lacks additional share capital that can be used for additional investment in its productive assets. While the decline in CAMVA shows investors' assessment of the company's growth opportunities where the higher CAMVA shows that the company has a profitable prospect in the future. This increase in MVBVA means that the market value of corporate assets in the consumption sector is smaller than the book value, but in 2016 it has increased again so that the potential for growth and investment can be profitable. MVBVE tends to fluctuate and re-increase in 2016. PER also shows that each year fluctuates and decreases in 2016 due to a slight decrease in profits per share equal to stock prices.

Company Growth

The company's growth variable data from 2012 - 2016 in this study are as follows:
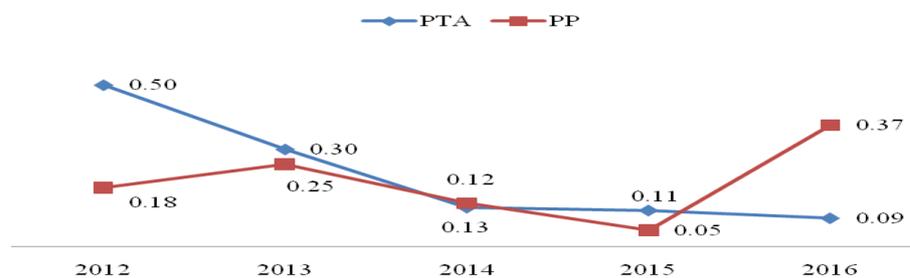
In the results of the average calculation of changes in total assets and growth of companies in 2012 to 2016, the total assets growth tends to decline until 2016, this can be caused by companies not increasing the amount of company assets. However, the average sales growth in the consumption sector actually showed an increase due to the presence of 1 issuer from 34 which experienced sales growth of 10.16% (TSPC), and 33 listed companies were below the average increase in sales growth.

Profitability

The IOS variable data from 2012 - 2016 in this study are as follows :
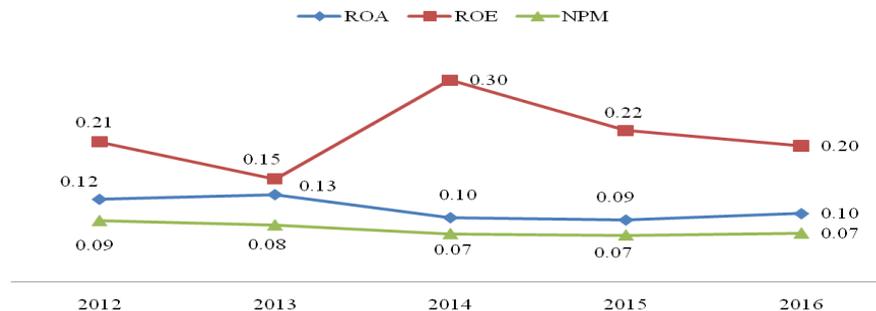
Figure 4 Average ROA, ROA, NPM

On the average results, the calculation of ROA, ROE, and NPM in 2012 to 2016 has decreased not significantly. A decrease in ROA can occur due to a decrease in sales or the company is not efficient in utilizing company assets. On ROE fluctuations occurred, namely an increase in 2014 but declined again in 2016, this could be due to the decline in the performance of the consumption sector companies, as well as the increased source of capital from external companies so that the company has responsibility or liability for capital from these creditors. Whereas the NPM in the graph shows stability in generating net income over the past 3 years, meaning that management has not made changes in the efficiency of production, operations and sales management.

Goodness of Fit (GoF) Results

Evaluating the last model by looking at the GoF of the model, evaluating the goodness of fit model is done for purification and refinement of the validity test or variable reliability (Ghozali and Latan, 2015) so that this GoF is used to understand the combined performance between the inner model and outer model. This GoF value extends between 1-0. GoF values are obtained from:

GoF = $\sqrt{}$ (AVE average) X (Average R2)

= $\sqrt{}$ (0.916) X (0.205)

= $\sqrt{}$ 0.18778

GoF = 0.4333

The results of the GoF calculation in this study show that the value of 0.4333 is above 0.36, so the model in this study has a strong ability to explain empirical data.

Empirical results and hypothesis testing

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The results of the hypothesis proposed, can be seen from the magnitude of t-statistics. The t-statistic value compared with the t-table value specified in this study is 1,654 where it is known that the df value is 168 (the number of samples is reduced by two: 170 - 2) and α is 0.05 (one tailed). The limit for accepting the hypothesis proposed is ± 1,654, where if t count> t-table.

Tabel 3 Test Results for the Parameters of the Parameters

	Original Sample	Sample Mean	Standard Error	T-Statistc	P value
Capital Structure → Profitability	-0.322	-0.331	0.090	3.565	0.000
Capital Structure →Company Growth	0.184	0.202	0.067	2.795	0.006
Company Growth → Profitability	-0.004	0.005	0.048	0.085	0.932
Capital Structure → Investment Opportunities	0.312	0.307	0.097	3.205	0.001
Investment Opportunities → Profitability	0.742	0.746	0.075	9.935	0.000

Based on Table 3 , bellows described the hypothesis testing.

1. Profitability Hypothesis Test Results Influenced by Capital Structure

The results of hypothesis testing based on table 4.10 carried out by the bootstrapping method show that the effect of capital structure on profitability has a path coefficient of - 0.322 and is significant at p-value of 0.000 <0.05 with a t-statistical value of 3.565> t-table of 1,654. This means that the capital structure has a negative and significant effect on profitability, so the second hypothesis is accepted. The real effect of capital structure on profitability is in accordance with the research conducted by Al-Najjar and Peter (2008), where the results of capital structure research have a significant negative effect on

profitability, to be able to increase profits of course companies need sources of funds to increase company capacity, but with additional External capital can reduce the benefits of the company in terms of both the cost of interest and the cost of equity, while the company will seek additional capital from earnings to be withheld. As in the descriptive analysis, that DAR decreases where the ability of the company's assets to debt is greater, the company's profitability ROA increases. But conversely if DAR is higher then ROA will decrease.

2. Hypothesis Test Results of Corporate Growth Influenced by Capital Structure

The results of hypothesis testing based on table 4.11 performed with the bootstrapping method show that the effect of capital structure on the growth of the company has a path coefficient of 0.184 and is significant at p-value of 0.006 <0.05 with a t-statistic of 2.795> t-table of 1,654. This means that the capital structure has a positive and significant influence on the growth of the company, so the first hypothesis is accepted. The real effect of capital structure on company growth is in accordance with the research conducted by Kumar et al (2017), where the results of capital structure research have a positive effect on company growth. Capital structure is needed by companies, especially companies that want to grow, of course, need capital to develop their business, according to pecking order theory companies will have a source of capital that has a level of risk or low cost. In the descriptive analysis shows that with the decrease in DAR, the growth of the total assets of the company will also decrease, meaning that when the company makes additional capital structure, the company will experience an increase in the total assets of the company.

3. Hypothesis Test Results of Investment Opportunities Influenced by Capital Structure

The results of hypothesis testing based on table 4.12 conducted with the bootstrapping method show that the effect of capital structure on investment opportunities has a path coefficient of 0.312 and is significant at p-value of 0.001 <0.05 with a t-statistical value of 3.205> t-table of 1,654. This means that the capital structure has a positive and significant influence on investment opportunities, so the first hypothesis is accepted. The real effect of capital structure on investment opportunities is in accordance with the research conducted by Rolita (2014), where the results of the capital structure research influence investment opportunities. The existence of these influences explains that debt policy influences investment decisions, if part of the capital structure is replaced and other factors are considered fixed it will affect the company's investment decisions will change.

4. Results of the Profitability Hypothesis Influenced by the Growth of the Company

The results of hypothesis testing based on table 4.13 performed with the bootstrapping method show that the influence of company growth on profitability has a path coefficient of -0.004 and is significant at p-value of 0.932> 0.05 with a t-statistical value of 0.085 <t-table of 1,654. This means that the company's growth does not have a significant and negative influence on profitability, so the fourth hypothesis is not accepted. These results are in accordance with the results of research conducted by Fauzi et al (2015), where the

results of research on company growth have no significant and negative effect on profitability. In descriptive analysis shows that with a decrease in growth in total assets, company profitability also decreased, on net profit margin and ROA still showed stability and a slight increase. Companies that have high growth give an increasingly growing picture by having high assets and sales. The results of sales made by the company can be used to pay the loan principal (debt) and interest on the debt so as to reduce profitability, but not significantly influence. In the consumption sector, the average total asset growth is lower than the average income of the company.

5. Profitability Hypothesis Test Results Influenced by Investment Opportunities

The results of hypothesis testing based on table 4.14 performed with the bootstrapping method show that the influence of IOS on profitability has a path coefficient of 0.742 and is significant at p-value of 0.000 <0.05 with a t-statistical value of 9,935 <t-table of 1,654. This means that IOS has a positive and significant influence on profitability, so the fourth hypothesis is accepted. These results are in accordance with the results of research conducted by Sun et al (2014) and, Christiningrum (2015) where the results of IOS research have a significant positive effect on profitability. IOS from a company can influence the views of stakeholders in the company, companies that have high investment opportunities are considered to be able to generate high profits. IOS has a significant positive effect on the profitability of the company in the consumption sector because the prospects or opportunities that are considered profitable are then responded positively by investors so investors increase their investment in the consumption sector. In the descriptive analysis, we can see that there was an increase in MVBVA and MVBVE at the end of 2016, in line with the increase in profitability, namely ROA and Net Profit Margin, there was a decrease in ROE because the market equity value was greater than the book value, but because book value that is too small is considered not able to give profit to the company.

Conclusions and discussions

The variable profitability is influenced by the capital structure negatively and significantly. To be able to increase company profits, of course, companies need funding sources both from external and internal to increase the capacity of the company, but with the source of funds originating from external or debt can reduce company profits, because companies must be able to pay high interest costs. In the descriptive analysis, that DAR decreases where the ability of company assets to debt is greater, the company's profitability ROA increases. But conversely if DAR is higher then ROA will decrease. This supports the results of the research of Al-Najjar and Peter (2008) and Uche (2016) which states that profitability is influenced by capital structure negatively and significantly.

The company's growth variable is influenced by the capital structure positively and significantly. In the descriptive analysis shows that with the decrease in DAR, the growth of the total assets of the company will also decrease, meaning that when the company

makes additional capital structure, the company will experience an increase in the total assets of the company. Capital structure is needed by companies, especially companies that want to grow, of course, need capital to be able to increase production capacity so that companies can sell more and increase changes in the total assets they have. This supports the results of the study of Kumar et al (2017) which states that company growth is positively and significantly influenced.

The investment opportunity variable (IOS) is influenced by the capital structure positively and significantly. The existence of these influences explains that a good debt policy can increase a company's ability to increase productivity and manage large funds, so that the company is able to manage funds to make investment decisions. This supports the results of Rolitas (2017) research which states that investment opportunities are positively and significantly influenced by the capital structure.

The variable profitability is influenced by the company's growth negatively and not significantly. Companies that have high profitability are not influenced by company growth, especially the growth of total assets. In descriptive analysis shows that with a decrease in growth in total assets, company profitability also decreased, on net profit margin and ROA still showed stability and a slight increase. Companies that have high growth give an increasingly growing picture by having high assets and sales. The assets of a growing company can be caused by an increase in the company's liability, the increase in liabilities will affect the company's profits so that it can reduce profitability. This supports the results of the study by Fauzi et al (2014) which stated that spermability was influenced negatively and not significantly.

The variable profitability is influenced by investment decisions (IOS) positively and significantly. In the descriptive analysis, we can see that there was an increase in MVBVA and MVBVE at the end of 2016, in line with the increase in profitability, namely ROA and Net Profit Margin, there was a decrease in ROE because the market equity value was greater than the book value, but because book value that is too small is considered not able to give profit to the company. The investment opportunity of a company can influence the views of stakeholders in the company, companies that have high investment opportunities are considered to be able to generate profits from investments made by the company. This supports the results of research by Sun et al (2014) and Christiningrum (2014) which state that profitability is positively and significantly affected.

References

Brigham dan Houston, 2012. *Dasar – Dasar Manajemen Keuangan Edisi V*, Salemba Empat, Jakarta.

Brigham, Eugene F., dan Michael C. Ehrahardt, 2008. *Financial Management: Theory and Practice Twelfth Edition.* Thomson Learning, Inc., South Western.

Echdar, Saban, 2017. *Metode Penelitian Manajemen dan Bisnis.* Ghalia Indoesia, Bogor.

Ghozali, Imam, dan Latan H, 2015. *Partial Least Square (PLS) Konsep, Teknik dan Aplikasi menggunakan Program SmartPLS 3.0 untuk Penelitian Empiris*. Badan Perbit Universitas Diponegoro, Semarang.

Kuncoro, Mudrajad. 2011. *Metode Kuantitatif : Teori dan Aplikasi untuk Bisnis dan Ekonomi*. UPP STIM YKPN : Yogyakarta.

Ross, Stephen A, Randolph W. Westerfield, dan Jeffrey Jaffe ,2010. *Corporate Finance Ninth Edition*, Mc Graw Hill, New York.

Sekaran, Uma dan Roger Bougie. 2013. *Research Methods for Business*. Willey, United Kingdom.

Sulindawati, Ni Luh Gede Erni, Gede Adi Yuniarta, dan Igusti Ayu Punamawati, 2017. *Manajemen Keuangan : Sebagai Dasar Pengambilan Keputusan Bisnis*. Rajagrafindo Persada, Depok.

Agburuga, Uche T., 2016. *The Predictive Ability of Corporate Profitability Components and Future Earnings*. Europan Journal of Accounting and Finance Research, Vol.4, No.11 Issue Desember 2016, pp : 1 – 12.

Al-Najjar, Basil, dan Peter Taylor, 2008. *The Relationship Between Capital Structure and Ownership Structure : New Evidence From Jordanian Panel Data*. Managerial Finance, Vol.34 Issue: 12, 2017, pp: 919 – 933.

Andrian, Jun, 2012. *Pengaruh Struktur Modal, Pertumbuhan Perusahaan, Capital Expenditure dan Insentif Manajer terhadap Nilai Perusahaan dengan Profitabilitas sebagai Variable Intervening*. Jurnal Bisnis, Vol 21 No.2, Desember 2012, pp : 18 – 49.

Astuti, Kurniasih Dwi, Wulan Retnowati, dan Ahmad Rosyid, 2015. *Pengaruh Struktur Modal Terhadap Profitabilitas (Studi Pada Perusahaan Go Publik yang Menjadi 100 Perusahaan Terbaik Versi Majalah Fortune Indonesia Periode Tahun 2010 – 2012)*. ISSN 2339 – 2436, Vol 2 No. 1, Juli 2015, pp : 49 – 60.

Buniarto, Edwin Agus, 2008. *Pengaruh Struktur Modal, Kesempatan Investasi serta Kebijakan Keuangan terhadap Resiko dan Kinerja Keuangan pada BUMN yang di Privasi Melalui Pasar Modal Indonesia*. Jurnal Ilmu Ekonomi dan Manajemen, Vol 4 No.4, Juli 2008, pp : 101 – 128.

Christiningrum, MF, 2015. *Effect of Diversification Strategy, Leverage, and IOS on Multi Segment Corporate Performance in Indonesia*. Mediterranean Journal of Social Sciences, MCSER Publishing, Rome - Italy, ISSN 2039 – 2117, Vol 6 No.6, Oktober 2015, pp : 157 – 166.

Fadhilah, Ansoriyah, 2012. *Pengaruh Struktur Modal Terhadap Kinerja Keuangan Perusahaan : Studi Kasus pada Perusahaan Sektor Pertambangan yang Tercatat di Bursa Efek Indonesia 2005 - 2011*. Kajian Ekonomi dan Keuangan, ISSN 1410 – 3249, Vol. 16 No. 1, pp: 1 – 15.

Fauzi, Mohammad Nur, dan Suhadak, 2015. *Pengaruh Kebijakan Deviden dan Pertumbuhan Perusahaan Terhadap Struktur Modal dan Profitabilitas (Studi pada Sektor Mining yang terdaftar di Bursa Efek Indonesia Periode 2011-2013)*. Jurnal Administrasi Bisnis, Vol. 24 No. 1, Juni 2015, pp: 1 – 10.

Hafsah, dan Sri Sutra Sari, 2015. *Analisis Struktur Modal Terhadap Kinerja Keuangan pada Perusahaan Properti dan Real Estate yang Terdaftar di BEI*. Vol 15 No.1, Edisi 1 Maret 2015, pp : 52 – 64.

Handriani, Eka, dan Tjipto Endang Irianti, 2015. *Investment Opportunity Set (IOS) Berbasis Pertumbuhan Perusahaan dan Kaitannya dengan Upaya Peningkatan Nilai Perusahaan*. ISSN 1979 – 6471, Volume XVIII No.1, April 2015, pp : 83 – 99.

Kallapur, Sanjay, 2001. *The Investment Opportunity Set : Determinant, Consequences and Measurement*. Managerial Finance, Vol. 27 Issue. 3, pp: 3 – 15.

Kouser, Rehana et al, 2012. *Inter-Relationship between Profitability, Growth, and Size : A Case of Non-Financial Companies from Pakistan*. Journal. Commoer. Soc. Sci, Vol. 6 No. 2, 2012, pp: 405 – 419.

Kumar, Satish, Sisira Colombage, dan Purnia Rao, 2017. *Research on Capital Structure Determinants : A Review and Future Direction*. International Jounal of Managerial Financer, Vol. 13 No. 2, 2017, pp: 106 – 132

Phan, Kim Chi, 2013. *Factors Affecting Profitability (Case of Consumer Products Companies of Thailand)*. International Conference on Innovation in Engineering and Technology, Desember 2013, pp: 163 – 166.

Purwohandoko, 2017. *The Influence of Firm's Size, Growth, and Profitability on Firm Value with Capital Structure as the Mediator : A Study on the Agricultural Firm Listed in the Indonesia Stock Exchange*. ISSN 1916-971X, International Journal of Economics and Finance: Vol 9, No.8 , 2017, pp: 103 – 110.

Ratnasari, Linda, 2016. *Pengaruh Leverage, Likuiditas, Ukuran Perusahaan Terhadap Profitabilitas pada Perusahaan Otomotif di BEI*. ISSN 2461 – 0593, Vol. 5 No. 6, Juni 2016, pp: 1 – 15.

Rolita, Risa, 2014. *Hubungan Struktur Modal dan Keputusan Investasi pada Perusahaan Manufaktur*. SK. No. 040/P/2014. Jurnal Keuangan dan Perbankan, Vol.18, No3, 2014, pp : 370 – 383.

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Sulistiono, Sugenng, Moeljadi, Atim Djazuli, dan Solimun. 2017. *Investment Opportunity Set as the Mediation Effect of Capital Structure, and Corporate Dividend Policy on Firm Value : A Study on Manufacutring Firm in Indonesia Stock Exchange*. International Journal of Applied Business and Economic Research. Vol. 15 No.22, 2017, pp : 303 – 314.

Sun, Jerry, George Lan, dan Zhenzhong Ma, 2014. *Investment Opportunity Set, Board Independence, and Firm Performance : The Impact of The Sarbanes-Oxley Act*. Managerial Finance. Vol. 40 No.5, 2014, pp : 0307 – 4358.

Sunarto, dan Agus Pratseyo Budi, 2009. *Pengaruh Leverage, Ukuran dan Pertumbuhan Perusahaan terhadap Profitabilitas*. Vol 6 Edisi 1 Maret 2009, pp: 86 – 103.

Syardiana, Gita, Ahmad Rodoni, dan Zuwesty Eka Putri, 2015. *Pengaruh Investment Opportunity Set, Struktur Modal, Pertumbuhan Perusahaan, dan Return On Asset Terhadap Nilai Perusahaan*. ISSN : 1979 – 858X, Vol. VII No.1, April 2015, pp : 39 – 46.

Quddus, Ghina Ghaliya, 2017. *Nielsen : Ada Penurunan Daya Beli Kelas Menengah*. [Diakses 15 November 2017 dari www.nasional,kontan.co.id/news].

Walfajri, Maizal, 2017. ICAEW : *Pertumbuhan Ekonomi Indonesia 5.1% di 2017*. [Diakses 30 Oktober 2017 dari www.nasional,kontan.co.id/news].

ENVIRONMENTAL AUDIT IN RUSSIA AS A MEASURE OF CORPORATE SOCIAL RESPONSIBILITY

ANNA KRAEVA, ELENA KUZMINA — *NATIONAL RESEARCH UNIVERSITY HIGHER SCHOOL OF ECONOMICS, SAINT-PETERSBURG*

Abstract

This article is devoted to the investigation of environmental audit in Russia as a subject of corporate social responsibility in the context of the current ecological situation. The fourth highest level of carbon emissions in the world and the fifty-second place in environmental performance index rank in 2017 set an agenda of sustainable development in Russia, the ground zero for which is the evaluation of business entities' activities in terms of environmental impact. Hereby, the purpose of this study is to reveal the mechanisms for stimulating environmental audit as a part of corporate social responsibility. In the first place, the notion of "environmental audit" is determined regarding the type of its beneficiary. On this basis, operational and managerial nature of this term are distinguished, concerning the procedure regulations and the economic benefit for organizations respectively. The research also provides patterns of environmental audit proceeding from its stakeholders' interests. The methods applied for the investigation include theoretical modelling, benchmark analysis of Russian and foreign practices and statistical review of the non-financial reporting publications. Thereby, the main results of the study suggest that the development of environmental audit as a social responsibility requires the introduction of a legislative framework governing a binding nature of the audit in particular cases and providing a certain relief of ecological licensing procedure for those companies, which have performed the audit. The other solution implies the harmonization of non-financial reports carried out through the promotion of the practice of using the GRI guidelines.

Keywords: Environmental audit, corporate social responsibility, non-financial report

Introduction

Nowadays, the global ecosystem is undergoing a great anthropogenic pressure (He L., Shen J. and Zhang Y., 2017, p.115). According to the British multinational oil and gas company (British Petroleum, statistical review), the global carbon emission level was characterized by a permanent growth during 2009 – 2017 (figure 1). In the case of Russia, this index was subjected to strong fluctuations, reaching its top in 2012 and returning to an upward tendency in 2015 – 2017. Concerning the last year of the period in question, the total carbon emissions' volume in the world amounted to 33.4 billion tons, that is 1.3% higher than the previous year. In particular, Russia accounted for well over 1.5 billion tons, demonstrating the 4th highest level of global emissions in the world. The other eloquent indicator, which reflects the health and vitality of the ecosystem, is the environmental performance index (Environmental Performance Index: Ranking 2017). Based on 24 characteristics of the ecosystem's wealth, Russia appeared to be on the 52nd place among 180 observed countries.

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ANNA KRAEVA, ELENA KUZMINA — NATIONAL RESEARCH UNIVERSITY HIGHER SCHOOL OF
ECONOMICS, SAINT-PETERSBURG
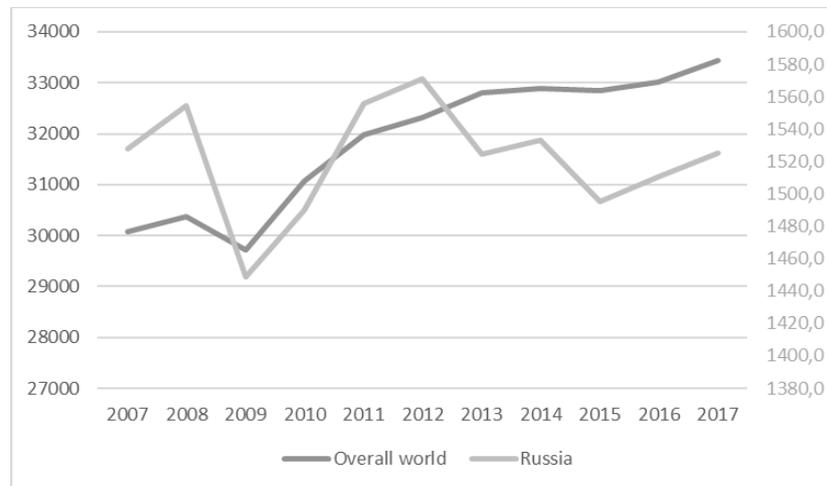
Figure 1 Emissions of carbon dioxide, Million Tons

Source: British Petroleum Statistics

At the same time, it is worth mentioning that the resilience of the ecosystem is a product of synthetic interaction of ecology and economy (Mokhtar, Jusoh and Zulkiflu, 2016, p.111). In line with this fact, the implementation in 2015 of the United Nations (UN) Goals for Sustainable Development until 2030 (17 main goals and 169 tasks) requires a common business, government and society effort. At once, within the framework of the state program of environmental development of Russia for the period up to 2030 the environmental audit of organizations is considered an integral mechanism for the sustainable development of the ecosystem (Ecological doctrine of the Russian Federation of 31.08.2002 № 1225-p). Besides an unambiguous influence on the ecological situation, this program benefits governmental bodies and organizations. On the one hand, based on the publication of environmental audit reports government agencies can diagnose in a prompt manner the environmental situation, thereby increasing the level of public welfare. Furthermore, environmental audit provides government with an opportunity to adjust upcoming costs on social programs concerning ecological issues. On the other hand, from the organizations' point of view the present legislative framework coupled with the current ecological situation favour conducting economic activity in accordance with the concept of "threefold equilibrium". This concept determines the operational efficiency of the organization by virtue of finding an equilibrium of three key elements - people, planet and profits (3 "P" principle), which play roles of proxy for social, environmental and economic performance respectively (Kuzubov S.G., Danilenko N.I., Demchuk O.N., 2015, p.49). Such an approach to the sustainable development of organizations implies the adoption of social and ecological responsibility, the ground zero for which is an assessment of company's activities in terms of environmental impact. It is important to note that there is a substantial number of previous works, which have already defined the

significance of ecological monitoring (Baboukardos D., 2018, p.32). Hence, the aim of the current study is to reveal the mechanisms for stimulating environmental audit as a part of corporate social responsibility (CSR), which has its benefits both at the state (macro) level and for organizations (micro level).

The Federal Law of Russia "On the environmental security" defines environmental audit as an independent verification process of "compliance with ecological regulations". Nevertheless, the notion of "environmental audit" is multifaceted providing that its application is not limited to the representation of governmental concerns (Cook V., Van Bommel S., Turnhout E., 2016, p.34). In particular, there are theoretical researches, which show that the shaping of "environmental audit" term is balancing between two extremes – the definition through "transparency", allowing some degree of freedom in disclosing certain ecological indexes, and through "normativity", basing on elaborated standards (Cook, Bommel and Turnhout, 2016, p. 35, 38). This suggests that apart from an operational status, environmental audit has a managerial nature (Mokhtar N., Jusoh R., Zulkifli N., 2016, p.112). This methodological approach is justified by the practices of its realization aimed at coordinating economic activities with respect to the impact on the environment. Suchwise, it is viable to consider environmental audit as a CSR that implies a voluntary monitoring of the ecological impact exerted by the functioning of organization, with a subsequent demonstration of the effect on the regional environmental well-being.

Theoretical model of environmental audit

The approach to define environmental audit in terms of organizational management alludes a two-way relationship between key performance indicators (KPI) of the company and the natural microclimate. It is worth stressing that to the date there are numerous research papers, which have figured out a positive effect of environmental reporting on the economic performance. Specifically, these studies have proved a potential increment of market value and income on account of ecological monitoring. In particular, Diogenis Baboukardos in his econometrical investigation of French listed firms with the highest capitalization has revealed a moderating character of ecological provision in organizations' balance sheets (Baboukardos, 2018, p. 47). The author states that as soon as environmental provision of a company increases a positive influence on the investors' decision-making raises. What is more, Mokhtar, Yusokh and Zulkifli claim that the identification of environmental effects could pave the way to the more "informed economic decision" both in case of companies related with environment and not (Mokhtar, Yusokh and Zulkifli, 2016, p. 122).

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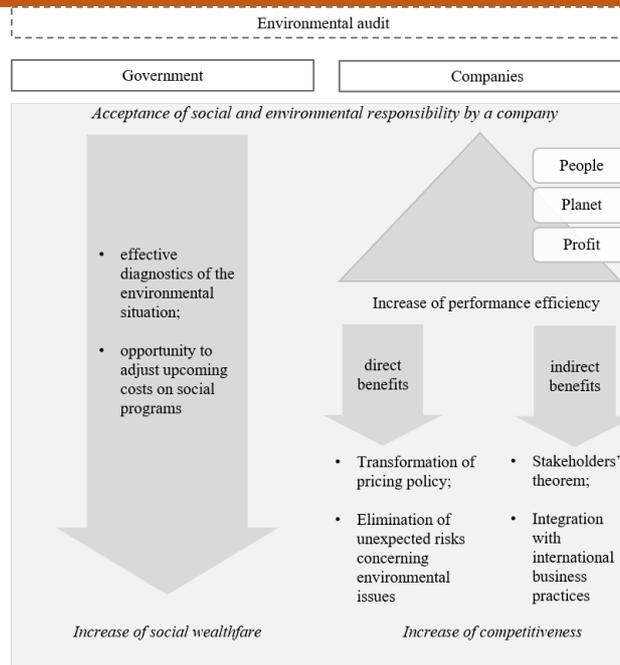
Figure 2 Theoretical model of environmental audit benefits

Source: Developed by the authors

To summarize, carrying on a voluntary systematic environmental audit can have both direct and indirect financial benefits for organizations (figure 2).

With regard to direct advantages, they are achieved through an adoption of pricing policy, which takes into account environmental costs. Under an escalating trend towards fee-paying use of natural resources, the financial tool of accounting for environmental costs is becoming increasingly relevant (Yurchenko. and Minosyan, 2017, p. 70). In addition, environmental audit within the framework of CSR contributes to the elimination of unforeseen risks. In the face of such a threat in February, 2019 appeared to be a Russian company of limited partnership interest "FilmFest" (Fontanka.ru). The blue flooring used by the film company as a decoration for movie production on one of the city rivers led to water pollution (Federal Service for Supervision of Natural Resources). On the basis of this incident, an administrative case was initiated detecting the violation of the Federal Water Code. It exposes the company to the risk of a penalty for the "pollution of the ice cover in places of tourism, sports and mass recreation" amounted up to 50 thousands rubles.

The existence of indirect advantages aligns with the results of a research hold by Mokhtar, Yusokh and Zulkifli about joint-stock companies in Malaysia. The authors revealed that

the degree of implementation of the environmental management did not depend on the interaction scale between the production process and the nature (Mokhtar, Yusokh and Zulkifli, 2016, p. 118). Consequently, other factors that have an indirect impact on the company's environmental policy come around. Among possible indirect benefits stands out a theory of stakeholders. It claims that the upsurge of companies' authority in the eyes of parties concerned by complying their ecological interests has its economic returns expressed in the loyalty towards organizations (Kuzubov S.G., Danilenko N.I., Demchuk O.N., 2015, p.52.). Besides, amid the worldwide tendency of incorporating ecological references to decision-making processes (Mokhtar, Yusokh and Zulkifli, 2016, p. 112) the implementation of environmental audit in Russian management systems indicates the integration with international business practices. As a consequence, it would bring together international and Russian patterns of running a business, thereby establishing tides with exterior companies based on a common ground and attracting potential financial sources of foreign investors.

Thereby, the impact of environmental audit on public welfare, as well as on the management mechanisms of an organization, creates the need to increase the level of participation of companies in a voluntary systematic ecological monitoring. In its turn, the pursuing of this procedure by companies correlates with the development of the environmental legislative framework, as well as the methodological patterns for its disclosure in non-financial reporting of organizations.

Review of the current situation and challenges

All mentioned above suggests that the introduction of practices of environmental auditing in Russia as a measure of CSR should be explored through the prism of the legislative framework and the methodology of non-financial reporting. According to the Russian Union of Industrialists and Entrepreneurs (RUIE), in 2016 among 27 countries registered in the Global CSR resource database Russia occupied the 20th place in the number of companies issuing non-financial reports (figure 3). During the period of interest 81 companies published non-financial reports in Russia. Contrining the benchmark analysis of Russia on a global scale, it might be representative to narrow the field of interest to the 100 largest national companies by capitalization. In 2016, the percentage of non-financial reports issuers among these organizations was 76% in Latin America, 73% in Europe, 71% in the Asia-Pacific region (Analytical review of the RUIE, 2017). In case of Russia, this indicator amounted to approximately 40%.
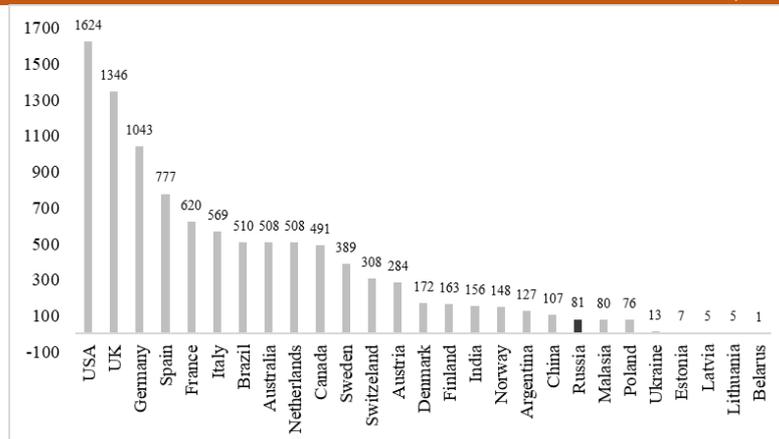
Figure 3 Number of companies issuing non-financial reports by country, 2016

Source: the Russian Union of Industrialists and Entrepreneurs

Regarding the benchmark of quantity of non-financial reports within Russia, during 2000 – 2019 overall 897 statements were issued, including environmental, sustainable development, social responsibility and integrated reports (table 1). The biggest share accounts for energy sector (21%), followed by oil and gas industry (19%) and metal production (13%). It is noteworthy that on the 4th place by the submitted non-financial report there is financial services sector, thus underlining the involvement in environmental audit of non-related to ecological impact companies as well. Concerning reports exclusively devoted to environment, their share of non-financial statements is uncompetitive with the other types of reports accounting for just 9%.

Table 1 Number of non-financial reports in Russia by industries, 2000 – 11.04.2019

Sector	Number of companies	Number of reports				
		IR	SDR	SRR	ER	Overall
Energy	42	88	53	45	5	191
Oil and gas	21	5	111	9	41	166
Metals product	20	15	42	55	3	115

Financial Services	18	7	23	67	0	97
Chemicals	12	39	18	20	6	83
Products	10	0	29	23	0	52
Telecommunications	11	6	12	22	0	40
Non-Profit / Services	7	0	7	32	0	39
Forest and Paper Products	5	0	2	4	18	24
Transport	5	1	5	12	6	24
Housing and utilities	5	2	0	14	1	17
Education	6	0	1	12	0	13
Technology Hardware	2	12	0	0	0	12
Retail	2	1	3	0	0	4
Construction	2	0	1	0	1	2
Other	8	0	8	37	0	45
Overall	172	176	314	326	81	897

Note: IR – Integrated reports, SDR – Sustainable Development reports, SRR –Social responsibility reports, ER – Environmental reports

Source: the Russian Union of Industrialists and Entrepreneurs

Legislative framework

Such a gap in the accounting for environmental performance partly stems from the legislative framework regulating the procedure of environment audit. For example, in France, the law of Grenelle 2 qualifies the publication of the results of environmental audits as a company's duty. It is worth noting that in Russia there is a resembling legislation that implies an obligatory issue of non-financial statements (Directive of the Chairman of the Russian Government 03.30.2012 № 1710p-P13) with the only difference that it can be applied only to governmental bodies. In addition, the legislative regulation structure of the environmental performance of organizations in Russia is heterogeneous - regulatory legal acts that have both a mandatory and voluntary nature, "do not form a coherent system of rational use of natural resources" (Ratner and Almastyan, 2014, p. 44). In particular, despite the existence of laws on environmental protection at the macro and micro levels, the last layer of regulatory legal acts lacks a developed information support from the side of the government (Ratner S. V., Almastyan N. A. , 2014, p.43).

Looking into details, the Russian legislative framework concerning environment can be divided into 3 main blocks – standards, federal and regional laws (figure 4). The backbone consists of federal laws, which in conjunction affirm the right of citizens to a favorable environment, enshrined in the Constitution of Russia. Overall, these federal laws determine the basic principles and approaches to the organization of the environmental management system at the macro level. Besides, at the federal level, attempts were made in order to adopt projects of a law "on environmental audit" and a law "on public non-financial reporting" aimed at the support of sustainable economic growth. The first potential law establishes cases of mandatory environmental audit, such as running a business in a sphere of waste utilization. What is more, this legislative project provides incentives for a voluntary environmental audit. In particular, it
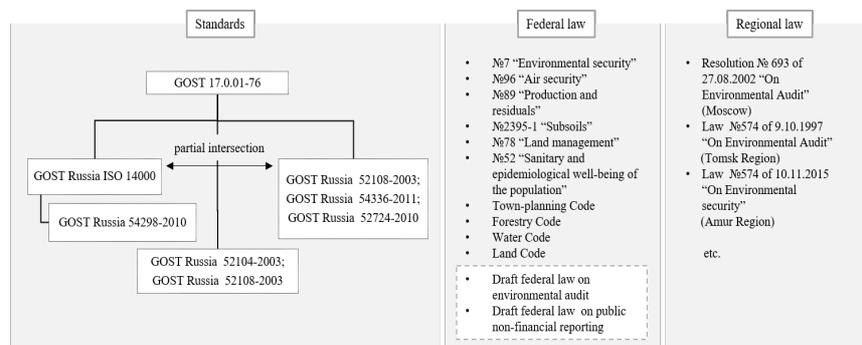
Figure 4 Legal framework for environmental security in Russia

Source: developed by the authors based on national regulatory legal acts

facilitates a procedure of a renewal of integrated environmental permits for those, who have passed the audit. The second project of the regulatory act implies the imposing of

responsibilities on state corporations, public companies, state unitary enterprises and business companies for issuing non-financial reports. Nevertheless, both of them cause numerous discussions and thus, they are staying under review.

The other block of the legal framework for environmental security consists of regional laws (The center for International Finance, 2018). As an example could be mentioned Moscow, Tomsk and Amur Regions. The first two federal subjects of Russia possess laws "on environmental audit", the key element of which is the differentiation of mandatory and voluntary type of the procedure under consideration. In terms of obligatory environmental audit, beneficiaries of funds from the city budget that produce a negative impact on the microclimate are the target audience of the Moscow's laws. On the contrary, in Tomsk region mandatory environmental audit is conducted by decisions of public authorities in case of licensing of certain activities. Regarding Amur region, the local legislation prescribes an obligatory environmental audit to firms, which specialization concerns dangerous productions defined by the federal law "on industrial safety of hazardous production facilities".

At the same time, specific mechanisms providing a possible balance of the ecological and economic interests are set in the documents of less conceptual level, namely, in state standards. The ancestor for them was a group of standards "Nature protection" (17.0.01-76), which is functioning up to the date. This group is rather large containing more than 80 state and about 50 industry standards adopted by authorized bodies. The following evolution of environmental standarts lied in the transition from operational to managerial character. It was realized through the implementation of international standarts ISO 14000, which outline a framework that a company can pursue in order to create an effective environmental management system. Importantly, the content of these standards partially overlaps with the standards on the "cost-effective use of resources" and the standards regulating environmental management processes at high-tech enterprises and hazardous industries.

Thereby, the legislative structure of the environmental performance of organizations in Russia is unequilibrated, shaping managerial and operational tools in the regulatory acts of different levels. Consequently, this impedes the pursuing of indicated mechanisms.

Methodological framework

Another explanation for the observed gap in the accounting for environmental performance comes from the methodical aspect of non-financial reporting. Namely, its harmonization benefits both the draftsmen and the stakeholders. In the first case, it creates ground for the well-run reporting system, thus, lowering the marginal effort on compiling an account. In case of stakeholders, the harmonization of non-financial reporting reduces the variation level between its users, facilitating the comparison of different accounts. Currently, the requirement of comparability of reports is most fully met by the Global Reporting Initiative (GRI) system, which reflects specific indicators of sustainable economic performance.

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Table 2

Number of non-financial reports in Russia by the implementation of the GRI system,
2017

	SME	MNE	Large	Overall
GRI implemented	3	4	41	48
GRI not implemented	6	7	20	33
Share of GRI implementation	33%	36%	67%	60%

Source: developed by the authors on the basis of the Sustainability Disclosure database (GRI)

In addition to the rigor of the principles of accounting for CSR, the advantage of the GRI is a high degree of practical integration into the economic sector. In 2017, 72% of all companies issuing non-financial reports used the GRI guidance (Russian Union of Industrialists and Entrepreneurs). With reference to Russia, the data indicates that in the same year approximately 60% of registered non-financial reports implemented the GRI system (Global reporting initiative, database). In particular, the lowest share of the GRI implementation was observed within small and medium-sized enterprises (SMEs) (33%) and the largest share belonged to big companies. Nevertheless, it is worth mentioning that the bigger a company is, the larger the number of overall non-finanial reports is. Hereby, the degree of the GRI use while making a report on CSR in Russia is lower in comparison to the average world indicator. At the same time, the results suggest that the widespread ground for the harmonization of non-financial reporting creates favorable conditions for completing the process of accounting for environmental audit as a CSR basing on a single system.

Solutions

Considering all mentioned above, the mechanisms for encouraging environmental audit as a CSR are defined within legislative and methodological aspects. In terms of government regulations, the project of law "on environmental audit", which was introduced in 2013 and since then has undergone several revisions, should be transferred

to the status of a law in force. The expected effect of such a solution, despite the identification of cases when firms are obliged to perform an environmental audit, implies the stimulating tools for a voluntary environmental audit. In particular, the facilitation of ecological licensing of a company's operational activity for those organizations, which have performed environmental audit, could bring a voluntary audit on a higher level.

Furthermore, the support of the project of law "on public non-financial reporting" would be a strong approach to balance operational and managerial aspect of environmental audit. By the introduction of the responsibility for the disclosure of non-financial indicators, a solid ground could be found not only to perform environmental audit, but also to implement its outcomes to a company's strategical development.

Regarding methodological aspect, the reasonable solution would be the endorsement of the GRI system for the environmental audit accounting. In 2012, the RUIE), which represents the interests of business community, established an informational partnership with the GRI organization. This collaboration consists in sharing of non-financial reports with the consent of organizations followed by a subsequent publication in the GRI database. Nevertheless, the international practices enable cooperation that is even more decisive. In 2010 in order to promote Sustainable Development Information Disclosure the GRI became a co-founder of the International Integrated Reporting Council (ISIS). Suchwise, amid this tendency the framework of the stated partnership could be extended by the lightening of the GRI events on the website of the RUIE. What is more, the RUIE could organize itself webinars and trainings concerning the GRI principles. Finally, similarly to the GRI practices, the RUIE could initiate a "Pioneers program", which is developed to support the earliest adopters of the GRI system. Within its framework, webinars are offered for those organizations, which have already accounted for non-financial indicators and seek higher quality of reporting. Moreover, this program promotes an effective platform for exchanging experience within companies having the biggest experience in terms of the GRI implementation. Overall, these mechanisms aim to stimulating the GRA standards among new users and experienced stakeholders alike.

Conclusions

The current ecological circumstances in Russia defined by the degree of anthropogenic pressure with a following influence on the environmental health and vitality require serious measures to be taken. Since the nature resilience is a product of ecological and economical reciprocity, a crucial role in the sustainable development belongs to business entities. In this case, environmental audit undertaken by organizations as a CSR mediates between ecological impact of companies' operational performance and the economic utility for managerial strategy. Thereby, these days, the issue of stimulating environmental audit as a CSR is on the agenda.

The investigation of Russian realities indicates that the contribution to the accounting for the results of the environmental audit faces legislative and methodological barriers. For the development of environmental audit as a CSR of an organization, it is necessary to introduce legislative measures governing a binding nature of the audit in particular cases

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and providing a certain relief of the ecological licensing procedure for those companies, which have performed the audit. The second solution implies the harmonization of non-financial reporting carried out through the promotion of the GRI standards. In particular, the RUIE could fasten its partnership with the GRI by forming favourable conditions both for the primary mastering of the GRI guidance and the following deepening of non-financial reporting skills. In conjunction, these measures are expected to fulfill both public and organizations' interests by enhancing the ecological performance and expanding the spectrum of managerial tools in companies' disposal.

References

Baboukardos D. (2018) The valuation relevance of environmental performance revisited: The moderating role of environmental provisions. *The British Accounting Review, 50, pp.32-47.*

British Petroleum: *Statistical review* https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html [accessed 11.03.2019]

Cook V., Van Bommel S., Turnhout E. (2016) Inside environmental auditing: efficiency, objectivity and transparency. *Current opinion in environmental sustainability, 18, pp. 33-39.*

Directive of the Chairman of the Russian Government 03.30.2012 № 1710p-P13

Ecological doctrine of the Russian Federation of 31.08.2002 № 1225-p

Environmental Performance Index: *Ranking 2017,* https://epi.envirocenter.yale.edu/epi-topline, [accessed 04.03.2019]

Federal Service for Supervision of Natural Resources, http://rpn.gov.ru/node/9332 [accessed 10.03.2019]

Fontanka.ru: *Article,* https://www.fontanka.ru/2019/02/18/133/, [accessed 04.03.2019]

Global reporting initiative: *Sustainable Disclosure database,* http://database.globalreporting.org/search/ [accessed 11.03.2019]

He L., Shen J., Zhang Y. (2018) Ecological vulnerability assessment for ecological conservation and environmental management. *Environmental management, 206, pp. 1115-1125.*

Kuzubov S.G., Danilenko N.I., Demchuk O.N. (2015) Corporate social responsibility as a subject of research in accounting. *International Accounting,17 (359), pp. 48-61*

Mokhtar N., Jusoh R., Zulkifli N. (2016). Introduction of Corporate characteristics and environmental management accounting implementation: evidence from Malaysian public listed companies. *Cleaner Production Journal, 136, pp. 111-122.*

Ratner S. V., Almastyan N. A. (2014) Environmental Management in Russia: Problems and Development Prospects. *Threats and Safety, 17 (254), pp. 37-46.*

Russian Union of Industrialists and Entrepreneurs, http://rspp.ru/simplepage/475 [accessed 11.03.2019]

The center for International Finance (2018) The system of supervision and control of environmental risks in the Russian Federation, *pp.1-24*

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INFORMATION TECHNOLOGY, ORGANIZATIONAL CULTURE, AND SERVICE QUALITY: THE MEDIATING EFFECT OF PERSONNEL'S PERFORMANCE
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Abstract

This study aims to investigate and develop a model of empirical research on Information Technology, Organizational Culture and Personnel's Performance to Service Quality by proposing Personnel's Performance as a mediating variable. The study was conducted by surveying 100 police officers and 100 community Personnel in the cooperation office between Police with Local Government of Bandung city, and the data were analyzed by structural equation model, using Smart PLS with results all hypotheses are accepted and the result of the study proves that personnel's performance acts as an intervening variable on the influence of Information Technology, Organizational Culture on Service Quality.

Keywords: Information Technology, Organizational Culture, Performance, Service Quality

Introduction

National Police of the Republic of Indonesia that called as "Polri" is an organization that carries out government functions in the field of maintenance of security, public order, law enforcement, protection and service to the community.

According to the regulation ministry of government officer control No. 63 of 2003 concerning General Guidelines for the Implementation of Public Services, the form of public services is a form of service activities carried out by the delivery of public services as an effort to fulfill the needs of recipients of services or the implementation of statutory provisions.

While Ibrahim (2008: 66) tries to formulate that prime public service is service by the government to the community with various dimensions, standards, processes and implementation so that the community feels satisfied with the service.

The Police in this case is the Traffic Police which carries out its role and function as a public servant as stated in Law No. 2 of 2002 concerning the National Police, and more specifically in traffic assignments as referred to in Regulation No. 22 of 2009 concerning Road Traffic and Transportation.

Based on Regulation Number 2 of 2002 concerning the National Police of the Republic of Indonesia Article 15 paragraph (2) letter (b), the National Police of the Republic of Indonesia has the authority to hold registration and identification of motorized vehicles. This is reaffirmed in Regulation Number 22 of 2009 concerning Road Traffic and Transportation Article 7 paragraph (2) letter (e) which states government affairs in the

field of Motor Vehicle Registration and Identification and Drivers, Law Enforcement, Operational Management and Engineering Traffic, and traffic education.

Based on the Law that mention above, so the Indonesian National Police has the authority and duties in the framework of carrying out / managing registration and identification of motorized vehicles.

Problems that often arise regarding the personnel's performance of employees states by Mukarom and Laksana, (2016: 20) like the public complaint when queuing at the Registration and identification service counter turned out that someone else's queue behind and file afterwards was completed first.

The research question such as ; 1). Does Information Technology have a positive and significant effect on Personnel's Performance, 2). Does Organizational Culture have a positive and significant effect on Personnel's Performance, 3) Does Information Technology has a positive and significant effect on the Quality of Service 4). Does Organizational Culture have a positive and significant effect on the Quality of Service 5). Does Personnel's Performance have a positive and significant effect on the Service Quality?

Theoretical background

Information Technology

According to Bambang Warsita (2008: 135) states that information technology is a means and infrastructure (hardware, software, use ware) system and methods for obtaining, sending, processing, interpreting, storing, organizing, and using data meaningfully, while Azhar Susanto (2013: 12) states that information technology is a study, design, implementation, development, and support and management of information systems on a computer basis, especially those related to the application of computer hardware and software.

Organizational culture

According to Robbins and Judge (2013: 512) states that organizational culture refers to a system of shared meanings held by personnel that distinguish organizations from other organizations, while Kinicki and Fugate (2013: 32) states that organizational culture is a set of shared assumptions, taken for implicit assumptions held by a group and which determine how he views, thinks about, and reacts to various environments.

Employee performance

Performance is the output produced by functions or indicators of a job or a profession in a certain time (Wibowo, 2010: 5), while Abdullah (2014: 3) states that employee performance is the result of work that has a strong relationship with the objectives of organizational strategy, customer satisfaction and economic contribution."

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Service quality

According to Adam (2015: 13) states that the quality of service is consumers evaluating the quality of services obtained starting from the process and the results of delivery given whether it is in accordance with consumer expectations, in determining the services obtained have been fulfilled well finally will be returned to consumers because consumers' views will vary according to the wishes and expectations of consumers."

Hypothesis, research design and methodology employed

According to some theory and prior research, bellow the authors states the hypothesis ;

1). Information Technology has a positive and significant effect on Personnel's Performance, 2). Organizational Culture has a positive and significant effect on Personnel's Performance, 3). Information Technology has a positive and significant effect on Service Quality, 4). Organizational Culture has a positive and significant effect on Service Quality 5). Personnel's Performance has a positive and significant effect on Service Quality.

This study uses a quantitative approach, and the Operationalization Variable such as ;

Exogenous Variables are Information technology with measurement indicators; Proper functionality, reliability, availability, security and data integrity, standardization, integration, consistency, and portability, while organizational culture can be measured based on indicators as follows: Innovation and risk taking, attention to detail, results oriented , human-oriented , team oriented , Aggressive attitude , Stability.

Intervening variable is employee performance with indicator ; Effectiveness and Efficiency, Authority and Responsibility, Discipline, Initiative.

Endogenous variables is service quality with indicators of Tangibles, Reliability, Responsiveness, Assurance, Emphaty.

The population in this study were Personnel of the Bandung City Samsat (Region: West, Central, East) totaling 140 people, and sample that meet to the criteria are 100 respondents.

The data analysis method used in this study was multivariate analysis using Structural Equation Modeling by Partial Least Square (PLS) 2.0.

Data description and pre-test analysis

Table 1 Test of Average Variance Extract (AVE) and Composite Reliability (CR)

VALIDITY/ RELIABILITY	VARIABLES	AVE	CR	REMARKS
AVE / CR	Organizational Culture	0,898	0,978	Valid/Reliable
	Personnel's Performance	0,955	0,988	Valid/Reliable
	Service Quality	0,889	0,976	Valid/Reliable
	Information Technology	0,894	0,977	Valid/Reliable

Source: output Smart PLS

Based on table 1, we can see that average variance extract of variables shows the value of AVE > 0,50, and CR > 0,70, means that all variable meet to the criteria of validity and reliability.

Empirical results and hypothesis testing

Table 2 Test Results for the Parameters of the Parameters

		Original Sample (O)
Information Technology	*Personnel's Performance*	0,402
Organizational Culture	*Personnel's Performance*	0,549
Information Technology	*Service Quality*	0,206
Organizational Culture	*Service Quality*	0,342
Personnel's Performance	*Service Quality*	0,464

Source: Output Smart PLS

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Based on table 2 above, from the results of testing the structural model the following equations are obtained:

$$\eta_1 = 0{,}402\ \xi_1 + 0{,}549\ \xi_2 + \zeta \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(1)$$

$$\eta_2 = 0{,}464\ \eta_1 + 0{,}206\ \xi_1 + 0{,}342\ \xi_2 + \zeta \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(2)$$

Based on table 2, the hypothesis testing describes as follows;

1). Effect of Information Technology on Personnel's Performance

The results of the study show that information technology has a positive influence on the performance of Personnel, with a coefficient of 0.401 and a significance value of tstatistics of 3.449 greater than the t table value of 1.985. This is evident because of the average response of Personnel of respondents to Information Technology with a mean score of 4.13 and community respondents 4.05. This means that Personnel and the public have a good perception of Information Technology in the Samsat of Bandung. The results supports Abbas et al (2014), Muzakki et al, (2016), Nuskiya, (2018) which shows that information technology influences on performance.

2). Effect of Organizational Culture on Personnel's Performance

The results of the study show that organizational culture has a positive influence on the performance of Personnel, with a coefficient of 0.549 and a significance value of tstatistics of 4.703 greater than the ttable value of 1.985. This is evident because of the average response of Personnel of respondents to Organizational Culture with a mean score of 4.14 and community respondents 3.98. This results proves that organizational culture has an effect on and significant on performance. So the higher the organizational culture, the higher the performance of Personnel, This study agree with   (Paschal and Nizam, 2016), Thuku (2017) and Paschal and Nizam (2016).

3). Effect of Information Technology on Service Quality

The results of the study show that information technology has a positive influence on service quality, with a coefficient of 0.206 and a significance value of t statistics of 2.553 greater than the t table value of 1.985. This is evident because of the average response of Personnel of respondents to Information Technology with a mean score of 4.13 and community respondents 4.05. This study supports Rust and Kannan, (2002), Malkawi, 2017), Rasul and Ashok Kumar Sahu (2011).

4) Effect of Organizational Culture on Service Quality

The results of the study show that organizational culture has a positive influence on service quality, with a coefficient of 0.342 and a significance value of t statistics of 2.338 greater than the t table value of 1.985.This is evident because of the average response of Personnel of respondents to Organizational Culture with a mean score of 4.14 and community respondents 3.98.

The results of this study supports a theoretical basis (Gantsho and Sukdeo, 2018), Nalendra et al (2018), Zharkeshova et al (2017)

5). Effect of Personnel's Performance on Service Quality

The results of the study show that member performance has a positive influence on service quality, with a coefficient of 0.464 and a significance value of t statistics of 3.442 greater than the t table value of 1.985.This is evident because the average response of member respondents to the performance of Personnel with a mean score of 3.93 and community respondents 3.90. The results of this study are supported by Mangkunegara, (2016: 67) also Tissy et al (2015).

Conclusions and discussions

The influence of information technology with indicators of proper functionality, reliability, availability, security and data integrity, standardization, integration, consistency, and portability of member performance shows positive and significant coefficients where all indicators have high loading factor values, meaning if information technology increases member performance will increase significantly. These results support Nugroho (2016), Abbas et al (2014) and Nuskiya (2014).

The influence of organizational culture with indicators of innovation and risk taking, attention to detail, results oriented, human-oriented, team-oriented, Aggressiveness , Stability, on the performance of Personnel shows a positive and significant coefficient where all indicators have a high loading factor meaning that if the organizational culture increases the performance of Personnel will increase significantly. These results support Thuku (2017), and Paschal and Nizam (2016).

The influence of information technology on service quality shows a positive and significant coefficient, where all indicators have a high loading factor meaning if information technology increases, the quality of service will increase significantly. This supports Itumalla (2012), and Malkawi (2017).

The influence of organizational culture with indicators of innovation and risk taking, attention to detail, results oriented, human-oriented, team-oriented, Aggressiveness, Stability, the service quality shows a positive and significant coefficient where all indicators have a high loading factor, meaning if the organizational culture increases, the quality of service will increase significantly. This supports Gantsho and Sukdeo (2018), Zharkeshova et al (2017).

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The influence of Personnel's performance on service quality with indicators of Tangibles, Reliability, Responsiveness, Assurance, Emphaty indicators, shows positive and significant coefficients and all loading factors show high values, meaning if member performance increases then service quality will increase significantly. This is in accordance with the results of Tissy et al (2015).

References

Abdullah, Muhammad Ma'ruf. 2014. *Manajemen dan Evaluasi Kinerja Karyawan*. Yogyakarta: Penerbit Aswaja Pressindo.

Adam, Muhammad. 2015. Manajemen Pemasaran Jasa Teori dan Aplikasi. Bandung: Alfabeta.

Agil Rakhmansyah, M. Al Musadieq, Heru Susilo. 2014. Pengaruh Penggunaan Teknologi Informasi Terhadap Kinerja (Studi pada Karyawan PT. PLN Area Madiun). Jurnal Administrasi Bisnis (JAB)|Vol. 14 No. 1 September 2014.

Ahmad Fawwaz Malkawi. 2017. The Impact of the Use of Information Technology in Improving the Quality of Services: A Field Study of Fast-Food Restaurants in Jordan.. European Scientific Journal August 2017 edition Vol.13, No.23 ISSN: 1857 – 7881.

Ahrianto Bagus Johar. 2016. Pengaruh Teknologi Informasi Dan Sistem Informasi Terhadap Efektivitas Pelayanan Pada Kantor Dinas Kependudukan Dan Pencatatan Sipil Kabupaten Kepulauan Selayar. Jurnal Riset Unibos Vol 2, No. 007 2016.

Ainur Zharkeshova, Gulsara Junusbekova. 2017. Organizational culture in the civil service of Kazakhstan: a pilot study results. Timur Abilmazhinov. Viešoji Politika Ir Administravimas Public Policy And Administration 2017, T. 16, Nr. 2 / 2017, Vol. 16, No 2, p. 311–324.

Aloysius Rangga Aditya Nalendra, Sariwaty Agus Suhaila. 2018. *Pengaruh Implementasi Kebijakan dan Budaya Organisasi Terhadap Kualitas Pelayanan Publik*. Widya Cipta Vol II No. 1 Maret 2018.

Aliyar Fathima Nuskiya. 2018. *The Effect of Information Technology on Employees' Performance in the Banking Industry in Sri Lanka. Empirical Study Based on the Banks in Ampara District*. European Journal of Business and Management Vol.10, No.16, 2018.

Anozie Obinna Paschal. 2016. *Effects of Organisational Culture on Employees Performance: Case of Singapore Telecommunication*. International Journal of Accounting & Business Management. Vol. 4 (No.1), April , 2016.

Cooper, Donald R. dan Schindler Pamela S. 2006. *Business Research Methods*. New York: McGraw-Hill.

Dina Rahmayanti, Alizar Hasan, dan Zuchria Anggia Sari Hasnda. 2015. *Analisis Pengaruh Profil Budaya Organisasi Terhadap Kualitas Pelayanan*.journal.uinsuska.ac.id/ index.php/ SNTIKI/article/view/288211November 2015.

Fahmi, Irham. 2016. *Manajemen Sumber Daya Manusia*. Yogyakarta: Alfabeta.

Gulam Rasul and Ashok Kumar Sahu. 2011. *Use of IT and Its Impact on Service Quality in an Academic Library*. Library Philosophy and Practice (e-journal). 622.

Ibrahim, Amin. 2008. *Teori dan Konsep Pelayanan Publik Serta Implementasinya*. Jakarta: Mandar Maju

Jawad Abbas, Asif Muzaffar, Hassan Khawar Mahmood, Muhammad Atib Ramzan and Syed Sibt Ul Hassan Rizvi. 2014.. *Impact of Technology on Performance of Employees (A Case Study on Allied Bank Ltd, Pakistan)*. World Applied Sciences Journal 29 (2): 271-276, 2014.

Kinicki, Angelo., dan Fugate. 2013. *Organizational Behavior: Key Concepts, Skills and Best Practices. 5th Edition*. New York: McGraw-Hill Education.

Mangkunegara, Anwar Prabu. 2016. *Manajemen Sumber Daya Manusia Perusahaan*. Bandung: Remaja Rosdakarya.

Mukarom, Zaenal dan Laksana. 2016. *Membangun Kinerja Pelayanan Publik Menuju Clean Government and Good Governance*. Bandung. Pustaka Setia.

Robbins, Stephen and Judge, Timothy A. 2013. *Organizational Behaviour.15th edition*. New Jersey: Pearson Education.

Roseann Wangeci Thuku, Isack Odiwuor Abiero, Dennis Juma. 2013. *Influence of Organisational Culture on Employee Performance: A Case Study of East African Breweries Limited*. International Journal of Science and Research (IJSR) ISSN (Online): 2319-7064 Index Copernicus Value.

Rodiathul Kusuma Wardani, M. Djudi Mukzam, Yuniadi Mayowan.. 2016. *Pengaruh Budaya Organisasi Terhadap Kinerja Karyawan (Studi Pada Karyawan PT Karya Indah Buana Surabaya)*. Jurnal Administrasi Bisnis (JAB)|Vol. 31 No. 1 Februari 2016.

Roseann Wangeci Thuku, Isack Odiwuor Abiero, Dennis Juma. 2016. *Influence of Organisational Culture on Employee Performance: A Case Study of East African Breweries Limited*. International Journal of Science and Research (IJSR). Volume 5 Issue 9, September 2016.

Part 2. Selected papers

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INDONESIAN POLICE SCIENCE COLLEGE

Ramaiah Itumalla. 2012. *Information Technology and Service Quality in Health Care: An Empirical Study of Private Hospital in India.* International Journal of Innovation, Management and Technology, Vol. 3, No. 4, August 2012.

Susanto, Azhar. 2013. *Sistem Informasi Akuntansi.* Bandung: Lingga Jaya.

Tissy. J. P. Supit, John. R. E. Tampi, Very. Y. Londa. 2015. *Pengaruh Kinerja Pegawai Terhadap Kualitas Pelayanan Di Perusahaan Daerah Air Minum (PDAM) Kota Tomohon.* Jurnal Ilmu Sosial & Pengelolaan Sumberdaya Pembangunan. Edisi XVII(September – Oktober 2015).

Waluyo dan Ismirah. 2016. *Pengaruh Budaya Organisasi Terhadap Mutu Pelayanan Pada Pusat Pengembangan Dan Pemberdayaan Pendidik Dan Tenaga Kependidikan* (PPPPTK) Bisnis Dan Pariwisata Jakarta. Jurnal Sekretaris vol 3 No.1- Januari 2016.

Warsita, Bambang. 2008. *Teknologi Pembelajaran: Landasan & Aplikasinya.* Jakarta: Rineka.

Wibowo. 2010. *Manajemen Kinerja.* Jakarta: Rajawali pers.

Yonela Gantsho and Nita Sukdeo. 2018. *Impact of Organizational Culture on Service Quality.. School of Mechanical and Industrial Engineering.* July 26-27, 2018.

Indonesian Regulation :

Regulation No. 2 of 2002 , Indonesian National Police (Polri)

Regulation No. 22 of 2009, Road Traffic and Transportation.

Regulation ministry of government officer control No. 63 of 2003 concerning General Guidelines for the Implementation of Public Services.

INTEGRATION OF PERFORMANCE ASSESSMENT INSTRUMENTS ON PERFORMANCE MANAGEMENT PERSPECTIVE IN WEST JAVA REGIONAL POLICE, INDONESIA

DR. VITA MAYASTINASARI, DR. BENYAMIN LUFPI, DR. NOVI INDAH EARLYANTI —
INDONESIA POLICE SCIENCE COLLEGE

Introduction

The performance of the Indonesian National Police personnel is always not only assessed by the leadership within the internal institution, but also assed by the public or external institution. Therefore, the accuracy of performance assesment instruments is important, because errors in setting and using performance assesment instruments would effect inaccurate placement of personnel in a duty or position which potentially affect the low performance of personnel and finally would influence organizational performance. This study aims to know the perceptions of National Police personnel regarding the performance assessment in National Police and how to propose the performance assesment instrumen in Indonesian National Police. Research mix method is the approach chosen in this study with survey method and descriptive analysis. Research area in this study is West Java Regional Police. The study involved 223 respondents of National Police personnel. Data collection is found by questionnaire distribution techniques, Focus Group Discussion (FGD) and document collection. The instruments of data collection in this study were questionnaires, interview guides, document check list sheets. The results of study indicated that Performance assessment instruments of Indonesian Police personnel vary, namely: Performance Management System, evaluation of assessment, talent, personnel records, education and training, officer duty period, duty Period in rank and other assessment instruments determined specifically relating to the determination of personnel who get awards on certain duty. Those elements would determine the promotion of personnels in some position. There for, the accuracy in determining performance assessment instruments is very important.

Keywords: *Performance Assessment Instruments, Performance Management*

Introduction

Professionalism of police in implementing their duties becomes a community demand toward the implementation of police duties is a demand of the community towards the National Police personnel in protecting and serving the community, maintaining security and order, and enforcing the law. Professionalism is closely related to the accurate placement of personnel in the field of duty or position, linier with their competence. Personnel placement is based on performance assessment. Performance assessment is an important factor to create positive performance.

Organizational policy planning is inseparable from the results of performance assessment. Performance assessment aims to improve performance, identify work mistake, provide compensation adjustments based on its performance, design and provide education and training in line with competency requirements for the implementation of duties and used as a basis for promotion, mutation, termination and personnel planning. Performance management can be done through appropriate performance assessment information.

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The accuracy of performance assessment is influenced by the accuracy of the assessment indicators and the objectivity of the assessor. The performance assessment of police personnel is not only determined by the internal assessment of the police institution, but also determined by external / public/ community assessments. It has implications for the demands of positive personnel performance. The positive performance of national police personnel can be realized when the placement of personnel in the field of duty or position is in linier with their competence. Competency mismatch in placement will potentially have negative effect for institution such as low satisfaction and low trust, and finally influence institutional performance.

Relating to the problem above, a study was conducted on "Integration of Performance Assessment Instruments on Performance Perspective of Performance in West Java Regional Police, Indonesia". The focus of research problems are the perception of National Police personnel on the performance assessment within the National Police and how the integration of performance assessment instruments within the National Police is proposed. The purpose of the study was to identify the perceptions of the National Police personnel on performance assessment within the National Police and to propose alternative formulation to integrate performance assessment.

Theory basis

Performance Assessment

Performance assessment is used to identify the performance level of personnel, provide feedback to encourage and improve positive performance and identify work mistake. Performance assessment is defined as *"Performance* assessment *(PA) is a formal system of periodic review and evaluation of an individual's job performance"* (Mondy and Nooe, 1993). Performance assessment is also useful to be used as the basis for personnel career development. Cascio (2003) stated his views related to this: "*Hire, promote, train, or transfer are major events in individual's careers. Frequently, there are tests, interviews, situational exercises, performance appraisals, and other assessment techniques. Developers and users of these instruments should concern with the questions of fairness, propriety, and individual rights, as well as with other ethical issues*".

Several things dealing with the assessment philosophy revealed by Newstrom (2007): *Thus the halmarks of modern appraisal philosophy are as follows:*

1. Performance orientation - it is not enough for employees to put forth effort; that effort must be the result of attainment of desire outcomes (products or services).

2. Focus on goals or objectives — as discussed in MBO shows, employees need to have a clear idea of what they are supposed to be doing and the priorities among their tasks; as the saying goes, "If you know where you want to go, you are more likely to get there".
3. Mutual goal setting between supervisor and employee - this is the belief that people will work harder for goals or objectives that they have participated in.

4. Clarification of behavioral expectations-this is often done via a behaviorally anchored rating scale (BARS), which provides the employee and manager with concrete examples of various levels of behavior.

5. Extensive feedback systems - employees can fine-tune their performance better if they know how they are doing the eyes of the organization.

Performance assessment in National Police environment is realized using various instruments, including the Performance Management System (PMS), assessment, assessment of Career Advisory Board (CAD) and so on. The Performance Management System (PMS) in the National Police environment is defined as: *"The system used to identify and measure the performance of civil servants in the National Police so that it is aligned with the vision and mission of the organization"* (Regulation of the Head of the Republic of Indonesia National Police, 2011). Assessment can be used as a basis for determining the placement of personnel in a position. The assessment is used to evaluate the patterns and career paths of employees consists of Employee Performance Values (EPV), psychological test results, innovations made, and continuing professional development (CPD) (Fuad & Ahmad, 2009). The assessment on National Police perspective is defined as *"a standard method of assessment to assess/ measure the potential or predictions of a person's success in a position through several simulations/ measuring instruments based on job competency conducted by several assessors"* (Regulation of the Head of the Republic of Indonesia National Police, 2012).

Performance Management

Performance management deals with the management and development of competencies and sustainable performance of Human Resources. Performance management is a framework for personnel within an organization, mediator to develop personnel competence to achieve work targets and improve performance. Key performance management elements were explained by Stone (2005):

The key elements of performance management are:

1.   the creation of a shared visions of the organization's strategic business objectives The establishment of performance objectives (derived from the organization's strategic business objectives) for functions, groups and individuals to ensure that their performance is aligned with the needs of the business.
2.   the use of a formal review process to evaluate functional, group and individual progress towards goal achievement
3.   the linking of performance evaluation and employee development and rewards to motivation and reinforced desired behavior.

Performance

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According to Slocum (2009"*Performance is a function of a person's level of ability and motivation. The principle is often expressed by the following formula*."

On another side Hughes and friends (2009) stated: *"Performance, on the other hand, those behaviors directed towards organizations' products and services resulting from those behaviors"*. Performance is influenced by various factors, including motivation, skills, role perceptions and so on. Greenberg and Barons (2008) explained performance, illustrated in Figure 1.
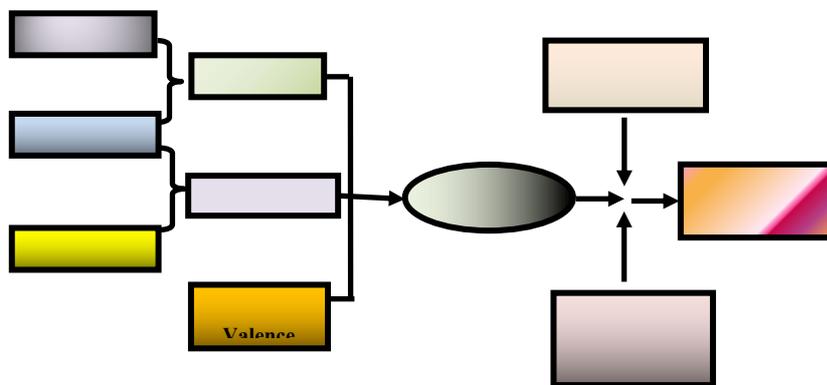
Figure 1
Expectancy Theory
Source: Jerald Greenberg and Robert A. Baron (2008)

Method

The study was conducted with a mix method research approach. The methods used are survey and descriptive analysis. Research area was West Java Regional Police. Respondents were 223 National Police personnel. The technique used for data collection is distributing questionnaires, Focus Group Discussion (FGD) and collecting documents. The instruments of data collection include: questionnaires, interview guides, document check list sheets.

Findings and analysis

Perception of National Police Personnel against Performance Assessment

Personnel's perceptions on performance assessment within the National Police become an important matter because the perceptions affect the personnal's trust or distrust towards fair treatment in a career. The level of personnel confidence in fair treatment regarding performance assessment will have positive impact for job satisfaction, motivation and positively contribute on performance.

Table 1 indicates that the tendency of National Police personnel's trust on the accuracy of the performance assessment is 70.40%. The use of the Officer Service Period and Duty Period in Rank is considered good by the majority of respondents (66.37%) and (63.68%). The majority of respondents (38.57%) said that competency with appropriate indicators of performance assessment is more important than the Officer Service Period and the Service Period in Rank for promotion requirements. 43,05% respondents considered that Education and development with appropriate performance assessment indicators to fulfill performance assessment requirements is more important than the duty period in rank or partial education and development. 51.57% of respondents stated that the duty period in rank with competency standard requirements is more important for promotion requirements.

54.71% of respondents agreed to the statement: "The promotion rules of service period in rank are not applied consistently because promotion is more determined by the availability of position. This must be considered comprehensively. The placement of a person in a position with higher rank requirements compared to his own rank as a form of promotion needs to be reviewed in order to integrate among performance assessment instruments. The perception of Indonesian National Police personnel in West Java Regional Police regarding performance assessment in is illustrated in Table 1.

Tabel 1. National Police's Perceptions towards Performance Assessment in West Java Regional Police

NO.	QUESTIONNAIRE STATEMENT	PERCENTAGE OF RESPONDENT'S ANSWER CHOICE			
		a	**b**	**C**	**d**
1.	My level of trust towards the accuracy of the Polri's performance assessment at this time a. strongly believe c. disbelieve b. believe d. strongly disbelieve	18,39	70,40	9,87	1,35
2.	In my opinion, the use of Officer Service Period for the requirements of the National Police Personnel's promotion a. very properly c. not properly b. properly d. very not properly	14,80	66,37	17,04	1,79
3.	In my opinion, the use of Service Period in Rank for the requirements of the National Police Personnel's promotion a. very properly c. not properly	14,80	63,68	21,08	0,45

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	b. properly d. very not properly				
4.	In my opinion, between Officer Service Period and Service Period in Rank, thing is more important for promotion requirements is a. Officer Service Period b. Service Period in Rank c. Officer Service Period and Service Period in Rank d. Competence with appropriate performance assessment indicators	19,28	23,32	18,83	38,57
5.	In my opinion, between Service Period in Rank and development education, thing is more important for promotion requirements is a. Service Period in Rank b. Development education c. Service Period in Rank and Development education d. Development education with appropriate performance assessment indicators	15,25	7,17	34,53	43,05
6.	In my opinion, between service period in rank and competence, thing is more important for promotion requirements is b. Competence c. Service Period in Rank with competence standard requirements d. Competence with minimal service period in rank(determined if a personnel has promotion, faster than normal service period in rank)	10,31	18,39	51,57	19,73
7.	The rules of service period in rank for promotion are not consistently applied because the promotion is determined with the availability of position a. Very agree c. Dis-agree b. Agree d. Very dis-agree	5,83	36,77	54,71	2,69

8.	In my opinion, performance assessment based on officer service period, service period in rank and development education for promotion requirements a. Very properly c. Not properly b. Properly d. Very not properly	31,84	57,40	9,87	0,90
9.	In my opinion, the majority of personnel get a position because a. Officer Service Period b. Service Period in Rank c. Development education d. Leadership Recommendation who has authority of promotion process	8,97	14,80	13,90	62,33
10.	In my opinion, the administration rules of National police personnel's promotion at the present a. Very definite c. Indefinite b. Definite d. Very indefinite	21,52	62,78	15,25	0,45
11.	My level of trust towards the consistency of rules and performance assessment within National Police at the present a. strongly believe c. disbelieve b. believe d. strongly disbelieve	11,21	64,57	21,97	2,24
12.	Socialization of performance assessment rules for national police personnel a. Always done periodically b. Often done periodically c. Done when there is a new rule d. Never done	29,60	12,56	53,36	4,48
13.	Periodical Socialization of performance assessment a. Very important c. Not important b. Important d. Very not important	46,19	52,02	1,35	0,45

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14.	The duty placement which I experienced is appropriate with the competence a. Always c. Sometimes b. Often d. Never	33,63	17,94	47,09	1,35
15.	My position until the present a. Never use leadership recommendation who has direct influence in promotion process b. Sometimes use leadership recommendation who has direct influence in promotion process c. Often use leadership recommendation who has direct influence in promotion process d. Always use leadership recommendation who has direct influence in promotion process	58,74	21,97	5,38	13,90
16.	Regarding the position I achieve at the present, I feel a. Very satisfied c. Sometimes satisfied b. Satisfied d. Never satisfied	9,87	68,61	17,04	4,48
17.	The placement of personnel in a position at the present a. Very proportional c. Not proportional b. Proportional d. Very not proportional	5,83	58,30	33,63	2,24
18.	The tendency of performance assessment implementation toward my work motivation has impact a. Very positively c. Negatively b. Positively d. Very Negatively	17,94	78,03	3,14	0,90
19..	My position encourage me to develop my competence more actively a. Very agree c. Dis-agree b. Agree d. Very dis-agree	34,98	61,43	2,69	0,90

20.	The tendency of personnel placement at the present	5,38	33,63	42,60	18,39
	a. Very appropriate with the competence b. Appropriate with the competence c. Sometimes appropriate with the competence d. Never appropriate with the competence, depending on the relation with the leadership who has direct influence in personnel placement				
21.	My position compared with my friend's position a. Very appropriate with the performance b. Appropriate with the performance c. Not appropriate with the performance d. Not very appropriate with the performance	15,25	75,34	8,07	1,35

Sumber: Data processed result

Integration of the Performance Assessment Instrument in National Police
The performance assessment of National police personnel is used as feedback for their performance and used as a foundation for promotion or occupying a position. Performance assessment instruments in National police environment are varied, namely: Performance Management System, education and training, assessment, personnel records, talent assessment, evaluation of the Career Advisory Board, Officer Service Period, Service Period in Rank and other achievements that have implications for extraordinary promotion. Therefore, there are several things relating to performance assessment that need to be determined appropriately in order to encourage work motivation, realize job satisfaction and sense of justice in a career to create positive performance.

In the provisions of Performance Management System, performance assessment is implemented based on the Generic Factor (FG) with assessment of 35% and a Specific Factor (FS) with assessment of 65%. Generic performance assessment consists of ten (10) performance factors, namely: leadership, social networks, communication, emotional control, agent of change, integrity, empathy, administrative management, creativity, and independence.

Some things needed regarding performance assessment are:
▪   Comprehensive performance assessment;
▪   Integration between assessment instruments (Performance Management System, assessment results, personnel records, Talent assessments, assessment of Performance

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Assessment Board and other specific achievements) as the basis for selecting a person occupying a position;

▪   Composition assessment among instruments.

Competence management information system has a role as infrastructure or facilitators of comprehensive development and integration of performance assessment because the system can provide and disseminate information about: competence, job competence requirements, level of proficient, competency-based training. Competency content that can be developed in this system includes: core competencies, leadership (managerial competency) and technical/ operational (functional competency). The core competencies that National police personnel have, among others, are: understanding the rule of law, being polite and having a sense of empathy. Managerial competence includes the ability of National Police personnel when they meet contingency situations. Functional competence is related to the technical implementation of duties. Content of job competence requirements includes: general structure of job competence and competence map. Content level of proficient is the degree of expertise each competence. Competency-based training content includes: job training needs to minimize competence gaps and competence-based training curriculum design.

Performance score at the police institution is identical to the Performance Management System; however the substance of Performance Management System is considered less relevant if the Performance Assessment Indicator is equally applied to all functions and all levels. Performance Management System is performance assessment result of all personnel, including the main outcome element, main behavioral field and all personnel characteristics. Therefore an appropriate performance assessment indicator is much needed. Specific and realistic assessment indicators could make easier for personnel to achieve target and improve performance productivity.

Performance assessment implies the need of integration between assessment instruments and basic requirements formed in personnel records as the basis for both determining promotions, and occupying in a position. The fundamental argument for establishing personnel records as a basic requirement is that the document indicates that the personnel can ethically be promoted regarding the duties of National Police as protector, public servant, caretaker of Community Security and Order, and law enforcement. Performance assessment is implemented by calculating the total score of all performance assessment instruments given a certain percentage in each assessment instrument, including: Score of Performance Management System, assessment, talent assessment, education and training.

References

Cascio, Wayne F(2003). *Managing human resources* (pp. 565), Sixth Edition, New York: McGraw-Hill Irwin

Fuad, Noor & Gofur, Ahmad (2009). *Integrated HRD human resources development* (pp. 163), Jakarta; Kompas, Gramedia

Greenberg, Jerald and Baron, Robert A. (2008). *Behavior in organizations* (pp. 270), Ninth Edition, New Jersey: Pearson Education, Inc

Hughes, L Richard., Ginnett, Robert C. & Curphy, J Gordon (2009) *Leadership*, enhancing *the lessons of experience* (pp. 370), Sixth Edition, New York: McGraw-Hill Companies, Inc

Mondy, R. Wayne & Noe, Robert M (1993) *Human resource management* (pp. 394), Fifth Edition, Singapore: Allyn and Bacon

Newstrom, John W (2007). *Organizational behavior*: *human behavior at work* (pp. 138), Twelfth Edition, New York: McGraw-Hil Companies, Inc

Peraturan Kepala Kepolisian Negara Republik Indonesia Nomor 16 Tahun 2011 Tentang Penilaian Kinerja Bagi Pegawai Negeri Pada Kepolisian Negara Republik Indonesia Dengan Sistem Manajemen Kinerja (Rojianstra)

Peraturan Kepala Kepolisian Negara Republik Indonesia Nomor 12 Tahun 2012 Tentang Penyelenggaraan *Assessment Center* Di Lingkungan Kepolisian Negara Republik Indonesia (Robinkar)

Slocum, John W. & Hellriegel, Don (2009). *Principles of organizational behavior* (pp. 127), Twelfth Edition, Canada: Nelson Education, Ltd

Stone, Raymond J (2005). *Human resource management* (pp. 277) Fifth Edition, Australia: John Wiley & Sons Australia, Ltd

POST-MERGER INTEGRATION OF LABOUR RELATIONS IN INTERNATIONAL M&AS, EXEMPLIFIED BY THE AUTOMOTIVE INDUSTRY
JHON PICCIONE – *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

Introduction

During the last decades companies' business has become more and more globalized and internationalized. This trend has been closely followed by the globalization of the relations between companies. In the last decades, the relationships between companies, whose headquarters can be considerably far, have flourished, giving birth, sometimes, to complex configurations. Usually, in case of mergers and acquisitions (M&A), companies pay particular attention to the possible frictions that may come out between the employees and managers of the interested companies that are going to merge. (Gomes 2012) Of course, it is an important matter as frictions may sometimes lead to uncooperative behaviour within the workforce of the companies. There are a multitude of scholars that analyzed thoroughly the question and several schools of thought have developed since the subject began to matter.

Although industrial relation is a day to day matter for a company, it is an aspect that is usually neglected when it comes to international M&A. Even between scholars, the two subjects are usually treated separately and it's hard to find a correlation between the two scholar traditions. As we will highlight later, this unfortunate neglect may lead to a suboptimal performance in some cases because cultural clashes between labour representation institutions do matter for several reasons. This usually happens when a merge (or an acquisition) concerns companies whose labour representation institutions are strongly ingrained in each other's country and in companies themselves (in a conflictual or cooperative way).

As we noticed, there are countless of *ideal types*[7] of industrial relations configurations (see Becther et al., 2012), each of which helps to shape and mold a particular economic system.

The paper has, in summary, the purpose to assess whether industrial relations matter during the post-merger phase of an international M&A and, thus, whether a company should consider them during the decision of acquisition. With the help of the previous researches, we will be able to confirm the importance of industrial relations during international M&As. Nevertheless, at the best of our knowledge, there is no research or analysis regarding the dynamics of integration of industrial relations during international M&As. The problem is that a thorough analysis of this kind requires approaches that are particularly distant; that are, Law comparison and Business Administration. Usually scholars from these two fields focus on their own area of expertise while leaving (nearly) unconsidered other aspects.

This paper has the purpose to merge the two above-mentioned fields in order to draw a more precise picture of the subject. We will do a comparison of the labour law principles of Germany, Italy, United Kingdom and United States. In particular we will focus on:

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[7] "Ideal types" to be considered as Weber's concept.

- The effectiveness of the protection of the right to pursue labour   activities
- The dynamics of labour representation
- Where present, the dynamics of labour participation
- Whether the decisions regarding labour standards are taken in a centralized or decentralized way

For what regards the Business Administration point of view, we start from the Jirjhan's (2014) hypothesis that states that employees will be more uncooperative when a foreign owner succeeds the previous (national) one because are afraid of new policies regarding labour arrangement. The research question, then, is, does this happen in every case? Is the value creation aspect (that is pursued through the merger or the acquisition) always infringed by differences in industrial relations' practices? More precisely, our research question regards the output of the possible combination of labour relations subjects within the considered countries. We hypothesize that there are some situations that can be less damaging than others. We want, in substance, try to schematize the possible outputs of international M&As between companies of the before-mentioned countries and, finally, try to provide suggestions regarding the approach to have when it comes to face a specific labour relations system.

Considered the promiscuity and complexity of the subject (industrial relations), this analysis will be done through a case study analysis. Being more precisely, the object of the research consists of international mergers and acquisitions within the automotive industry. In fact, we selected four cases from the automotive industry and studied the relations and the dynamics between labour representation organisms with foreign labour representation organisms and with foreign owners. We expect the Jirjhan's hypothesis to be true but, mostly, in the cases in which labour relations' practices are particularly different and distant. In those cases in which, on the contrary, we have similar labour relations practices, there must be less friction between the labour relations subjects. As we discovered, this field should be covered more in the future research because of its importance during international M&As; as we will see, in some cases, a major cooperation between labour relations' subjects would have led to a less disastrous output. There are, in fact, some situations and some national regulations that create a framework that favours cooperation between the subjects.

Having this been said, we want to focus on the interactions of a particular kind of industrial relations with other labour representations institutes, that is the one that is generated in those countries with co-determination. Co-determination is a peculiar legal arrangement that moves labour representation directly within the supervisory board of a company. Better put, the workforce, instead of being represented by organizations that are external to the company, i.e. labour unions, are represented by a specific organ that, usually, seats within the supervisory boards and in some fields has an actual veto power. There are several layouts and each of them has specific characteristics and outputs. The one we consider most interesting and most representative of this kind of legal arrangement is German Co-determination Law (*Mitbestimmungsgesetz*) of the 1976. We can find the origin of the Co-determination Law back in the 1848, when the People's Committee of economy of the Constituent Assembly drew out the "Project of the Reich's

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industrial system" (*Entwurfeiner Reichsgewerbeordnung*). Legislative project that proposed the introduction of Works Councils (*Betriebsräte*) in order to limit the power of the corporate[8]. We do believe that this particular legal arrangement deserves particular attention for several reasons. Firstly, Germany is characterized by a specific economic system, which is defined by some authors, like Addison (2009), "Rheinish Capitalism"; secondly, in the cases studied, we noticed that this particular arrangement has led to interesting economic performance (more stability, faster reaction in particular cases); thirdly, as we will see further, in Germany this particular legal arrangement is particularly ingrained. In fact, in some cases, German Works Councils have powers that go beyond the limits established by the letter of the law (T. Haipeter, S. Lendhorff 2005).

The paper is structured as follows:

- In order to better understand the peculiarities of labour relation system in each country, a legal framework will be provided in the appendix at the end of the paper.

- In the first part, we will analyze the theories regarding international M&As focusing, in particular on the post-merger phase. We will, then, narrow down the discussion on the integration of labour relations in particular during international M&As of automotive companies.

- In the second part we will analyse the latest evolution of the automotive industry and will explain why we chose this particular industry. We will, then, expose a few cases regarding international M&A of automotive companies.

- The case studies will be followed by a discussion which will try to summarize and briefly analyse the cases.

- In the end, a conclusion regarding what we observed and our suggestions for future research will be provided.

1. Post-merger integration of labour relations in international M&As

1.1 Post-merger stage in international M&As

With the expression Merger and Acquisition (from now on "M&A") we refer to those situations in which a company merges with another company or buys another company. The reasons for merging or acquiring may be infinite, but the main ones are: to merge or acquire as internationalization method that has lower risks if compared to other methods (Johanson and Vahlne, 1977), increase the product portfolio or increase the market share, create and exploit synergies. In general, we can say that the ultimate goal is to create value for the company. The main idea that stands behind M&As is that 1+1 > 2 (Mirvis and Marks

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[8] Matteo Corti, *La partecipazione dei lavoratori. La cornice europea e l'esperienza comparata*, Vita e Pensiero, (2012), p. 37

1992). The added value that makes possible the equation is the result of a synergy. A synergy has the aim to increase the competitive advantage of two companies (Perry and Porter 1985) . Goold and Campbell (1998) defined 6 kinds of synergy: Shared know-how, combined business creation, vertical integration, pooled negotiation power, coordinated strategies and shared resources. But to merge with a company or to acquire a company is not simple. It is of crucial importance to decide, who, when and how to acquire and to be sure that the reason that led to the decision of merging or acquiring is consistent with the company's business.

It is interesting to notice that the majority of M&As fail; according to Marks and Mirvis (2001), 75% of M&As fail. Scholars have given different explanation for this high rate of failure. Some address the fact that companies neglect the opportunity to learn from previous acquisition's experience (Brouthers & Brouthers, 2000), other address the poor communication   (Angwin   2001). Having this been said, we clearly understand the importance of the considerations and choices that must be made in order to avoid a negative or unsatisfying output.

Scholars have tried to develop what can be here considered "steps" that should be followed when choosing and implementing an M&A. We will broach the analysis by dividing the steps in two groups. The first ones relate to the phase prior to the M&A itself (i.e. pre-merger phase) and, then, to the phase that follows the acquisition (i.e. post-merger phase).

There is a particularly rich literature regarding the pre-merger phase while gaps have been seldomly noted for what concerns the post-merger phase, in particular for what regards the HR activities (Weber et al. 2011). According to Gomes et al. (2012) the main aspects and factors in the post-merger phase that affect the performance of the merger or acquisition are: integration, post-acquisition leadership, speed of implementation, communication during implementation and managing corporate, national cultural differences and human resources management. Researches regarding post-merger phase came a little later than those ones regarding the pre-merger phase. Furthermore, it is important to notice that post-merger researches have been solicited by the fact that many M&As have failed due to managers' neglect of post-merger aspects (Gomes et al., 2012). As Haspeslagh and Jemison noted (1991), it is in the post-merger phase that the value is concretely created and, thus, shouldn't be underestimated.

Integration is the first crucial stage of the post-merger phase. Integration is crucial for several factors because it provides the possibility to create value through synergies. A synergy is not created by the integration of a single element, but by the combination of the integration of different aspects of the business, be it specific know-how or corporate culture. Weber et al. (2011), for example, talk about "knowledge integration capability" as the ability of a company to integrate and exploit the knowledge of the other company. There are several ways to improve knowledge capability but, nevertheless, this ability can positively affect the performance of the merger (Capron 1999). Knowledge and people, during a M&A, should considered as assets – and not as liabilities (Badrtalei and Bates 2007) – that, nevertheless, can not be bought in the market but must be developed

through a well-planned integration (Weber et al. 2011). Finally, Haspeslagh and Jemison (1991) created a frame for what regards the different types of M&A we can find, depending on the scale and depth of integration (symbiotic, preservation, absorption and holding). This frame would be furtherly developed by Marks and Mirvis (2001) which will provide a more detailed and thorough analysis regarding the various outputs of different configurations. Depending on the changes occurred in each company we have five situations:

- Preservation. In this case, the merger is barely noticeable as both companies keep their characteristics and the contacts between the workforces are pretty rare.
- Absorption. The acquiring company (or the dominant one) absorbs completely the other one and changes the cultural characteristics of the latter.
- Reverse takeover. Has the same characteristics as for the absorption configuration, but, in this case, it's the weaker (or acquired) company to prevail. It's a rather unique situation and it, mostly, happens for business units.
- Best of both. In this case we don't have a company prevailing on the other. Both companies merge culturally influencing each other. In this phase, some elements are kept while others are left. Usually, each company keeps the elements that best fit the new entity.
- Transformation. In this latter case, both companies are deeply changed. There's a clear and sharp interruption from the past. It is usually the trickiest situation as it requires a lot of investment and, furthermore, in the long run, the output is not easily predictable.

We have to notice that in some cases one company is, basically, prevailing on the other. This shouldn't be considered something inefficient or, in general, negative. In fact, there's always a partner that is prevailing and that can strongly influence the other. This domination of one company shouldn't be opposed as it is inevitable. It should, instead, be accepted as it is the only way to exploit certain synergies (Badrtalei and Bates 2007). It is important to keep in mind the possible outputs of a merger as a good configuration doesn't just eliminate the possibility of value destruction, but also represents a source of value creation (Almor et al. 2009).

The key element that follows, is, thus, leadership. Leadership is fundamental in M&As as it is in the everyday business. In reality, what really matters is the clarity of which is the leader company. If it is not clear, this may lead to (as in the Daimler-Chrysler case) to a negotiation that is dragged on even after the deal (Blashko et al. 2000). Dragged on negotiations lead to inefficiencies as only an unmistakable leadership may deliver clear expectations from both organizations.

An unmistakable leadership, furthermore, influences another aspect, that is "speed of implementation". In this case, though, according to Olie (1994) we shouldn't think that "the faster, the better", as a too-fast integration may lead to clashes. On the other hand, a well-timed and planned integration helps to build trust. Nevertheless, there's no unique

recipe or a solution that may fit for all as the time necessary depends on several and innumerable factors (Ranft and Lord 2002).

Although communication during implementation has always been seen as one of the most important aspects during the post-merger phase, at the best of our knowledge, the results of the available literature are quite contradictory and, in general, not complete. Nevertheless, Badrtalei et al. (2007) stress the importance of communication within two merging companies by assessing that a biunivocal communication reduces uncertainties and friction between the employees of the organizations. But, differently from Badrtalei, Weber et al. (2012) noted that overcommunication should be avoided in order to keep a certain degree of flexibility.

Corporate and national cultural differences have, advisedly, always been considered as a negative element during M&As. This applies, as we will see further, for several aspects of national or corporate culture. Sometimes differences in customs may lead to complaints and inability to cooperate. Sometimes, even the compensation of an executive can be the cause of a dispute and of a consequent slowdown of the operations or the implementation of the merger (Blashko et al. 2000). In general, it has been proved several times that cultural differences may affect the post-merger performance. Nevertheless, it is not clear whether it affects the merge positively or negatively as some authors, in fact, argue that it may be positive as it makes the company less rigid and, thus, improves the ability to overcome unforeseen changes (Vermeulen and Barkema, 2001). It is crucial, therefore, that future research tries to find what are the elements that determine a positive or negative output when it comes to cultural differences.

Finally, we come to the factor that, in our opinion, results to be the trickiest one (as it can impede the exploitation of possible synergies), that is human resources management. As Dill et al. (2014) and Jirjhan and Pfeifer (2009) noted, employees are, generally, suspicious of the new employer or, in general of the new management and would, thus, hardly share information and know-how with the new management. This, of course, infringes the quality and the nature of the expected synergy. Therefore, some initiatives, as training or policies having the aim to let the employees know better the practices of the partner company, are necessary to avoid a hostile behaviour from the employees (Gomes et al. 2012).

We have here listed and briefly described those elements that can be considered to be the most relevant when it comes to post-merger phase. We shouldn't do the mistake to consider each factor as isolated, as each of them is, in fact, strictly linked with the others.

There is, however, one element that, at the best of our knowledge, is neglected by scholars, that is labour relations. As we will see, labour relations are particularly different from country to country. Even though the analysis provided in this paper will be, mostly, a comparison of the legal frameworks that mould and shape the labour relation within different countries, we will notice that the differences in the reality are deeper and wider than the differences between the different regulations. This because, in some cases, the subjects of labour relations operate in spaces that are not enforced by the law and, thus,

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create behaviours and customs that go beyond the letter of the legislator keeping, however, the *ratio* of the latter.

In our opinion it is important to evaluate what kind of effect can the clash of two different labour relations systems have during the post-merger phase. In order to highlight the importance of labour relations and to gauge the magnitude of a possible clash between two systems, we will analyze the differences between labour relations system of different States.

1.2 Labour relations in international M&A's

For "labour relations" the doctrine means all those aspects that regard the relation between the employer and the employees. In order to properly understand labour relations, we have to look at the labour law of a specific State and how do the subjects of labour relations behave consequently. We have to keep in mind that seldomly these subjects establish solid behaviours and customs that go beyond the law creating, thus, a peculiar and unique environment. Therefore, the analysis of labour law will not be enough without taking into consideration the following elements:

- the crystallized[9] behaviours and customs;
- the opinion of the jurisprudence.

While the first element helps us highlight the *opinion juris ac necessitatis* – which is the opinion of the subjects expressed through repeated and consolidated actions – the second element helps us to understand what the opinion of the jurists is. All in all, the most important element that we will try to highlight is the *ratio* of the legislator expressed through the legislative activity.

The comparison of the different legal frameworks can be found in the appendix at the end of the paper.

1.3 Industrial relations in international M&A in automotive sector

It is now time to discuss briefly about the characteristics of the industry we decided to study in order to make clear the reasons that stand behind our choice.

First of all, we have to highlight that the automotive industry is one of the most important industries or, using the words of Peter Drucker, "the industry of industries" (Holweg, 2008).

It is, in fact, is one of the most labour intensive industries (Jürgens and Krzywdzinski, 2009) and, thus, we believe that it is the best subject for an analysis regarding labour

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[9] The "Crystallization" of a norm is a process thanks to which a behaviour or a custom becomes an "unwritten" law.

relations. Furthermore, during the last decades it has gone through several and drastic changes. For example, part of the employment covered by the automotive industry has been devolved to supplying companies as time passed. In fact, from 1985, as Sturgeon et al. noted (2008), there has been a shift between the amount of people employed in assembly companies and the amount of people employed in producing companies. This was due to the fact that in the late 1980s and first 1990s automotive companies started to strongly outsource part of their production to other companies. This, however, didn't led to an increase of the number of supplying companies but the opposite (Holweg and Pil, 2004). But what automotive companies did was not just simple outsourcing but was a more complex and intricate way to organize the production. Automotive companies, in fact, have tried to create stronger and longer relationships with supplier companies in order to, first, devolve part of the production (and, of course, part of workforce's costs) to their suppliers, and, second, maintain a degree of control over the characteristics and the standards of the requested goods. Holweg (2008) clearly explains this kind of new relation between producing company and supplying company by defining the first-tier suppliers as "0.5-tier" suppliers. One concrete case that clearly followed this trend was the concept of the "globally breathing production network" of Volkswagen in the early 1990s. With this concept the company wanted to create a network of suppliers and production facilities that could easily adapt to the changes of the market. Each supplier had its own autonomy but, nevertheless, had to accept some margin of discretion to be held by Volkswagen (Haipeter 1999).

The automotive industry had to change during those years because of a particular change brought by a new player, the Japanese producers. Even though Fordism had been working effectively for a long period in a growing market, in a saturated market (the American and the western-European one), it was no use. In fact, Fordist production had led to a "chronic inability to adjust output to demand and link the production schedule to actual customer orders" (Holweg 2008). On the other side, the new Japanese competitors have developed what has been called the "lean" production, which permitted them to have a more efficient production organization which helped to develop the ability adequate the output to the demand reasonably quickly. The European and American players, as already said, tried to compete by outsourcing the production.

The other event that we should care about is the wage of M&As that characterized the automotive industry in the 1990s. Automotive companies believed that scale of production was one of the best solutions to counter their Japanese competitors and to gain bargaining power when it came to negotiate with suppliers. If theoretically this could have worked, practically it didn't. Several mergers and acquisitions failed even though they could exploit their scales. The fact is that, according to Holweg (2008), considering the dynamicity of this world and the flexibility of a new global market, a standardized production or strategy won't fit for every situation and, in particular, forever.

2. Practice of integration of industrial relations in intern companies

2.1 International M&As in automotive industry

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Having seen how the legal system may influence and shape the industrial relations of a country (see appendix) we have now to try to understand what happens when two companies of two different countries merge. We will have to keep in mind that each company, independently on the country of origin, has to respect the laws of the country where the new entity is being created. Thus, the main clash that would appear, for what regards industrial relations, is related between the customs and praxis of the foreign country with the national workforce and management.

We will further analyze several cases of automotive companies merging and will try to, in view of the above, understand what the differences in terms of labour regulation are and, finally, understand what the effects and the consequences of these differences are.

The cases we will study are:

-         General Motors-Opel
-         Daimler-Chrysler
-         BMW-Rover
-         FIAT-Chrysler

2.2 Case study

2.2.1. General Motors-Opel

The history of General Motors-Opel has been characterised by a bipolar system. In fact, Opel was the major brand under the GME (the European division of General Motors European). The plants were scattered all around Europe but the major one was Russelsheim, headquarter of Opel.

We will focus on the characteristics of the relations with the workforce representatives and the management of GM. Interestingly, even though GME was responsible for the European zone, the majority of the negotiation were held with the American management[10].

We can divide the major aspects regarding the role of the Opel's *Betriebsrat* in two main parts. The first one, as the most important engine of the European Works Council established in the middle of the 1990s. The second one, as the most solid and stubborn interlocutor with the GM's management.

In the beginning of the 1990s, GM was able to harshly diminish the weight of labour unions within the European countries thanks to a standardized production system. Thanks to the easiness to calculate the costs that the standardization favoured, the management was able to leverage its bargaining power (Greer 2012). When the pressure

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[10] See Ian Greer, *Identity work: sustaining transnational collective action at General Motors Europe*, Cornell University ILR, (2012) and Wolfgang Schaumbert, *General Motors is attacking European workers. Is there no resistance? The example of Opel Bochum*, Journal for and about social movements Action, Vol. 6:1, (2014)

of the crisis that occurred in Europe in that period, the plants of each country were worried about the effects that the international competition would cause. The opportuneness to establish a EWC was first raised during a meeting proposed by the German Works Council and the European Metal Workers Federation. In the beginning, the suspicions and the lack of trust between the labour representatives of each State have led to delays in the creation of the EWC. Nevertheless, in the beginning of the EWC' works, the environment seemed to be cohesive and quite determined against the unilateral behaviour of GM management (Greer 2012). This cohesion started to crumble when the GM management declared a massive layoff all around Europe in 1998. German workers were able conclude an agreement that would have granted them employment for 5 years. This agreement was to the detriment of their Britain colleagues who had to increase, somehow, the production (Greer 2012). This has brought a lot of tension within the EWC and confirmed the suspects that were present in the beginning.

Nevertheless, it was clear that, in order to face another wave of transnational layoffs, it was necessary to cooperate. This cooperation was enforced by Klaus Franz, who in the 2000 became the chair of the German *Betriebsrat* and the EWC. This cooperation was quickly proved by the collective opposition when GM management wanted to implement a joint venture with FIAT (at the expense of the European and Brazilian plants) without consulting the EWC. A breakthrough was reached, saving both the joint venture and the privileges gained by those workers that were about to be transferred in the joint venture.

After this event, a new conflict between the EWC and GM management arose over the Luton plant's closure. On the 25 January 2001 around 40000 workers participated to a strike while Franz kept negotiating with the management (Herber and Schäfer-Klug, 2002). Even though the plant was not saved, the workforce was not dismissed completely and, part of it, was transferred to nearby plants. This event helped the members of the EWC to dissipate any suspect that they have against each other (Greer 2012).

Although the restructuring efforts of GM management, the financial situation of the company got worse as time passed. In 2004, the company announced a layoff of 10000 employees in Germany. The reaction to this announcement was a 6-day long strike in Bochum's plant and a second "European Action Day" that consisted of a one-day strike of 40000 workers. The agreement reached was not that successful as 9500 workers were dismissed. The interesting thing is that the negotiations broadened the margin of bargaining at local level (Dribbusch 2004). The solidarity of GME's workers is quite surprising but not sporadic. Each unilateral action of GM was answered with an energetic action of the European workers, like in the case of the closure of the Azambuja plant, or the collusive behaviour between plants when GM implemented "site selection" processes (Bartmann and Dehnen 2009).

Summarizing, what is important to notice is that the EWC succeed in creating solidarity and unanimity within the workforce. It is important also to notice the role of the German members. They had, mostly, two important roles. The first one, when Klaus Franz became the chair of the EWC also became the glue of the organization; he dispelled part of the mistrust that prevented the EWC to work properly and uniformly. The second one, the

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German representatives kept their role of dealing directly with the management as it used in Germany. This permitted, sometimes, to create better alternatives.

But we consider the period during and after the global financial crisis of 2008 to be the most interesting one for the Opel's case. Right after the crisis, which has highlighted the internal structural issues of GM, the company has been owned from the U.S. government, which paid €36 Bln. On the 27th may of the same year, GM announced the legal separation from the European division (Klikauer 2012) leaving it in a critical situation. Interestingly, the situation was under the control of the Works Council and, in particular, of Klaus Franz. The European management wasn't able to autonomously take any decision, due to the tight control of the American management of the previous years (Greer 2012). The "management role" of the Works Council has manifested during the negotiation for a possible acquisition of Opel, phase during which the GMO management was impassive. We will not here discuss the details of the debate on the possibilities that GMO's *Betriebsrat* faced, but the fact that the traditional relation between management and labour representation had been reversed completely. According to Klikauer (2012) the key element that permitted GMO's *Betriebsrat* to take the control of the situation and to find a solution that led to the salvation of the company was the solid net of connections between traditional Industrial relations subjects and to make these ones to cooperate. In order to comprehend the importance of this element we have to recall one of the duties incumbent on the *Betriebsrat*, that is, the obligation to make the company work peacefully. This duty puts the *Betriebsrat* outside the dialectal materialism between workers and employer. The aim of the *Betriebsrat* is to guarantee the shared interest of the parties, that is the survival of the company.

2.2.2. Daimler Chrysler

The merge between Daimler Benz and Chrysler happened in 1998 has to be considered as a part of the "globalisation strategy" aggressive project of the former (Koehler 2009). It is, in fact, opinion of the scholars (Badrtalei and Bates 2007; Koehler 2009) that between the two companies, Daimler Benz was the leading one.

Anyway, the project had the aim to enlarge the market of each company without any cannibalization effect. In particular, Daimler Benz wanted to open new plants in the American continent not just for having access to new markets, but to utilize them as laboratories to test new production methods from the scratch without incurring in too-high costs (by exploiting the knocked-down strategy) (Koehler 2009). On the other side, for Chrysler the merge was necessary in order to achieve a certain degree of stability, given the unstable period before 1998 due to the necessary continuous innovation and renovation of the product portfolio (Belzowski 1998). Even though we think that the completeness that results from the merge of these two complementary businesses may have led to an optimal synergy, the reality is that just one year later after the merge problems arose (Koehler 2009). For Daimler Benz, Chrysler was a dead weight. After the merge, German management teams were sent to the Chrysler plants. According to the opinion of American labour unions, without Daimler, Chrysler would have inevitably gone bankrupt (Koehler 2009). In fact, in the following years, Chrysler was unable to create a

discreet profit. This is due to the inability to reinvent properly the product portfolio and, thus, to compete within the American market.

Talking about the industrial relations, it is important to notice right in the beginning that when the two companies merged, one representative of the American United Workers were, for the first time, represented within the supervisory board of Daimler. Nevertheless, the AUW reacted with suspicion against the German institute. Nevertheless, the AUW supported the appointment of Dieter Zetsche as CEO of Chrysler and both the unions supported a turnaround of the American group. Even though the German representatives were quite against the idea, they recognised that a restructuration of Chrysler was necessary in order to keep its operations feasible and competitive in the market (Koehler 2009). *Dignum memoria,* in order to avoid any panic within the Daimler plants, the management agreed to sign the "Safeguarding the future 2012" agreement, which, in exchange of lower wages, prevented the management to implement mass dismissal until the end of 2011. The new management of Chrysler copycatted several Daimler's strategies, (for example, it implemented the "innovation teams").

The transnational relations between labour representative organizations were characterised by a strong leading role of the German IG Metall and the German members of the *Betriebsrat*. In the following months a working group composed by Canadian Auto Workers (CAW), IG Metall and AUW was held in order to discuss on a possible transnational cooperation. As a result of this working group, in 2002 the World Employee Committee was created. In this committee it is important to notice that the group formed by German representatives was the biggest one (6 members) compared to the northern-American one (4 members) and the Brazilian one (1 member). The main reason for which the German representatives energetically pushed for the establishment of this global committee was that they were afraid that the merger may lead to a major weight of the management side and, thus, to an invalidation of the German institution (Mueller et al. 2005).

Interestingly, some of the policies proposed by German labour representatives in the American plants where quite unpopular between the mass workers. Nevertheless, the German labour representatives have always had the support of the unions across the globe (Koehler 2009).

We have to keep in mind that this high level of cooperation between labour representatives is also due to the fact that there wasn't a high level of competition between plants (as, for example, it was for the VW's plants) (Mueller et al. 2005)

Eventually, the break-up occurred in 2007, when the majority of Chrysler's stake had been sold to Cerberus Capital.

Even though the Mercedes succeeded in entering inside the American market (while Chrysler poorly failed), for Daimler the merge costed a loss of € 35 bln.

2.2.3. BMW-Rover

For what regards the industrial relations, the BMW-Rover case is distinguished from the other cases by a strong wariness of the other company's labour representatives. For the Rover's labour representatives, their German counterparts were too deeply linked with the management and, thus, were to be considered "management lackeys" (Whittall 2010). For the Rover's labour representatives, the German co-determination was, somehow a betrayal of the genuineness of labour bargaining. A betrayal that consisted in a sort of "class collusion" (Whittall 2010). On the other side, BMW's labour representatives considered the uncooperativeness of their British counterparts as a waste of time and energy, in particular when their unobtrusiveness kept existing during the EWC meetings. But even when Rover's delegates decided to disclose information regarding the economic situation of the British plants, their analysis were lacking accuracy and in-depth analysis.

This reciprocal suspicion was, nevertheless, dispelled by a curious and surprising outcome. In the middle of 1998, Rover faced a quite dramatic economic situation (Whittall 2010). The management wanted to introduce paid lay-offs in order to cut costs. An important role to avoid jobs cuts was covered by the German employee representatives within the EWC. The management of Rover had been observing for long the German organization. In fact, Rover's management wanted to introduce a more flexible working times, similar to those of their German counterparts. This novelty was particularly opposed by the British labour unions and the discussion within the EWC was particularly heated. Nevertheless, the German representatives were particularly persuasive and convinced the British counterparts that making the working times more flexible was the best solution or, at least, better than reducing the workforce. Furthermore, it is worth notice that after this episode a new representation organ was constituted within Rover, the Involvement Group (IG), which is a representative committee that has similar characteristics to the ones of the German *Betriebsrat*. One of the reasons for which the IG was created were, mostly, regarding the difficulties and, sometimes, impossibility that Rover management faced when trying to communicate and share information with the labour unions. According to Whitthall (2010), this process, that can be considered a "germanization" of the British industrial relations, has occurred thanks to the crisis that Rover was going through. Of course, the importance of the EWC shouldn't be ignored, as it gives the possibility to observe the same problem from different point of view. Additionally, we have to keep in mind that Rover's management kept following anyway its plans even though it implemented the flexibilization and reduction of working time.

In general, we can say that there has been strong German influence over Rover's management and industrial relations. The EWC helped both parties to communicate and share information regarding the production. Nevertheless, Rover was keeping reporting bad economic results. In the end of the 1999 the BMW management unilaterally created the "Turnaround year" project and sent 120 German experts to the Rover plants (Whittall 2005). But it was no use; in fact, no appreciable improvement could be noticed, and, in March 2000, BMW secretly decided to sell the Longsbride and Solihull plants. BMW management communicated this choice to the German representatives only after a while, but never went against the provision of the letter of the law. Received the news, the Rover representatives were afraid about the potential acquirer, that is, for the Longsbride plant,

Alchemy (a venture capital) which, in their opinion (which has been lately been confirmed by the declarations of the CEO of the venture company itself), was particularly keen to reduce the workforce and eliminate all the redundancies. According to the projects of Alchemy, the Longsbride plant would be used for producing niche cars and there would be produced only 100.000 units and, thus, there would have been a workforce reduction anyway. The Rover's labour representatives tried to convince their German counterpart to find another solution but received a negative answer, justified by the fact that within the Supervisory board, the German labour representatives have a minority share of votes (the employer side has always one seat more than the labour representatives' side). This is partly true, but we have also to keep in mind that particularly often, the range of action of the German co-determination institute has been wider than the one provided by the letter of the law. In reality, the German labour representatives were aware of the fact that keeping the economic relation with Rover was extremely costly and each day represented a considerable cost for the company (Rubython 2000). What changed dramatically the situation was an unforeseen bid from a third company, Phoenix, which occurred a few weeks before the final meetings for the deal between BMW and Alchemy. This event heated the Rover trade unionists, which, in this last period, pursued an intense lobbying activity toward BMW management and labour representatives through the EWC. According to Brady and Lorenz (2001), BMW, thanks to an inconsistent pretext, raised the demand for the Longsbride plant. This increase led to the failure of the negotiation with Alchemy.

After that, the Longsbride has been sold to Phoenix for a symbolic sum of 10£ on may the 9th 2000.

2.2.4. Fiat-Chrysler

After the failure of the merger with Daimler-Benz, Chrysler wasn't able to get back on its feet again. Even after the acquisition by the Cerberus Capital Management fund, the company kept recording losses (Caputo 2015). Fiat saw in Chrysler's situation a good deal and, thus, in 2009 the negotiation for the acquisition of the American automotive company started. According to the first agreement, Fiat would initially receive 35% of Chrysler's equity with the possibility to obtain other 20% after one year. Nevertheless, U.S. government, having granted $ 12,5 Bln for Chrysler's bailout in the previous years intervened during the negotiations. The result was that 55% of Chrysler's shares were given to the Unionized Automobile Workers (UAW) to guarantee pension credits, 25% remained to the government while the rest to FIAT (with the possibility to reach a total of 51%).

Both companies would benefit from the acquisition. First of all, the merger would permit both companies to achieve a better scale of economy which was necessary to compete given the market situation of the time (Caputo 2015). Furthermore, both companies would obtain an easier access to the market of the partner. Finally, *dignum memoria*, Fiat completed the acquisition in 2014.

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The real protagonist of the negotiation was FIAT' CEO, Sergio Marchionne, who demonstrated to be wise and smart. This smartness let him obtain good terms for Chrysler's acquisition. We have to, nevertheless, notice that he kept the same behaviour and attitude after the acquisition and in both countries. In reality, we have to admit that FIAT, being the Italian manufacturing company with the highest share of employees in Italy (500.000 in 2015) and with a good share of the national GDP (5% in 2015), was able to influence and affect the Italian labour relation system and dynamics with an approach that can be considered, as some scholars argued, to be "americanized" (Nespoli 2018). In fact, from 2010, Marchionne's behaviour with Italian unions has been characterized by an aggressive and antagonistic note. After the acquisition, having more economic resources, FIAT's plans were to revive and renovate Pomigliano's and Mirafiori's plant, which were two historical plants of the Italian company. When the negotiation with the Italian labour union regarding the new collective agreement for the two plants started, Marchionne's starting point was a "take it or leave it" by threating the labour unions to move the production in Serbia or in Canada in case they wouldn't accept the terms he proposed for the new collective agreement (Nuti 2011). This behaviour became, given the importance of the company in Italy, a political and national issue. There were some that considered Marchionne's approach as a real and concrete blackmail; other that considered it as a necessary answer to the globalization and the labour market of the time. In reality, the globalization, or, better, the feasibility to offshore that it causes, was just a leverage exploited by FIAT management to negotiate with the unions. FIAT's management, in short, wanted more flexible conditions regarding working time and, in particular, more guarantees for what regards absenteeism in the workplace. As Nuti (2011) noted, it wasn't the necessity, but the possibility to start the production abroad that permitted a high leverage during negotiation with the unions. But what really matters to us is how Marchionne's behaviour influenced not just the collective agreements for the above-mentioned plants but the entire labour relations system in Italy. Trying to slim the discussion regarding FIAT's negotiations, which have been thoroughly exposed by (Nuti 2011), (Nespoli 2018), (Russi, 2016), (Cillo and Pradella 2019) and (Leonardi 2010), we want to recall what we have mentioned in the appendix regarding the influence of FIAT's *aut aut* in the end of in this paper. Marchionne's rigidness led Italian unions not just to come to an agreement that in first instance was considered unacceptable, but to a permission, regarding which labour union should be considered as representative within the plant. The negotiations, summarizing, introduced the possibility to amend and infringe the National Collective Agreement *in peius*, which, as we exposed in the appendix, was not possible. The tough (or "Americanised") approach led to an "ablative bargaining" (Leonardi 2010) which, consequently, led to a more stressed detachment of the workers from the unions. Strong of its determination, Marchionne was also able to obtain good favourable terms for the collective agreement even in the U.S. by decreasing the wage per hour (introducing the "two-tier remuneration system") for the Chrysler workers even though within the same agreement a higher wage was granted to General Motors and Ford (Nespoli 2018). It is hard to understand what was the role of the Unionised Automotive Workers (UAW) as we have to recall that the labour union at that time was co-owner of the Chrysler company and that, furthermore, workers complained about the fact that even the union didn't disclose information regarding the negotiations with management

(Nespoli 2018). What is common between the American and Italian workforce is the detachment from the unions. The difference is that, in the Italian case, the workforce was able to reorganize and call for strikes – even though CGIL, one of the biggest national union, tried to impede the strikes of the workers – without the help or the intervention of the Unions (Cillo and Pradella 2019). These happenings were unexpected for FCA management, which expected from Italian workforce a behaviour that would be similar to the one of their American counterparts. We will try to explain this difference lately. What is important to notice here is that the "independent" workers organizations were also able to engage the workforce in Serbia thanks to the linkages between these grassroots unions. Nevertheless, no relevant connection has been established with the American unions. Why?

First of all, we have to notice that the strikes were possible thanks to a new organization established by the workers (i.e. Coordinamento lavoratrici e lavoratori FCA centro-sud) which is the result of the work of three different minor organizations. The strikes also received support from other sources: politicians, media and external organizations (Cillo and Pradella 2019). The historical importance of Fiat within Italy and the oddness of the atypical abuse of (economic) power exerted by Marchionne was sufficient to unhinge the labour bargaining activity from its institutional framework and create spaces for manoeuvre. In the meanwhile, the American counterparts, blandly reacted to a stronger pressure of FCA management.

2.3 Discussion

Summary

We now have to highlight what was the role of the labour representatives after the merger and, in particular, during period of economic difficulties. In the appendix (*infra*) we already discussed about the legal framework that shapes and moulds the industrial relation system in each country. Let's now try to highlight, in the light of what we already acknowledged, their peculiarities.

For what we've seen within the German legal framework, the output is particular interesting and, in the same time, complex. In this case we have subjects that are used to act and to take actions in spaces that are not provided by the letter of the law. As we noted in the General Motors-Opel case, the labour representatives of the latter took complete control of the situation while the management of GME were not able to act and operate autonomously from the American HQ. We cannot state, though, the same for what regards the BMW-Rover. In this case, in fact, we noted that the German labour representatives were quite subjugated by the management will. In reality, if we look more accurately, we notice a more specific element. Talking again about the BMW-Rover case, we have to notice that there is a specific reason for which German labour representatives decided not to intervene within the negotiations in the first place. In fact, right after the proposal of Phoenix, the German labour representatives didn't seem to oppose the change. What is clear, then, is the reason for which they refused to intervene in the first place even though they were aware of the fact that selling the Longsbride plant to Alchemy would have led

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to an appreciable decrease in the workforce within the plant. Basically, as long as the German partners didn't have any other potential acquirer, refusing the offer of Alchemy would have meant a continuous loss for BMW, which, accordingly to Rubython (2000), amounted to 5 Mln € per day. Therefore, the intention of BMW management was to avoid any additional costs for the company, even though this could have meant job losses for their partners. In fact, as soon as a new offer appeared on the horizon, they changed their plans. We can, thus, understand what the main driver for the German labour representative is: the operativity of the company. As Whittall (2005) noted, there is some kind of "national identity" when it comes to create compromises. We cannot concretely blame the German labour representatives because their duty, according to the law, is, in the first place, to keep the functioning of the company. Impeding the negotiation before the offer of Phoenix, again, would have led to costs that couldn't be justifiable. The imbalance between the possible job losses that would have happened in case Alchemy had bought the plant and the costs that BMW would have had for an indefinite period in case they hadn't sold the plant is huge and prevents any possible consideration in the matter.

We, thus, understand that the interest of the German labour representatives is to keep the Company work efficiently. In the case of BMW-Rover, the question was not regarding to sell or not to sell (as selling was necessary in order to avoid further losses), but to whom sell. As in the beginning there was only one potential buyer, the German labour representations (nor the BMW management) had pretty many possibilities.

The German labour representatives have as main interest, again, the operativity of the company. This may, sometimes, lead to results that may not be particularly appreciated by the workforce (as for the case of major flexibilization of the working times in Rover's plants). This may be due to the lack of information that the workforce possesses regarding the company's situation and, thus, a general suspicion toward the choices of the management. On the other side, the decrease of information asymmetry between German employees and employers (*infra*) has led to a more trustful relationship and environment. The *Betriebsrat*, thanks to its peculiarities, permits to obtain and to communicate information to both sides. The *Betriebsrat* can combine the necessities of the workers and the employer and, thus, find the best solution for the company, considered in its totality. It is not, as the Rover's labour representatives thought, the management that influences the German labour representatives, but the opposite. German labour representatives have repeatedly demonstrated to possess a strong power to influence and to, sometimes, take full control of managerial powers. For this reason, several authors (Hertwig, Pries, Rampeltshammer 2011; Ferner, Quintanilla and Varul 2001) have talked about "Co-management" instead of "Co-determination". Of course, we have to keep in mind that the peculiarities and the capabilities of the *Betriebsrat* grow and develop in an area that is not provided by the law. Therefore, as clearly exposed by Bramucci and Zanfei (2014) these capabilities (and their results) are strictly linked to the behaviour of the employer; a loyal and correct behaviour of the employer, leads to good understanding and good compromises with the workforce. Generally, if the workforce perceives that the employer is not trustworthy or doesn't want to cooperate it will withdraw its efforts in the everyday work, will hardly disclose information regarding the production (Jirjhan and Pfeifer,

2009). This is the same reason for which German workforce tend to be particularly suspicious toward foreign owners.

In reality, as we noted before, this lack of trust toward foreign owners is quite justified. In the General Motors-Opel case, in fact, we could notice that suspicions was not heated by the foreignness of the owner, but by the fact that it didn't want to cooperate and dialogue with the organization that Opel, together with other plants within the group, created in order to uniformly bargain, i.e. the EWC. We can consider, thus, GME as a unique group, the workers representatives of which were led by Opel's *Betriebsrat*. We have to recall that, in the beginning and in several cases, there had been tensions between the different groups within the EWC. It is important, then, for us, to understand what led the representatives of different countries to cooperate and, in particular, to counter GM's initiatives of restructuring, in a cohesive way.

The fact that GM didn't want to collaborate with this institute led the workers of the European division to be uncollaborative and, furthermore, particularly aggressive all across the old continent. We had, in fact, a mixture of different labour relation's traditions: from establishment of an organ that should permit a peaceful dialogue between the workers and the employer to a series of wildcat strikes. In reality, the two phenomena are mutually exclusive as the strikes were the answer to the unwillingness of GM to dialogue.

If we take into consideration Italian workers' reaction to Marchionne's approach and the incapacity of the historical labour unions (CGIL, FIOM etc.), we understand that an aggressive and unregulated reaction can occur in specific cases. For instance, in both cases (FIAT-Chrysler and GM-Opel) the management of the company decided not to behave within the frame established and requested by the country in which the "unruled" strikes occurred.

In the case of FIAT, which, as we discussed earlier, is a peculiar case, the management used an Americanized approach which was characterized by a debasement and submission of the labour unions. The degree of the submission of the role of the labour unions was to the point of creating a precedent and, thus, undermine the entire Italian legal framework of labour relations.

In the case of GM-Opel, the geography that we should consider is not a single country, but the European territory as the gathering force of German labour representatives was enough to create a single voice and opinion (which took life through the EWC). But those cases in which GM downgraded and ignored the EWC were countered by rigidness from the members of the EWC and, in the worst cases, strikes all around the European territory (*Dignum memoria*, the strikes occurred even in Germany, which is particularly unusual, considered the "peaceful obligation" being placed on the *Betriebsrat*).

Another thing we need to highlight is the fact that, in the FIAT-Chrysler case, there was no communication between the American and the Italian labour representatives. It's hard for now to understand why this happened but, if we consider the customs of American labour relations, we may hypothesize that the low degree of involvement may have led to a lack

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of interest in transnational labour relations' activities. On the other side, German labour representatives have always showed an high degree of involvement and inclusiveness independently on their counterpart. In the same time, Italian labour unions, stuck in their historical and traditional role, lacked this kind of inclusiveness. In fact, the solidarity of Serbian workers that we mentioned before was the result of the coordination of other organizations (Cillo and Pradella 2019). One last thing we want to stress is the pervasive role of the German labour representatives. In every case, other than being particularly inclusive, they've been also particularly intrusive. In the BMW-Opel case, however, it was the English management that looked at the German labour representatives and, in particular, at their proposals.

One interesting fact that we want to briefly highlight in the end of this discussion is the behaviour of Chinese companies. In fact, it has seldomly been reported that Chinese companies when acquiring a foreign company tend to have a double-face behaviour. On the one hand, they tend to adapt to the labour relations practices of the hosting country; on the other hand, they favour expatriation of Chinese workers (Smith and Zheng 2016). If we take into consideration, for example, the acquisition of Volvo by Geely, several authors (Balcet et al. 2017; Xiaohui and Haiyan 2010) have registered a strong adaptation to the welfaristic approach of the Swedish automotive company. There are two main answer to this situation and both, in the end, converge on a unique point which is the costs that a fight with the workers may be too costly for a company. As Luthje (2014) noted, there's a more general Chinese keenness to accept workers requests in china and abroad. This is mostly caused by the fact that it would be more expensive to keep fighting them as in the case of the strikes called by grass-roots organizations in 2010 (Luthje 2014). According to this explanation, the Chinese approach is just a manifestation of the acknowledgment that strong friction with the workforce can be too expensive. This may also explain why Chinese companies that are set abroad, as exposed before, tend to facilitate expatriations. As far as they cannot implement policies that are "Chinese" within a foreign environment, by favouriting employment of Chinese workforce, they create a more familiar environment, which would more easily accept rigid labour policies.

From another point of view, accepting labour relations practices, represents for Chinese companies another peculiar advantage. What can be considered one of the specific advantage of Chinese companies within China (Bloody-taylorism, Lipietz 1987) cannot be profitably used in other countries for the reason above mentioned, that is, it's expensive. The costs that "bloody-taylorism" would cause due to the strong trade unions in European countries are too high to consider this system as profitable. Nevertheless, Chinese companies were able to spot other country specific advantages (for what regards labour relations practices) in different countries and to adopt them in order to exploit the beneficial effects[11].

Conclusions

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[11] Like in italy (Smith and Zheng 2016) or in Germany (Zhu 2017)

The aim of the paper was to highlight and stress what would happen, for what regards the industrial relations, during post-merger phase. We wanted to see whether the management would try to implement policies having the scope to integrate the labour relations customs or not and what would be the result. In the cases analysed we have four different situations. Our hypothesis was that companies of countries with similar labour regulations and practices are less likely to infringe the value creation of merge or acquisition. On the other side, the research question was regarding the possible outputs that would result from the combination of two or more of the given countries. Considering what we observed, we may conclude that:

In case a company is merging or acquiring a German company, they should expect the labour representatives to be particularly intrusive and pervasive. We're not talking about labour unions, but about that specific institute that characterizes German labour relations, i.e. the *Betriebsrat*. As we've seen earlier, the *Betriebsrat* always attempts to impose its "method" to representatives of other countries. Nevertheless, they are always promoters of establishment of EWC or, in general, roundtables. A company should, furthermore, be aware of the fact that the *Betriebsrat* is a powerful tool to avoid fights with labour representatives, as long as the management cooperates with it. However, the members of a *Betriebsrat*, due to the intrinsic and institutionalized spirit of togetherness, will create a thick network of relationship with eventual plants outside Germany. This will lead to a change of concept of "foreignness". As we discussed before, Jirjhan (2014) noted that foreign owners may lead to suspicions within the workforce and, thus, a withdraw from human capital investment. But we noticed that it's not just a matter of nationality, but a matter of behaviour. Better put, if management's behaviour infringes those limits traced by the law or by the customs of a labour relations system, we should expect the workforce to be more aggressive, less willing to disclose information and, in particular, to answer by using untraditional or uncommon ways. However, as we noted with cases, it's not a matter of the nationality of the management because:

- In Fiat-Chrysler case, the management was Italian. The behaviour of the management, though could be considered "Americanized"
- In General-Motors-Opel case, the management was American, but the workforce was multinational (European).

We can, thus, draw a few final considerations.

The first one is that a company should consider (and behave according to) the peculiarities national traditional practice of labour relation independently of the country of origin.

The second one is that in case more labour representatives coming from different countries are able to create a unique channel of communication and discussion, this one should be considered and not ignored.

The third one is that, considering the difficulties related to the comprehension of the traditional labour relations practices of one or more countries, to proactively establish a

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unique channel of communication and discussion is advisable as this would avoid the suspicions within the workforce caused by the "foreignness" of the employer.

In general, we can state that labour relations do matter when we consider international M&As, even though, at best of our knowledge, it's a topic that hasn't been studied with necessary attention in the past. It is important, though, to highlight that there's something to learn from the Chinese approach as it is an evolving and polyform system. Furthermore, the attempts of Chinese companies, for what scholars observed, were particularly successful when it came to deal with foreign workforce. Companies should, therefore:

- In case they acquire/merge with a German company, not impede the works of the *Betriebsrat* but, instead, try to cooperate with it in order to exploit its potential
- In case they acquire/merge with an Italian company, they shouldn't force the already-proved industrial relation practices in the Italian peninsula but, instead, try to understand the complex dynamics within the Italian legal framework.
- In case they own different plants in the European Union and a EWC is established, they shouldn't ignore it as it can help to dissuade wildcat behaviours and saves costs of communication with the labour representation as it represents a unique channel for the different labour representation institutions within the countries.
- Italian companies should favour a communication channel between their own and foreign labour representatives.

Unfortunately, this is a qualitative and industry-specific analysis of a very complex phenomenon. Therefore, a quantitative and inter-industry analysis should be necessary in order to narrow and define better the subject. Another problem is that we are here considering only big companies and, in our opinion, would be interesting to understand what the situation in case of SME companies would be.

Appendix

German industrial relations

Albeit we can find the first traces of Co-determination in the 1848, we can find the enshrinement of worker's involvement within a company in Weimar Constitution [Art. 165, Weimar Constitution] (Feroni et al. 2009). The article in question, in fact states that:

"Workers and employees shall, for the purpose of looking after their economic and social interests, be given legal representation in Factory Workers Councils, as well as in District Workers Councils organized on the basis of economic areas and in a Workers Council of the Reich."

[Weimar Constitution (1919), Art. 165, § 2]

Although the Weimar Constitution doesn't cite any specific mechanism (except for an umpirage joint committee that would intervene in case the parts were not able to find an arrangement by themselves), but draws up a list of those fields that should be decided

upon jointly, that are, extension or reduction of working time, holiday's regulation, hiring directives and so forth[12].

The real prevision of workers representatives' involvement within the supervisory board can be found in the Law of 1922, the *Betriebsrätegesetz* (Kostler et al. 2006).

In 1951, the Co-determination law in coal and steel industry (*Montanmitbestimmungsgesetz*) has passed, thus, bringing back within the industrial relation the Works Council arrangement. Although it was basically limited to those companies within the coal and steel industry, the law in question put the two parties on a, more or less, equal level. In the other sectors it couldn't be reached a similar agreement (mostly because of the German post-war political situation). In fact, in 1952, the *Betriebsverfassungsgesetz* law (From now on: BetrVG) passed, extending the Co-determination right to all the other industries (only to those companies with more than 500 employees) but with a minority position for the workers representatives (1/3) (Corti 2012). Exactly 20 years later, the BetrVG has been reformed by giving more space to the Unions (which have been basically suppressed previously). The only thing that remains and that is crucial in order understand the ratio of the post-war German legislator is that Works Council are subject to a peace obligation (BetrVG (1972) §7.2). In fact, they don't have the right to strike; in case they are not able to find an agreement with the board they may ask the intervention or the opinion of the competent Labour Court.

Changes in the German political system led to a deep revision of the Co-determination rights which has been drawn up by the *Mitbestimmungsgesetz* (1976). Basically, from the 1976 every company, regardless the industry, with more than 2000 employees has the legal requirement to establish a Works Council which is now put on an equal level with the board (*dignum memoria* legal requirement that pends on the employer but that is not automatic, i.e. the employees have to initiate the procedure to request the establishment of the Works Council). Only in case of even votes within the supervisory board, there's an additional vote in favour to the shareholders.

Having seen the evolution of the law concerning co-determination, we can try to draw some considerations.

Firstly, we can notice how the Co-determination law is strongly bound to the German legal system. For instance, we have to keep in mind that the Weimar Constitution is one of the first constitutions that provides for the first welfare legal arrangements. Albeit the intrinsic hiatuses of the Weimar Constitution, we can appreciate the interest for the welfare of the German constituent of the time (Feroni et al. 2009). We can, thus, interpret the provision for Co-determination as the desire of the constituents to suppress the differences between the employers and the employees in order to avoid an opportunistic

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[12] Matteo Corti, *La partecipazione dei lavoratori. La cornice europea e l'esperienza comparata,* Vita e Pensiero, (2012), p. 39

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behaviour of the employer, which is the socio-economically stronger party (Wilkinson et al. 2010).

Secondly, for what regards the post-war phase, we have to pay particular attention to the "peace obligation" that pends on the Works Council. In particular we can notice how the "peace obligation" in the BetrVG of 1952 has the peculiarity of being, as noted by Däubler (1985), a positive obligation, while twenty years later would become a negative obligation. This, in our opinion, assumes a strong importance if we consider the relations between the Works Council and the Unions. While in the letter of the law of 1972 the Works Council has to avoid any behaviour that may lead to a conflictual bargaining[13], following what provided by the BetrVG of 1952, the Works Council has to actively impede any conflictual behaviour within the company (implicitly, from the unions). Probably, in the post-war Germany, the allies wanted to prevent a strong presence of Labour Unions within the companies but, in the same time, guarantee the right of the workers to be represented.

Nowadays the Co-determination consists of two basic pillars. In the next two paragraphs we will try to highlight all those aspects that are relevant for the aim of this paper.

The external participation

The first one, which we can consider as "external" involvement of the workers representatives, which is almost completely covered by the BetrVG, comprises the concrete Works Council. The Works Council (*Betriebsrat*) is an organ elected by the workers in each plant of a company and, on average, has five representatives, three of which are electable [Artt. 1, 14, §§1, 21, BetrVG]. When in a company are present several *Betriebsräte*, a General Works Council (*Gesamtbetriebsrat*) must be established [Art. 47, BetrVG]. In general, the competencies of the *Betriebsrat* can be divided in three groups: questions regarding the social aspect, questions regarding personnel and questions regarding the economic affairs of the plant [Artt. 87 ff, BetrVG]. Only in the first field the *Betriebsrat* has a real co-decision right, having, as the only limit, what has been decided previously by a Collective Agreement [art. 87, § 1, BetrVG]. In case the two parties cannot find an agreement on the field at hand, the final decision is taken by an arbitrary committee, the members of which are equally appointed by the employer and the *Betriebsrat* [art. 87, §2, BetrVG]. In the field of personnel, the *Betriebsrat* has only the right to be informed and, in some specific cases, to be consulted [Art. 92, BetrVG]. In particular, we want to highlight that the *Betriebsrat* has the right to propose solutions that have the aim to guarantee or increase the employment [Art 92, § 1 BetrVG]. To be noted, is that on the last point, in plants with more than 100 employees, the employer has to provide a

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[13] The BetrVG states, in fact, that "The employer and the works council must refrain from activities that affect the work flow or the peace of the business", [Art. 74, §2, BetrVG]

written position upon the proposal of the *Betriebsrat[14]*. The only veto power given to the *Betriebsrat* regarding personnel questions subsists when hiring, assignment, transfer and laying-off of employment is contrary to the legislation or the BetrVG itself [Artt. 99, 102, §3 BetrVG]. In the last field, the economic aspects, the employer has the obligation to inform the *Betriebsrat* and to consult it. In those cases, the economic decisions have repercussions on the employment, the *Betriebsrat,* in force of the previously mentioned articles, has the right to bargain and, in some cases, to co-determine the measures that have to be taken. In general, the economic decisions (that are listed by the art. 106, § 3, BetrVG) must be communicated promptly to a committee of experts, established by the *Betriebsrat.*

The internal participation

The second pillar is completely covered by the *Gesetz über die Mitbestimmung der Arbeitnehmer* (From now on: MitbG) of 1976. Briefly, the MitbG permits the employees to appoint their representatives within the Supervisory Board in those companies with more than 2000 employees [Art 1, §1, MitbG]. The appointment of the workers representatives is done through a direct election; in cases of big companies, this can be done with an indirect election [Art. 9, MitbG]. Differently from what is provided for the establishment of the *Betriebsrat*, the company, when the requirements listed in the MitbG subsist, has the obligation to establish the workers representative's involvement within the Supervisory Board. It is, in fact, a promptly operative obligation that pends upon the employer, the respect of which can be exhorted by starting a legal proceeding.

For what regards the quota of workers representatives there are two possibilities. For those companies that fall within the the *Gesetz über die Drittelbeteiligung der Arbetnehmer im Aufsichtsrat* of 2004 [15] (from now on: DrittelbG) the workers representatives' participation is limited to a 1/3 of the participants. On the other side, the MitbG recognizes an equal representation of the parties giving, though, a small advantage to the capital side. In fact, in case of even votes, as mentioned before (*supra*), the president of the Supervisory Board as an additional vote [Art. 29, §2, MitbG]. The president is elected with a majority of 2/3 of the Supervisory Board; if the Supervisory Board fails to elect a president, then the shareholders representatives will appoint one while the workers representatives will appoint a vice-president [Art. 27, §§1-2, MitbG]. The Supervisory board is, normally, composed by 11 members [16] : five members are workers representatives, five are shareholders representatives and one is the president. One member of both parties has to possess independence requirements [Art. 4, §1, lett. a-b, MitbG]. The president has to be

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[14] Matteo Corti, *La partecipazione dei lavoratori. La cornice europea e l'esperienza comparata,* Vita e Pensiero, (2012), p. 137, note 48.

[15] In companies between 501 and 2000 employees, the *Gesetz über die Drittelbeteiligung der Arbetnehmer im Aufsichtsrat* of 2004, which is basically drawn on the BetrVG of 1952.

[16] But in bigger companies, if stated within the company's charter or by collective contract, can be 15 or 21 [Art. 9, MitbG]

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voted by at least three members of each party and, finally, has to receive the acceptance of the Shareholders assembly (*Hauptversammlung*) [Art. 8, §1 MitbG]. From this last element, we understand that, in any case, the president of the Supervisory Board is theoretically, more representative of the shareholders. The main duty of the Supervisory Board is to control the operations of the Management Board[17] [Art. 111, §1 MitbG]. The latter has to inform regularly the Supervisory Board regarding its own activities [Art. 90 MitbG]. The control of the Supervisory Board is not limited to what may regard the legitimacy of the activities of the Management Board, but it may also regard the economic feasibility and opportuneness of the management activities (*Dignum memoria,* the Supervisory board can:

- revoke the appointment of the components of the Management Board [Artt. 84-85, MitbG];
- conduct an inquiry and inspection regarding the books of the company [Art. 111, §2, MitbG]
- approve the balance [Art. 172, MitbG]

Having seen the characteristics of the two pillars of the in-force Co-determination law, we can try to draw considerations regarding the peculiarities of German industrial relations.

First of all, we have to understand that we are in a dualistic system. On the one hand we have the traditional labour union, while on the other hand we have the Works Council. What makes the two institutions different is not just the role they have within the company, but the legal principle they're founded upon. As Corti (2012) noticed, the Works Council derives its legitimacy from the elective principle, while the Union derives it from the associative principle. In fact, the Works Council doesn't make any difference between the employees of a plant, while the Union refers to its members. According to the letter of the law, there is a well-shaped division of the prerogatives of the two institutions. While we already covered the Works Council's ones, we must mention those of the Unions. The strike, for instance is considered a personal and unionist right by the German Constitution [Art. 9, §3, GrundGesetz], thus, the employee can legitimately participate to the strike called by a Union. But here we can understand the key concept of the Co-determination Law and, therefore, the *ratio* of the German legislator. As we noted before, the Works Council has to avoid any conflictual situation[18] (*Dignum Memoria,* the members of the Works Council, *uti singuli*, can participate to strike and even organize collective bargaining activities).

We have to understand the reasoning of the legislator, which, after the 1972 revision, becomes clear. It's not the isolation of the labour union that is pursued, but the avoidance

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[17] The Management Board has the responsibility of the daily activities of social affairs, as well as the external representation of the company.

[18] *Dignum Memoria*, the members of the Works Council, *uti singuli*, can participate to strike and even organize collective bargaining activities (see Corti 2012, p 159)

of the conflict inside the company that may "affect the work flow or the peace of the business" [Art. 74, §2, BetrVG]. Furthermore, in the same article is given a protection for the employees that carry out unionist activities:

"Employees, who execute tasks in the frame of this law, are through this not limited in their activity for the labour union in the enterprise"

[Art. 74, §3, BetrVG]

It's clear now that the aim of the Co-determination law, after the 1972, is not to relieve the Labour Union of their duty, but to open a new communication channel that could, hopefully, help to avoid unnecessary and high-priced conflicts. It is, in fact, interesting to notice how seldomly the *Betriebsrat* and the Labour Union are, *de facto*, cooperating, even though they are, *de jure,* separated entities (and with strictly separated prerogatives). Usually, when Union and *Betriebsrat* cooperate, they don't have a conflictual approach. On the contrary, thanks to an understanding effort, the Union avoids an aggressive behaviour, like it happened during the crisis period for Volkswagen during the 90s (Werner Widuckel 2001). Furthermore, unions and *Betriebsräte*, generally, have one point in common, that is, they need a big company in order to exist or to be efficient. As we know, the establishment of a *Betriebsrat* and the presence of the workers representatives is mandatory in those companies having more than 2000 employees (*supra*), while Beaumont et al. (1990) and Rehder (2005) have noticed that big establishment are more willing to recognize a labour union and that the latter is keener to concentrate its efforts in bigger establishments and companies as it has limited resources. As we understood the *Betriebsrat* has a precautionary role; has, summarizing, the duty to prevent fights between the employer and the employees. But it is important to remember that the *Betriebsrat* is short of prerogatives given by the legislator (*supra*), and, thus, we have to question how he can promptly and effectively intervene in such a situation. For instance, Bramucci and Zanfei (2014) have noticed that, depending on the behaviour of the employer, the *Betriebsrat* can have, substantially three main roles:

-         *Betriebsrat* as a simple information receiver
-         *Betriebsrat* as a negotiator for compensation mechanisms
-         *Betriebsrat* as promoter of alternative strategies

The role (between the above mentioned) that a *Betriebsrat* can cover when a company decides to offshore, according to Bramucci and Zanfei (2014) depends on the timeliness and the quality of the information given by the employer. In fact, according to them, if a *Betriebsrat* receives the information regarding the offshoring plan in a reasonable advance it can provide an alternative and, sometimes, more efficient plan [19]. The

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[19] See the "four-pillar strategy" proposed by Volkswagen's Betriebsrat in Werner Widuckel, *Globale Integration von Unternehmen und Interessenvertretung von Arbeitnehmern am Beispiel der Volkswagen AG*, Industrielle Beziehungen / The German Journal of Industrial Relations, Jahrg. 8, H. 3 (2001)

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interesting point we want to mention here is that it is interesting how, according to the few scholars considered here (and to those that will be considered later), the real effectiveness of the *Betriebsrat* can be noticed when it operates beyond the prerogatives given by the letter of the law. For instance, as we will see, there are some cases in which the *Betriebsrat* assumes the role of, as Jirjhan (2010) defined it, "co-manager", meaning that it actively participates during the decision-making phase with the managers; it is not a counterpart of the management but, in some cases, assumes the "original" management functions (Haipeter, 1999).

Industrial Relations in the U.S.A.

The American experience is characterized by its youth and its lack of rules protecting workers' rights. In the beginning of the 18th century, striking or organizing in order to request better conditions was considered as an unnatural criminal behaviour (*Commonwealth v. Pullis,* 1806)[20]. After roughly 40 years, the Massachusetts Supreme Court had slightly changed the opinion of the coeval jurisprudence by stating that collective bargaining, if concerned only peaceful conducts, couldn't be considered unlawful (*Commonwealth v. Hunt,* 1842)[21]. This was normal if we only consider that in the 1926 (Railroad Labour Act) we have the first federal law that has the purpose to establish and guarantee the workers' right to organize and to act in order to bargain and negotiate with the employer of better labour conditions. The RLA firstly covered only the workers of the railroad industry. Only 10 years later this coverage was extended to the airline industry (Compa 2014). Interestingly, the RLA permits the workers to organize and to negotiate with the employer but are prevented from striking until the National Mediation Board "releases" the negotiating parties without any agreement. But is important to remember also that the president of the NMB has the authority to break the strike up independently of the output of the negotiation between employer and workers.

In 1935 the National Labour Relations Act has been adopted by the Congress of the United States. Thanks to the NLRA are prohibited:

- Interferences with employee's activities
- Employer oppression of labour activities
- Discrimination against employees that join a union
- Refusal to negotiate

For what regards this last prohibition, we have a positive counterpart norm. The duty to negotiate with the labour union with "Good Faith" [§158(c), Sec. 8, National Labour Relations Act 1935]. At the same time, though, within the NLRA there's no obligation for the employer to accept any Union's proposal. The law, nevertheless, offers the employees a guarantee regarding the conduct of the employer. In fact, the employer has also the duty

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[20] See *Commonwealth v. Pullis*, 3 Doc. Hist. 59 (1806).

[21] See *Commonwealth v. Hunt,* 45 Mass.

to avoid any "surface" (Compa 2014) negotiation[22], thus enhancing the concept of "good faith".

On the other side, the limitations for the labour representation are several. For instance, there can be only one union that may represent the workforce and that can legitimately negotiate with the employer [§159, Sec. 9, NLRA]. The union that receives the majority of votes has the right to represent them all (within a business unit) and the employer must recognize the union and negotiate with it [§158, Sec. 1, NLRA]. In case an agreement cannot be find and an "impasse" situation is reached, the employer has the right to implement its final offer, thus, leaving the employees with the "take it or leave it" choice [§183, Secc. 213(a) and 213(c), NLRA]. In case an impasse is reached, the employer can "lockout" the plant (prevent employees from working) and the workforce can strike. It is important, though, to notice that the employees, while striking, cannot prevent the continuing of the production [§141, Sec. 1(b), NLRA]. During the strike the employer has the right to hire substitutes in order to cover the vacant places. The strikers, though, are not fired and they would be put in a "priority" list and will be called back when a vacant job will be available (Compa 2014).

Having this been said, we must notice that, as stated in the beginning of this sub-chapter, the guarantees for labour representation and bargaining activity are particularly weak. For instance, as we can deduct from the legislation here exposed, if in a plant a there's no certified Union, the employer is completely free to act. Furthermore, it has been noted that, usually, employers, tend to threat (with subliminal declaration) the employees (Human Rights Watch, 2000). The only limitation that are posed to the employer in this case, is represented by those minimum standards (minimum wage, labour standards and so forth) provided by the law.

Industrial Relations in Italy

When talking about the Italian experience we must understand that, when it comes to labour law, it is characterized by a strongly fragmented and, particularly, unclear legal system. In fact, it's quite common that the jurisprudence had plugged a gap left by the legislator. This may be due to unwillingness of the legislator or, most probably, to the intrinsic peculiarity of the Italian industrial relations. For instance, the result of the collective bargaining between the national labour parties is the National Collective Agreement (Contratto Collettivo Nazionale – CCNL) assumes the role of main regulator of the other decentralized agreements. This role has been achieved through complex and, sometimes, inconsistent attempts of the legislator. In fact, as we will see, the actual situation has not been achieved through the legislative instrument, but, as we will see further, through an inter-confederal agreement of 2011 between the major national

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[22] By surface bargaining the legislator meant a conduct during the negotiation that has the clear aim to avoid any agreement even though the employer has fulfilled all its formal duties.

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labour unions (CGIL, CISL and UIL) and the major national employers' union (Confindustria).

For what regards the topic of this paper, it is important to clarify that the Italian legal system doesn't provide any form of labour participation. Even though in past decades we could see the existence *Consiglio di fabbrica* (Plant Council), which is an institute that, for what concerns the representativeness of the workers within the company or the business unit, may be compared to the German *Betriebsrat*, we can say that the former didn't have the participation rights of is German counterpart. Furthermore, the *Consiglio di fabbrica* has been replaced by the *Rappresentanza Sindacale Aziendale – RSA –* (Company Labour Representation) and the *Rappresentanza Sindacale Unitaria – RSU –* (Plant Labour Representation) by the Law in 1991.The RSA and RSU are two organs that have the aim to represent the employees of the unit or of the company and to negotiate with the employer. In the beginning, they were composed by members belonging to those unions that signed the collective agreement effective in the unit or company [Art. 19.a, L. 20 Maggio 1970, 300]. This article, according to the opinion of the Constitutional Court[23], was illegitimate as it was conflicting with the Constitutional law protecting the freedom of the will of the workers to be represented [Art. 39, Cost.]. After the judgement of 2013, workers can be represented by any union that had some "weight" during the negotiations with the employer for the collective agreement to be applied on the company or on the plant. This has led, of course, to a fragmented representation (Garilli 2014) that has undermined the representativeness and the effectiveness of the unions.

We talked about National Collective Agreement, Company Collective Agreement and Plant Collective Agreement but what is the relationship between them? Better put, how are the labour standards within the company regulated? As for what regards labour representation, we have a fragmented and non-uniform evolution. We have to start from the fact that, in order to guarantee the freedom of labour organization, the legislator cannot interfere with the collective agreements in any way [Artt. 39, 40, 46, Cost.]. Thus, the regulation is left to private subjects. We have, then, try to understand what's the efficacy of the regulation adopted through collective agreements.

For what regards the objective efficacy, there are two things to consider. The first one, the relation with the law. A collective agreement can infringe the law only with terms *in melius* and not with terms *in peius.* The jurisprudence, though, is of the opinion that, in order to guarantee the rights already obtained by the workforce, for specific instances, there may be some infringements *in peius* in the Company collective agreement[24]. The second aspect to consider is the relation between collective agreements of different ranks. Up to date, the CCNL leaves some gaps to be plugged by the company's or plant collective agreement.

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[23] See judgement 23 Luglio 2013 n. 231 Corte Costituzionale

[24] See Judgement n. 19396 del 15 settembre 2014.

Those fields that are already regulated by the CCNL shouldn't be subject of new negotiation at company's or plant level (principle *ne bis in idem*)[25].

The subjective efficacy of the Collective agreements is guaranteed by the legal institute of representation [Artt. 1387-1400, Codice Civile]. This means that if a worker is unionized within a specific union, he has to be provided the contract that has been negotiated by that specific union. The problem is that there are several unions and, thus, several collective agreements may be in force in the same time in the same company or business unit. Even though there has been attempts[26], there is no law that uniformizes the regulation on labour standards on a national level. This has led to a strong deregulation and, as in the case of FIAT, to adopt Company agreements that infringe those aspects the CCNL that couldn't be touched (Ferraro 2011) (Cfr. Bavaro 2010). The situation caused by FIAT was solved with the interconfederal agreement of the 2011, which, stated that the Company or Plant agreement shall be signed by the most representative RSU of the Company. That agreement, furthermore, is valid for every worker that is unionized with one of the unions signing the interconfederal agreement of the 2011[27]. The interesting point is that every union signed the interconfederal agreement of the 2011.

Why does it matter? The aspects here listed have the aim to highlight the peculiarities of the Italian industrial relation system. We can see that the decision-makers cannot implement any policy having the aim to uniformize the situation. The other element that must be highlighted, for what here we are more concerned about, is the high and necessary decentralization needed. Even though in the beginning of the XXI century there have been some attempts to decentralize the collective bargaining, the peculiarities of the legal system have permitted companies to acquire more negotiating power, thus leading to a crumbling of the industrial relation system. This situation was solved by a new interconfederal agreement and not by the intervention of the legislator.

Industrial relations in United Kingdom

The United Kingdom industrial relations have roots in the XIV century. Right after the Black Death, with ordinance of labourers (1349) and the Statute of Labourers (1351) there has been an attempt to fix worker's wage as an answer to price fluctuations (Rothstein and Liebman, 2007). Nevertheless, United Kingdom labour relations begun the take the appearance we see today only in the XIX century. The first important acts, in fact, are the Trade Union Act (1871) [34 & 35 Vict. c. 31] and Conspiracy and protection of property Act (1875) [38 & 39 Vict. c. 86] which legitimised trade unions. For instance, the reasoning behind this Act was that the actions pursued by a Union shouldn't be considered illegal if they were considered legitimate for an individual.

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[25] See Interconfederal Agreement of 15 April 2009, Art. 3, §2.

[26] Like the Legge Vigorelli, Legge 14 Luglio 1959, N. 741.

[27] Intercofederal Agreement 18 Giugno 2011, Art. 8.

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Interestingly, the House of Lords, in the decision *Mogul Steamship Co. Ltd. v. McGregor, Gow and Co*. (1892) [AC 25] stated that businesses and employers should have the same right of the employees to gather and, of course, to create an organization that we nowadays define as "Cartel". This opinion of the House of Lords had been overruled by the Competition Act (1998) [c. 41]. It is important here to notice how back in the period under discussion the workers collective activity was compared to the one of the employers. This reasoning has been enforced with the decision *Taff Vale Co. v. Amalgamated Society of Railway Servants* (1901) [AC 426] during which the House of Lord expressed the opinion according to which labour unions, as long as they can own property, should be considered liable for the damages or loss of profits caused to the employer during strikes. Of course, this decision made, basically, the unions paralyzed as every strike could be considered as a damage to the operativity of the company. As a consequence, the Labour Party was founded in order to revert this decision of the House of Lords (Worley 2009), and from that moment, the labour relations were deeply intertwined with the political situation[28] (Mitchell 1987).

Nowadays, the relation between the unions and the single worker is a contract and the former can act in name of the latter thanks to the agency principle.

Within British Common Law the strike has been mostly considered as a right in the last one hundred years. Nevertheless, it is important to notice that, the Trade Union can be considered liable for the damage caused by all those actions that are not pursued "in contemplation or furtherance of a trade dispute"[29] [s. 219, Trade Union and Labour Relations (Consolidation) Act 1992, c. 52]. The section 224 of the same Act gives a further clarification of what we should consider as a "trade dispute", which is every dispute "between workers and their employer". However, one singular characteristic of British labour relations is the fact that, in case a Trade union wants to call a strike, it has to conduct a ballot and inform the employer about this ballot 7 days earlier of its programmed conduction [s. 226 TULRCA 1992, c.52]. If the ballot has a positive result regarding the strike, the Union must inform the employer "as soon as possible" and must communicate the people involved [ss. 231-234 TULRCA 1992, c.52]. This system clearly wants to protect the employers from an aggressive and unregulated collective action. Nevertheless, it has caused some impediments and stale situations within the court due to the unprecise and vague requisites[30].

For what regards information disclosure, the employer, upon union's request, has to share information that are crucial to workforce interests [ss. 181-182 TULRCA 1992, c.52].

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[28] Let's consider, for example, the miners' strike in the 1980s due to Margaret Thatcher's policies or, more interestingly, the fact that the workplace was the starting point for the movement of the *"Suffragettes"*.

[29] This sentence was also written in the Conspiracy and Protection of Property Act 1875 and in the Trade Disputes Act 1906.

[30] See, for example, *British Airways Plc v. Unite the Union* [2009] EWHC 3541.

The United Kingdom has tried to implement, in order to harmonise its regulation to the Information and Consultation of Employees Directive [2002/14/EC] which requires the employer to permit, in companies with more than 50 employees, the establishment of a consultative organ (works Council).

It is, finally, worth to notice the existence of a "British" works Council, that is, the Whitley Council. The Whitley Council, projected by John Whitley in 1917 was a formal committee having the aim to open a kind of roundtable between workers and employers, so to diminish the frictions between the employer and the workforce (Frankel 1956).

Nevertheless, neither the Whitley Council nor the Works Council have an important impact within the British labour relations the protagonists of which are the labour unions.

Summary of labour interaction to a "foreign approach" and to foreign labour representatives

Aspects\Country	Germany	Italy	England	U.S.
Workers participation	High and well institutionalized	Low and not strongly institutionalized	Low but with attempts of institutionalization	Low and no legal institutionalization
Workers representation	High and strongly connected with the management	High but quite violent. Spreading of lack of trust toward the unions.	High and quite peaceful.	Middle-low and with bland influence in the decision-making phase.
Reaction to "foreign approach"	Strong but not extremely violent.	Strong, violent and unpredictable.	Open to dialogue but "en-guarde".	Not registered.

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Reaction to foreign labour representatives	Open to dialogue and with leading approach. Particularly invasive	Not registered.	Doubtful but open to dialogue.	Doubtful but open to dialogue.

References

John T. Addison, *The Economics of Codetermination: Lessons from the German Experience*. New York: Palgrave McMillan, (2009).

Tamar Almor, Shlomo Yedidia Tarba, and Haim Benjamini, *Unmasking Integration Challenges. The Case of Biogal's Acquisition by Teva Pharmaceutical Industries,* International studies of management and organization, Vol. 39:3, (2009).

Duncan Angwin, *Mergers and acquisitions across European borders: National perspectives on pre-acquisition due diligence and the use of professional advisors*, Journal of World Business, Vol. 36, (2001).

Giovanni Balcet, Hua Wang and Xavier Richet, *Catching up strategies and multinational growth: the case of Geely Volvo,* in *Chinese investment in Europe: corporate strategies and labour relations*, (edited by) Jan Drahokoupil, ETUI, (2017).

Jeff Badrtalei, Donald L. Bates, *Effect of organizational culture on mergers and acquisitions: the case of Daimler-Chrysler,* International Journal of Management, Vol. 24:2, (2007).

Martin Bartmann, Veronika Dehnen , *Cooperation versus competition: Union and works council strategies in the Delta site-selection process at General Motors Europe*, in *European Works Councils in Complementary Perspectives*, (edited by) Markus Hertwig , Ludger Pries and Luitpold Rampeltshammer, Brussels, ETUI, (2009).

Vincenzo Bavaro, *Contrattazione collettiva e relazioni industriali nell'«archetipo» Fiat di Pomigliano d'Arco,* Quaderni di Rassegna Sindacale, Vol. 3, 2010

P.B. Beaumont, P. Cressey and P. Jakobsen, *Key Industrial Relations: West German Subsidiaries in Britain*, Emerald Backfiles, (1990).

Barbara Bechter, Bernd Brandl, Guglielmo Meardi, *Sector or Countries? Typologies and levels of analysis in comparative Industrial relations,* European Journal of Industrial Relations, Vol 18, Issue 3, (2012).

Bruce M. Belzowski, *Reinventing Chrysler*, in *One Best Way? Trajectories and Industrial Models of the World's Automobile Producers*, M. Freyssenet, A. Mair, K. Shimizu and G. Volpato (eds), Oxford University Press, (1998).

Matej Blashko, Jeffry M. Netter, Joseph F. Sinkey, *Value creation and challenges of an international transaction the DaimlerChrysler merger,* International Review of Financial Analysis, Vol. 9:1, (2000).

Joseph L. Bower, *Not all M&As are alike – and that matters*, Harvard Business review, Vol. 79:3, (2001).

Alessandro Bramucci, Antonello Zanfei, The governance of offshoring and its effects at home. *The role of codetermination in the international organization of German firms,* Institute for International Political Economy Berlin, No. 40, (2014).

Keith D. Brouthers, Lance Eliot Brouthers, *Acquisition or Greenfield Start-up? Institutional, Cultural and transaction cost influences,* Strategic Management Journal, Vol. 21, (2000).

Laurence Capron, *The long-term performance of horizontal acquisitions,* Strategic management Journal, (1999).

Andrea Caputo, *Fiat and Chrysler, negotiating for survival*, Strategic Direction, Vol. 31:1, , (2015).

Rossana Cillo, Lucia Pradella, *Remaking the labour movement in Italy: the revival of strikes at Fiat-Chrysler Automobiles in 2015–17*, Globalizations, (2019).

Lance A. Compa, *An Overview of Collective Bargaining in the United States,* ILR Collection, (2014)

Matteo Corti, *La partecipazione dei lavoratori. La cornice europea e l'esperienza comparata*,

Vita e Pensiero, (2012)

W. Däubler, *Das Arbeitsrecht 1. Die gemeinsame Wahrung von Interesse nim Betrieb*, Rowohlt, Hamburg, (2006).

Verena Dill, Uwe Jirjhan, Stephen C. Smith, *Do foreign owners favor short-term profit? Evidence from Germany*, IZA discussion papers, N. 8165, (2014).

Cerrina Feroni G., T. E. Frosini, A. Torre, *Codice Delle Costituzioni*, Giappicelli Editore, (2009).

Heiner Dribbusch, *Agreement on Restructuring and Cost-Cutting at GM Germany,* EIRO Online, (2004).

Part 2. Selected papers

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EXEMPLIFIED BY THE AUTOMOTIVE INDUSTRY
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Anthony Ferner, Javier Quintanilla, Matthias Z. Varul, *Country-of-Origin Effects, Host-Country Effects, and the Management of HR in Multinationals: German Companies in Britain and Spain*, Journal of World Business, 36:2, (2001).

Giuseppe Ferraro, *Il contratto collettivo oggi dopo l'art. 8 del decreto n. 138/2011,* I working paers, (2011).

S. T. Frankel, *Staff Relations in the Canadian Federal Public Service: Experience with Joint Consultation,* The Canadian Journal of Economics and Political Science, Vol. 22:4, (1956).

Kathleen Fuller, Jeffry Netter, Mike Stegemoller, *What Do Returns to Acquiring Firms Tell Us? Evidence from Firms That Make Many Acquisitions*, The journal of Finance, Vol. 57:4, (2002).

Alessandro Garilli, *Reciproco riconoscimento e rappresentatività sindacale spunti ricostruttivi*

della sentenza della Corte costituzionale n. 231 de 2013, in Arg. Dir. Lav., (2014)

François Gaudu, Raymond Vatinet, *Droit du Travail,* Dalloz, 2011.

Emanuel Gomes, Duncan N. Angwin, Yaakov Weber, Shlomo Yedida Tarba, *Critical Success Factors through the Mergers and Acquisitions Process: Revealing Pre- and Post-M&A Connections for Improved Performance*, Thunderbird international Business review, Vol. 55, (2012).

Michael Goold, Andrew Campbell, Marcus Alexander, *How Corporate parents add value to the stand-alone performance of their business,* Business strategy Review, Vol. 5:4, (1994).

Michael Goold, Andrew Campbell, *Desperately seeking synergy*, Harvard Business Review, Vol. 76, (1998).

Ian Greer, *Identity Work: Sustaining Transnational collective action at General Motors Europe,*

Thomas Haipeter, Steffen Lehndorff, *Decentralised bargaining of working time in the German automotive industry*, Industrial Relations Journal, 36, 2, (2005).

Thomas, Haipeter, Z*um Formwandel der Internationalisierung bei VW in den 80er und 90er Jahren*, Zeitschrift für kritische Sozialwissenschaft, (1999).

Philippe Haspeslagh, David B. Jemison, *Acquisitions: Myths and reality,* Sloan Management Review, (1987).

Philippe Haspeslagh, David B. Jemison, *The challeng of renewal through acquisitions,* Planning review, vol. 19, (1991).

Armin Herber, Wolfgang Schäfer-Klug, *How a European Works Council learned to negotiate*, Mitbestimmung International (Edition 5), (2002).

Markus Hertwig, Ludger Pries, Luitpold Rampeltshammer, *Stabilizing effects of European Works Councils: Examples from the automotive industry*, European Journal of Industrial Relations 17:3, (2011)

Matthias Holweg and Frits K. Pil, *The Second Century: Reconnecting Customer and Value Chain Through Build-to-Order: Moving Beyond Mass and Lean Production in the Auto Industry.* MIT Press, Cambridge, Massachussetts (2004).

Matthias Holweg, *The evolution of competion in the automotive industry,* Judge Business School, (2008).

Uwe Jirjhan, Christian Pfeifer, *The introduction of Works Counci in German establishments – Rent seeking or rent protection?*, British journal of Industrial relations, Vol. 47:3, (2009).

Jan Johanson, Jan-Erik Vahlne, *The internationalization Process of a Firm. A model of knowledge development and increasing foreign Market Commitment,* Journal of international Business Studies, Vol. 8, No. 1, (1977).

Ulrich Jürgens, Martin Krzywdzinski, *Changing East-West Division of labour in the European automotive industry,* European urban and regional studies, Vol. 16:1, (2009).

Thomas Klikauer, *A General Motors works council's response to the capitalis global financial crisis: a case study from Germany,* Capital & Class, Vol. 36:2, (2012).

Holm-Detlev Köhler, *From marriage in heaven to divorce on earth: the DaimlerChrysler Trajectory since the merger*, in *The second automobile revolution*, (edited) by M. Freyssenet, Palgrave MacMillan, (2009).

Köstler R., Zachert U., Müller M., *Aufsichtsratspraxis*, Bund Verlag, (2006).

Salvo Leonardi, *Gli accordi separati: un vulnus letale per le relazioni industriali,* QRS, Vol. 3, (2010).

Alan Lipietz, *Mirages and miracles: crisis in global Fordism*, London, Verso, (1987).

Boy Luthje, *Labour relations, production regimes and labour conflicts in the Chinese automotive industry*, International Labour Review, Vol. 153:4, (2014).

Part 2. Selected papers

POST-MERGER INTEGRATION OF LABOUR RELATIONS IN INTERNATIONAL M&AS,
EXEMPLIFIED BY THE AUTOMOTIVE INDUSTRY
JHON PICCIONE – HIGHER SCHOOL OF ECONOMICS, RUSSIA

Mitchell Lee Marks, Philip H. Mirvis, *Making mergers and acquisitions works: Strategic and psychological preparation*, Academy of management Executive, Vol. 15:2, (2001).

Philip H. Mirvis, Mitchell Lee Marks, *The human side of Merger Planning:Assessing and analysing "Fit",* Human resources Planning, Vol. 15:3, (1992).

Neil J. Mitchell, *Where traditional Tories fear to tread: Mrs Thatcher's trade union policy*, West European Politics, Vol. 10:1, (1987).

Torsten Müller, Hans-Wolfgang Platzer, Stefan Rüb, *Global Company Strategies - Global Employee Interest Representation? The Cases of Volkswagen and DaimlerChrysler*, in *Company Strategies and Organisational Evolution in the Automotive Sector: A Worldwide Perspective*, (edited) by F. Garibaldo and A. Bardi, Peter Lang, (2005).

Sara B. Moeller, Frederik P. Schlingemann, René M. Stulz, *Firm Size and the Gains from acquisition,* Journal of Financial Economics, Vol. 73, (2004).

Francesco Nespoli, *Framing the crisis in industrial relations. Contrasting the "Fiat case" and FCA-UAW agreement,* E-journal of international and comparative labour studies, Vol. 7:2, (2018).

Mario Nuti, *Industrial relations at FIAT: Dr Marchionne's class war,* Transfer, Vol. 17:2, (2011).

René Olie, *Shades of culture and institutions in International Mergers,* Organization Studies, Vol. 15:3, (1994).

Martin K. Perry, Robert H. Porter, *Oligopoly and the incentive for horizontal merger*, The American Economic Review, Vol. 75:1, (1985).

Price Pritchett, Donald Robinson, Russel Clarkson, *After the acquisi- tion: The authoritative guide for integration success* London, McGraw Hill, (1997).

Annette L. Ranft, Michael D. Lord, *Acquiring new technologies and capabilities: a grounded model of acquisition implementation*, Organization science, Vol. 13:4, (2002)

Britta Rehder, *Mitbestimmung im Investitionswettbewerb*, WeltTrends Nr. 47,(2005).

Mark A. Rothstein, Lance Liebman, Employment Law: Cases and Materials, Foundation Press, (2007).

M. Rubython, *Pischetsrieder: the man with Volkswagen's future in his hand*, Euro Business, Vol. 52:8, (2000).

Luigi Russi, *Dilemmatic Moments and Collective Future- Making: Imagining Turin After a Fiat-Chrysler Merger?,* Culture, Society and Praxis, Vol. 9:1, (2016).

Chris Smith, Yu Zheng, *Chinese MNCs' globalization, work and employment*, in *Flexible workforces and low profit margins: electronics assembly between Europe and China*, (Edited by) Jan Drahokoupil, Rutvica Andrijasevic and Devi Sacchetto, ETUI, (2016).

Freek Vermeulen, Harry Barkema, *Learning through acquisitions,* Academy of management Journal, Vol. 44:3, (2001).

Yaakov Weber, Dalia Rachman-Moore, Schlomo Yedidia Tarba, *HR practices during post-merger conflict and merger performance,* International Journal of Cross-cultural Management, (2011).

Yaakov Weber, Shlomo Yedidia Tarba, Gunter K. Sahl and Ziva Bachar-Rozen, *Integration of international mergers and acquisitions: test of new paradigm*, in *Handbook of Research on Mergers and Acquisitions* (edited by Yaakov Weber), Edward Elgar Publishing, (2012).

Timothy J. Sturgeon, Johannes Van Biesebroeck, Gary Gereffi, *Value chains, network and clusters: reframing the global automotive industry,* ITEC working paper series, Vol. 8:2, (2008).

Michael Whittall, *The problem of national industrial relations traditions in European works councils: The example of BMW,* Economic and industrial Democracy, Vol. 31:45, (2010).

Michael Whittall, *Modell Deutschland under pressure.* Economic and Industrial Democracy, Vol. 26:4, (2005).

Werner Widuckel, *Globale Integration von Unternehmen und Interessenvertretung von Arbeitnehmern am Beispiel der Volkswagen AG*, Industrielle Beziehungen / The German Journal of Industrial Relations, Jahrg. 8, H. 3 (2001).

Adrian Wilkinson, Paul J. Gollan, Mick Marchington, David Lewin, *Conceptualizing Employee Participation in Organizations*, The Oxford Handbook of Participation in Organizations, (2010).

Matthew Worley, *The foundation of the British Labour Party. Identities, cultures and perspectives, 1900-1939,* Ashgate Publishing, (2009).

Chen Xiaohui, Liao Haiyan*, Study on Enterprise Cultural Integration after Geely's Acquisition of Volvo,* Proceedings of the 7th International Conference on Innovation & Management, (2010).

Xiling Zhu, *Experience with acquisitions of German Mittelstand companies – a case study,* in *Chinese investment in Europe: corporate strategies and labour relations*, (edited by) Jan Drahokoupil, ETUI, (2017).

BORROWINGS FROM STANDING FACILITIES: A MODEL AND EVIDENCE FROM RUSSIA

IAKOV KUGA — *NATIONAL RESEARCH UNIVERSITY HIGHER SCHOOL OF ECONOMICS*

Abstract

I develop a model of borrowings from standing facility in a corridor type monetary policy framework with REPO auctions, and attribute spread between the standing facility rate and the auction rate to a premium for reinvestment-opportunity risk. An equation for the premium shows that the spread declines and total borrowings grow as more liquidity is provided through the auction. The model suggests that a standing facility is an inferior source of liquidity for banks, that is, borrowings from the standing facility go down as demand for liquidity grows, when demand for liquidity is high enough. I propose a method of structural estimation of the model and provide parameter estimates for Russia based on data for a period between April 2014 and September 2016. According to the estimates, individual banks' demand for liquidity is highly persistent and its variance across the banks is high. Simulations show that, for estimated parameters and money market conditions, inferiority of standing facility is not uncommon. The central bank can pursue quantitative targets keeping the standing facilities rates at a fixed level, but this policy affects the auction rate.

Introduction

Recently, more and more central banks have switched to the corridor monetary policy framework. Operating under this framework, a central bank uses standing facilities to provide and absorb liquidity. Standing facilities allow commercial banks to borrow money from the central bank and to place excess liquidity there on a daily basis being restricted only by safety reasons and availability of collateral. The two standing facilities rates form a corridor, and the daily money market rate is typically fluctuates inside it. Scale of daily usage of these standing facilities depends only on commercial banks' choice, though the central bank is able to manage it in the long-run, changing the width of the corridor and shifting the mid-point.

Under the pure corridor system the scale of the operations under control of the commercial banks, while another instrument available to the central banks, that is, open market operations, allows the central bank's control.

Nowadays, classical open market operations in a form of buying and selling some kind of market assets, say, bonds, are mostly replaced by REPO auctions. A REPO contract is, basically, a way to provide collateralised lending. It has two legs. The first leg involves buying the collateral by a creditor. Repurchasing of the collateral by a borrower at the price including both principal and predetermined interest is the second leg executing at the end of the contract term. The interest rates are determined at auctions. Several varieties of these auctions including the version used by the Central bank of Russia divide control under total amount of lending between commercial banks and a central bank. Open market operations including REPO auctions allow shifting the equilibrium inside the corridor. For good description of REPO auctions in interaction with the corridor framework see Kahn (2010) and Bindseil and Wurtz (2007).

The third element of the money market is interbank lending which is responsible for liquidity distribution between the banks. Unlike the borrowing from a central bank, interbank lending does not imply usage of collateral and, thus, is more risky.

REPO rate, standing facilities rates and interbank rate are usually different from each other, even when nonzero borrowing is observed from all three channels simultaneously. The obvious explanation is that these sources are imperfect substitutes.

Neyer (2007, ch. 4) and Hauck and Neyer (2014) focus on increasing marginal transaction costs of borrowing from the central bank (using standing facilities or REPO auctions) and on interbank market. Transaction costs of borrowing from the central bank arise from lower yield on eligible collateral, while the search costs occur in case of borrowing from commercial banks. Bindseil and Jablecki (2011), Berentsen and Monnet (2008), Whitesell (2006), Perez Quiros and Rodriguez Mendizabal (2012) derive imperfect substitutability from non-simultaneity of acts of borrowing from various sources and corresponding differences in information available to borrowers in these moments of time.

With the outbreak of the world financial crisis, banks reduced their borrowings from other banks and switched to resources provided by central banks (see, for example, Hauck and Neyer, 2014). As a result, the role of decentralised money market has declined. On the other hand, larger range of monetary policy instruments used by the central banks attracts the attention to their interactions. In the present paper I use the approach exploiting difference in information available to banks at the moments of decision making on borrowing from various sources. In my model this difference is limited to banks' idiosyncratic shocks of demand for liquidity.

Typically, little attention was paid to different frequencies of these decisions. A rare exception is Perez Quiros and Rodriguez Mendizabal (2012) who showed that open market operations and standing facilities are two different 2 policy instruments, allowing for simultaneous control of prices and quantities in the money market.

In the present study, different frequencies of borrowing from standing facilities and at an auction play a key role. Maturity mismatch between longerterm borrowing at the auction and shorter-term investments creates reinvestment-opportunity risk described in Hellwig (1994). Contrary to that, borrowing from the standing facilities does not produce the risk. I model a regular five-day week with weekly open market operations and daily borrowings from standing facilities. The model can be easily adjusted to cope with irregular weeks such as those with holidays.

Another feature of Perez Quiros and Rodriguez Mendizabal (2012) is an asymmetry of standing facilities, meaning that targeted by open market operations rate is not necessary a mid-point between standing facilities' rates. To do this, they assume that a central bank conducts fixed rate full allotment tenders. However, central banks usually prefer to limit the allotted quantity and, hence, use variable rate tenders. For example, the ECB(see Catal˜ao-Lopes, 2010) and the Central bank of Russia behave in this way. That is why, I

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model open market operations as variable rate tenders. In this case asymmetry of standing facilities arises as a result of quantity decisions by a central bank.

Many papers focus on interrelations between REPO auctions and money market (Bindseil and Jablecki, 2011; Berentsen and Monnet, 2008) or between standing facilities and money market (Whitesell, 2006). The world financial crisis raised risks of non-collateralised interbank lending which, together with abundance of financing by the central banks, diminished the role of this market. My point of interest is relations between various policy instruments. Therefore, I do not introduce interbank lending here. In the following section I describe and solve the model. Section 3 is devoted to non-structural and structural empirical analysis and numerical simulations. Finally, section 4 concludes.

In the economy there is a central bank and a mass of commercial banks normalised to unity and indexed by $\omega \in [0, 1]$. Each bank can borrow a fixed amount of liquidity B from the central bank, which could be invested in the day t = 1..T overnight at a rate Rt(ω). Banks are able to borrow both at the auction and from the standing facility.

The central bank provides commercial banks with two opportunities to refinance: standing facility and first price discriminatory auctions with reserve price. Borrowing from the standing facility is overnight at the rate iSF and available on every day of the week t = 1..T with the deal executed on the same day.

At the auction the central bank provides a fixed volume of liquidity S 3 on the Auction day (t = 0) with reserve rate ikey, which is lower than the standing facility rate, ikey < iSF . The first leg of the operation is executed on the Execution day (t = 1) consecutive to the Auction day. The second leg is executed at the end of day T and just before the next week's auction. The banks participating at the auction make bids. The central bank lends banks with highest bids being limited by the volume S and by the reservation rate ikey. The banks' timeline is presented at the Fig. 1.
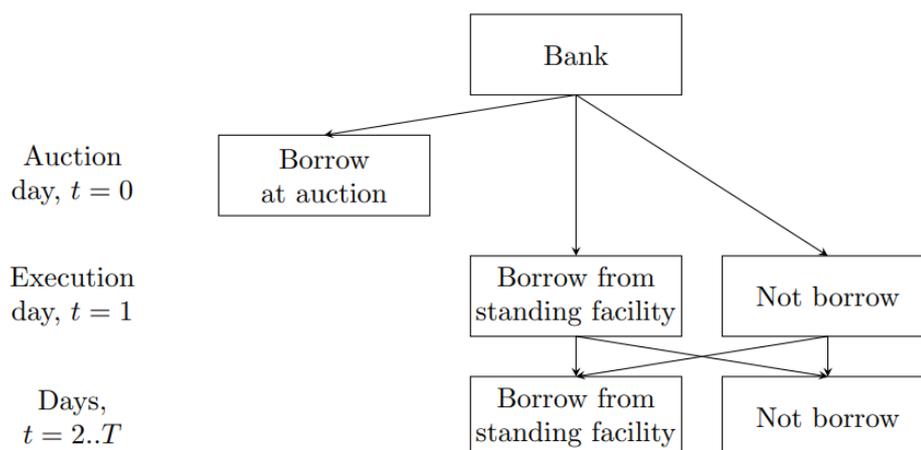
Fig. 1. Banks' available options.

Banks' rates of return depend on market conditions described by week and day of week effects together with persistent and transitory idiosyncratic shocks. It is described by (1):

$$R_{w,t}(\omega) = \mu_w + d_t + \xi_t(\omega) + \varepsilon_t(\omega), \qquad\qquad (1)$$

where μ_w is a week effect common for all banks, d_t is a day of week effect, which is the same for all banks too, $\xi_t(\omega)$ is a persistent idiosyncratic shock dependent on the previous shock $\xi_{t-1}(\omega)$ and innovation $\eta_t(\omega)$ in the following way: $\xi_t(\omega) = \alpha_t\xi_{t-1}(\omega) + \eta_t(\omega)$, and $\varepsilon_t(\omega)$ is a transitory shock. Transitory shocks $\varepsilon_t(\omega)$ and innovations $\eta_t(\omega)$ are i.i.d. normal random variables with zero means and variances $\sigma^2_{\varepsilon,t}$ and $\sigma^2_{\eta,t}$, which may vary from one day of week to another. An innovation of the persistent shock on at least one of the days of week should have positive variance, while all or some other shocks may be degenerate. Autoregressive coefficients α_t are all positive and smaller than 1.

As further analysis in this section is focused on rates of return within a week, I drop subscript w to avoid clutter.

The options available to banks are presented at the Fig. 1. Winners at the auction become borrowers both on the Execution and the remaining days of the week. Other banks have an option to borrow from the standing facility on any of days of week $t = 1..T$, or to refuse to borrow.

Banks know demand parameter B, monetary policy variables S, i_{key}, and i_{SF}, as well as variances $\sigma^2_{\varepsilon,t}$ and $\sigma^2_{\eta,t}$ on day $t = 0$. On day $t = 0..T$ each bank indexed ω knows realisations of her idiosyncratic shocks $\xi_t(\omega)$ and $\varepsilon_t(\omega)$. Making a decision to borrow, the banks maximise their expected profit, which is equal to the sum of spreads between the rate of return and the borrowing rate multiplied by borrowed value, B, on all days of the week (notice that the Auction day is on the preceding week).

Formal analysis

In the process of solving and analysing the model, I derive reinvestment opportunity risk premium equation explaining the spread between the standing facilities rate and the auction rate. After that, I formulate three propositions. The first of them points out that growing supply of the liquidity through the auction extends the total banks' borrowings though partially crowding out borrowing from the standing facility. The second proposition describes consequences of demand for credit growth when the demand for credit at the key rate exceeds the amount provided by the central bank. The third proposition states that liquidity provided through the standing facility behaves as an inferior resource when demand for liquidity is high and the central bank provides enough liquidity to keep the auction rate at the key rate level. To determine the banks' choice, I compare expected profit on the Auction day depending on their choice. The rate of return on day t can be decomposed into the expected on the Auction day rate of return on day t, $E_0R_t(\omega)$, and a sum of shocks occurred after the auction, $u_t(\omega)$:

$$R_{w,t}(\omega) = E_0 R_t(\omega) + u_t(\omega), \tag{2}$$

$$E_0 R_t(\omega) = \mu + d_t + \left(\prod_{s=1}^{t} \alpha_s \right) \xi_0(\omega), \tag{3}$$

$$\sigma_{t|0}^2 = \sigma_{\varepsilon,t}^2 + \sum_{\tau=0}^{t-1} \left(\prod_{s=\tau+1}^{t} \alpha_s^2 \right) \sigma_{\eta,\tau}^2 \tag{6}$$

The expected profit from borrowing at the auction per unit of borrowed liquidity is a sum of (3) for all days of the week:

where iA(ω) indexed ω auction.

$$E_0 \pi_{SF}(\omega) = T(\mu - i_{SF}) + \sum_{\tau=1}^{T} \left(d_\tau + \left(\prod_{s=1}^{\tau} \alpha_s \right) \xi_0(\omega) \right) +$$
$$+ \sum_{t=1}^{T} \sigma_{t|0} F\left(\frac{i_{SF} - \mu - d_t - \left(\prod_{s=1}^{t} \alpha_s \right) \xi_0(\omega)}{\sigma_{t|0}} \right). \tag{7}$$

is a bid bank pays at the

The choice between borrowing from the standing facility and not borrowing is obvious: a bank should borrow iff Rt(ω) > iSF . Then the profit on day t is:

$$\pi_{SF,t}(\omega) = \begin{cases} R_t(\omega) - i_{SF}, & R_t(\omega) > i_{SF} \\ 0, & \text{otherwise} \end{cases}.$$

Hence, the expected on the 5 Auction day profit from borrowing from standing facility on day t depends on variance of ut,

As all shocks are normally distributed, the expected profit on day t can be written as:

$$E_0 \pi_{SF,t}(\omega) = E_0 R_t(\omega) - i_{SF} + \sigma_{t|0} F\left(\frac{i_{SF} - E_0 R_t(\omega)}{\sigma_{t|0}} \right),$$

where F(x) = xΦ(x) + φ(x), Φ(x) and φ(x) are c.d.f. and p.d.f. of the standard normal distribution respectively (see the derivation in the Appendix A.1). It can be noted, that F(x) > 0 and, being an integral of Φ(x), is is increasing

$$E_0 \pi_A(\omega) = T(\mu - i_A(\omega)) + \sum_{\tau=1}^{T} \left(d_\tau + \left(\prod_{s=1}^{\tau} \alpha_s \right) \xi_0(\omega) \right), \tag{5}$$

everywhere. Sum of payoffs the bank gets from access to the standing facility during a week is then described by equation (7):

A bank indexed ω chooses to participate at the auction if $E0\pi A(\omega) > E0\pi SF(\omega)$. Thus, the bank is ready to pay premium to the auction rate:

$$p(\omega) = \frac{1}{T}\sum_{t=1}^{T}\sigma_{t|0}F\left(\frac{i_{SF} - \mu - d_t - \left(\prod_{s=1}^{t}\alpha_s\right)\xi_0(\omega)}{\sigma_{t|0}}\right) \qquad (8)$$

for borrowing from standing facility. One may derive two conclusions from (8). First, banks are willing to borrow at the auction only at the lower rate than the standing facility rate. Banks are ready to pay the premium for borrowings from the standing facility because it allows a choice of entering the market or not, depending on information available on every day, while the winning at the auction commits banks to borrow for the whole week. Second, banks with higher persistent shock $\xi 0(\omega)$ are ready to pay lower premium as their risks of low return during the week are smaller.

To find and analyse equilibrium I sort banks in ascending order by $\xi 0(\omega)$. Thus, ω now shows probability that on the Auction day bank faces persistent shock smaller than $\xi 0(\omega)$. Then (8) can be rewritten as:

Let the marginal bank borrowing from the auction be indexed $\omega *$. Banks make bids at the auction maximising their expected gain, which is proportional to
$\Pr(\text{win}|i_A(\omega))(i_{SF} - p(\omega) - i_A(\omega))$.
Information available to banks allows them to fully anticipate the market equilibrium. Hence, banks with indices $\omega > \omega*$ secure their win in the auction by making bid equal to the marginal bank's willingness to pay, iA = iSF − p($\omega *$). Banks with lower ω have no incentives to participate in the auction.

Definition

I say that the demand for borrowings at the auction is excessive if its volume at the key rate exceeds the amount supplied by the central bank, QA(ikey) > S while the demand is insufficient if its volume at the key rate is smaller than the amount supplied by the central bank QA(ikey) < S.

In excessive case the marginal borrowing bank's index is: , $\omega^* = \frac{B-S}{B}$ and all winners bid the same $i_A = i_{SF} - p\left(\frac{B-S}{B}\right)$ rate

If the demand for borrowings
$$p(\omega) = \frac{1}{T}\sum_{t=1}^{T}i_A = i_{key}\left(\frac{i_{SF} - \mu - d_t - \left(\prod_{s=1}^{t}\alpha_s\right)\sigma_{\varepsilon,0}\Phi^{-1}(\omega)}{\sigma_{t|0}} p(\omega^*) = i_{SF} - i_{key}\right) \qquad (9)$$
is, however,
insufficient, then the equilibrium rate is equal to the reservation rate: , and, therefore .

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The marginal bank's index can be expressed as:

$$\omega^* = p^{-1}(i_{SF} - i_{key}), \tag{10}$$

where is the $p^{-1}(\cdot)$

inverse function of risk premium function (9). Banks with indices higher than ω^* borrow from the auction, and their cumulative demand can be described by (11):

$$Q_A = B(1 - p^{-1}(i_{SF} - i_{key}). \tag{11}$$

Banks borrow from standing facility on day t if they decided not to borrow from the auction, but their rate of return on day t exceeds iSF . Thus, demand for borrowing from standing facility can be expressed as in (12):

$$Q_{SF,t} = BP_t, \tag{12}$$

where P_t is probability that for a random bank $\omega,\ \xi_0(\omega) < \xi_0(\omega^*)$, while $R_{w,t}(\omega) > i_{SF}$. It is convenient to express this probability using the bivariate normal distribution function $L(h, k, \rho)$, which shows a joint probability of $x > h, y > k$, where x and y are standard normally distributed random variables with correlation between them equal to ρ:

$$P_t = \Phi(-k_t) - L(\Phi^{-1}(\omega^*), k_t, \rho_t), \tag{13}$$

where

$$k_t = \frac{i_{SF} - \mu - d_t}{\sqrt{\sigma_{\xi,t}^2 + \sigma_{\varepsilon,t}^2}}; \tag{14}$$

$$\rho_t = \left(\prod_{s=1}^{t} \alpha_s\right) \frac{\sigma_{\xi,0}}{\sqrt{\sigma_{\xi,t}^2 + \sigma_{\varepsilon,t}^2}}. \tag{15}$$

See the derivation in the Appendix A.2.

I can now formulate Proposition 1

Proposition 1. Increasing amount of the liquidity, *S*, provided at the auction decreases the volume of the liquidity borrowed from the standing facility by a smaller amount: $-1 < \frac{dQ_{SF,t}}{dQ_A} < 0$

Proof. As it is seen from (10) and (11), $\omega^* = 1-QA/B$. After substituting $\omega*$ into (13) and (13) into (12), $\frac{dQ_{SF,t}}{dQ_A} = \frac{dL}{d\omega^*}$ obtain. Notice that change in QA affects only the first argument of the bivariate normal distribution function. Applying (A.1) yields

$$\frac{dQ_{SF,t}}{dQ_A} = -\Phi\left(\frac{\rho_t\Phi^{-1}(\omega^*) - k_t}{1 - \rho_t^2}\right), \qquad (16)$$

which is clearly between 1 and 0.

Thus, extending of the lending through the auction is not compensated fully by crowding out the borrowings from the standing facility at higher rate. This result demonstrates why auction based main refinance operations affect money market even though banks continue to use unlimited standing facilities.

Proposition 2. *If demand for borrowing at the auction is excessive, higher mean rate of return, μ, increases both the auction rate and the borrowing from the standing facility:*
$\frac{di_A}{d\mu} > 0, \frac{dQ_{SF,t}}{d\mu} > 0.$

Proof. In this case the amount of liquidity provided at the auction, QA, is determined by the central bank. As long as B and QA are constant, the marginal borrowing bank's index is fixed at $\omega^* = \frac{B-S}{B}$. On the other hand, risk premium decreases as μ grows as can be seen from (9). Hence, if the standing facility rate is fixed and demand for borrowings at the auction at the key rate exceeds the amount allotted by the central bank, a higher mean rate of return increases the auction rate.

From (12), signs of $\frac{dQ_{SF,t}}{d\mu}$ and $\frac{dP_t}{d\mu}$ are the same as long as B > 0. Differentiating (13) in respect to μ and applying (A.1) yields

$$\frac{dP_t}{d\mu} = \frac{\phi(k_t)}{\sqrt{\sigma_{\xi,t}^2 + \sigma_{\varepsilon,t}^2}}\Phi\left(\frac{\Phi^{-1}(\omega^*) - \rho_t k_t}{1 - \rho_t^2}\right) > 0.$$

In other words, higher mean rate of the return implies larger demand for borrowing from the standing facility by the banks unsuccessful at the auction.

Proposition 3. *If the demand for borrowing at the auction is insufficient, higher mean rate of return, μ, extends borrowing at the auction, while the effect on borrowing from standing facility is ambiguous:* $\frac{dQ_A}{d\mu} > 0, \frac{d\dot{Q}_{SF,t}}{d\mu} \lessgtr 0.$

Proof. In this case the amount borrowed at the auction, QA, is determined by demand of the banks, while the central bank defines the key rate. To find the effect of higher mean rate of borrowing

$$\frac{d\omega^*}{d\mu} = -\varphi\phi(\Phi^{-1}(\omega^*)), \qquad (17)$$

return on at the auction, I

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use (9). For the marginal bank, the risk premium is equal to the spread between the standing facilities' and the auction's rates. In this case, the auction rate is at its lowest level, the key rate. Therefore, we have . Interpreting (9) as an indirect function and differentiating it with respect to yields:

where

$$\varphi = \frac{\sum_{t=1}^{T} \Phi\left(\frac{i_{SF} - \mu - d_t - \left(\prod_{s=1}^{t} \alpha_s \right) \sigma_{\xi,0} \Phi^{-1}(\omega)}{\sigma_{t|0}} \right)}{\sum_{t=1}^{T} \left(\prod_{s=1}^{t} \alpha_s \right) \Phi\left(\frac{i_{SF} - \mu - d_t - \left(\prod_{s=1}^{t} \alpha_s \right) \sigma_{\xi,0} \Phi^{-1}(\omega)}{\sigma_{t|0}} \right)} \qquad (18)$$

This derivative is obviously negative, . $\qquad \frac{d\omega^*}{d\mu} < 0$

Since the auction participants are the banks with the highest rates of return (with indices $\omega \geq \omega^*$), equation (17) shows that the range of borrowers at the auction is increasing in the mean rate of return. As these banks always borrow all the money they need, the provided liquidity amount $\frac{dQ_A}{d\mu} = -B \frac{d\omega^*}{d\mu} > 0.$ grows as well:

As in case of Proposition 3, sign of the effect of μ on borrowing from standing facility is the same as the sign of $\frac{dP_t}{d\mu}$, which cannot be signed as ω depends on μ

$$\frac{dP_t}{d\mu} = \frac{1}{\sqrt{\sigma_{\xi,t}^2 + \sigma_{\varepsilon,t}^2}} \phi(k_t) \Phi\left(\frac{\Phi^{-1}(\omega^*) - \rho_t k_t}{1 - \rho_t^2} \right) - \\ - \frac{\varphi}{\sigma_{\xi,0}} \phi(\Phi^{-1}(\omega^*)) \Phi\left(\frac{\rho_t \Phi^{-1}(\omega^*) - k_t}{1 - \rho_t^2} \right). \qquad (19)$$

On the one hand, banks refusing to borrow at lower rate may find it profitable to use the standing facility, which is reflected by positive first term of (19). On another hand, some banks switching from standing facility to cheaper borrowings at the auction sufficiently safe expecting higher rate of return. This effect is described by the second term, which is negative. It can be shown in this case that the first effect prevails when μ is small enough. As a result, the borrowing from the standing facility go up as the mean rate of return increases. For high enough μ the second effect dominates. See proof in Appendix A.3.

It is natural to presume that standing facility and borrowing at the auction are close substitutes. Therefore, asymmetric influence of demand for liquidity growth on borrowings from these sources looks odd. However, this effect was described by Ferguson and Saving (1969) and Todaro (1969) and labelled as inferiority of production factor. The demanded quantity of the inferior factor decreases with expanding scope of production. In the case of standing facility the production factor inferiority, as it can be noted, does not imply low quality of the resource. Opposite to that, banks are always willing to pay more for borrowings from standing facility as it follows from equation (9). The intuition behind this finding is that the standing facility is most actively used by the banks with rates of return just below the rate of the marginal bank, which are especially uncertain

about profitability of their future investments. However, when mean rate of return is high and growing, the share of the uncertain banks diminishes.

Empirical analysis

Russian monetary policy framework

During the last decade, there was a shift from exchange rate targeting to inflation targeting in the Russian monetary policy. Between 2008 and 2017 the Central Bank of Russia has tried a wide range of monetary policy instruments together with various operational procedures, while money market conditions swung between shortages and abundances of liquidity (see an overview in Pestova, 2017). In general, a corridor type framework of monetary policy was forming slowly.

By 2013 the Central Bank of Russia used a set of several credit auctions with different terms of lending. In particular, the central bank was providing liquidity using daily REPO auctions. In September 2013 a decision was made to reduce number of auctions of this type, though the implementation of this decision was postponed till 2014 (Central Bank of the Russian Federation, 2013). In the first quarter of 2014 the REPO auctions for overnight refinancing were organised in eight of eleven weeks. In the second quarter of 2014 the number of auction decreased sharply, and they took place only in four weeks. Further, overnight REPO auctions were used rarely as fine-tuning operations.

Thus, by April 2014 the monetary policy of Russia was reorganised in a more systematic way. The weekly REPO auctions conducted regularly on Tuesdays with execution of the first leg of trade on the Wednesday and the second leg on the next Wednesday. These REPO auctions serve as main refinance operations. The liquidity volume to be provided through the auction is determined based on liquidity forecasts, and is announced in advance. The reservation rate at the auction is equal to the key rate or, in, other words, to the mid-point in the interest rate corridor. Auction winners pay their bid rate. In periods of liquidity excess, the Central Bank of Russia conducts a deposit auction instead of REPO auction.

The auctions are combined with standing facilities allowing borrowing on a daily basis with execution of the order on the same day. The lending standing facility rate is equal to the key rate + 1 percentage point, while the deposit standing facility rate is one percentage point below the key rate. These instruments are supplemented with irregularly used short-term fine-tuning operations and operations providing liquidity for much longer terms (e.g. 6 months, 1 year). Since April 2014 the fine-tuning operations occur several times per quarter and their volumes are insignificant. Banks' borrowings for the longer-term are significant, but the transactions are rare.

By October 2016 the Russian banking system has shifted from shortage of liquidity to its abundance. Consequently, the central bank has switched from the REPO auctions to the deposit auctions absorbing the excess liquidity.

The period under consideration was not calm for Russian money market. Sudden stop of capital inflows in March of 2014 as well as deteriorating terms of trade and following rapid depreciation of the rouble in the second half of the same year affected internal interest rates significantly. In 2014 the Central Bank of Russia changed exchange rate regime to free floating. These events affected money market significantly. However, I apply the model presented in the section 2 to the period between April 2014 and September 2016 as it allows for demand for liquidity shifts while requires a corridor type monetary policy framework.

Data

The model presented in this paper is related to the case of liquidity shortage and to the choice between the borrowings at the auctions and from the standing facility. Correspondingly, I use data on REPO auctions and borrowings from the standing facility published by the Central Bank of Russia for a period between 1 April 2014 and 30 September 2016 when structural liquidity shortage and rare usage of fine-tuning operations were typical. The period counts 128 weeks. After excluding weeks with holidays, with no bids at the auction, with fine-tuning operations, and with key rate changes, only 83 weeks remain.

Observables allow differentiating the cases of excessive demand from those of insufficient demand. When the demand is excessive, the amount of liquidity provided at the auction is equal to the volume supplied by the central bank and announced in advance. In case of insufficient demand the provided amount of liquidity is lower. The excessive demand was observed for 75 weeks and the insufficient demand had place for eight weeks.

As equations (9) and (11) show, the demand for borrowing at the auction depends not on μ per *se*, but rather on the spread $\mu-iSF$. This allows estimating the model in deviations from the standing facilities rate.

Descriptive statistics for the whole sample and for subsamples of excessive and insufficient demand periods is presented in the Table 1.

Non-structural estimation

I explore two consequences of Propositions 2 and 3 assuming that demand for liquidity changes are the major source of variance in equilibrium rates and quantities Hypothesis 1. In case of excessive demand, borrowings from standing facility and the auction rate (corrected for the standing facility rate) are positively correlated. Hypothesis 2. In case of insufficient demand, the relationship between borrowings at the auction and borrowings from standing facility has inverted U-shape. These hypotheses are tested using four models. The results are presented in the Table 2.

Table 1: Descriptive statistics

Variable	Excessive demand		Insufficient demand		Total	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Log of borrowings from standing facility	11.071	1.197	10.245	1.365	10.991	1.237
Spread between marginal winning bid and standing facility lending rate	−0.594	0.317	−0.999	0.003	−0.633	0.324
Spread between average winning bid and standing facility lending rate	−0.444	0.285	−0.759	0.242	−0.474	0.296
Log of borrowings at REPO auction	13.634	1.022	14.349	0.525	13.703	1.007
Log of borrowings at REPO auction squared	186.9	26.4	206.2	14.7	188.8	26.2
Observations	375		40		415	

Table 2: Non-structural estimation results

Dependent variable	Log of borrowings from standing facilities			
Subsample	Excessive demand		Insufficient demand	
Model	1	2	3	4
Spread between marginal winning bid and standing facility lending rate	2.328*** (0.141)			
Spread between average winning bid and standing facility lending rate		2.278*** (0.178)		
Log of borrowings at REPO auction			−1.219*** (0.357)	70.887*** (13.499)
Log of borrowings at REPO auction squared				−2.568*** (0.486)
R^2	0.38	0.30	0.22	0.49
Observations	375	375	40	40

Notes: Robust standard errors are in parentheses, *** denotes significance at 1% level.
Fixed effects of days of week are not included.

To test Hypothesis 1 I construct linear regression Models 1 and 2. The marginal winning bid rate is equal to the average winning rate in the model, because banks perfectly foresight the market equilibrium. However, in practice they have imprecise knowledge about market demand. Therefore, they do different bids (see a simple discriminatory auction model with continuum of bidders and uncertainty about the equilibrium in Federico and Rahman, 2003). Thus, marginal winning bid rate differs from average winning bid rate. Therefore, I use marginal winning bid rate in the Model 1 and average winning bid rate in the Model 2.

Possible systematic intra-week variations of the return can be captured by day of week effects. Wald test shows they are insignificant. Therefore, results presented in the Table 2 do not include these effects.

Looking at scatter diagrams presented at Fig. 2, one may notice heteroscedasticity. I assume robust errors to account for it.

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As can be seen, both models show very close results and allow rejecting null that there is no correlation between the auction rate and borrowings from the standing facility in favour of Hypothesis 1 at 1% significance level.
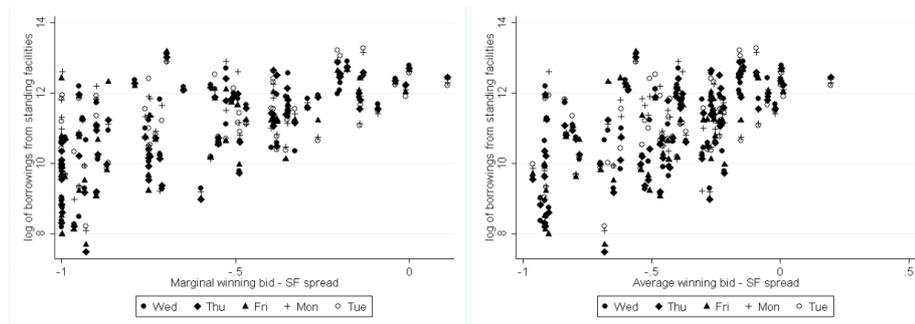
Fig. 2. Borrowing from standing facility in case of excessive demand.

Proposition 3 predicts that, in case of insufficient demand, growing demand for liquidity increases borrowing at the auction while the effect on borrowing from standing facility is positive when demand is low and negative when demand is high. The scatter diagram is presented at Fig. 3.

To test Hypothesis 2 I estimate linear (Model 3) and linear-quadratic (Model 4) regressions of borrowings from the standing facility on borrowings at the auctions. I expect negative sign for the squared borrowings.

The results presented at the Table 2 favour Hypothesis 2. The point estimate of the marginal effect is negative for mean log of borrowings at the auction.

Thus, the data agree with the results of the theoretical model. In particular, it turns out, that the borrowing from standing facility are, indeed, an inferior factor when demand for liquidity is high enough. It means that the demand for liquidity growth decreases demand for this type of financing.
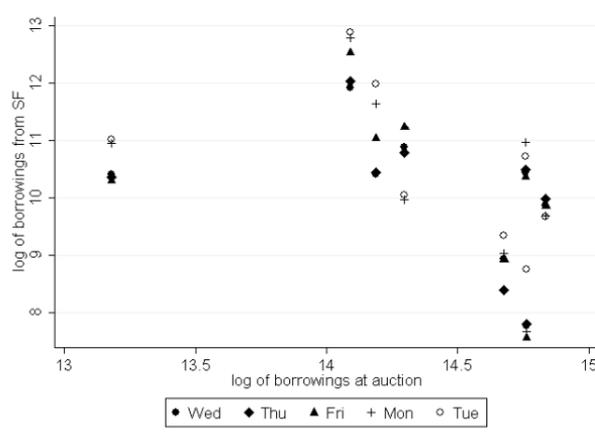
Fig. 3. Borrowing from standing facility in case of insufficient demand.

Structural estimation

The empirical evidence shown in the previous sub-section supports the model. However, results related to most surprising Hypothesis 2 are based on data on only few weeks. It is tempting to conduct a structural estimation of the model parameters and check if the inverted U-shape relationship takes place under typical parameters and prevalent demand for liquidity.

Empirical strategy

Under assumptions of the model, the data on borrowing at the auction are, essentially, the data on proportions of banks facing the rate of return above a particular level. Similarly, data on borrowing from the standing facility reflects proportion of banks with the rate of return on the Auction day below that level facing the rate of return increase above *iSF* on particular days of the next week. Let's assume the continuum of banks modelled in section 2 constitutes the population of banks. However, we observe, only a random samples of n banks. Cumulative maximum borrowing amount of these banks is normalised to B. Correspondingly, their observable actual borrowings at the auction and from the standing facility are only sample proportions of the cumulative maximum borrowing amount. Given B and n, one can derive a loglikelihood function of observing sample amounts of borrowing from the auction on particular week and subsequent borrowings from the standing facility on each day of the week w:

$$l_w(\theta_w) = \ln \frac{n!}{k_{w,o}!(n-k_{w,o})!} + n\frac{Q_{A,w}}{B}\ln(1-\omega_w^*) + n\left(1 - \frac{Q_{A,w}}{B}\right)\ln \omega_w^* +$$
$$+\left(\sum_{t=1}^{T}\left(\ln \frac{n!}{k_{w,t}!(n-k_{w,t})!} + n\frac{Q_{SF,w,t}}{B}\ln P_{w,t} + n\left(1 - \frac{Q_{SF,w,t}}{B}\ln(1-P_{w,t})\right)\right)\right),$$
$$\tag{20}$$

$$\theta_w \qquad\qquad k_{w,o} \equiv \frac{Q_{A,w}}{B}$$

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Where is a vector of parameters, is a number of banks that borrowed at the auction, is amount of borrowed at the auction on week w, ω w is an index of the marginal winning bank at the auction on week w in population, $k_{w,t} \equiv n \frac{Q_{SF,w,t}}{B}$ is a number of banks that borrowed from the standing facility on day t of week w, $Q_{SF,w,t}$ is amount of borrowings from the standing facility on day t of week w, and is a share of banks that borrowed from the standing $Q_{A,w}$ facility on day t of week w, among all banks in population. Notice that using (9) the marginal winning bank's index can be computed as

$$\omega_w^* = p^{-1}(i_{SF,w} - i_{A,w})$$, $i_{SF,w}$ where   is   the $P_{w,t}$ standing $i_{A,w}$ facility rate on week w and is the auction rate on week w. Similarly, the share of banks that borrowed from the standing facility in population can be computed using (13).

The theoretical model assumes no dependence between observations on different weeks. Hence, loglikelihood $l(\theta) = \sum_w l_w(\theta_w)$ function for the whole dataset is where vector of parameters θ consists of vector of weekly mean rates of return **μ** augmented with parameters invariant across the weeks. According to the theoretical model, these α_t parameters may include autoregressive coefficients , variances of shocks, $\sigma_{\varepsilon,t}^2$ and $\sigma_{\eta,t}^2$ and day effects, dt. In general, these parameters may vary from one day of week to another as stressed by indices t. However, restricted models may assume that a particular set of coefficients is the same for all days of week. As can be noted, equation (20) has components independent of model parameters. Thus, I rescale it in following way:

$$l_w(\theta_w) = \sum_{t=0}^{T} \ln \frac{n!}{k_{w,t}!(n - k_{w,t})!} + n\widetilde{l}_w(\theta_w), \qquad (21)$$

where

$$\widetilde{l}_w(\theta_w) = \frac{Q_{A,w}}{B} \ln(1 - \omega_w^*) + \left(1 - \frac{Q_{A,w}}{B}\right) \ln \omega_w^* +$$
$$+ \left(\sum_{t=1}^{T} \frac{Q_{SF,w,t}}{B} \ln P_{w,t} + \left(1 - \frac{Q_{SF,w,t}}{B} \ln(1 - P_{w,t})\right) \right).$$

As a result, by maximising the linearly transformed likelihood function $\widetilde{l}(\theta) = \sum_w \widetilde{l}_w(\theta_w)$ in respect to θ, I obtain the same maximum likelihood estimates. This means that there is no need to know sample size n to obtain the parameter values. However, the transformation affects the derivatives of the loglikelihood function in unknown direction and, thus, makes standard LM and LR tests inapplicable. That is why I use bootstrap procedure to estimate confidence intervals for the parameters values and bootstrap Wald

test for testing multiple hypotheses jointly. Last unobservable variable in the model is the maximal amount of borrowing from the central bank, *B*. This value is limited from below by actual borrowings which reach 3.7 tn roubles on a week ending on 17 December 2014. The upper limit of borrowing is determined by available amount of eligible collateral, which varied between 4.6 and 5.4 tn roubles in 2014 and slightly increased later 1. I provide estimates of the model parameters for various reasonable values of *B*.

Results

All estimates in this section are based on marginal rather than average winning bid rate. While estimating parameters I was forced to exclude two weekly observations related to auctions held on 2 February and 8 August of 2016. The marginal winning bid rate at these auctions exceeded the standing facility rate, which is incompatible with the model. In both of these cases, the central bank sharply cut amount of liquidity provided at the auction compared with the previous week. As a result, data for 81 weeks remain in the sample.

Estimates show no significant differences between autocorrelation coefficients for different days of week, *αt*, variances of shocks for different days of weeks,

σ_η^2 and σ_ε^2. They does not favour fixed effects of days of week, *dt* too. Therefore, table 3 presents maximum likelihood estimates of parameters only for the Model 5 (persistent shocks only) and for the Model 6 (both persistent and purely transitory shocks). I determine confidence intervals making 1000 draws of 81 weekly observations with replacements from the sample.

Table 3: Structural estimation results

B, tn rub	Model 5		Model 6	
	4	6	4	6
α	0.9953 [0.9920 0.9975]	0.9960 [0.9932 0.9979]	0.9959 [0.9947 0.9996]	0.9973 [0.9958 0.9997]
σ_η	1.09 [0.78; 1.70]	0.91 [0.67; 1.30]	0.46 [0.14; 0.84]	0.38 [0.11; 0.56]
σ_ε			1.12 [0.78; 1.58]	1.09 [0.71; 1.24]
$\sigma(R)$	11.27 [6.29; 23.09]	10.15 [5.78; 19.67]	5.17 [3.27; 12.70]	5.31 [3.03; 9.57]
$\widetilde{l}$	−89.7763	−71.7733	−89.6721	−71.6119

Note: Bootstrapped 95% confidence intervals are in the brackets.

As we may see from Table 3, allowing for purely transitory shocks significantly decreases estimates for magnitude of the persistent shock innovations, *ση*, and makes estimates of

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standard deviation of rate of return across banks, $\sigma(R)$, more reasonable. Hence, I use estimates of the Model 6 below to make numerical examples and to conduct simulations. Another conclusion from Table 3 is that the estimates of α are close to unity, while estimates of $\sigma\eta$ are not much lower than those of $\sigma\varepsilon$. It means that banks' current rates of return explain future rates well, or, putting it in different way, lion share of variance in rates of return arises from longer-term differences between banks' yields.

To investigate the results, let's examine a particular estimate, say, the estimate of the Model 6 under assumption of $B = 4$ tn rub. In this case $\xi_t(\omega) = \xi_{t-1}(\omega) + \eta(\omega)$ .Assuming, that distribution of ξ is stationary, obtain: $\sigma_\xi^2 = \frac{\sigma_\eta^2}{1-\alpha^2} \approx 25.32.$ Banks are highly differentiated by their rate of return. Its standard deviation, Banks are highly differentiated by their rate of return. Its standard deviation, $\sigma(R) = \sqrt{\sigma_\xi^2 + \sigma_\varepsilon^2}$, exceeds five percentage points. Prevalence of the persistent shock and its high persistence means that ranks of banks do not change from day to day sharply. For example, median bank with probability $1 - 2\Phi\left(\Phi^{-1}(0.4)\sqrt{\frac{\sigma_\xi^2+\sigma_\varepsilon^2}{\sigma_\eta^2+\sigma_\varepsilon^2}}\right) \approx 0.72$ would remain in the middle quintile of the distribution on the next day. Estimates of mean rate of return, μ are available for each week. Fig. 4 shows estimates according to the Model 6. The mean rate of return was close or even above the key rate during 2014, which was reflected in massive borrowing from the central bank. Sharp rise of the key rate in December 2014 cooled inflation expectations, and the rate of return started to decline. As key rate drop was much smaller, the borrowings shrunk. According to the model, only banks with highest rate of return continued to use this source of liquidity. Notice, that assumption on borrowing limit, B, affects estimates of μ. On the one hand, greater B means that a marginal borrowing bank has higher index, ω . On another hand, estimates of rate of return unconditional variance across the banks may depend on B. That is why estimates of μ are not always lower for higher borrowings limit.

Simulations

According to Proposition 1 a central bank is able to manipulate liquidity without changing interest rate. To what extent can it do that? Fig. 5 presents rates of crowding out of borrowing from standing facility as a result of increasing allotment at the auction. They are calculated using (16) for estimated parameters of the Model 6, assuming that mean rate of return across the banks is equal to standing facility rate. The results are similar for other mean rates of return and other days of week.
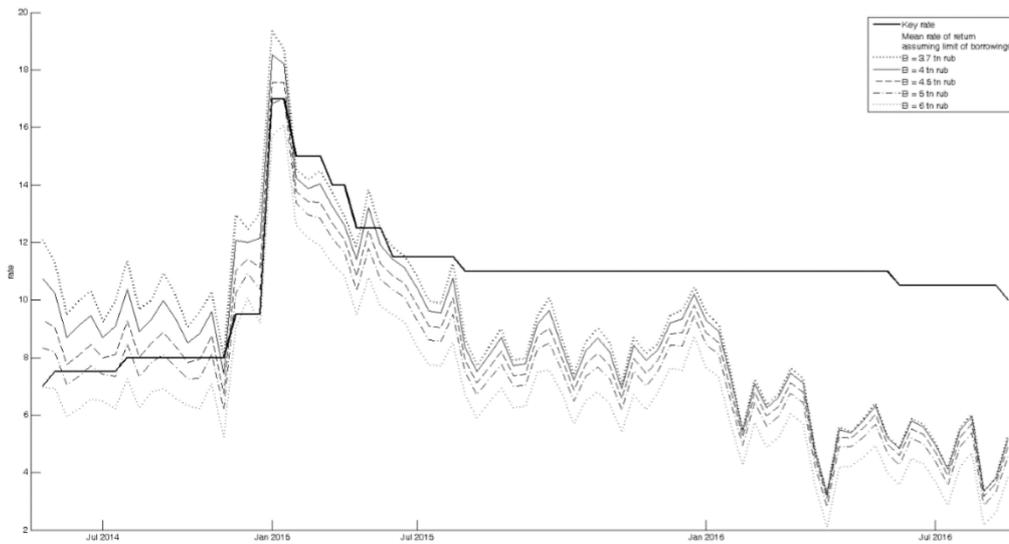
Fig.4.Estimates of mean rate of return (Model 6)
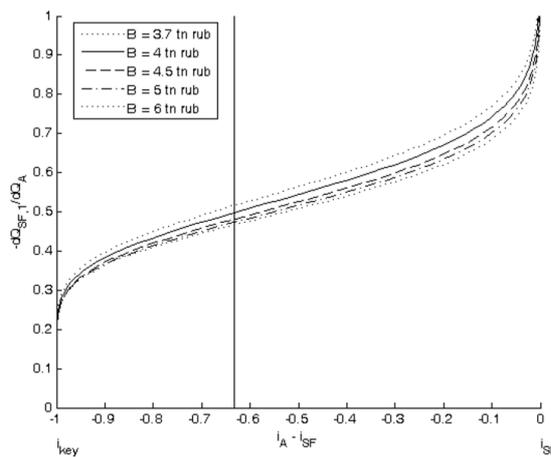
Fig. 5. Borrowings from standing facility crowding out rates

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(Model 6, $\mu = iSF$, Wednesday). Vertical line denotes mean $i_A - i_{SF}$ spread in the sample.

As the figure shows, crowding out is quite small when the auction rate is close to the key rate, but it grows as the spread between the lending facility rate and the auction rate is narrowing. As the spread vanishes, the crowding out becomes full. Why does the spread matter? When it is wide, behaviour of only small part of banks receiving the additional allotment would be affected as most of these banks would not face rate of return higher than i_{SF} on the next day and, thus, would not use lending facility anyway. When the spread is narrow, however, marginal banks borrowing at the auction are almost sure that their rate of return would be above the lending facility rate in subsequent days. Hence, rate of crowding out in this case would be close to unity. To sum up, central banks can control both upper bound of the interest rate corridor and liquidity using mix of auctions and lending facility when the spread between the standing facility rate and the auction rate wide. The Central Bank of Russia used to operate in that region. However, this trade-off arises mostly from shifts of the auction rate. For example, providing less liquidity while keeping the same standing facilities rates moves the auction rate up. I provide a numerical example of refining the effect of the auction rate position within the corridor. Assume that the auction rate is the same in both cases, but in the Case 1 it is located at the upper bound of the corridor while in the Case 2 it is at the midpoint of the 2 percentage point wide corridor. For simplicity, let $i_A = \mu$ and apply parameter estimates for the Model 6 and $B = 4\ tn$. The results are presented in the Table 4.

Table 4: Effect of the auction rate position. A Numerical example

Borrowed amount, bn rub	Q_A	$Q_{SF,1}$	$Q_{SF,2}$	$Q_{SF,3}$	$Q_{SF,4}$	$Q_{SF,5}$
Case 1	0	2000	2000	2000	2000	2000
Case 2	1920	62	71	79	87	95

In the Case 1 banks prefer more convenient borrowings from the lending facility. Exactly half of banks borrow every day of week. In the Case 2 slightly less than a half of banks are sure enough that their rates of return would be high and are ready to commit borrowings from the auction. Small share of remaining banks occasionally uses the lending facility. This share grows from Wednesday to next Tuesday as banks' forecasts for longer period are less precise. The daily average borrowing in the Case 2 is just slightly lower than in the Case 1. This example suggests that the ability to use standing facilities and REPO auctions as independent instruments is still very limited. Proposition 3 allows for factor inferiority for high enough mean rates of return. How high are these rates compared to the rates typical for the sample? To answer the question, I conduct simulations of Q_{SF}/B for various values of B and corresponding estimated parameters of the Model 6 applying (16). This equation implies that it is $\mu - i_{SF}$, not the mean rate of return itself, affects Q_{SF}/B. Hence, I compute Q_{SF}/B or range of weekly estimates of $\mu - i_{SF}$ produced by the corresponding model. Fig. 6 shows the simulation results for estimated parameters values under assumption that B = 4 tn roubles. The graph has clear inverted U-shape form. It shows that factor inferiority occurs under mean rates of return slightly higher than the sample mean of this variable. Simulations for other reasonable values of B produce similar

results. Thus, the inferiority of the borrowings from standing facilities has place under parameters typical for the Russian money market.

Conclusions

I investigate banks' choice to borrow at REPO actions or from standing facility. These sources are close substitutes. However, banks are typically ready to pay higher rates for borrowing from standing facility. Moreover, banks are heterogeneous in their preferences between these two sources of liquidity. I propose a theoretical model with banks heterogeneous in respect to their rate of return on liquid assets. The model shows that banks are ready to pay higher rates for more flexible borrowing from standing facility compared to their bids at weekly auctions. Moreover, this premium is higher for banks with lower rate of return on their investments.
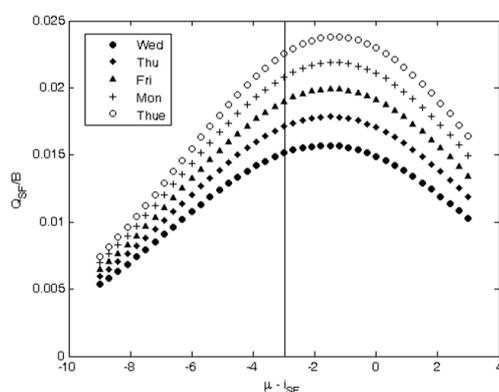
Fig. 6. Borrowings from standing facility crowding out rates (Model 6, $\mu - i_{SF}$, Wednesday). Vertical line denotes mean estimated $\mu - i_{SF}$ spread in the sample

The model predicts that as REPO auctions and lending standing facility are imperfect substitutes. More specifically, adding liquidity through the auction crowds out borrowings from standing facility, but only partially. This result supports the findings by Perez Quiros and Rodriguez Mendizabal (2012). Moreover, these sources of liquidity differ from each other in a very surprising way. Growth of demand for liquidity raises share of the banks willing to borrow at the auction. Hence, the share of potential borrowers from the standing facility decreases, but chances that these banks find it profitable to borrow from the standing facility increase. The first effect may or may not exceed the second one. Consequently, borrowings from standing facility may decline or increase as demand for liquidity grows. This first case can be referred to as inferiority of financing from the standing facility. I estimated the model structurally using daily data on Russian money market between April 2014 and September 2016. The results suggest that individual banks rates of return on liquidity are characterised by high persistence and variance. However, a transitory component is also present. According to estimates, the

Central bank of Russia can affect liquidity volume and corridor interest rates separately controlling amount of liquidity supplied to the REPO auctions. Providing an additional unit of liquidity at the auction decreases the borrowings from the lending facility of about half of unit when auction rate is at its sample average level. However, this effect arises mostly from the auction rate changes, not from auction rate position within the corridor.

Appendix A.1

Let x be a normally distributed variable with mean μ and variance σ^2: $x \sim \mathcal{N}(\mu, \sigma^2)$. Let $y = \begin{cases} x_0, & x < x_0 \\ x, & x \geq x_0 \end{cases}$, where x_0 is a parameter. Then mean of y, $E(y) = \Pr(x < x_0)x_0 + (1 - \Pr(x < x_0))E(x \geq x_0)$. Using the mean of truncated normally distributed variable formula, obtain: $E(y) = (x - \mu)\Phi(\frac{x_0-\mu}{\sigma}) + \mu + \sigma\phi(\frac{x_0-\mu}{\sigma})$. It is convenient to express this mean using integral of normal distribution c.d.f., $F(x) = \int_{-\infty}^{x} \Phi(x)dx = x\Phi(x) + \phi(x)$. Finally, obtain: $E(y) = \sigma F\left(\frac{x_0-\mu}{\sigma}\right)$.

Appendix A.2

Bivariate normal distribution function

$$L(h, k, \rho) = \int_h^{\infty} \int_k^{\infty} \frac{1}{2\pi\sqrt{1-\rho^2}} e^{-\frac{x^2 - 2\rho xy + y^2}{2(1-\rho^2)}} \, dy dx$$

shows probability that for two standard normally distributed variables x and y, $x \geq h$ and $y \geq k$ if correlation between these variables is equal to ρ.

Partial derivatives of L in respect to h and k can be expressed using p.d.f. and c.d.f. of the standard normal distribution. Due to symmetry, it is enough to differentiate in respect to one of the arguments:

$$\frac{\partial L}{\partial h} = -\phi(h)\Phi\left(\frac{\rho h - k}{1 - \rho^2}\right) \tag{A.1}$$

Appendix A.3

The proof is based on exploring behaviour of (10) as $\mu \to \pm\infty$.

1. If mean rate of return, μ, is high enough, all banks except of infinitely small fraction of them will to participate in the auction: $\lim_{\mu \to +\infty} \omega^* = 0$. Contrary to that, if mean rate of return, μ, is low enough, all banks except of infinitely small fraction of them will not to participate in the auction: $\lim_{\mu \to -\infty} \omega^* = 1$.

Indeed, in a way used to derive (17) one can show that

$$\frac{d\Phi^{-1}(\omega^*(\mu))}{d\mu} = -\frac{\varphi}{\sigma_{\xi,0}}, \tag{A.2}$$

and, as it is seen from (18),

$$\frac{1}{\prod_{s=1}^{T} \alpha_s} > \varphi > \frac{1}{\alpha_1}. \tag{A.3}$$

Thus, $\Phi^{-1}(\omega^*)$ decreases infinitely with μ growth. Consequently, ω^* approaches to zero. In a similar way, decreasing of μ leads to infinite growth of $\Phi^{-1}(\omega^*)$, and, correspondingly, ω^* approaches to unity.

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2. Find useful limit: $\lim_{\mu \to \pm\infty} \frac{\Phi^{-1}(\omega^*(\mu))}{i_{SF} - \mu - d_t}$. Using L'Hôpital rule and $(A.2)$, obtain: $\lim_{\mu \to \pm\infty} \frac{\Phi^{-1}(\omega^*(\mu))}{i_{SF} - \mu - d_t} = \frac{\sigma_{\xi,0}}{\lim_{\mu \to \pm\infty} \varphi} \left(\lim_{\mu \to \pm\infty} \frac{\Phi^{-1}(\omega^*(\mu))}{i_{SF} - \mu - d_t} \right)^2$. Solve for the limit:

$$\lim_{\mu \to \pm\infty} \frac{\Phi^{-1}(\omega^*(\mu))}{i_{SF} - \mu - d_t} = \frac{\lim_{\mu \to \pm\infty} \varphi}{\sigma_{\xi,0}} \qquad (A.4)$$

(zero root is not a solution as it is clear after substituting into (18)).

3. Find another useful limit: $\lim_{\mu \to \pm\infty} \left(\chi\Phi^{-1}(\omega^*(\mu)) - (i_{SF} - \mu - d_t) \right)$, where χ is an   llowing

way: obtain

results

Table A.1: Limits of $\chi\Phi^{-1}(\omega^*(\mu)) - (i_{SF} - \mu - d_t)$

	$\chi \lim_{\mu \to +\infty} \varphi/\sigma_{\xi,0} < 1$	$\chi \lim_{\mu \to +\infty} \varphi/\sigma_{\xi,0} > 1$
$\mu \to -\infty$	$-\infty$	$+\infty$
$\mu \to +\infty$	$+\infty$	$-\infty$

It follows from Table A.1 that:

$$\lim_{\mu \to -\infty} \Phi\left(\chi\Phi^{-1}(\omega^*(\mu)) - (i_{SF} - \mu - d_t) \right) = \begin{cases} 0, & \chi\lim_{\mu \to -\infty} \varphi/\sigma_{\xi,0} < 1 \\ 1, & \chi\lim_{\mu \to -\infty} \varphi/\sigma_{\xi,0} > 1 \end{cases} \quad (A.5)$$

$$\lim_{\mu \to +\infty} \Phi\left(\chi\Phi^{-1}(\omega^*(\mu)) - (i_{SF} - \mu - d_t) \right) = \begin{cases} 1, & \chi\lim_{\mu \to +\infty} \varphi/\sigma_{\xi,0} < 1 \\ 0, & \chi\lim_{\mu \to +\infty} \varphi/\sigma_{\xi,0} > 1 \end{cases} \quad (A.6)$$

In paragraphs 4 and 5 I find $\lim_{\mu \to +\infty} \varphi$.

1.   From (18)

$$\lim_{\mu \to +\infty} \varphi = \frac{\sum_{t=1}^{T} \lim_{\mu \to +\infty} \Phi\left(\frac{i_{SF}-\mu-d_t-\left(\prod_{s=1}^{t} \alpha_s\right)\sigma_{\xi,0}\Phi^{-1}(\omega)}{\sigma_{t|0}}\right)}{\sum_{t=1}^{T} \left(\prod_{s=1}^{t} \alpha_s\right) \lim_{\mu \to +\infty} \Phi\left(\frac{i_{SF}-\mu-d_t-\left(\prod_{s=1}^{t} \alpha_s\right)\sigma_{\xi,0}\Phi^{-1}(\omega)}{\sigma_{t|0}}\right)}$$
(A.7)

Regroup and apply (A.6). As μ goes to infinity, $\Phi\left(\frac{i_{SF}-\mu-d_t}{\sigma_{t|0}}\left(1-\varphi\prod_{s=1}^{t} \alpha_s\right)\right)$ approaches zero if $\varphi < 1/\prod_{s=1}^{t} \alpha_s$ and it approaches unity if $\varphi > 1/\prod_{s=1}^{t} \alpha_s$. As a result, (A.7) holds iff

$$\lim_{\mu \to +\infty} \varphi = 1/\alpha_1.$$
(A.8)

2.   The same reasoning as in paragraph 4 allows concluding that:

$$\lim_{\mu \to -\infty} \varphi = 1/\prod_{s=1}^{T} \alpha_s.$$
(A.9)

3.   Reshuffle (19) in the following way:

$$\frac{dP_t}{d\mu} = \frac{1}{\sqrt{\sigma_{\xi,t}^2 + \sigma_{\varepsilon,t}^2}}\phi\left(\Phi^{-1}(\omega^*)\right)\psi_3\left(\psi_1\frac{\psi_2}{\psi_3} - \frac{\varphi}{\sigma_{\xi,0}}\sqrt{\sigma_{\xi,t}^2 + \sigma_{\varepsilon,t}^2}\right),$$
(A.10)

where

$$\psi_1 = \frac{\phi(k_t)}{\phi(\Phi^{-1}(\omega^*))},$$
(A.11)

$$\psi_2 = \Phi\left(\frac{\Phi^{-1}(\omega^*) - \rho_t k_t}{1 - \rho_t^2}\right),$$
(A.12)

$$\psi_3 = \Phi\left(\frac{\rho_t\Phi^{-1}(\omega^*) - k_t}{1 - \rho_t^2}\right),$$
(A.13)

k_t is described by (14), ρ_t is described by (15).

The sign of $\frac{dP_t}{d\mu}$ is the same as the sign of $\psi_1\frac{\psi_2}{\psi_3} - \frac{\varphi}{\sigma_{\xi,0}}\sqrt{\sigma_{\xi,t}^2 + \sigma_{\varepsilon,t}^2}$. Further analysis concerns signs of $\psi_1\frac{\psi_2}{\psi_3} - \frac{\varphi}{\sigma_{\xi,0}}\sqrt{\sigma_{\xi,t}^2 + \sigma_{\varepsilon,t}^2}$ as $\mu \to \pm\infty$.

7.   Take log of (A.11): $\ln \psi_1 = \frac{1}{2}\left(\left(\Phi^{-1}(\omega^*)\right)^2 - k_t^2\right)$. To find limits of $\ln \psi_1$, I decompose it in a similar way to those used in paragraph 3 and apply (A.4):

$$\lim_{\mu \to \pm\infty} \ln \psi_1 = \frac{(i_{SF} - \mu - d_t)^2}{2(\sigma_{\xi,t}^2 + \sigma_{\varepsilon,t}^2)}\left((\sigma_{\xi,t}^2 + \sigma_{\varepsilon,t}^2)\left(\frac{\lim_{\mu \to +\infty} \varphi}{\sigma_{\xi,0}}\right)^2 - 1\right).$$
(A.14)

I consider cases $\mu \to -\infty$ and $\mu \to +\infty$ in paragraphs 8 and 9.

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8. I insert (A.9) and (15) into (A.14). It turns out that

$$(\sigma_{\xi,t}^2 + \sigma_{\varepsilon,t}^2)\left(\frac{\lim_{\mu \to +\infty} \varphi}{\sigma_{\xi,0}}\right)^2 = \left(\rho_t \prod_{s=t+1}^T \alpha_s\right)^{-2} > 1,$$

while $(i_{SF} - \mu - d_t)^2$ grows infinitely. Thus,

$$\lim_{\mu \to -\infty} \psi_1 = +\infty. \tag{A.15}$$

After inserting (14) and (15) into (A.12) and applying (A.5) and (A.9), obtain that $\lim_{\mu \to -\infty} \psi_2 = 1$ if $\rho_t^2 < 1$. This condition always holds. Taking into account that ψ_3 is positive and does not exceed 1, conclude that $\psi_1 \frac{\psi_2}{\psi_3} - \frac{\varphi}{\sigma_{\xi,0}}\sqrt{\sigma_{\xi,t}^2 + \sigma_{\varepsilon,t}^2} > 0$, and, hence, $\lim_{\mu \to -\infty} \frac{dP_t}{d\mu} > 0$.

9. It is convenient to introduce parameter $\gamma_t = \frac{\sqrt{\sigma_{\xi,t}^2 + \sigma_{\varepsilon,t}^2}}{\alpha_1 \sigma_{\xi,0}}$. Inserting (A.8) into (A.14) shows that $\lim_{\mu \to +\infty} \psi_1 = +\infty$ if $\gamma_t > 1$. Applying (A.6) to (A.12) demonstrates that $\lim_{\mu \to +\infty} \psi_2 = 0$ if $\gamma_t > \prod_{s=1}^t \alpha_s$. Notice that $\gamma_1 = 1/\rho_1 > 1$ and $\gamma_t > 1/\rho_t > 1, t > 1$. Thus, $\gamma_t > 1$. Finally, applying (A.6) to (A.13) shows that $\lim_{\mu \to +\infty} \psi_3 = 1$ for any $t > 1$.

10. Consider the case $t > 1$. Apply L'Hôpital rule to resolve indeterminacy:

$$\lim_{\mu \to +\infty} \psi_1 \psi_2 =$$

$$\frac{\frac{1}{\sqrt{2\pi}} \lim_{\mu \to +\infty} \frac{d}{d\mu}\left(\frac{\Phi^{-1}(\omega^*) - \rho_t k_t}{1 - \rho_t^2}\right)}{\frac{1}{2} \lim_{\mu \to +\infty} \frac{d}{d\mu}(k_t^2 - \Phi^{-1}(\omega^*)^2)} \lim_{\mu \to +\infty} e^{-\frac{1}{2}\left((k_t^2 - \Phi^{-1}(\omega^*)^2 + \left(\frac{\Phi^{-1}(\omega^*) - \rho_t k_t}{1 - \rho_t^2}\right)\right)}$$

It follows directly from calculations in paragraph 9 that

$$\frac{\frac{1}{\sqrt{2\pi}} \lim_{\mu \to +\infty} \frac{d}{d\mu}\left(\frac{\Phi^{-1}(\omega^*) - \rho_t k_t}{1 - \rho_t^2}\right)}{\frac{1}{2} \lim_{\mu \to +\infty} \frac{d}{d\mu}(k_t^2 - \Phi^{-1}(\omega^*)^2)} = 0$$

To find limit of the last factor, I take log and factorise in the same way as in paragraph 7. Applying (A.8) and (A.4) yields

$$\lim_{\mu \to +\infty} -\frac{1}{2}\left((k_t^2 - \Phi^{-1}(\omega^*)^2) + \left(\frac{\Phi^{-1}(\omega^*) - \rho_t k_t}{1 - \rho_t^2}\right)\right) =$$
$$= -\frac{1}{2}\left((1 - \gamma_t^2)(1 - \rho_t^2) + (\gamma_t - \rho_t)^2\right) \lim_{\mu \to +\infty} \frac{(i_{SF} - \mu - d_t)^2}{(1 - \rho_t^2)^2(\sigma_{\xi,t}^2 + \sigma_{\varepsilon,t}^2)} \tag{A.16}$$

Completing the square shows that

$$(1 - \gamma_t^2)(1 - \rho_t^2) + (\gamma_t - \rho_t)^2 = \rho_t^2(2 - \rho_t^2)\left(\gamma_t - \frac{1}{\rho_t(2 - \rho_t^2)}\right)^2 + \frac{(1 - \rho_t)^3}{2 - \rho_t^2} > 0$$ and, thus, (A.16) goes to $-\infty$. Hence, $\lim_{\mu \to +\infty} \psi_1 \psi_2 = 0$. This leads to negative $\lim_{\mu \to +\infty} \psi_1 \frac{\psi_2}{\psi_3} - \frac{\varphi}{\sigma_{\xi,0}}\sqrt{\sigma_{\xi,t}^2 + \sigma_{\varepsilon,t}^2}$. Consequently, $\lim_{\mu \to -\infty} \frac{dP_t}{d\mu} < 0$. ∎

References

Berentsen A. and Monnet, C. Monetary policy in a channel system. Journal of Monetary Economics, 2008, vol. 55, no 6, pp.1067-1080.

Bindseil U. and Jablecki J. The Optimal Width of the Central Bank Standing Facilities Corridor and Banks Day-to-Day Liquidity Management. ECB Working paper # 1350, 2011.

Bindseil U. and Wurtz F. Open market operations – their role and specification today. In Open Market Operations and Financial Markets / ed. D.G. Mayes and J. Toporowsky, Routledge, 2007, pp. 54-79.

Catal̃ao-Lopes M. Fixed-and variable-rate tenders in the management of liquidity by the Eurosystem: Implications of the recent credit crisis. International Journal of Central Banking, 2010, vol.6, no 2, 199-230.

Central Bank of the Russian Federation. On the system of Bank of Russia monetary policy instruments, 13 September 2013. http://cbr.ru/eng/ press/PR/?file=130913_135042eng_3.htm.

Federico G. and Rahman D. Bidding in an electricity pay-as-bid auction. Journal of Regulatory Economics, 2003, vol. 24, no 2, pp. 175-211.

Ferguson C.E. and Saving, T.R. Long-run scale adjustments of a perfectly competitive firm and industry. American Economic Review, 1969, vol. 59, no 5, pp. 774-783.

Hauck A. and Neyer U. A model of the Eurosystem's operational framework and the euro overnight interbank market. European Journal of Political Economy, 2014, vol. 34, S65–S82.

Hellwig M. Liquidity provision, banking, and the allocation of interest rate risk. European Economic Review, 1994, vol. 38, no 7, pp. 1363-1389.

Kahn G.A. Monetary Policy under a Corridor Operating Framework. Economic Review. Federal Reserve Bank of Kansas, 2010, No 4, pp. 5-33.

Neyer U. The design of the Eurosystem's Monetary Policy Instruments. Physica-Verlag, 2007.

Perez Quiros G. and Rodriguez Mendizabal, H. Asymmetric Standing Facilities: An Unexploited Monetary Policy Tool. IMF Economic Review, 2012, vol. 50, no 1, pp. 43-74.

Pestova A. Monetary policy regimes in Russia: Guidelines for further quantitative studies, Voprosy Economiki, 2017, Issue 4, pp. 38-60 (In Russian).

Part 2. Selected papers

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IAKOV KUGA — NATIONAL RESEARCH UNIVERSITY HIGHER SCHOOL OF ECONOMICS

Todaro M.P. A theoretical note on labour as an 'inferior' factor in less developed economies. The Journal of Development Studies, 1969, vol.5, No 4, pp. 252-261.

Whitesell W. Interest rate corridors and reserves. Journal of Monetary Economics, 2006, vol. 53, pp. 1177-1195.

CONCEPTUAL FRAMEWORK OF AGENT-BASED MODEL OF RELATIONAL CONFLICTS IN RUSSIAN RETAIL

YULIA A. MOROZOVA , SCHOOL OF LOGISTICS — *NATIONAL RESEARCH UNIVERSITY HIGHER SCHOOL OF ECONOMICS MOSCOW, RUSSIA*

Abstract

Collaboration and trust relationships are important success factors in supply chain management. However, in practice relationships between counterparties in supply chain face conflicts preventing from building ideal supply chain collaboration. This paper proposes a conceptual framework of agent-based model that helps to understand how individual behavior of counterparties in conflict situations and collaboration strategy effect on supply chain efficiency in dynamics. The research is based on Russian retail case study, describing a grocery sector where key market stakeholders are retailers and suppliers (manufacturers). The important feature of Russian grocery sector is a dominating power of retailers over suppliers. Author investigates the main drivers of conflicts in retailer-supplier's relationships and offers a specification of agent-based model.

Keywords: supply chain management, agent-based modeling, collaboration, trust, conflicts, relationship dynamics, Russian retail.

Introduction

Multiple-store companies demonstrated accelerating growth in Russia and increased their influence on the market over last 20 years. This made relationships between suppliers and retailers more complicated. Multiple-store companies showed aggressive supplier policy aiming to secure their gross margin and to establish control over supplier's behavior. They imposed new contract requirements including low price guarantee, fees for entering to the store, penalties for breaking delivery schedules, mistakes in documentation, and distortion of transportation and storage standards, compensation for retailer services. Suppliers in turn aim to maximize their presence on store shelves and to oust competitors. These conditions do not help to establish durable relationships based on collaboration and trust. Moreover, relational conflicts occur. The main reasons of such conflicts are infringements of supply conditions from supplier and payment delays from retailer.

The purpose of this research is to understand mechanisms of collaboration relationships development in supply chains considering trust factor and occurring conflicts. To achieve this goal, we propose a specification of agent-based model of supply chain.

Literature review

The number of researches on supply chain modeling have been growing over last 20 years [6]. Depending on modeled process different approaches are used: agent-based modeling, discrete-event simulation and system dynamics. Behdani [3] evaluated paradigms for modeling supply chains as complex socio-technical systems. At micro-level author

highlighted such systemic properties of supply chains as numerousness and heterogeneity, local interactions, nestedness, adaptiveness. At macro-level supply chains have such properties as emergence, self-organization, co-evolution, path dependency. Author concluded that agent-based modeling covered these properties most of all.

Angerhofer and Angelides [1] offered a system dynamic model of the collaborative supply chains, highlighting constituents such as stakeholders, a system of inter-linkages (topology), inter-relationships (levels of collaboration), processes, supporting technology and business strategy. Authors showed that collaboration causes additional costs: the higher is level of collaboration the longer time it takes positive effect to appear. Authors also considered dependency of supply chain efficiency from level of alignment which shows how close business-strategy of individual stakeholder is to the business-strategy of the whole collaborative supply chain.

Langroodi and Amiri [8] used system dynamics approach for designing a five-level multi-product supply chain consisting of retailer, final product distributor, manufacturer, material distributor, and supplier in four different regions. Authors investigate supplier-buyer relationships in each level of supply chain depending on the operational costs and in conditions of non-stationary demand.

Crowe et al [4] studied dynamic behavior of three echelon food retail supply chain using balanced score card (BSC) and system dynamic model. It is vitally important for FMCG supply chain to be sustainable and reliable, therefore special attention was paid to disruptions of supplies. Authors used BSC for detection and comparison of performance feedback loops. BSC included 4 groups of indicators, finance, customer, internal business, growth & learning.

Arvitrida, Robinson and Tako [2] studied competition and collaboration in supply chains using agentbased modeling. The model describes two-stage supply chain that consists of suppliers, manufacturers and customers, each of which is an agent and has its behavior. The model has input factors such as collaboration strategy including duration of collaboration between supplier and manufacturer and manufacturers' number of sourcing and competition behavior. The outputs of the model are supply chain revenue and supply chain service level.

Ponte et al [11] used an agent-based model of the four-echelon supply chain to prove that decisionmaking process requires evolving "from a reductionist approach (where the overall strategy is the sum of individual strategies) to a holistic approach (where global optimization is sought through collaboration)". Additionally, authors used the theory of constraints to define an appropriate framework and the Drum– Buffer–Rope method to integrate supply chain processes and synchronize decisions.

Long [9] confirmed that inter-organizational collaborative simulation covering the knowledge of agent, flow and process was required to represent the supply chain network operation. For this purpose author proposed a multi-methodological collaborative

simulation framework, in which a multi-agent system was adopted to represent the inter-organizational structure of a supply chain network; the three flows of material, information and time were enabled to represent the operational mechanisms; and the processes were used to represent the micro behaviors of agents.

Some researches [5], [10], [14], [15] considered a social factor, trust and its role in development of relations of counterparties in supply chain. Kim [7] proposed an agent-based model describing the agents' behavioral decision-makings and, through the simulation studies, examined the intermediate self-organizing processes and the resulting macro-level system behaviors. The simulations results showed that agents' decision-making behavior based on the trust relationship can contribute to the reduction in the variability of inventory levels.

Literature review showed that problem of supply chain collaboration was widely researched. However, supply chain collaboration relationships in Russian retail are not studied enough. This study aims to fill the gap by proposing an agent-based model that will help to answer following questions considering Russian retail:

•   How do collaboration relationships between retailer and supplier develop considering retailer contract requirements and occurring conflicts?
•   How do retailer contract requirements and occurring conflicts influence on supply chain efficiency?

Model description

The proposed model describes dynamics of supplier-retailer relationships in a grocery sector of Russian retail. A grocery sector was chosen because it is one of the largest retail sectors in Russia, attracting the most attention from analysts and policy makers at present. A grocery sector is understood as a buyer-driven commodity chain in which retailers are power-advantaged, that can be explained by dominated number of suppliers in comparison to number of chain stores. The model simulates behavior of the main actors in supply chain in a grocery sector: supplier (manufacturer), retailer and customer. Actors make strategic choices that effect on market relationships.

Each actor is described in the model by corresponding agent class. The supply chain distributes single product that is being produced by different manufacturers and may have different price and quality.

Agent Customer

Input parameters: purchase intensity, price and quality preferences, demand.

Key output indicators: customer's satisfaction, loyalty to each retailer.

Methods: selecting the retailer, selecting the product, purchasing the product.

Customer defines a demand and chooses a retailer to satisfy it. Customer's choice is based on previous experience of interaction with each retailer that formed his loyalty and individual price and quality preferences. If demand is not satisfied, then customer's satisfaction and loyalty towards particular retailer decreases.

Agent Retailer

Input parameters: collaboration strategy (desirable contract duration, desirable number of suppliers, willingness to share information), contact requirements (maximum price, payment delay, payment for access to the chain stores, payment for an increase of sales, penalty for infringements of supply conditions), inventory management policy (order interval, minimum order, safety stock, desirable service level), logistic capacity.

Key output indicators: stocks, stocks in transit, stock turnover, average service level, costs, revenue, profit, trust level for each contractor, market share, duration of collaboration, number of conflicts.

Methods: goods selling, sales planning, supplier selecting, purchases planning, orders allocation, receiving the shipments, paying for shipments, returning unsold goods to supplier.

Retailer receives a demand from customers and tries to satisfy it if possible. Customers do not have priority and are serviced in a queue order until stocks run out.

Service level of retailer i at time t is calculated by formula:

$$Retailer\ Service\ Level_{i,t} = Satisfied\ demand_{i,t} / Demand_{i,t} \tag{1}$$

Retailer searches for a supplier and settles a few contracts according to the parameter "desirable number of suppliers" for a period equal to the "desirable contract duration". Retailer selects suppliers according to the following algorithm:

- Sort suppliers by trust level and product price.
- Select top n suppliers, where n = desirable number of suppliers.
- Send an offer with contract requirements to suppliers.
- If offers accepted, then create contracts with suppliers, including parameters: begin date, end date, frequency, minimum order size, maximum order size, payment term, discount, access payment, payment for an increase of sales, infringement penalty. If offer is not accepted, then select another supplier.
- Repeat from the beginning after end date.

The size of the company is an indicator of its bargaining power. Large retailers impose rules of exchange at the market and small retailers quickly learn them and apply to their suppliers. According to the research [13], retailers do not select small suppliers based on financial capacities, as they are often unable to pay slotting allowances or provide

significant marketing budgets. However, small suppliers can enter the supply chain if they demonstrate an ability to meet retailer's requirements.

Retailer plans sales according to demand forecast based on previous product sales. Parameter "willingness to share information" represents desire and readiness of retailer for joint planning.

Retailer's order allocation is based on trust and utility heuristics. Trust level is based on previous experience on interaction with counterparty. Research [13] showed that the most probable reason of conflict emergence from retailer's point of view is contract infringement.

Following indicators are calculated for each contract of retailer: service level, order lead time, number of contract infringements. Let p and q be the adaptation parameters which have a value in (0,1). Then, in a pair of a retailer i and a supplier j, the retailer i 's trust in the supplier j at time t is modeled as follows:

$$Trust_{ij,t} = Trust_{ij,t-1} + p*(Service\ Level_{ji,t} - Service\ Level_{ji,t-1}) + q*(Order\ lead\ time_{ji,t} - Order\ lead\ time_{ji,t-1}) \tag{2}$$

Orders from purchaser i to seller j are sent according to the following allocation rule, where k is number of purchaser's contracts:

Each order

$$Order_{ij,t} = Total\_Order_{i,t} * [\ Trust_{ij,tm} / \sum_k Trust_{ik,t}\ ] \tag{3}$$

is modeled as an agent having parameters: ordered quantity, delivery date. The order lifecycle from creation to fulfilment is modeled and statistics on dynamics and distribution of order lead time is available in simulation results.

Agent Supplier

Key indicators: raw material stocks, raw material stocks in transit, product stocks, product stock turnover, service level, order lead time, costs, revenue, profit, trust level for each contractor.

Methods: receive order, send shipments, select contractor, plan purchases, allocate orders, receive shipment, plan production, produce.

Supplier (manufacturer) receives orders from retailers and sends shipments if possible. It is supposed in the model that suppliers have inexhaustible source of raw material stocks and it takes time to replenish their stocks from this source. Price of finished goods is linearly proportional to the efficiency level of the suppliers.

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For each supplier's contract order size growth is calculated. From a supplier's point of view, if the latest order received meets or exceeds the previous shipment, the supplier's trust in the retailer increases, and if not, its trust in the retailer decreases. Then, in a pair of a supplier i and a retailer j, the supplier i 's trust in the retailer j at time t is modeled as

$$Trust_{ij,t} = Trust_{ij, t-1} + p * Order\ size\ growth_{ji,t} \qquad (4)$$

follows:

Shipments from supplier i to retailer j will be sent according to the following allocation rule, where k is number of supplier's contracts:

$$Shipment_{ij,t} = Total\_Shipment_{i,t} * [\ Trust_{ij,t} / \sum_k Trust_{ik,t}] \qquad (5)$$

From a supplier's point of view main causes of relational conflicts are retailer's bonus requirements and payment delays. Number of emerging conflicts is calculated in the model for each retailer.

Conclusion

The proposed conceptual model is going to be implemented in simulation system Anylogic that combines agent-based, system dynamics and discrete-event approaches. Implemented agent-based simulation model will allow performing scenario analysis to study dynamics of relationships depending on company's strategy. The key experimental factor is the collaboration strategy, involving the duration of collaboration between counterparties, number of sourcing for each retailer, contract requirements, and willingness to share information, that represents desire and readiness for joint planning. Future research will give the answer how these factors influence on supply chain efficiency.

References

[1] B.J. Angerhofer, M.C. Angelides, "A Model and a Performance Measurement System for Collaborative Supply Chains". Decision Support Systems 42, 2006, pp. 283–301.

[2] N.I. Arvitrida, S. Robinson and A.A. Tako, "How do competition and collaboration affect supply chain performance? An agent based modeling approach". In Proceedings of the 2015 Winter Simulation Conference, 2015, pp. 218-229.

[3] B. Behdani, "Evaluation of Paradigms for Modeling Supply Chains as Complex Socio-Technical Systems". In Proceedings of the 2012 Winter Simulation Conference, 2012, pp. 3794–3808.

[4] J. Crowe, M. Mesabbah, and A. Arisha, "Understanding the Dynamic Behaviour of Three Echelon Retail Supply Chain Disruptions". In Proceedings of the 2015 Winter Simulation Conference, 2015, pp. 1948-1959.

[5] R. Dwyer, P. Schurr, and S. Oh, "Developing buyer-seller relationships". Journal of Marketing, 51, April 1987, pp. 11-27.

[6] W. Kersten, M.A. Saeed, "A SCOR Based Analysis of Simulation in Supply Chain Management". Proceedings 28th European Conference on Modeling and Simulation. Brescia, Italy, May 27th - 30th, 2014.

[7] W.-S. Kim, "Effects of a Trust Mechanism on Complex Adaptive Supply Networks: An Agent-Based Social Simulation Study". Journal of Artificial Societies and Social Simulation 12(3)4, 2009.

[8] R.R.P. Langroodi, M. Amiri, "A System Dynamics Modeling Approach for a Multi-Level, MultiProduct, Multi-Region Supply Chain under Demand Uncertainty". Expert Systems With Applications 51, 2016, pp. 231–244.

[9] Q. Long, "A Multi-Methodological Collaborative Simulation for Inter-Organizational Supply Chain Networks". Knowledge-Based Systems 96, 2016, pp. 84–95

[10] R.M. Morgan and S.D. Hunt, "The Commitment-Trust Theory of Relationship Marketing". Journal of Marketing, 58, July 1994, pp. 20-38.

[11] B. Ponte, J. Costas, J. Puche, D. de la Fuente, R. Pinoa, "Holism versus reductionism in supply chain management: An economic analysis". Decision Support Systems 86, 2016, pp. 83–94.

[12] V. Radaev, "Relational exchange in supply chains and its constitutive elements," Journal of Economic Sociology, 16 (1), 2015, pp. 81-99.

[13] V. Radaev, "Market power and relational conflicts in Russian retailing", Journal of Business & Industrial Marketing, Vol. 28 Issue, 2013, 3, pp.167-177.

[14] D. Tykhonov, C. Jonker, S. Meijer, and T. Verwaart, "Agent-Based Simulation of the Trust and Tracing Game for Supply Chains and Networks". Journal of Artificial Societies and Social Simulation 11(3), 2008.

[15] P.I. Vlachos and M. Bourlakis, "Supply chain collaboration between retailers and manufacturers: Do they trust each other?". Supply Chain Forum: An International Journal, 7(1), 2006, pp. 70-80.

COOPERATIVE GAMES FOR JOINT WORKING CAPITAL MANAGEMENT IN DISTRIBUTIVE SUPPLY NETWORKS?

ANASTASIIA IVAKINA, EGOR LAPIN AND NIKOLAY ZENKEVICH — *ST.PETERSBUR STATE UNIVERSITY*

Abstract

Working capital management (WCM) is increasingly recognized as important means of liquidity and profitability improvement [Talonpoika et al., 2016], specifically in terms of globalization and growing competition between supply chains. At the same time, rising financial risk in supply chains (SCs) stimulated management to recognize that the financial side of supply chain management (SCM) is a promising area for improvements. Nevertheless, companies still focus on their individual SC issues and take their own interests into account rather than understanding the whole SC and cooperating with their partners (Wuttke et al., 2016). We address this gap by developing cooperative game of working capital management aimed at minimizing total financial costs associated with each SC stage. The model is verified on the grounds of the combination of game-theoretical modeling and case study of Russian collaborative SC. The suggested model analyses working capital management process for 3-stage supply network. The focal network is a distributive supply network consisting of N suppliers, one distributor and M retailers connected through material, information and financial flows. The members of the network can form coalitions with the distributor. Each member's working capital position is constrained by liquidity and profitability requirements. As such, they face the need to control and manage financial costs associated with each stage. We construct cooperative working capital cost game. For this cooperative game we investigate Shapley value as an optimal imputation. Theoretical results are illustrated with the numeric example of a real-life supply network from ICT industry. The investigated model provides financial illustration for the motivation of SC partners to cooperate in order to simultaneously achieve target levels of working capital investments and improve individual financial performance through collaborative actions.

Keywords: Working Capital Management, Supply Chain Finance, Cooperative Game, Cost Imputation, Nondominant Cost Imputation.

Introduction

Supply chains comprise a wide range of activities among various organizations, what induce challenges for effective collaboration among the participants. From scientific perspective, collaboration is a meta-concept, which might be interpreted differently. Overall all approaches to supply chain collaboration might be divided into two main groups: one focuses on process and another focuses on relationships. The former is based on efforts to coordinate supply chain activities in order to achieve required goals, while the latter implies to coordinate intangibles such as trust, responsibility and cooperation. For the purposes of our study we exploit the first approach.

If customers and suppliers, being significant cooperation agents, aim to achieve high levels of performance, they have to comprehend ways of co-creating value and sharing benefits among partners. It means they have to find satisfactory levels of effectiveness and efficiency of the relationships with their partners [Selnes and Sallis, 2003]. Effectiveness

implies development of new products and enhancing quality of the existing ones thereby intensifying competitiveness. Efficiency concerns optimization of costs, in-time deliveries and shortening lead times. However, these criteria are achievable only on the grounds of consistent improvement of relationships with each partner, or, simply put, collaborating parties are striving to provide more valuable product than it is possible individually.

Besides, "for an effective supply chain system, the management of upstream flow of money is as important as the management of downstream flow of goods" [Gupta, Dutta, 2011]. From this perspective, working capital management (WCM) as an essential element of financial supply chain management (FSCM) has gained a lot of attention [Deloof, 2003; García-Teruel, Martínez-Solano, 2007; Johnson, Templar, 2011; Viskari et al., 2011; Viskari, Karri, 2012a; Matyac, 2015] due to the fact that it is a way to accelerate the cycle time of working capital (WC) and increase the profitability of the company in response to financial volatility in the business environment, e.g. the enacted Basel II, restraining external financing from banks.

Consequently, the demand for capital from within the SC, e.g. from companies directly involved in supply chain finance (SCF) schemes or acting as financial service providers (FSPs) has increased [Gelsomino et al., 2016; Hofmann, Kotzab, 2010; Kouvelis, Zhao, 2017; Song, Yu and Lu, 2018; Protopappa-Sieke and Seifert, 2017; Talonpoika et al., 2016; Xu et al., 2018]. For this reason, the importance of effective WCM has raised dramatically, especially for SCs from emerging markets, which faced difficulties with access to capital, limited financial infrastructure and legal, regulatory and accounting uncertainties in the first place.

The coordinating mechanisms of WCM and SCF in SCs have received little attention because the role of financial coordinators (FSPs, banks, FinTech companies and other financial intermediaries) as core participants in facilitating and enabling SCF has only recently been identified in academic literature [Silvestro, Lustrato, 2014; Song, Yu, Lu, 2018; Martin, Hofmann, 2017; Protopappa-Sieke, Seifert, 2017].

We address these gaps and aim to develop a methodology for SC participants to cooperate with each other and unite into coalitions, what would lead to cost optimization of joint working capital and fair redistribution of optimized costs among the participants. As a result, we construct a cooperative game model providing optimal levels of cash conversion cycle to every business partner. This is only achieved by means of collaborative actions of capital reallocation along the SC under constraints of profitability-liquidity tradeoff. The model is verified on Russian collaborative SC data. The paper begins with a review of SC collaboration, WCM and SCF literature leading to the research question:

RQ: What are the cooperative solutions to the working capital cost game?

The selected methodology aiming at responding to the research question represents the upgrading of the approach proposed by [Hofmann, Kotzab, 2010]. In response to the RQ,

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a model is developed; this is followed by numerical analysis and discussion of the findings. The paper closes with a conclusion, identifying further research directions.

Financial cooperation in supply chains

From the strategic management point of view, one of the most challenging collaboration perspectives is to extend the concept from collaboration within an organization to the level between organizations, since they do not exist in isolation [Gadde, Snehota, 2000; H˚akansson, Snehota, 2006; Simatupang, Sridharan, 2002]. Any organization, whether a large corporation, public body, or a small business, aims to meet the needs of its various customers and stakeholders, will need resources to do this, and will acquire many of its materials, equipment, facilities and supplies from other organizations. The performance of an organization is thus influenced by the actions of the organizations that make up the supply chain [Frohlich, Westbrook, 2001; Barratt, 2004; Kim, 2009, Kirca et al., 2005]. Therefore, focus has moved from competition between firms at the same level in the production process to competition between supply chains, from raw materials to end customers [Beamon, 1998; H˚akansson, Ford, 2002]. A company's ability to create trust-based and longterm business relationships with customers, suppliers, and other strategic partners becomes a crucial competitive parameter. Though it is accepted that external relationships in SCM are strategically important, still many questions concerning operations integration with suppliers and customers in SC remain unanswered [Blome et al., 2014; Chen, Paulraj, 2004; Fairchild, 2005; Frochlich, Westbrook, 2001; Wuttke et al., 2013]. SC collaboration is especially important to manage external relationships with suppliers and customers [Fawcett, Magnan, 2002]. The empirical results indicate that SC collaboration considerably improves the collaborative advantage [Cao, Zhang, 2011], which in turn, has a significant positive effect on firms' financial performance (in particular, the mediator role of collaborative advantage is stronger for small firms than medium and large firms [Shi, Yu, 2013]. Furthermore, a lack of collaboration may result in poor performance of the whole SC [Gunasekaran et al., 2004], such as: inaccurate forecasts, low capacity utilization, excessive inventory, inadequate customer service, inventory turns, inventory costs, time to market, order fulfillment response, quality, customer focus and customer satisfaction [Hendricks, Singhal, 2003; Ramdas, Spekman, 2000; Coyle et al., 2013], not to mention the perspective representing the "dark side" of inter-firm collaboration, which characterizes many buyer-supplier relationships [Rokkan, Heide, Wathne, 2003; Noordhoff et al., 2011; Seggie, Griffith, Jap, 2013].

It has been well documented by operations management scholars and practitioners, that communication between business partners is the essence of organizational life [Rokkan, Heide and Wathne, 2003; Galaskiewicz, 2011]. However, in empirical studies, researchers have typically considered inter-organizational communication as a part of a broader construct or have examined the extent to which the use of selected communication strategies by buyer firms enhances supplier firm operational performance. Furthermore, the majority of research focuses on the economic value for buyers or for suppliers; few studies investigate how strategic orientations of buyers and suppliers affect the relative relationship performance for the individual dyad members [Flynn, Huo, Zhao, 2010;

Paulraj et al., 2008]. This being said, traditional perspectives that suppliers and buyers act as independent economic agents are being replaced with the understanding that these exchange partners are co-producers of value, and thus their performances are interlinked [Blackman, Holland, Westcott, 2013; Flynn, Koufteros, Lu, 2016; Malshe, Agarwal, 2015; Silvestro, Lustrato, 2014; Stevens, Johnson, 2016; Yousefi, Pishvaee, 2018]. Cachon and Lariviere (2005) published a paper analyzing the role of revenue sharing contracts in coordinating a supply chain. The idea is straightforward: organizations are self-serving entities maximizing individual profits, but sometimes this might result in a sub-optimal overall performance. However, a focal company can contractually coordinate the actions of other players in the supply chain in order to achieve optimal profit. With this in mind, in the next paragraph we will mainly leave out of consideration a large body of working capital and cash management literature providing, solutions aimed at improving working capital position for a single company and thus neglecting the inter-organizational perspective of the issue [e.g. Deloof et al., 2003, Fedorova, Timofeev, 2015; Garc´ıa-Teruel, Mart´ınez-Solano, 2007; Enqvist et al., 2014; Va´zquez et al., 2016; Chauhan and Banerjee, 2017]. Instead, we will focus on the recent papers outlining approaches to working capital management in the context of collaboration of business partners in a supply chain.

Working capital management in supply chains

Finance literature captures financial flow management as working capital management aimed to figure out a sufficient level of working capital, which will permit the company to achieve its strategic and financial goals. From this point of view, efficient business management comprises ability to leverage the working capital position in a way of maintaining sustainable balance between growth, profitability and liquidity.

Adequate working capital management is a paramount necessity for each company as inconsistent processes and operations within the supply chain, excessive inventories, inadequate terms of loans and credits lead to higher levels of working capital and lower levels of liquidity. If the first two factors are directly concerned with operational management of the supply chain, the last two are related to financial management. Therefore, the goals of a working capital management are (1) to evaluate the required level of inventory and receivables for the stable operation of the company; (2) to unlock additional liquidity; (3) to minimize capital blocked in current assets.

There are two main perspectives of working capital. The first one defines it as the ability of the company to cover its short-term debt with current assets. Jones (2006) defines the concept of this working capital perspective and describes it with the equation:

$$Working\ capital = Current\ assets-Current\ liabilities. \qquad (1)$$

According to Jones (2006), current assets consist of cash, total inventory, accounts receivable, securities and cash equivalents. On the other side, current liabilities refer to accounts payable, accruals, notes payable and short-term debt. A positive result of working capital means that the amount of cash the company will receive in the next 12 months is bigger than what company needs to cover its liabilities. A negative result of

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working capital means that the company will not be able to cover its short-term debt (1). Another perspective of working capital is widely used in most of the studies dedicated to operating working capital and consists of the total level of inventory, accounts receivable (A/R) and accounts payable (A/P). According to Pirttila¨(2014) the equation is following:

Working capital = Inventories + Accounts receivable–Accounts payable. (2)

The study by Talonpoika et al. (2014) included accrued expenses (A/E) in (2) as a separate component into the working capital cycle (usually is a part of A/P). Pirttila¨ (2014) states that the working capital cycle describes the main parts of the company's performance associated with financial flows. The operational approach to evaluate working capital is a time-based measure of cash conversion cycle (CCC) introduced by [Richards, Laughlin, 1980] for measuring and controlling the effectiveness of working capital management on the basis of relative ratios (Figure 1). The CCC has gained a strong position as a proxy of operational working capital management in the academic literature [Shin, Soenen, 1998;Deloof,2003;Hutchison et al., 2007]. It ignores the financial components of net working capital, such as cash, marketable securities, and short-term loans, and concentrate of the operational components. The CCC (3) presents the length (in days) of time a firm has funds
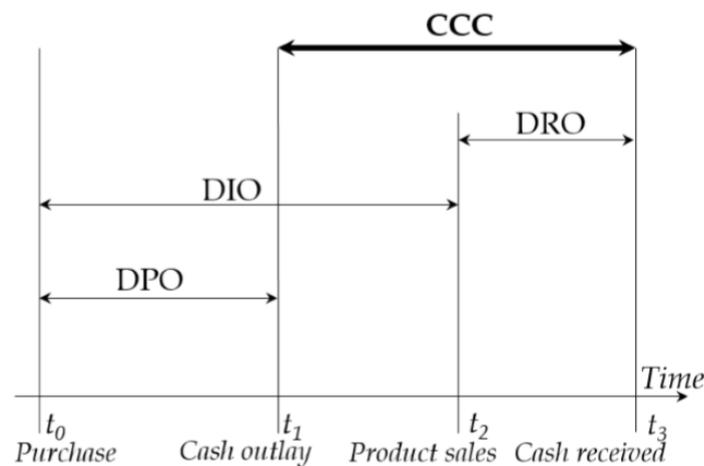
Figure1. Cash conversion cycle

tied up in working capital, starting from the payment of purchases to the supplier and ending when remittance of sales is received from the customers. In other words, the CCC is a merge of three sub-cycles: the cycle times of inventories (DIO) as well as financial flows of accounts receivable (DRO) and accounts payable (DPO).

$$CCC = DIO + DRO - DPO. \qquad (3)$$

 CCC as working capital measure can be either negative or positive. Negative CCC means that the company has a low amount of inventory and the company receives money from its customers before it has to pay its A/R. In other words, in a negative CCC scenario, a company receives its A/R before it should pay A/P.

A large number of researchers believe that the lower CCC is the better a company can manage it cycles efficiently, although a too low CCC can cause problems with each component of the CCC [Cherkasova, Chadin, 2015; Garanina, Petrova, 2015; Volkov, Nikulin, 2012].

As such, DIO shows that the relationship between the level of inventory within a firm and the firm financial results is nor trivial. Inventory is a temporary physical asset, which a firm must possess to maintain its ongoing service of the customers. Therefore, managers have to leverage this metric not harming customer experience. Nonetheless, excessive levels of inventory keep the invested money tied up and might result in increased costs, for instance, warehousing or servicing the goods, but on the other hand appropriate reductions in inventory lead to loose cash and re-invest it in other aspects. Further, alteration of levels of inventory might have a bullwhip consequence effecting the upstream supply chain participants. leveraging inventory may either improve financial result or harass the overall performance of a company and a chain. Nonetheless there is considerable number of empirical test, which show that in general a shorter DIO correlates with a higher liquidity and superior financial results [Al-Shubiri and Aburumman, 2013]. Besides, there are empirical results presenting negative correlation of high levels of inventory with firm's operational and strategical output. Vendor Managed Inventory (VMI), replenishment systems, Lean/Just-In-Time management programs are examples of the methods, which allow to lower inventory levels avoiding the risk of out of stock situations. These techniques and frameworks via increasing productivity of information channels in the chain help to reduce excessive inventory [Chen and Paulraj, 2004].

DRO implies that cash received from the customers in a known period might enhance liquidity. This cash inflow might be re-invested in activities, which in their term might increase the sales volume. Thereafter, the less DRO, the higher chances that firm will re-invest the money. Moreover, there are considerable empirical evidences, which show the situation when a certain company spreads DRO via crediting sales, leads to a higher risk of not collecting the payments. According to these studies, it is supposed that a lower DRO positively correlates with a better financial results for a firm [Randall and Farris, 2009]. Often decreased DRO is perceived as an unfavorable action for the customer, however,

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companies can smooth it via, for instance, discounts for paying in advance, thereby achieving lower DRO without straining the relationships with the customers.

DPO has as well contradictory relation with financial results. Delaying the payment to suppliers will obviously allow to keep the cash for longer period of time and thereby improve the liquidity. Nonetheless, when a company experiments with delaying the payments it might directly damage the relationships with its suppliers, moreover the whole supply chain in the long term might be damaged because suppliers lacking cash. Another negative collateral effect of such experiments are deteriorated level of service from suppliers due to the need of cash.

Considering the problem of identifying the CCC optimal value, there arises the issue of achieving target rates of return and, at the same time, maintaining the necessary level of liquidity [Garanina, Belova, 2015; Talonpoika et al., 2016; Yazdanfar, ¨Ohman,2014].In recent years the number of studies devoted to this issue has boomed, though the results are controversial and incomparable due to a number of reasons with research method selection among them (casestudies[Farris,Hutchison, 2002; Randall, Farris, 2009]; regression analysis of annual financial statements [Deloof, 2003; Garanina, Petrova, 2015; Garcia-Teruel, Martinez-Solano, 2007; Kroes, Manikas, 2014]; optimization modeling [Hofmann, Kotzab, 2010; Gelsomino et al., 2018; Margolis et al., 2018; Yan et al., 2018].

As far as it goes, there are mixed evidences on the inverse relation between CCC and its components and profitability [Deloof, 2003; Garcia-Teruel, Martinez-Solano, 2007; Lazaridis, Tryfonidis, 2006; Randall, Farris, 2009; Shin, Soenen, 1998] as well as direct relation between CCC and its components and liquidity [Filbeck, Krueger, 2005]. However, the conviction is the following: an increase of CCC will reduce risk and profitability on the one hand and will improve liquidity on the other.

Clearly, each company pursuing its target levels of liquidity and profitability implements a set of working capital policies [Kroes, Manikas, 2014] usually referred to as conservative, moderate or aggressive. The aggressive working capital policy implies estimation of current assets at the lowest possible level resulting in lower working capital requirements and higher risks. Conservative policy, on the contrary, is aimed at avoiding the maximum possible risks and guarantees smooth operations of the company, though the higher level of current assets leads to lower profitability. Moderate policy is assumed to be a trade-off between the aggressive and conservative policies providing reasonable accordance in profitability and liquidity.

In line with this classification, the contribution by [Talonpoika et al., 2016] suggests the theoretical typology of various financial working capital management strategies focusing on maximization or minimization of CCC components aiming to improve the financial working capital. Authors claim these strategies are to be pursued during the economic downturn, which make them possible to apply for companies from emerging markets, as they faced difficulties with access to capital, limited financial infrastructure and legal, regulatory and accounting uncertainties well before spreading volatility in the business

environment as well as the enacted Basel II restrained getting financing from banks and in turn increased demand for capital from within the SC [Hofmann, Kotzab, 2010; Song, Yu, Lu, 2018; Protopappa-Sieke, Seifert, 2017; Talonpoika et al., 2016; Volkov, Nikulin, 2012]. For this reasons, the practitioners' interest to effective WCM on inter-organizational level has increased dramatically, which resulted in a wave of publications [Marttonen, Monto, Ka¨rri, 2013; Protopappa-Sieke, Seifert, 2010; Protopappa-Sieke, Seifert, 2017; Pirttila¨ et al., 2014; Talonpoika at al., 2014; Talonpoika et al., 2016; Viskari et al., 2011; Viskari, Ka¨rri, 2012a; Viskari et al., 2012b; Viskari et al., 2012c; Yla¨-Kujala et al., 2016].

Motivation behind these research, besides the mentioned post-crisis challenges is the idea, that finance research on WCM has been focusing on company profitability instead of supply chain contribution, consequently, companies seek to optimize their individual performance; however, none of its elements can be truly managed by a company individually, but only in collaboration with business partners. It is important to note that individual financial performance optimization is to be considered in terms of a more holistic approach taking into account each participant's interests as well as the abilities to collaborate, or, in other words, supply chain orientation of a company. With this consideration in mind, an initial assumption for optimization is, following Cachon and Lariviere (2005), collaboration of supply chain partners already motivated to maximize total profit of the chain. Alternatively, this motivation can be reformulated in terms of total financial costs minimization, and specifically financial costs associated with WCM.

Collaborative working capital management in supply chains

For the purposes of our study we consider a collaborative distributive three-stage supply network comprising three sets - K1 suppliers, K2 distributor and K3 retailers at first, second and third stages respectively (see Figure 2). Initially collaborative
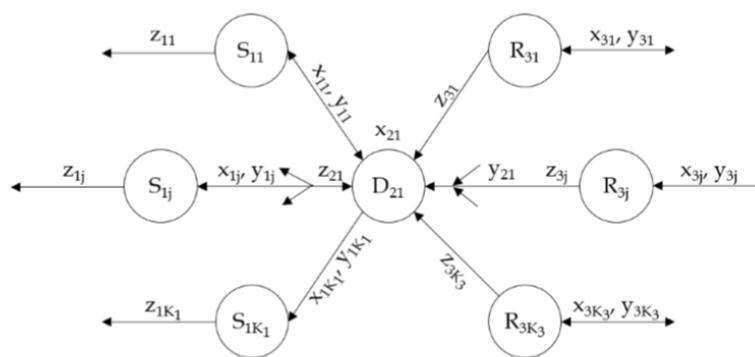
Figure2. Collaborative supply chain.

cash conversion cycle (CCCC) was considered as the concise consequence of an attempt to reduce CCC by solely one company (Figure 3), however leveraging CCC has an impact on all participants of the supply chain [Hofmann and Kotzab, 2010]. The research was conducted from the perspective that improving cash conversion cycle only within organization not considering other stakeholders might lead to the conflict of interests. In addition, the authors included in the research the aspects of joint risks and redistribution of costs along the chain among partners incurred by delay payments and excessive inventories.

Collaborative cash conversion cycle possesses the same benefits as CCC, however considers the whole supply chain thereby providing more precise estimation of working capital at part step of the chain. There are several limitations of the CCCC framework: operating with distinct suppliers and customers might cause internal competition and unwillingness to share information. In order to overcome this boundaries, it is advised to start the evaluation of CCCC from the pivotal firm and further extend it to the suppliers and customers.

There are two main purposes of CCCC: the first is to cut down overall costs of joint working capital and decrease collaborative cash conversion cycle. At the same time, the purpose is to minimize joint costs without violating constraints for each participant of the collaboration and global constraints for the whole chain. Further this paper considers costs minimization of a collaborative supply chain with the outlined on Figure 2 structure.

We denote $K_1 = \{(1,1), ..., (1,k_1)\}$, $K_2 = \{(2,1)\}$ and $K_3 = \{(3,1), ..., (3,k_3)\}$ as sets of suppliers, distributor and retailers in the chain respectively (Figure 2).
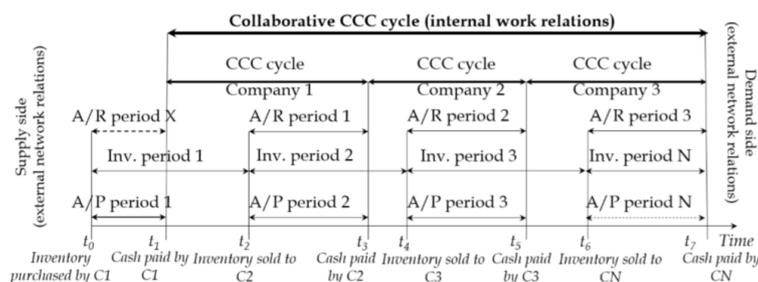
Figure3. Collaborative cash conversion cycle.

For simplicity we introduce pair *(i,j)* K, where *K = K1 K2 K3* as a set of players, the former index presents the stage of the chain a participant belongs to: the suppliers *(i = 1),* the distributor *(i = 2)* or the retailers *(i = 3).* The latter index specifies the exact player

belonging to the stage in question. As such, a pair *(i,j)* $\in$ *K* implies the participant *(i,j)* of the chain, for instance, the pair *(1,1)* implies the first supplier *(S11)*.

Further we denote $DIO_{ij} = x_{ij}, DRO_{ij} = y_{ij}$ and $DPO_{ij} = z_{ij}$ and consequently $INV_{ij} = a_{ij}x_{ij}, AR_{ij} = b_{ij}y_{ij}$ and $AP_{ij} = c_{ij}z_{ij}$. Therefore the estimation of working capital financial costs for *(i,j)* participant of the chain [Viskari and Ka̋rri, 2013] will take the following form:

$$FC_{ij}(x_{ij}, y_{ij}, z_{ij}) = a_{ij}x_{ij}\left[(1+r_{ij})^{\frac{x_{ij}}{365}} - 1\right] + b_{ij}y_{ij}\left[(1+r_{ij})^{\frac{y_{ij}}{365}} - 1\right] -$$
$$-c_{ij}z_{ij}\left[(1+r_{ij})^{\frac{z_{ij}}{365}} - 1\right]. \tag{4}$$

First of all, each participant has individual cash conversion cycle boundaries:

$$\underline{CCC}_{ij} \le x_{ij} + y_{ij} - z_{ij} \le \overline{CCC}_{ij}. \tag{5}$$

Moreover, several constrains arise from the outlined structure of the network (Figure 2) and the definition of collaborative conversion cycle. The suppliers are not able to leverage the days payable outstanding and the retailers are not able to leverage their days receivables outstanding:

$$z_{1i} = z_{1i}^0, i = 1,...k_1;$$
$$y_{3j} = y_{3j}^0, j = 1,...k_3. \tag{6}$$

The next constraint refer to days of accounts receivable of the distributor as the sum of days of accounts payable of the retailers:

$$y_{21} = \sum_{j=1}^{k_3} z_{3j}. \tag{7}$$

The same approach is applied to days of accounts payable of the distributor: we set it as the sum of days of accounts receivable of the suppliers:

$$z_{21} = \sum_{j=1}^{k_1} y_{1j}. \tag{8}$$

Further, there is an important recommendation on non-negativity and continuity of the CCCC elements [Figueira, Greco and Ehrgott, 2005]:

$$x_{ij} \ge 0, y_{ij} \ge 0, z_{ij} \ge 0, (i,j) \in K. \tag{9}$$

We define the joint financial costs of the supply chain as a sum of financial costs of all supply chain participants:

$$FC(..., x_{ij}, y_{ij}, z_{ij}, ...) =$$
$$= \sum_{i=1}^{k_1} FC_{1i}(x_{1i}, y_{1i}, z_{1i}) + FC_{21}(x_{21}, y_{21}, z_{21}) + \sum_{j=1}^{k_3} FC_{3j}(x_{3j}, y_{3j}, z_{3j}). \quad (10)$$

As the result we aim to solve a minimization problem with the objective function (10) and the set of the constrains (4)−(9). The outlined problem comprises the CCCC configuration for the case when players form a maximum coalition K. Previously it was inferred that the participants of the supply chain are motivated to cooperate with each other and collaborate in order to reduce the collaborative cash conversion cycle and the cost of the joint working capital of the whole supply chain. However, having achieved positive result of decreasing total financial costs and optimizing the length of CCCC, the participants of the coalition face the next issue. Since the solution of the cost minimization issue is a vector comprising of new individual CCC components $(..., x_{ij}^*, y_{ij}^* z_{ij}^*, ...)$ it is not fixed that the next condition is fulfilled:

$$FC(..., x_{ij}^*, y_{ij}^*, z_{ij}^*, ...) \leq FC(..., x_{ij}^0, y_{ij}^0, z_i^0, ...), (i,j) \in K \quad (11)$$

where $x_{ij}^0, y_{ij}^0, z_{ij}^0$ - parameters of the participant *(i,j)* before optimization, and $x_{ij}^*, y_{ij}^*, z_{ij}^*$ - parameters of the participant *(i,j)* after optimization.

In other words, there might be a situation, when working capital costs of a certain participant have increased after optimization. Therefore, it is not beneficial for him to participate in such a coalition. If there are no further actions in the coalition regarding this issue, this participant being individually rational will leave the coalition thereby affecting all the participants of the chain. This issue of cost distribution policy is still to be solved.

Cooperative working capital cost game

Characteristic cost function

In our study the characteristic function of a game with a multitude of players *N* is the real function defined on all possible coalitions *S   K*, and for any pair of non-overlapping coalitions *T, S (T   K, S   K)* the sub-additivity condition is satisfied [Kunter, 2012; Leng and Parlar, 2009]:

$$v(T) + v(S) \geq v(T \cup S), \ v(\emptyset) = 0. \quad (12)$$

The inequality (12) implies that the opportunities of the joint coalition are not worse compared to two non-overlapping coalitions acting independently of each other. Therefore, the participant of the game is motivated to unite into the maximum coalition *K*.

From the perspective of this paper and problem stated characteristic cost function *v(S), S* $\subseteq$ *K* has the next form:

$$v(S) = \min_{x_{ij}, y_{ij}, z_{ij},\, (i,j)\in S} \max_{x_{ij}, y_{ij}, z_{ij},\, (i,j)\notin S} FC_S(..., x_{ij}, y_{ij}, z_{ij}, ...), \qquad (13)$$

where *S* $\subseteq$ *K*, $FC_S(..., x_{ij}, y_{ij}, z_{ij}, ...) = \sum_{(i,j)\in S} FC_{ij}(x_{ij}, y_{ij}, z_{ij}).$

If we define υ(S) as in (13), the sub-addivity condition (12) is satisfied meaning thattheparticipantoftwodifferentandnotoverlappingcoalitionshasopportunities to reduce their costs further via uniting in a larger coalition.

The vector $\alpha = (..., \alpha_{ij}, ...)$ satisfying the following conditions [Petrosyan and Zenkevich, 2016]:

$$\alpha_{ij} \leq v(i,j), (i,j) \in K, \qquad (14)$$

$$\sum_{(i,j)\in K} \alpha_{ij} = v(K), \qquad (15)$$

where *υ(i,j)* – is the value of the characteristic function for one element coalition *S* = {(*i,j*)} and *αij* is an imputation. The multitude of all imputations in cooperative game *G* = ⟨*K, υ*⟩ is further marked as *I(G)*.

The condition (14) is individual rationality condition implying that each participant of the coalition obtains at least the same value playing individually and not joining the coalition and not having support from any other players. The condition (15) is collective rationality condition implying that there is no other imputation vector, according to which a player will obtain more value or the players are dividing not existing gain and such imputation is not feasible.

Further the imputation $\varphi[v] = (..., \varphi_{ij}[v], ...)$ is assigned as a cooperative solution of the cooperative game *G* = ⟨*K, v*⟩, the components of which will be interpreted as winnings received by players as a result of an agreement or decision of an arbiter.

Further in order to solve the issues of optimization and costs redistribution for the many-one-many supply chain structure it is necessary to list each possible coalition and build the characteristic function of each one. In the given structure (Figure 2) there are eight

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possible substructures of united participants: coalition of the distributor, coalition of a set of suppliers, coalition of a set of retailers, coalition of a set of suppliers and the distributor, coalition of a set of retailers and the distributor, coalition of a set of suppliers and a set of retailers, coalition of a set of suppliers, the distributor and a set of retailers, coalition of all participant in the chain. The next sections are dedicated to the process of constructing the characteristic function for each situation.

Value of characteristic function for the distributor coalition. Let us examine the coalition consisting only of the distributor, the rest of the players (the suppliers and the retailers) are playing against him trying to maximize the cost of the working capital of the distributor. Therefore the value $v(2,1)$ of the characteristic function will have the following form:

$$v(2,1) = \min_{x_{21}} \max_{y_{21}, z_{21}} FC_{21}(x_{21}, y_{21}, z_{21}). \qquad (16)$$

The financial cost function has the form:

$$FC_{21}(x_{21}, y_{21}, z_{21}) = a_{21}x_{21}\left[(1+r_{21})^{\frac{x_{21}}{365}} - 1\right] + b_{21}y_{21}\left[(1+r_{21})^{\frac{y_{21}}{365}} - 1\right] - $$
$$- c_{21}z_{21}\left[(1+r_{21})^{\frac{z_{21}}{365}} - 1\right]. \qquad (17)$$

The suppliers and retailers have an ability to influence both DRO_{21} and DPO_{21} of the distributor according to the equations (7) and (8). In order to maximize the characteristic function the counterparts have to minimize z_{21} and maximize y_{21}, moreover the distributor has the cash conversion cycle constraints:

$$z_{21} \to \min;$$

$$y_{21} \to \max;$$

$$\underline{CCC}_{21} \le x_{21} + y_{21} + z_{21} \le \overline{CCC}_{21}.$$

The minimum of z_{21} is 0 according to condition (9), while the maximizing value of y_{21} is:

$$y_{21} = \overline{CCC}_{21} - x_{21}. \qquad (18)$$

Therefore, in order to build the characteristic function the next step is to minimize the cost in the next form:

Value $\quad FC_{21}(x_{21}, y_{21}, z_{21}) = a_{21}x_{21}\left[(1+r_{21})^{\frac{x_{21}}{365}} - 1\right] + b_{21}(\overline{CCC}_{21} - x_2)\left[(1+r_2)^{\frac{\overline{CCC}_{21} - x_{21}}{365}} - 1\right] - \quad$ of

$$-c_{21}z_{21}\left[(1+r_{21})^{\frac{z_{21}}{365}} - 1\right] \to \min_{x_{21}}.$$

$$(19)$$

characteristic function for a set of suppliers coalition. As a further step we consider the suppliers coalition $S \subset K_1$ with the rest of the players acting against the the coalition trying to maximize the cost of the working capital of the coalition in question.

In this case $v(S)$ will have the following form:

$$v(S) = \min_{x_{1j}, y_{1j}} \max_{y_{1j}} \sum_{(1,j) \in S} FC_{1j}(x_{1j}, y_{1j}, z_{1j}). \qquad (20)$$

Where the financial cost function FCS has the form:

$$FC_S = \sum_{(1,j) \in S} FC_{1j}(x_{1j}, y_{1j}, z_{1j}) = \sum_{(1,j) \in S} a_{1j}x_{1j}\left[(1+r_{1j})^{\frac{x_{1j}}{365}} - 1\right] +$$

$$\sum_{(1,j) \in S} b_{1j}y_{1j}\left[(1+r_{1j})^{\frac{y_{1j}}{365}} - 1\right] - \sum_{(1,j) \in S} c_{1j}z_{1j}^0\left[(1+r_{1j})^{\frac{z_{1j}^0}{365}} - 1\right].$$

$$(21)$$

The players exterior to the coalition have an ability to influence days receivable outstanding $\left(\sum_{(1,j) \in S} y_{1j}\right)$ of the coalition group via delaying payments according to the equation (8). In order to maximize the characteristic function the counterparts have to maximize $\sum_{(1,j) \in S} y_{1j}$, moreover the coalition has the cash conversion cycle constraints and constraints for each participant.

$$\underline{CCC}_{1j} \leq x_{1j} + y_{1j} - z_{1j}^0 \leq \overline{CCC}_{1j}, (1,j) \in K_1$$

Therefore the maximum values the counterparts can achieve follow the next rule:

$$\sum_{(1,j) \in S} y_{1j} = \sum_{(1,j) \in S} \overline{CCC}_{1j} - \sum_{(1,j) \in S} x_{1j} + \sum_{(1,j) \in S} z_{1j}^0. \qquad (22)$$

Therefore the coalition can minimize its cost function (21) via leveraging its y1j along the constrain (22) and managing its set of x_{1j} as well.

Value of characteristic function for a set of retailers coalition. The further coalition represents a group of retailers $S \subset K_3$ with the rest of the players performing against it

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trying to maximize the cost of the working capital of the coalition. Therefore the characteristic function will have the following form:

$$v(S) = \min_{x_{3l},z_{3l}} \max_{z_{3l}} \sum_{(3,l)\in S} FC_{3l}(x_{3l}, y_{3l}, z_{3l}). \qquad (23)$$

Where the financial cost function has the form:

$$FC_S = \sum_{(3,l)\in S} FC_{3l}(x_{3l}, y_{3l}, z_{3l}) = \sum_{(3,l)\in S} a_{3l}x_{3l}\left[(1+r_{3l})^{\frac{x_{3l}}{365}} - 1\right] +$$
$$\sum_{(3,l)\in S} b_{3l}y_{3l}^0\left[(1+r_{3l})^{\frac{y_{3l}^0}{365}} - 1\right] - \sum_{(3,l)\in S} c_{3l}z_{3l}\left[(1+r_{3l})^{\frac{z_{3l}}{365}} - 1\right]. \qquad (24)$$

The counterparts of the coalition have an ability to influence days payable outstanding $\sum_{(3,l)\in S} z_{3l}$ of the coalition group via shortening payments period according to the equation(8).In order to maximize the characteristic function the counterparts have to minimize $\sum_{(3,l)\in S} z_{3l}$, moreover the coalition has the cash conversion cycle constraints and constrains on each participant:

$$\underline{CCC}_{3l} \le x_{3l} + y_{3l}^0 - z_{3l} \le \overline{CCC}_{3l}, (3,l) \in S$$

Therefore the maximum values the counterparts can achieve comply with the next rule:

$$\sum_{(3,l)\in S} z_{3l} = 0. \qquad (25)$$

Further the coalition can minimize its cost function (24) via leveraging its z_{3l} along the constraint (25) and managing its set of x_{3l} keeping in mind the limitations on cash conversion cycle.

Value of characteristic function for a set of suppliers and distributor coalition. We consider the coalition comprising a group of $(U \subset K_1)$ and the distributor while the rest $K_1 \setminus U$ suppliers and all the retailers K_3 are playing against it trying to maximize the cost of the working capital of the coalition. Therefore the value of characteristic function for the coalition $S = U \cup K_2$ will have the following form:

$$v(S) = v(U \cup K_2) =$$
$$= \min_{x_{1j},y_{1j},z_{21}} \max_{y_{21}} \left(\sum_{(1,j)\in U} FC_{1j}(x_{1j}, y_{1j}, z_{1j}) + FC_{21}(x_{21}, y_{21}, z_{21})\right). \qquad (26)$$

Where the financial cost function has the form:

$$\sum_{(1,j)\in U} FC_{1j}(x_{1j}, y_{1j}, z_{1j}) + FC_{21}(x_{21}, y_{21}, z_{21}) =$$

$$= \sum_{(1,j)\in U} a_{1j}x_{1j}\left[(1+r_{1j})^{\frac{x_{1j}}{365}} - 1\right] + \sum_{(1,j)\in U} b_{1j}y_{1j}\left[(1+r_{1j})^{\frac{y_{1j}}{365}} - 1\right] -$$

$$- \sum_{(1,j)\in U} c_{1j}z_{1j}\left[(1+r_{1j})^{\frac{z_{1j}}{365}} - 1\right] + a_{21}x_{21}\left[(1+r_{21})^{\frac{x_{21}}{365}} - 1\right] +$$

$$+ b_{21}y_{21}\left[(1+r_{21})^{\frac{y_{21}}{365}} - 1\right] - c_{21}z_{21}\left[(1+r_{21})^{\frac{z_{21}}{365}} - 1\right]. \quad (27)$$

The coalition opponents have power to influence days payable outstanding and days receivable outstanding of the coalition group via shortening payments period of the distributor and delaying payments to the distributor. In order to maximize the characteristic function the opponents have to maximize y_{21} and minimize z_{21}, in addition the coalition has the coalition has the cash conversion cycle constraints and constrains on each participant.

$$\underline{CCC}_{1j} \leq x_{1j} + y_{1j} - z_{1j}^0 \leq \overline{CCC}_{1j}, (1,j) \in U, \quad (28)$$

$$\underline{CCC}_{21} \leq x_{21} + y_{21}^0 - z_{21} \leq \overline{CCC}_{21}, (2,1) = K_2. \quad (29)$$

The minimum of z_{21} according to the condition (9) and the structure of the coalition is:

$$z_{21} = \sum_{(1,j)\in U} y_{1j}.$$

While the maximizing value of y_{21} is:

$$y_{21} = \overline{CCC}_{21} - x_{21} + \sum_{(1,j)\in U} y_{1j}.$$

Further the coalition can minimize its cost function (27) via leveraging its $\sum_{(1,j)\in U} y_{1j}$ and operating its set of $x_{21},\ x_{1j},\ (1,j) \in U$ acknowledging the cash conversion cycle boundaries.

Value of characteristic function for a set of retailers and the distributor coalition.
Next we consider the coalition V consisting of a group of retailers $(V \subset K_3)$ and the

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distributor, while the rest $K_3 \setminus V$ retailers and all the suppliers are playing against it trying to maximize the cost of the working capital of the coalition. Therefore the value of characteristic function for the coalition $\bar{S} = V \cup K_2$ will have the following form: $K_3)$

$$v(S) = v(V \cup K_2) = \min_{x_{ij}, z_{21}, y_{3l}} \max_{y_{21}} \left(FC_{21}(x_{21}, y_{21}, z_{21}) + \sum_{(3,l) \in V} FC_{3l}(x_{3l}, y_{3l}, z_{3l}) \right). \tag{30}$$

Where the financial cost function has the form:

$$
\begin{aligned}
FC_S = FC_{21}(x_{21}, y_{21}, z_{21}) + \sum_{(3,l) \in V} FC_{3l}(x_{3l}, y_{3l}, z_{3l}) = \\
= a_{21}x_{21}\left[(1+r_{21})^{\frac{x_{21}}{365}} - 1\right] + b_{21}y_{21}\left[(1+r_{21})^{\frac{y_{21}}{365}} - 1\right] - \\
- c_{21}z_{21}\left[(1+r_{21})^{\frac{z_{21}}{365}} - 1\right] + \sum_{(3,l) \in V} a_{3l}x_{3l}\left[(1+r_{3l})^{\frac{x_{3l}}{365}} - 1\right] + \\
+ \sum_{(3,l) \in V} b_{3l}y_{3l}^0\left[(1+r_{3l})^{\frac{y_{3l}^0}{365}} - 1\right] - \sum_{(3,l) \in V} c_{3l}z_{3l}\left[(1+r_{3l})^{\frac{z_{3l}}{365}} - 1\right]. \tag{31}
\end{aligned}
$$

The opponents attempting to maximize (31) have an impact on days payable outstanding and days receivable outstanding of the coalition group via shortening payments period of the distributor and delaying payments to the distributor. In order to maximize the characteristic function the opponents have to maximize y_{21} and minimize z_{21}, in addition the coalition has the cash conversion cycle constraints and constrains on each participant:

$$\underline{CCC}_{3l} \le x_{3l} + y_{3l}^0 - z_{3l} \le \overline{CCC}_{3l}, (3,l) \in V \tag{32}$$

$$\underline{CCC}_{21} \le x_{21} + y_{21} - z_{21} \le \overline{CCC}_{21}. \tag{33}$$

Therefore the maximum values the counterparts can achieve comply with the rule:

$$z_{21} = \sum_{(1,j) \in K_1} y_{1j} = 0. \tag{34}$$

While the maximizing value of y_{21} is:

$$y_{21} = \overline{CCC}_{21} - x_{21}.$$

Further the coalition can minimize its cost function (31) via leveraging its $\sum_{(3,l)\in V} z_{3l}$ and manipulating its set of $x_{21}, x_{3l}, (3,l) \in V$ taking into consideration the cash conversion cycle boundaries.

Value of characteristic function for a set of suppliers and a set of retailers coalition. The further coalition represents a group of suppliers U $(U \subset K_1)$ and a group of retailers V $(V \subset K_3)$. The rest of the $K_1 \setminus U$ suppliers, the distributor and the $K_3 \setminus V$ retailers are playing against it trying to maximize the cost of the working capital of the coalition. Therefore the value of the characteristic function for the coalition $S = U \cup V$ will have the following form:

$$v(S) = v(U \cup V) =$$
$$= \min_{x_{1j},y_{1j},x_{3l},z_{3l}} \max_{y_{1j},z_{3l}} \left(\sum_{(1,j)\in U} FC_{1j}(x_{1j}, y_{1j}, z_{1j}) + \sum_{(3,l)\in V} FC_{3l}(x_{3l}, y_{3l}, z_{3l}) \right).$$
(35)

Where the financial cost function has the form:

$$FC_S = \sum_{(1,j)\in U} FC_{1j}(x_{1j}, y_{1j}, z_{1j}) + \sum_{(3,l)\in V} FC_{3l}(x_{3l}, y_{3l}, z_{3l}) =$$
$$= \sum_{(1,j)\in U} a_{1j}x_{1j}\left[(1+r_{1j})^{\frac{x_{1j}}{365}} - 1\right] + \sum_{(1,j)\in U} b_{1j}y_{1j}\left[(1+r_{1j})^{\frac{y_{1j}}{365}} - 1\right] -$$
$$- \sum_{(1,j)\in U} c_{1j}z_{1j}^0\left[(1+r_{1j})^{\frac{z_{1j}^0}{365}} - 1\right] + \sum_{(3,l)\in V} a_{3l}x_{3l}\left[(1+r_{3l})^{\frac{x_{3l}}{365}} - 1\right] +$$
$$+ \sum_{(3,l)\in V} b_{3l}y_{3l}\left[(1+r_{3l})^{\frac{y_{3l}^0}{365}} - 1\right] - \sum_{(3,l)\in V} c_{3l}z_{3l}^0\left[(1+r_{3l})^{\frac{z_{3l}}{365}} - 1\right].$$
(36)

The opponents have power to influence days payable outstanding and days receivable outstanding of the coalition group via shortening payments period of the retailers and delaying payments to the suppliers . In order to maximize the characteristic function the opponents have to maximize y_{21} and minimize z_{21}, in addition the coalition has the cash conversion cycle constraints and constrains on each participant:

$$\underline{CCC}_{1j} \leq x_{1j} + y_{1j} - z_{1j}^0 \leq \overline{CCC}_{1j}, (1,j) \in U, \tag{37}$$
$$\underline{CCC}_{3l} \leq x_{3l} + y_{3l}^0 - z_{3l} \leq \overline{CCC}_{3l}, (3,l) \in V. \tag{38}$$

Therefore the maximum values the counterparts can achieve follow the next rules:

$$\sum_{(1,j)\in U} y_{1j} = \sum_{(1,j)\in U} \overline{CCC}_{1j} - \sum_{(1,j)\in U} x_{1j} + \sum_{(1,j)\in U} z_{1j}^0; \tag{39}$$
$$\sum_{(3,l)\in V} z_{3l} = 0. \tag{40}$$

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Further the coalition can minimize its cost function (35) via leveraging its $\sum_{(1,j)\in U} y_{1j}$ and operating its set of x_{1j}, x_{3l}, $(1,j) \in U$ and $(3,l) \in V$ keeping in mind the cash conversion cycle boundaries. In general this coalition structure represents a combined form of two previous structures: a set of retails and suppliers, therefore the processes of building characteristic function are just combines as well.

Value of characteristic function for a set of suppliers, the distributor and a set of retailers coalition. This coalition is the most complicated and comprises a group of suppliers U, the distributor K_2 and a group of retailers V, while the rest $K_1 \setminus U$ suppliers and $K_3 \setminus V$ retailers are playing against it trying to maximize the cost of the working capital of the coalition. Therefore the characteristic function of coalition $S = U \cup K_2 \cup V$ will have the following form:

$$
v(S) = v(U \cup K_2 \cup V) =
$$
$$
\min_{x_{ij},y_{ij},z_{ij}} \max_{x_{ij},y_{ij},z_{ij}} \left(\sum_{(1,j)\in U} FC_{1j}(x_{1j}, y_{1j}, z_{1j}) + \right.
$$
$$
\left. + FC_{21}(x_{21}, y_{21}, z_{21}) + \sum_{(3,l)\in V} FC_{3l}(x_{3l}, y_{3l}, z_{3l}) \right). \quad (41)
$$

Where the financial cost function has the form:

$$
\sum_{(1,j)\in U} FC_{1j}(x_{1j}, y_{1j}, z_{1j}) + FC_{21}(x_{21}, y_{21}, z_{21}) + \sum_{(3,l)\in V} FC_{3l}(x_{3l}, y_{3l}, z_{3l}) =
$$
$$
= \sum_{(1,j)\in U} a_{1j}x_{1j}\left[(1+r_{1j})^{\frac{x_{1j}}{365}} - 1\right] + \sum_{(1,j)\in U} b_{1j}y_{1j}\left[(1+r_{1j})^{\frac{y_{1j}}{365}} - 1\right] -
$$
$$
- \sum_{(1,j)\in U} c_{1j}z_{1j}\left[(1+r_{1j})^{\frac{z_{1j}}{365}} - 1\right] +
$$
$$
+ a_{21}x_2\left[(1+r_{21})^{\frac{x_{21}}{365}} - 1\right] + b_{21}y_{21}\left[(1+r_{21})^{\frac{y_{21}}{365}} - 1\right] - c_{21}z_{21}\left[(1+r_{21})^{\frac{z_{21}}{365}} - 1\right] +
$$
$$
+ \sum_{(3,l)\in V} a_{3l}x_{3l}\left[(1+r_{3l})^{\frac{x_{3l}}{365}} - 1\right] + \sum_{(3,l)\in V} b_{3l}y_{3l}\left[(1+r_{3l})^{\frac{y_{3l}}{365}} - 1\right] -
$$
$$
- \sum_{(3,l)\in V} c_{3l}z_{3l}\left[(1+r_{3l})^{\frac{z_{3l}}{365}} - 1\right]. \quad (42)
$$

The coalition opponents have power to influence days payable outstanding and days receivable outstanding of the coalition group via shortening payments period of the distributor and delaying payments to the distributor. In order to maximize the characteristic function the opponents have to maximize y_{21} and minimize z_{21}, in addition the

$$
\underline{CCC}_{1j} \leq x_{1j} + y_{1j} - z_{1j}^0 \leq \overline{CCC}_{1j}, \ (1,j) \in U, \quad (43)
$$
$$
\underline{CCC}_{21} \leq x_{21} + y_{21} - z_{21} \leq \overline{CCC}_{21}; \quad (44)
$$
$$
\underline{CCC}_{3l} \leq x_{3l} + y_{3l}^0 - z_{3l} \leq \overline{CCC}_{3l}, \ (3,l) \in V. \quad (45)
$$

coalition has the coalition has the cash conversion cycle constraints and constrains on each participant:

Therefore the maximum values the counterparts can achieve comply with the following rule:

$$z_{21} = \sum_{(1,j) \in U} y_{1j};$$

$$y_{21} = \overline{CCC}_{21} - x_{21} + \sum_{(1,j) \in U} y_{1j}.$$

Further the coalition can minimize its cost function (41) via leveraging its $\sum_{(1,j) \in U} y_{1j}$, $\sum_{(3,l) \in V} z_{3l}$ and manipulating its set of $x_{1j} \in U$, x_{21} and $x_{3l} \in V$ keeping in mind the cash conversion cycle boundaries. Value of characteristic function for grand coalition. The last coalition K consists of all participants in the supply chain. Since all partners have a common goal, the only step to build the characteristic function is to minimize the cost function of joint working capital.

Value of characteristic function for grand coalition. The last coalition K consists of all participants in the supply chain. Since all partners have a common goal, the only step to build the characteristic function is to minimize the cost function of joint working capital.

$$v(K) = v(K_1, K_2, K_3) = \min_{x_{ij}, y_{ij}, z_{ij}} \left(\sum_{(1,i) \in K_1} FC_{1i} + FC_{21} + \sum_{(3,j) \in K_3} FC_{3j} \right). \quad (46)$$

After this stage having exploited the possible structures of the chain, the goal is to build the Shapley value of the game and check whether it belongs to C-core. It will be the solution of the costs redistribution problem.

Shapley value and C-core

Let $\varphi : \{\langle (N, v) \rangle\} \to R^n$ – function complying to each game $G = \langle N, v \rangle$ the imputation $\varphi[v] = (\varphi_1[v], \dots, \varphi_n[v])$, which satisfies the Shapley's axioms . This vector $\varphi[v] = (\varphi_1[v], \dots, \varphi_n[v])$ is named Shapley value of the game $G = \langle N, v \rangle$ [Shapley, 1953].

In arbitrary game G = ⟨N,υ⟩ exists unique Shapley value. The components of Shapley value are calculated according to the following formula [Shapley, 1953]:

$$\varphi_i[v] = \sum_{\{S | i \in S \subset N\}} \frac{(s-1)!(n-s)!}{n!} [v(S) - v(S \setminus i)], \quad for \ \forall i \in N, \quad (47)$$

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where s is the number of players in coalition *S*.

Shapley value has the next implications. it is assumed that the players have coordinated to meet up in a certain place in order to conduct the negotiations of redistribution the gain from the maximum possible coalition. Naturally due to some random delay each of them arrives at different time. it is assumed hat each sequence of arriving players has the same probability and if the player *i* arriving find the others in the coalition $S \setminus i$, then the player *i* receives the gain equivalent $v(S) - v(S \setminus i)$. In other words the gain of the player *i* is the value added by this player to the maximum guaranteed gain of the coalition. Shapley value provides a mathematical solution of the cost distribution problem. The values of the vector correspond to the cost each player should bear after the optimization.

The theory and concepts above allow to introduce a methodology which purpose to provide a solid solution of the costs redistribution after the optimization. The algorithm includes the further steps:

1. Define the participant of the supply chain;

2. Define all the possible coalitions within the supply chain;

3. Introduce the working capital cost function;

4. Build the characteristic function for each coalition;

(a) Implement the maximizing constraints on the coalition;

(b) Minimize the cost function of the coalition;

5. Build the Shapley value of the game;

6. Test Shapley value for belonging to C-core.

Numerical example

The case study represents the numerical optimization in information and communications technology industry (ICT). This choice is justified by several reasons. First of all this industry possesses deeply integrated structure, rapidly implements new technologies [Pirttila¨, et al., 2014], Moreover, being service oriented, the industry has wide range of the customers. In addition, there is an obvious absence of thorough attention to the ICT supply chain in the scientific literature [Lind et al., 2012]. Figure 4. depicts a financial supply chain of Russian provider of telecommunication services. According to the chain structure considered in the paper, the company plays a role of the distributor D21.The focal company provides a wide range of products and services: long-distance and mobile telephony services, data transmission, television. The strategy of the

company is to achieve a shift towards being a provider of completely integrated services via enhancing technological aspects. According to this goal the company invests substantial amounts of money into modernization of operational software, for instance, one of the direction is procurement optimization programs. Therefore the firm is highly motivated to cooperate with the other participants avoiding any discrimination of both either small or medium participants.
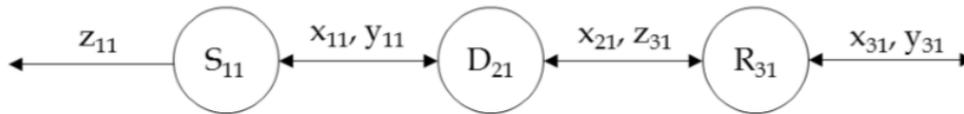
Figure 4. Financial flows of the ICT chain.

The system integrator *S11* (Figure 4.) is a large player on the domestic market as well operating in Europe. The business of the integrator is primarily concentrated on development of ICT infrastructure: energy appliance, information hubs, engineering solutions for industries. The firm is the major supplier of the telecommunication services provider highly involved in its procurement. Mobile phone company *R31* (Figure4.) being deeply integrated with the provider of telecommunication services sells services such as mobile internet, mobile telecommunications across Russia. It business has the model of providing superior products at affordable price. This approach along with high demand on the products allows the firm to perform better in terms of growing the number of the subscribers. Nonetheless, the firms financial accomplishment lack behind due to the construction of a new network, which required significant leverage. The data was gathered from the annual financial reports of the considered companies and represented in Table 1 and Table 2. The model requires optimization of CCC part in certain possible interval. This paper uses the interval between -17 and 61.50 for cash conversion cycle of information and communications technology industry defined by [Garanina and Petrova, 2015]. Further, according to the methodology in order to optimize costs along the supply chain and obtain the cost distribution strategy it is necessary to go through 6 steps. Table3 and Table4 represent the results of optimization and comparative change in controllable variables and the best possible value of the joint cost function. Interpreting the results of the optimization it is possible to see that in general for

Table1. Initial data before optimization.

	System integrator	Telecommunication services provider	Mobile phone company
	1	**2**	**3**
DIO	77.2	184	64.2
DRO	67.6	5.7	6.6
DPO	51.8	67.6	5.6
INV	1 342	11 593	972
AR	1 374	458	119
AP	901	4 256	85
CCC	**93**	**122.1**	**65.2**
FC	**32.5**	**237.7**	**2.7**

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Table 2. Parameters of the SC players.

	System integrator	Telecommunication services provider	Mobile phone company
	1	**2**	**3**
r	8.2%	4.7%	3.4%
Revenue	7 419	29 792	6 588
COGS	6 345	22 981	5 528

the supply chain it is beneficial to reduce the amount of the inventories. For instance, the model implies that the supplier should decrease its inventories as much as possible, ideally to 0.

Another significant point is that according to the model the coalition should prolongthepaymentsdueforthemobilecompanybythetelecommunicationservices provider. In addition the system integrator should prolong the payments due to the telecommunication services provider as well.

Considering the changes it is obvious that the cash conversion cycle of each participant took boundary values of the range of stability. Furthermore while the telecommunicationservicesproviderandthemobilephonecompanytheCCCvalues took the left boundary, the CCC of the system integrator received the value of the right boundary. Since the optimization was conducted along the cost of working capital function, therefore the main cost contributor was the telecommunication services provider and the minimization of its contribute to the cost brought more value for the coalition.

Further analyzing the reduce in the cost of the joint capital two issues arise. The first is that the final value of the function is negative. The second issue is that according to the model the system integrator should bear higher costs on its working capital after the optimization. Considering the second issue on the first sight being rational the system integrator should not accept these terms of the agreement and leave the coalition thereby saving its own financial resources bot negatively affecting the rest player. Nonetheless, the results of the optimization are positive in terms of cost reduction of the joint working capital. Therefore, the participant being interested in this cooperation should develop a fair distribution strategy.

At this point we construct the cooperative game according to the methodology described, calculate the value of characteristic function for the existing coalitions (Table 5) and evaluation of Shapley value of the game (Table 6).

Table 3. Data after optimization in grand coalition.

	System integrator	Telecommunication services provider	Mobile phone company
	1	**2**	**3**
DIO	0	52.65	18.35
DRO	112	42.35	6.6
DPO	51.8	112	42.45
INV	0	3 314	278
AR	2 276	3 456	126
AP	1 946	2 667	106
CCC	**60**	**-17**	**-17**
FC	**45.4**	**-102**	**-1.7**

Table 4. Comparative analysis

	System integrator	Telecommunication services provider	Mobile phone company
	1	**2**	**3**
DIO	0%	29%	29%
DRO	166%	423%	106%
DPO	100 %	243%	755%
INV	0%	29%	29%
AR	166%	423%	106%
AP	100 %	243%	755%
CCC	**65%**	**-717%**	**-382%**
FC	**140%**	**-43%**	**-67%**

The Shapley value implies the way how the final cost should be optimally redistributed. In other words, the supplier should get additional decrease of the costs by -12.98, which is less compared to 15.29 - costs when not participating in the coalition. The distributor should also have a significant decrease in working capital costs – -20.14, which is considerably higher in comparison with 16,26 associated with not participating in coalition. Finally considering the optimization for the retailer the final costs should be -25.90 compared to 0,08 of not being a participant of the maximum coalition. Besides we can say that the obtained Shapley value belongs to the C-core:

$$\varphi(1) + \varphi(2) = -33.12 < 10.69 = v(1,2),$$

$$\varphi(1) + \varphi(3) = -38.88 < 15.36 = v(1,3),$$

$$\varphi(2) + \varphi(3) = -46.04 < 0.07 = v(2,3),$$

$$\varphi(1) + \varphi(2) + \varphi(3) = -59.02 = v(1,2,3).$$

It proves that this cost imputation is strictly nondominant and there are no coalitions that can be opportunistic in such a game. Nonetheless this case reveals several constrains which are still to be discovered further. The first one is the base for the assumption that each participant of the chain is able to obtain its cash conversion cycle on the boundary values. In the reality there might be conditions and situations, for instance delays in the supplies due to infrastructure breakdowns. The second assumption is that possessing a optimal negative cost function of the joint working capital a supply chain participant might

Table 5. Characteristic function.

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S	1	2	3	12	13	23	123
$v(S)$	15.29	16.26.	0.08	10.69	15.37	0.07	-59.02

Table 6. Shapley value.

$\varphi(1)$	$\varphi(2)$	$\varphi(3)$
-12.98	-20.14	-25.90

face not willingness to be financed by outer participants of the chain, for instance the final customer might not be ready to pay in advance for the product and decide to switch to another retailer or the earlier step supplier might require earlier payments.

Discussion and conclusions

The main purpose of the study was to introduce a methodology, which would allow the participants of a supply chain willing to cooperate to optimize the costs on joint working capital and develop cost redistribution policy.

Critical literature analysis showed that competent management of financial supply chains has direct positive impact on the liquidity of a company. Moreover it was discover that the most prominent approach in this field is management of the working capital. Cash conversion cycle is a widely admitted metrics to measure the effectiveness of working capital management. This metrics contains three important parts: days inventory outstanding, days accounts receivable and days accounts payable, which describe financial flows of the supply chain. Reduce of the cash conversion cycle generally leads to increase in the liquidity. However, CCC reduction on the level of a certain form is highly limited, therefore the optimization should be done along several consequent parts of the chain. Therefore collaborative cash conversion cycle should be considered.

Further even if the participants of a certain chain decided to cooperate with each other in order to optimize the collaborative cash conversion cycle and the costs of the joint working capital they might face the problem of redistribution of costs, because there may be cases in which participants obtain higher costs on their working capital. However the described case shows that Shapley value lies in the C-core and is strictly nondominant. It implies that all supply chain participants have no motives to oppose cooperation and behave opportunistically.

The methodology provides a mathematical overview of the cost redistribution problem allowing the participant to bear costs according the value they add participating in the coalition. The example was considered as upply chain with one-one-one structure in information telecommunication industry of three participants: a system integrator, a telecommunication service provider and a mobile phone company. In this example the costs of the joint working capital were reduced to -59 mln dollars a year, with final cost redistribution to each participant: -12.98 to the supplier, -20.14 to the distributor and -25.98 to the retailer. Moreover the CCC of each participants took the next values: 60 for the supplier, -17 for the distributor and -17 for the retailer.

Further research should be done is two directions: mathematical and managerial. Regarding the former, a limitation which was obtained empirically is that each additional participant in a supply chain compounds calculation process of characteristic function for coalitions and Shapley value. Therefore it is needed to consider quantitative method of optimization or analytical approach, which would permit to aggregate some types of coalitions.

Further fruitful area of research in mathematical terms is dynamic cooperative working capital cost game allowing to redistribute the costs on a regular day-to-day basis

Considering the second field, it is necessary to develop a framework or technique which would on the one hand figure out the possibility of maintaining boundary levels of the conversion cash cycle of the coalition participants in a particular industry, and on the other hand will discover the possibility for the chain to be financed from the outer participants.

References

Akkermans, H., Van Wassenhove, L. N. Supply Chain Tsunamis: Research on Low-Probability, High-Impact Disruptions. Journal of Supply Chain Management. 2018;54(1):64-76.

Barratt, M. Understanding the meaning of collaboration in the supply chain. Supply Chain Management: An International Journal. 2004;9(1):30–42.

Beamon, B. M. Supply chain design and analysis: Models and methods. International Journal of Production Economics. 1998;55(3):281–294.

Blackman, I. D., Holland, C., Westcott, T. Motorola's global financial supply chain strategy. Supply Chain Management: An International Journal.2013;18(2):132–147.

Blome, C., Paulraj, A., Schuetz, K. Supply chain collaboration and sustainability: a profile deviation analysis. International Journal of Operations and Production Management. 2014;34(5):639–663.

Cachon, G. P., Lariviere, M. A. Supply chain coordination with revenue-sharing contracts: strengths and limitations. Management science. 2005;51(1):30-44.

Cao, M., Zhang, Q. Supply chain collaboration: Impact on collaborative advantage and firm performance. Journal of Operations Management.2011;29(3):163–180.

Chauhan, G. S., Banerjee, P. Financial constraints and optimal working capital–evidence from an emerging market. International Journal of Managerial Finance. 2018; 14(1):37-53.

Chen, I. J., Paulraj, A. Towards a theory of supply chain management: the constructs and measurements. Journal of Operations Management.2004;22(2):119–150

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Cherkasova, V., Chadin, V. Working capital determinants in the concept of life cycle of the organization. Journal of Corporate Finance Research. 2015;9(2):79-99.

Coyle, J. J., Langley, J. C., Novack, R. A., Gibson, B. J. Supply Chain Management: A Logistics Perspective. Ninth Edition, South-Western, Cengage Learning: Mason, USA; 2013.

Deloof M. Does working capital management affect profitability of Belgian firms? Journal of Business Finance and Accounting. 2003;30(3–4):573–87.

Enqvist, J., Graham, M., Nikkinen, J. The impact of working capital management on firm profitability in different business cycles: Evidence from Finland. Research in International Business and Finance. 2014;32:36-49.

Fairchild, A. Intelligent matching: integrating efficiencies in the financial supply chain. Supply Chain Management: An International Journal. 2005;10(4):244–248.

Fawcett, S. E., Magnan, G. M. The rhetoric and reality of supply chain integration. International Journal of Physical Distribution and Logistics Management. 2002;32(5):339. Fedorova,E.,Timofeev,Y.Standards of financial stability of Russian companies: industry-specific features. Journal of Corporate Finance Research. 2015;9(1):38-47.

Filbeck, G., Krueger, T. M. An analysis of working capital management results across industries. American Journal of Business. 2005;20(2):11-20.

Flynn, B. B., Huo, B., Zhao, X. The impact of supply chain integration on performance: A contingency and configuration approach. Journal of Operations Management. 2010;28(1):58–71.

Flynn, B. B., Koufteros, X., Lu, G. On theory in supply chain uncertainty and its implications for supply chain integration. Journal of Supply Chain Management. 2016;52(3):3-27.

Frohlich, M. T., Westbrook, R. Arcs of integration: An international study of supply chain strategies. Journal of Operations Management. 2001;19(2):185–200.

Gadde, L.-E., Snehota, I. Making the Most of Supplier Relationships. Industrial Marketing Management, 2000;29(4):305–316.

Galaskiewicz, J. Studying supply chains from a social network perspective, Journal of Supply Chain Management. 2011;47(1);4-8.

Garanina, T. A., Belova, O. A. Liquidity, cash conversion cycle and financial performance: case of Russian companies. Investment Management and Financial Innovations. 2015;12(1):90-100.

Garanina, T., Petrova, O. Relationship between liquidity, cash conversion cycle and returns of Russian companies. Journal of Corporate Finance Research. 2015;9(1):5-21.

Garc´ıa-Teruel, P. J., Mart´ınez-Solano, P. Effects of Working Capital Management on SME Profitability. International Journal of Managerial Finance,2007;3(2):164–177

Gelsomino, L.M., deBoer, R.,Steeman, M.,Perego,A. An optimization strategy for concurrent Supply Chain Finance schemes. Journal of Purchasing and Supply Management. 2018. DOI: 10.1016/j.pursup.2018.07.004

Gelsomino, L. M., Mangiaracina, R., Perego, A., Tumino, A. Supply chain finance: a literature review. International Journal of Physical Distribution Logistics Management. 2016;46(4):348-366.

Gunasekaran,A.,Patel,C.,McGaughey,R.E.A framework for supply chain performance measurement. International Journal of Production Economics.2004;87(3):333–347.

Gupta S., Dutta K. Modeling of financial supply chain. European Journal of Operational Research. 2011;211(1):47–56.

H°akansson, H., Ford, D. How should companies interact in business networks? Journal of Business Research. 2002; 55:133– 139.

H°akansson, H., Snehota, I. No business is an island: The network concept of business strategy, Scandinavian Journal of Management. 2006;22:256– 270

Hendricks, K. B., Singhal, V. R. The effect of supply chain glitches on shareholder wealth. Journal of Operations Management. 2003;21(5):501–522.

Hofmann, E., Kotzab, H. A Supply Chain-Oriented Approach of Working Capital Management. Journal of Business Logistics. 2010;31(2):305–330.

Hutchison, P. D., Farris II, M. T., Anders, S. B. Cash-to-cash analysis and management. The CPA Journal. 2007;77(8):42.

Johnson, M., Templar, S. The relationships between supply chain and firm performance: The development and testing of a unified proxy. International Journal of Physical Distribution and Logistics Management. 2011;41(2):88–103.

Jones, M. Financial accounting. Wiley; 2006.

Kim, S.W. An investigation on the direct and indirect effect of supply chain integration on firm performance. International Journal of Production Economics. 2009;119(2):328–346.

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Kirca, A. H., Jayachandran, S., Bearden, W. O. Market Orientation: A Meta-Analytic Review and Assessment of Its Antecedents and Impact on Performance. Journal of Marketing. 2005;69(2):24–41.

Kouvelis P., Chambers C., Wang H. Supply Chain Management Research and Review, Trends, and Opportunities. Production and Operations Management.2006;15(3):449–69.

Kouvelis, P., Zhao, W. Who should finance the supply chain? Impact of credit ratings on supply chain decisions. Manufacturing Service Operations Management. 2017;20(1):19-35.

Kroes, J. R., Manikas, A. S. Cash flow management and manufacturing firm financial performance: A longitudinal perspective. International Journal of Production Economics. 2014;148:37–50.

Kunter, M. Coordination via cost and revenue sharing in manufacturer–retailer channels. European Journal of Operational Research. 2012;216(2):477-486.

Lazaridis, I., Tryfonidis, D. Relationship between working capital management and profitability of listed companies in the Athens stock exchange. Journal of Financial Management and Analysis. 2006;19(1).

Leng, M., Parlar, M. Allocation of cost savings in a three-level supply chain with demand information sharing: A cooperative-game approach. Operations Research. 2009;57(1):200-213.

Lind, L., Pirttila¨, M., Viskari, S., Schupp, F., Ka¨rri, T. Working capital management in the automotive industry: Financial value chain analysis. Journal of purchasing and supply management. 2012;18(2):92-100.

Malshe, A., Agarwal, M. K. From Finance to Marketing: The Impact of Financial Leverage on Customer Satisfaction. Journal of Marketing. 2015;79(September):21–38.

Margolis, J. T., Sullivan, K. M., Mason, S. J., Magagnotti, M. A multi-objective optimization model for designing resilient supply chain networks. International Journal of Production Economics. 2018; 204:174-185.

Martin, J., Hofmann, E. Involving financial service providers in supply chain finance practices: Company needs and service requirements. Journal of Applied Accounting Research. 2017;18(1):42-62.

Marttonen, S., Monto, S., Ka¨rri, T. Profitable working capital management in industrial maintenance companies. Journal of Quality in Maintenance Engineering. 2013;19(4):429-446.

Matyac, E. Financial supply chain management. Strategic Finance.2015;96(9):62.

Noordhoff, C. S., Kyriakopoulos, K., Moorman, C., Pauwels, P., Dellaert, B. G. The bright side and dark side of embedded ties in business-to-business innovation. Journal of Marketing. 2011;75(5):34–52.

Paulraj, A., Lado, A. A., Chen, I. J. Inter-organizational communication as a relational competency: Antecedents and performance outcomes in collaborative buyer–supplier relationships. Journal of Operations Management. 2008;26(1):45–64.

Petrosyan L.A., Zenkevich N.A. (2016). Game Theory. World Scientific Publishing, 2016. — 564.

Pirttila¨, M., Viskari, S., Lind, L., Ka¨rri, T. Benchmarking working capital management in the inter-organisational context. International Journal of Business Innovation and Research. 2014;8(2):119-136.

Protopappa-Sieke, M., Seifert, R. W. Benefits of working capital sharing in supply chains. Journal of the Operational Research Society. 2017;68(5):521-532.

Protopappa-Sieke, M., Seifert, R. W. Interrelating operational and financial performance measurements in inventory control. European Journal of Operational Research. 2010;204(3):439–448.

Ramdas, K., Spekman, R. E. Chain or shackles: understanding what drives supply-chain performance. Interfaces. 2000;30(4):3-21.

Randall, W. S., Theodore Farris, M. Supply chain financing: using cash-to-cash variables to strengthen the supply chain. International Journal of Physical Distribution Logistics Management. 2009;39(8):669-689.

Richards, V. D., Laughlin, E. J. A cash conversion cycle approach to liquidity analysis. Financial management. 1980;9(1):32-38.

Rokkan, A. I., Heide, J. B., Wathne, K. H. Specific Investments in Marketing Relationships: Expropriation and Bonding Effects. Journal of Marketing Research. 2003;40 (May):210–224.

Seggie, S. H., Griffith, D. A., Jap, S. D. Passive and active opportunism in interorganizational exchange. Journal of Marketing. 2013;77(6):73– 90.

Shapley,L.S. A value forn-person games. Contributions to the Theory of Games. 1953;2(28):307-317.

Shin, H. H., Soenen, L. Efficiency of working capital management and corporate profitability. Financial practice and education. 1998;8:37-45.

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Silvestro, R., Lustrato, P. Integrating financial and physical supply chains: the role of banks in enabling supply chain integration. International Journal of Operations and Production Management. 2014;34(3):298–324.

Simatupang, T. M., Sridharan, R. The Collaborative Supply Chain. The International Journal of Logistics Management. 2002;13(1):15–30.

Song, H., Yu, K., Lu, Q. Financial service providers and banks' role in helping SMEs to access finance. International Journal of Physical Distribution and Logistics Management. 2018;48(1):69-92.

Stevens, G.,Johnson, M. Integrating the Supply Chain... 25YearsOn.International Journal of Physical Distribution and Logistics Management. 2016;46(1):1–30.

Talonpoika, A. M., Ka¨rri, T., Pirttila¨, M., Monto, S. Defined strategies for financial working capital management. International Journal of Managerial Finance. 2016;12(3):277-294.

Talonpoika, A. M., Monto, S., Pirttila¨, M., Ka¨rri, T. Modifying the cash conversion cycle: revealing concealed advance payments. International Journal of Productivity and Performance Management. 2014;63(3):341-353.

Va´zquez, X. H., Sartal, A., Lozano-Lozano, L. M. Watch the working capital of tier-two suppliers: a financial perspective of supply chain collaboration in the automotive industry. Supply Chain Management: An International Journal. 2016;21(3):321-333.

Viskari, S., Ka¨rri, T. A cycle time model for analysing the efficiency of working capital management in a value chain. International Journal of Business Performance and Supply Chain Modelling. 2013;5(3):221-238.

Viskari, S., Ka¨rri, T. A model for working capital management in the interorganisational context. International Journal of Integrated Supply Management. 2012;7(1-3):61-79. Viskari, S., Lind, L., Ka¨rri, T., Schupp, F. Using working capital management to improve profitability in the value chain of automotive industry. International Journal of Services and Operations Management. 2012;13(1):42-64.

Viskari, S., Pirttila¨, M., Ka¨rri, T. Improving profitability by managing working capital in the value chain of pulp and paper industry. International Journal of Managerial and Financial Accounting. (2011);3(4):348-366.

Viskari, S., Ruokola, A., Pirttila¨, M., Ka¨rri, T. Advanced model for working capital management: bridging theory and practice. International Journal of Applied Management Science. 2012;4(1):1-17.

Volkov, D., Nikulin, E. Current State and Prospects for Research on Firm's Working Capital Management. Journal of Corporate Finance Research.2012;6(3):6169.

Wuttke, D. A., Blome, C., Henke, M. Focusing the financial flow of supply chains: An empirical investigation of financial supply chain management. International Journal of Production Economics. 2013;145(2):773–789.

Xu, X., Chen, X., Jia, F., Brown, S., Gong, Y., Xu, Y. Supply chain finance: A systematic literature review and bibliometric analysis. International Journal of Production Economics. 2018;204:160-173.

Yan, N., He, X., Liu, Y. Financing the capital-constrained supply chain with loss aversion: supplier finance vs. supplier investment.Omega.2018.DOI:10.1016/j.omega.2018.08.003 Yazdanfar,D., ¨Ohman, P. The impact of cash conversion cycle on firm profitability : An empirical study based on Swedish data. International Journal of Managerial Finance. 2014;10(4):442-452.

Yla¨-Kujala,A.,Marttonen,S.,Ka¨rri,T.,Sinkkonen,T.,Baglee,D.Inter-organisational asset management: linking an operational and a strategic view. International Journal of Process Management and Benchmarking. 2016;6(3):366-385.

Yousefi, A., Pishvaee, M. S. A Fuzzy Optimization Approach to Integration of Physical and Financial Flows in a Global Supply Chain Under Exchange Rate Uncertainty. International Journal of Fuzzy Systems. 2018;20(8):2415-2439.

FIRMS' EFFICIENCY, EXITS AND GOVERNMENT PROCUREMENT CONTRACTS

EVGUENIA BESSONOVA — *THE BANK OF RUSSIA AND NATIONAL RESEARCH UNIVERSITY HIGHER SCHOOL OF ECONOMICS*

Abstract

This study provides evidence that productivity growth trends in Russia are similar to those in other countries where technology leaders enjoy productivity growth with a gap increasing between them and other companies. The survival analysis suggests that the most efficient firms quit the market at a faster rate than firms in other efficiency groups in the Russian economy. Survival functions of the least efficient firm do not always differ significantly from those of other companies. Results based on public procurement data provide evidence that additional financing from government contracts helps both the most and the least efficient firms to survive and shelters them from competitive pressure. In the short run, the positive effect of winning government procurement contracts for leaders seems in to be only observed in their home regions, providing indirect evidence that the public procurement system does not support all types of firms with growth potential but only those affiliated with local authorities. Intervention in the mechanism of market selection through the system of public procurement could have a strong negative effect on economic growth as it provides incentives for inefficient firms without growth potential to stay in the market longer.

Keywords: TFP growth, efficiency, productivity gap, government procurement contracts, firms' exits

Introduction

In recent years, studies examining productivity trends have provided evidence that productivity growth has slowed at the aggregate level after the 2008 crisis. This was found to be true of various countries differing in the level of economic development. Research based on data for developed countries suggests that this trend emerged even before the 2008 crisis. Estimations using aggregated data (see, for example, Voskoboynikov, 2017) show similar trends in the Russian economy. Since 2010, various industries in the Russian economy have seen a decline in both labour and total factor productivity growth rates.

Recent cross-country studies based on firm level data attribute this productivity growth slowdown to the increasing gap in productivity levels between the most and least efficient firms within the same industries rather than to a decline in the rate of technological progress. Researches provide a number of explanations for this phenomenon, one of them being that the nature of technological progress has changed, innovation now involves greater costs, and inefficient firms do not have enough resources for innovation.

This explanation invites two questions. First, why has technological diffusion from leading companies to the less efficient ones slowed down and why has it become more difficult for the less efficient firms to replicate best practices? Second, why do inefficient firms not exit the market, continuing to use scarce production factors in their operations? This study concentrates on the analysis of firm

dynamics in the Russian economy and the factors enabling inefficient firms to stay in the market. Recent research in productivity trends for developed countries quite often explains the presence of inefficient firms in the market by their access to cheap credit thanks to low interest rates after the 2008 crisis. This is not very relevant to Russia, where the levels of interest rates remained much higher than in developed countries over the period under study. The existence of a large share of inefficient firms in the market seems to arise from other factors.

In my research, I regard the public procurement system as a possible source of supporting inefficient companies in various industries. Government procurement contracts are widely used to support domestic firms via increasing demand. They are commonly oriented to various types of firms (for example, SMEs) or sectors of the economy, and are in this sense employed as an instrument of industrial policy. Studies based on data for the less developed countries quite often find that involvement in the public procurement system has a positive effect on growth, especially in lagging regions. In Russia, government purchasing contracts accounted for 21% of GDP in 2018,1 with a significant share of firms (about 35% in my sample) involved in public procurement. Thus, government financial support through public procurement is quite substantial and could have a considerable impact on the Russian economy.

The contribution of this study to the literature on the government procurement system's efficiency and firm dynamics is that it evaluates the effect of getting additional support via the public procurement system on the performance of firms with various efficiency levels.

I use the stochastic frontier approach to evaluate TFP growth and the efficiency level for each firm. This allows identifying three groups of companies in my sample: the leaders, the baseline group and the laggards, and conducting the analysis by comparing exit hazards for each group, as well as evaluating the effect of winning government procurement contracts on the performance of firms with different efficiency levels.

I have found that the most efficient firms exit the market at a faster pace than firms from the other efficiency groups. It may reflect the fact that regional markets are isolated in Russia, and less efficient firms operate in local markets with weaker competition, while leaders are capable of entering national and international markets which see a stronger competitive pressure and a higher firm turnover.

At the same time, lagging companies quit market less frequently than leaders, and their survival function quite often does not significantly differ from that of the baseline group firms. This suggests that the market mechanism of selecting the most efficient firms is not itself efficient enough in the Russian economy.

I show that the government procurement system indeed helps firms involved in it to stay in the market longer but does not necessarily support the most efficient firms with growth potential. My results provide evidence that additional financing via government contracts helps inefficient firms survive and shelters them from competition with more efficient enterprises. The manner in which the government procurement system operates

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therefore supports a negative trend towards increasing the productivity gap. This system features intransparent procedures, allowing less efficient companies to take advantage of this.

For leaders, the positive effect of winning government procurement contracts is in the short run observed only in their home regions, suggesting that the public procurement system does not support all types of firms with growth potential but gives preference to those affiliated with local authorities.

The rest of the paper is structured as follows. The second section discusses the related literature. Section 3 dwells on the data used in the analysis. Section 4 is devoted to the empirical strategy. The results are described in section 5. Section 6 concludes.

Related literature

My study is related to two strands of literature on recent productivity growth trends and public procurement as an instrument of industrial policy. First, a number of studies provide evidence of an increasing productivity gap among firms within industries, provoking a discussion about whether this has an effect on firms' entry and exit rates and slows aggregate GDP growth. The second line of the recent literature which has a bearing on my research focuses on the efficiency of support for various types of firms via industrial policy or the public procurement system and its effect on firm dynamics.

Productivity trends on the micro level

Increasing availability of firm-level data has made it possible to analyse in detail the heterogeneity in the pattern of firms' productivity growth. Research suggests that productivity dispersion has been increasing in various countries. This became evident even before the 2008 financial crisis and has persisted beyond that point. A number of recent studies find that only a small share of the most productive firms enjoy productivity growth, while other companies fail to catch up with the technological leaders (Andrews et al. (2016) and Berlingieri et al. (2017) for OECD countries, Decker et al. (2016) for the US, Gamberoni et al. (2016) for EU countries). The authors argue that the nature of technological diffusion has changed. The less efficient firms cannot adopt new technologies or new ways of organising their business from the leaders promptly enough. At the same time, competition mechanism does not force inefficient firms to exit the market. Various explanations have been offered, but the there is no predominant hypothesis to account for the persisting productivity gap between more advanced firms and other market players and for this change in firm dynamics.

This study checks whether similar trends are observed for the Russian economy, which is known for high entry costs and a rather monopolised industrial structure, especially on the regional level. These features were inherited from the Soviet economy and have not been completely overcome after the twenty odd years of market reforms.

Hypothesis 1. Firms' exit rates vary with their efficiency levels, but laggard firms do not necessarily exit the market at a faster pace than more efficient players do.

Public procurement system and firm dynamics

In recent years, both theoretical and empirical literature has focused on the influence of industrial policy and the issue of its efficiency in supporting firms with growth potential. In the theoretical general equilibrium model, Acemoglu et al. (2018) show that an optimal industrial policy should be designed in such a way as to allow resources from the low-type firms move freely to the innovation activity of high-type firms, and this can be brought about by motivating low-productivity firms to exit the market. In the empirical paper on China, Aghion et al. (2015) demonstrate that sectoral government support promotes productivity growth more effectively where it focuses on more competitive sectors, and especially when it is not confined to just one or a handful of firms within the sector. Andrews et al. (2016), in their research on OECD countries, arrive at a conclusion that the increase in productivity gap was larger in sectors where market reforms fostering competition were less comprehensive. Thus, current research in this area shows that industrial policy should be targeted in such a way as to support the most efficient players.

One common goal of the public procurement system is to support various types of firms through boosting demand. Hence the influence of a public procurement system on firm dynamics could, in a certain sense, also be regarded as an instrument of industrial policy.

Empirical studies dealing with government procurement and firm growth often find that government purchases help firms expand sales, introduce new products to markets and enter new markets. Recent papers on developing economies suggest that public procurement in general improves growth rates of firms which obtain government contracts. Ferraz et al. (2015) analysing government purchasing auctions in Brazil show that government purchases via auctions could alleviate constraints on growth owed to lack of access to markets, letting firms know of potential markets or lowering barriers to sell in larger markets.

The effect of government purchases could be different for different types of firms. Hoekman and Sanfilippo (2018) found a robust direct relationship between government demand (by public agencies) and the performance of firms in the low-income Sub-Saharan Africa countries. They show that there exists a substantial heterogeneity across firms, and the relationship between sales to government entities and performance is more pronounced for firms at the lower bound of the productivity distribution. Fadic (2018) using data on Equador's public procurement auctions demonstrates that positive demand shocks associated with government contracts are seen as shortterm ones.

In all countries, the public procurement system is used to support certain types of firms or firms in targeted industries. At the same time, government support could be ineffective if the underlying mechanisms allow inefficient firms to receive support via the public procurement system and help them survive in the market. By supporting all firms with no regard for their efficiency level and potential of productivity growth, local authorities or

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the federal government could, under certain circumstances, act as an additional impediment to creative destruction.

If the public procurement system protects an inefficient firm, reducing competitive pressure in a specific industry, then inefficient incumbents stay in the market longer, preventing the entry of new, more innovative and productive companies. In the Russian case, procedures for allocating government procurement contracts are not always transparent, helping to keep afloat less efficient firms which would otherwise exit the market.

Hypothesis 2. Involvement in public procurement helps inefficient firms stay in the market longer.

In addition, local authorities' objectives (supporting employment in incumbent companies or corruption schemes in the public procurement system) may run counter to mechanisms fostering economic growth. In low-income regions, the local government could act as a monopolist in the market, and in this case, its willingness to award contracts to local companies could have a discouraging effect on the creative destruction process.

Hypothesis 3. Local authorities have more incentives to support firms in the home region and thus intervene in the market mechanism of creative destruction.

Data

To conduct this study, three databases were combined: firm level data from balance sheets used to estimate productivity growth and the efficiency level for each firm, data on each firm's entry in and exit from the market, and information on participation of a firm in government procurement auctions.

Firm level data

The stochastic frontier analysis uses data from the RUSLANA database. In this study, the estimations are conducted using data from Russian firms' balance sheets for eight years from 2008 to 2015. The RUSLANA dataset contains information on firms' sales, fixed assets, the number of employees, and the cost of goods sold. For the purposes of my research I limit the sample to the non-farm nonfinancial sectors to be able to estimate stochastic production functions using a standard set of output (value added) and inputs (labour and capital).

The RUSLANA database does not include data on the payroll fund for the entire period of observation. At the same time, Rosstat collects data on average wages separately for each of the Russian Federation's regions, providing a fairly detailed breakdown by industry. This allows proxying the labour costs by multiplying the number of the firm's employees by average wages in the region's relevant industry. Therefore, value added for a firm is calculated as the difference between total sales and the cost of goods sold plus labour costs.

To estimate the parameters of the production functions, this study uses data on value added, capital and labour. For capital and labour inputs, the real fixed assets and the number of employees are used.

The value added numbers are deflated by industrial PPIs for mining and quarrying, manufacturing, and electricity, gas and water supply, and by the SNA deflators for the other sectors. The deflators for capital are obtained from the data on nominal capital stocks and volume indices of capital stocks which are published by Rosstat at the sectoral level. Since all methods of estimating the production possibility frontiers are very sensitive to outliers, I exclude from the sample 0.5% of firms with the largest total sales and 0.5% of those with the lowest sales each year.

The final sample ranges from 127,570 firms in 2008 to 187,960 in 2015 and fairly accurately represents the industrial structure as shown by Rosstat data, with a slight bias towards manufacturing at the expense of business and personal services.

Data on exits and entries

The panel based on the RUSLANA database is unbalanced, and data for a certain part of firms are not available for the entire period of observation. If a firm stops reporting in a certain year it does not necessarily mean that it has exited the market. For this reason, in the next step, I combine my estimations of firms' efficiency levels with information on the dates of a firm's incorporation and its removal from the Unified State Register of Legal Entities.

Most firms established in the Soviet period went through mass privatisations in 1992–1994 and were supposed to reregister as part of the privatisation process. For these firms, the date of incorporation will reflect the date of privatisation rather than that of establishment. The share of such firms in the sample is 9.5%. A large part of firms in the Russian economy (41%) were established in the 2000– 2007 period of economic growth, and a third of the firms were established after the 2008 crisis.

Since the productivity and efficiency indicators are estimated for the 2008–2015 period, the companies liquidated before the year 2008 are excluded from the analysis. As of 2016, 3.5% of the firms in the sample exited the market (see Table 1). The average age of a firm is 11 years. The maximum age at exit for the firms in the sample is 24 years.

Government Procurement Contracts

The data on the winners of government procurement contracts are taken from the SPARK Marketing dataset. This dataset contains information on public procurement purchases with very detailed data for each contract since 2011. Public procurement is governed by two laws in the Russian Federation: Federal Law 44 and Federal Law 223.2 The former details the entire procurement process, from planning to the performance of contracts. The latter only addresses certain types of suppliers and contracts and is less strict in the sense that it only governs the general principles of the procurement process. According to the official statistics,3 in 2015, most contracts signed under Federal Law 44 provided

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for purchases from a sole supplier, open tender, requests for quoting price, or an electronic auction. Under Federal Law 223, the most popular types of contracts in 2015 were purchasing from a sole supplier and requests for quotation.

In my analysis, I use information on the auction winner, the date of the contract, and the contract customer's region for the 2011–2015 period.

The dataset on government procurement contracts was linked to firm level data on productivity growth using information on the winner identification code (INN). One third of the firms from my sample participated in government procurement (see Table 2) in 2011–2015. Among firms that were awarded government contracts during these years, 24% obtained contracts under Federal Law 223, 34% won contracts under Federal Law 44 and a large share of firms (41%) were awarded contracts under both laws. Since a very significant share of firms in the sample were awarded government contracts under rules set forth in both laws on public procurement, I do not make a distinction between them in my analysis.

The SPARK Marketing dataset also contains basic information on contract customers, and in some specifications, I limit the sample to firms located in the same region as the contract customer.

Empirical Strategy

This study is comprised of two steps. In the first step, I estimate productivity growth and efficiency at the firm level. In the second step, I estimate survival functions for firms belonging to different efficiency groups and analyze the effect of involvement in the public procurement system on firm dynamics taking into consideration firms' efficiency level.

Estimation of TFP growth and the efficiency level

I use the stochastic frontier approach to evaluate TFP growth and the efficiency level for each firm. The deterministic part of the production function is modelled as a translog function of three parameters – labour (L), capital (K), and time (t). The inefficiency term is modelled as a function of firm-specific variables and time following Battese and Coelli (1995). Under these assumptions, TFP growth could be decomposed at the firm level into three components (see Kumbhakar and Lovell (2003)): technological progress (shift of the production frontier between two periods), change in technical efficiency (change in the distance to the frontier which is moving itself) and the return to scale term.

Another feature of the stochastic frontier estimations is that under this approach the group of leaders which define the stochastic frontier is determined taking into account the position of the firm over the entire period of observation, which makes this group quite stable. Firms enter this group but rather rarely exit it. This contrasts with other methods of identifying efficient firms in an industry, under which entries in and exits from this group occur more often and firms which have only temporary efficiency gains can be assigned to the group of technological leaders.

Stochastic production functions are estimated separately for 282 industries,4 mainly for three- or four-digit industries under NACE 1.1 classification. Using the estimated parameters of the stochastic frontier, the TFP growth rates and technical efficiency (defined as the distance to the industryspecific frontier) for each firm are computed.

Exits and government procurement contracts

The second part of the paper uses the survival analysis to look at whether a firm's exit from the market depends on its efficiency level. In the survival analysis, the hazard rate at age t is the conditional probability of exit at age t after having survived until that age, and the survival rate at age t is the probability of surviving until age t. In this study, the age of a firm is measured in years and calculated as the year of observation minus the year of incorporation of a firm.

I use a proportional hazard specification in which the hazard function is a product of the baseline hazard and a term that shifts the baseline hazard in accordance with the influence of various covariates. The baseline hazard is a function of a firm's age:

$$\gamma(t, x, \beta, \gamma_b) = \phi(x, \beta)\gamma_b(t),$$

where γ is the hazard rate, γb is the base hazard function, corresponding to $\phi(\cdot) = 1$, $\phi(x,\beta) = ex'\beta$, x is the vector of explanatory variables, and β is estimated coefficients. My estimations are based on Cox proportional hazard model. This is a semi-parametrical approach under which the parametrical form of the base hazard function is left unspecified.

The baseline model estimates the effect of a firm's efficiency level on the hazard ratios. Then I analyse how access to additional financing from government procurement contracts affects hazard ratios. To test this hypothesis, a dummy for obtaining a government contract and a cross-term of this variable with a firm's efficiency level are added to the regression.

Involvement in public procurement may have an immediate effect on firm dynamics, whereby winning a government contract helps a firm to survive in the year when the contract was awarded. But it could also have a prolonged effect, i.e., the position of a firm in the market in terms of its survival rate improves for a longer period after winning the government contract. To estimate these effects, two explanatory variables are constructed.

In analyzing the immediate effects, the dummy for a government contract equals 1 if a firm wins a government procurement contract at least once in each year from 2011 to 2016 and 0 otherwise. In this case, the failure event is an exit from the market in the year subsequent to the year of obtaining the contract. This approach also relies on the features of longitudinal data, allowing the time variant covariates (firms' efficiency levels in different years) to be included in the model.

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In analyzing the prolonged effects, the dummy for a government contract is defined in a slightly different way. It equals 1 if a firm obtained a government procurement contract at least once in the 2011–2015 period and 0 otherwise. Under this setup, the failure event is an exit by the end of the period (i.e., 2016). In this case, the estimations for the last observable year were used for the efficiency level of a firm. Summary statistics and regression results are reported for both setups.

In addition, the effect of winning the contract in the home region was tested. In this case, the group of firms which obtained contracts in other regions than those where they were registered or both in home and some other regions were excluded from the sample. The corresponding group is the same as in the other specifications – firms that did not win government contracts during the period under study. In all the estimations I control for the sector in which a firm operates and the size of the firm by including the corresponding sector and size dummies. The distribution of firms by sector and size is reported in Table 2.

Results

Productivity trends based on micro level estimations

The average TFP growth rates estimated under the stochastic frontier approach remained negative over the entire period of observation (see the left panel in Figure 1). After the 2008 crisis, a productivity decline was quite significant at about 5–7% each year over the 2009–2011 period. In the following years, the rate of TFP decline was slower, with growth remaining negative until the end of the period under analysis. At the same time, it can be seen from the decomposition of the TFP growth rates that the Russian economy currently sees technological progress, with the rate of technical change remaining positive and even continuing to accelerate over the 2009–2015 period (see Figure 1).

The stochastic frontier approach reveals that the negative average TFP growth rates stem from a significant negative impact of the inefficiency component5 rather than lack of technological progress. As can be seen from Figure 1, the change in technical efficiency was negative, with the average efficiency level falling 12%–13% annually. This means that the stochastic frontier is moving up because the most efficient firms in the sample are improving their productivity but other firms are not catching up with them and the distance to the frontier keeps increasing.

Thus, productivity growth trends for Russia are similar to the results obtained for other countries (see Andrews et al. (2016) and Berlingieri et al. (2017) for OECD countries, Decker et al. (2016) for US, Gamberoni et al. (2016) for EU countries). The Russian specific is that the average productivity growth rates are lower (staying in negative territory over the entire period of observation) than in developed countries where very low but positive productivity growth rates are reported. It could reflect the fact that the gap between more efficient and less efficient firms is larger in the Russian economy and the slowdown due to the negative impact of laggards is stronger.

TFP growth in efficiency groups

Using the estimations of the efficiency level for each firm from stochastic frontier analysis the sample was divided into three categories to compare productivity trends in the efficiency groups

• Leaders. Top 10% of firms with the highest technological efficiency (closest to the frontier in the industry)
• Baseline group. Firms with an efficiency level of 20% to 90%
• Laggards. Bottom 20% of firms with the lowest technical efficiency.

These groups are defined within each industry for which the stochastic frontier functions were estimated. The accumulated TFP growth rates for each group are presented in Figure 2.

Trends presented in Figure 2 reveal that the gap between leaders and the other groups kept widening in 2009–2015. Comparison between trends based on simple averages and weighed by value added average TFP growth rates provides evidence that more efficient firms not only grow faster but also increase their market shares. At the same time, the market share of laggards is shrinking but they do not exit the market.

Efficiency, exit rates and government purchasing contracts

Exits by efficiency groups

In the next step, I analyze firm dynamics, comparing survival functions for different efficiency groups. The nonparametric Kaplan-Meier survival estimates are presented in Figure 3. In the entire period sample, where the efficiency levels are taken from the last year observed, the unrestricted survival estimates for laggards are higher than those for the baseline group and leaders. When I estimate the immediate effect of efficiency levels on exit using a yearly sample, the difference between laggards and the baseline group is no longer so pronounced.

Regression analysis using the Cox proportional hazard model does not show lower hazard rates for less efficient firms (see Table 3). If the control variables for the firm's size and sector are included in the analysis in the entire period setup, the differences in conditional probabilities of exit for all three efficiency are not significant. In the short run, the hazard ratios are higher for both leaders and laggards than for the baseline group of enterprises.

It is interesting that under both setups the conditional probability of exit is higher for a leader than for the other groups, though not always significantly. There may be two different interpretations of this fact. One is that the leaders may operate in markets with a stronger competitive pressure and more intense firm dynamics. The other is that a fast growing but not a big enough leader could attract attention of large companies or firms affiliated with regional authorities and go through a friendly or hostile acquisition, which

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means that it does not exit the market but changes the tax identification code and is not seen as a separate entity in the sample.

In the short run, the hazard ratios are higher for the least efficient firms than for the baseline group. In examining the prolonged effects, the hazard ratios for laggerds are not significantly different from those of the baseline group and the group of leaders.

In the Russian economy, the creative destruction mechanism seems to work in the way opposite to what is conventionally expected. The relationship between a firm's efficiency level and conditional probability of its exit is counterintuitive. The most efficient companies quit markets at a faster pace than average companies in the economy. At the same time, the conditional probability of exit of laggards is in the short run comparable with that of leaders and in the long run the hazard ratios for the least efficient firms do not differ from those for the more efficient groups.

Government purchasing contracts

This section analyzes the impact of government purchasing contracts on exit rates. In Russia, the public procurement system accounts for a significant part of GDP, and a large number of firms are   involved in it. In my sample, 35% percent of firms were involved in public procurement in 2011–2016 (see Table 4). After the sanctions were imposed on Russia, the role of public procurement as an instrument of economic policy to support enterprises affected by the sanctions became more evident. The effectiveness of this economic policy may be questionable if it affects firm dynamics through changing market mechanism of selection of more productive firms.

What kind of firms obtain government contracts

It can also be seen from Table 4 that that the percentage of firms with government contracts is higher among the most efficient firms (44%) and lower among laggards. Still, a quarter of the least efficient companies were awarded government contracts in 2011–2016. I also check which types of firms obtain government purchasing contracts more often than other companies using a simple logit model. Here the dummy for winning a government contract at least once in the period from 2011 to 2016 is used as a dependent variable. Estimation results are presented in Table 5.

The results of the regression analysis are in line with the summary statistics. The probability of being awarded a government contract is 2.6% higher for leaders and 7.2% lower for laggards in comparison with firms form the baseline group. The corresponding coefficients are significant although the magnitude of the effect is not that large, especially for leaders.

The probability of getting a government contract increases with a firm's size. Thus, the probability of being involved in public procurement in 2011–2016 was 42% higher for large companies than for micro firms. Sectoral distribution of the government purchasing contracts also agrees with intuition. Firms in the electricity, gas and water supply sector

win government contracts 39% more often than those in the wholesale and retail sector. The probability of being involved in public procurement is also slightly higher for manufacturing firms and companies from the business services sector than for those in trade. Firms from the extractive sector, hotels and restaurants, as well as the transport and communications sectors obtain government contracts less often than companies from the wholesale and retail sector.

Exits and involvement in public procurement

Here I move on to the analysis of how involvement in government procurement system affects the survival functions of firms with different efficiency levels. In this section, the conditional probability of exit at a certain age is explained by both the level of efficiency and winning government contracts. The non-parametric estimations of hazard ratios show that the probability of exit is lower for firms with government purchase contracts in all efficiency groups (see Figures 4 and 5). It can also be seen that for laggards the gap in hazard ratios between firms with and without government contracts increases with the age at exit. Inefficient firms without government contracts exit the market more often than leaders and firms from the baseline group but differences in the hazard ratios between different efficiency groups diminish for firms with government contracts. Figures 4 and 5 also show that if leaders are not involved in the government procurement system the hazard ratios for them are slightly higher than in the baseline group.

These patterns are similar for both immediate and prolonged effects. Also, in the yearly setup for the group of leaders, there is an additional decrease in exit hazards for firms with government   contracts among mature companies. In sum, the non-parametric estimations reveal a lower conditional probability of exit for mature inefficient firms with government contracts in both setups and a lower conditional probability of exit for mature firms with government contracts in the group of leaders in the entire period setup.

The results of the estimates of Cox proportional hazard model are presented in Table 6 (see columns (7)-(8) for the prolonged effects specification, and columns (9)-(10) for the immediate effects specification). As expected, winning a government contract reduces the immediate exit hazards by 59.5 percentage points, bringing down the prolonged exit hazards by 62.6 percentage points.

The coefficient by the cross-term for the leaders dummy and the government contract dummy is not significant in the yearly setup and negative and significant in the entire period setup. Thus the immediate effect of winning a government contract is not observed but in the long run involvement in the government procurement system helps the leaders to stay in the market longer and reduces the exit hazards for this group to the level of the other efficiency groups.

For laggards, winning a government contract reduces the conditional probability of exit in both the short run and the long run (the coefficient at the cross-term for the laggards dummy and the government contract dummy is negative and significant in both specifications). The exit ratios are already not much lower for the least efficient

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enterprises in comparison with the other efficiency groups but winning a government purchasing contract makes this difference in exit hazards statistically insignificant.

These results are illustrated in Figures 6 and 7, where the survival functions by efficiency group based on the Cox proportional hazard model are presented for the yearly and entire period setups, respectively. In the yearly setup (see Figure 6), if firms which do not win a government contract in the year under consideration are regarded, then the survival functions for leaders and laggards are below the survival function for the baseline group. For the firms with a government contract, the situation is the opposite: the laggards stay in the market longer than firms in the baseline group and the survival functions for leaders and baseline group firms are very similar.

In the entire period setup (see Figure 7) the survival functions for laggards and the baseline group are similar, and leaders quit the market at a faster pace than firms from the other efficiency groups. If firms which win a government contract at least once during the period under study are considered, then the most and least efficient firms stay in the market longer than firms from the baseline group.

I also check the effect of involvement in the government procurement system on firms' exits using a subsample of firms which win government contracts only in their home regions. The regression result for this specification for the yearly setup is presented in Table 6 (see columns (11)-(12)). It can be seen from the table that the exit hazards for leaders oriented to local markets are 27.4 percentage points higher than those in the baseline group. A possible interpretation is that if a leading company cannot go beyond the the borders of the local market it quits the market at a faster rate. At the same time, the effect of obtaining a government contract on leaders is positive and significant in this specification. And in total it offsets the negative coefficient at the dummy for leaders in this specification. The exit hazard is lower for laggards with government contracts in their home region, than for firms in the baseline group, and the magnitude of this effect is close to the estimates for the entire period sample.

The survival functions for the Cox proportional hazard model are presented in Figure 8. If firms are not involved in the government procurement system then the survival functions for leaders and laggards are below the survival function for the baseline group, with the leaders showing a worse performance than firms from the other groups.

Where firms manage to win a government contract in their home regions (and do not have them in other regions), the conditional exit probabilities for all efficiency groups become very similar, with laggards performing slightly better than companies from the other efficiency groups.

Comparison of different specifications suggests that the exit hazards are higher for the most efficient firms than for companies from the other efficiency groups. It may imply that leaders operate in more competitive markets and/or more often go through various types of mergers and acquisitions. Upon limiting my sample to firms with a government contract in their home regions I find that involvement in the government procurement

system reduces exit hazards of the most efficient firms. A possible explanation is that leading companies are affiliated with local administrations, which may protect them from a stronger competitive pressure and hostile acquisitions, thus influencing the creative destruction mechanism in local markets.

This study also shows that the conditional probability of exit for inefficient firms is not always higher than for those from the baseline group. In some specifications, the difference between these two groups is statistically insignificant. Thus, the survival analysis does not support the hypothesis that the exit rate for the least efficient firms, (20% from the bottom of the distribution) is lower in the Russian economy if involvement in the government procurement system is not taken into account. Comparison of the exit hazards among firms with a government contract shows that inefficient firms with government contracts stay in the market longer than companies from the other efficiency groups.

There could be two explanations for the finding that financing via a government contract helps inefficient firms stay in the market. First, laggard firms could be affiliated with authorities, and government contracts shelter these companies from competition. Second, local and regional governments may seek to replace social policy with support for laggard firms to avoid high unemployment in the region. In either case, additional government support reduces incentives for inefficient firms to innovate to win competition with more efficient market players and maintain a status quo with a high share of inefficient companies in the economy.

Conclusion

The results obtained confirm that productivity growth trends in Russia are similar to those in other countries with technological growth among leaders and an increasing productivity gap between leaders and other companies. The analysis of TFP growth dynamics provides indirect evidence that a significant share of inefficient enterprises in the Russian economy do not exit the market, continuing to use production factors inefficiently.

The survival analysis shows that the most efficient firms quit the market at a faster pace than firms from the other efficiency groups in the Russian economy. At the same time, inefficient enterprises do not face higher exit hazards in all the specifications and it often appeared that survival functions of the least efficient firm do not differ significantly from the baseline group companies.

I also show that involvement in the public procurement system significantly reduces exit hazards in all the efficiency groups. My analysis of government purchasing contracts suggests that local authorities support both leaders and laggards. In both cases, the strategy of local authorities intervenes in the market mechanisms and affects firm dynamics. Results based on public procurement data provide evidence that additional financing from government contracts helps both the most and least efficient firms to survive and shelters them from competitive pressure.

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The positive effect of winning government procurement contract for leaders in the short run is observed only for home region which seems to suggest that the public procurement system does not support all types of firms with growth potential but only those that are affiliated with local authorities.

Intervention in the mechanism of market selection through the system of public procurement may have a strong negative effect on economic growth, as it provides incentives for inefficient firms without growth potential to stay in the market longer, maintaining the gap in productivity between the leaders and other companies. After the sanctions were imposed on Russia, the role of public procurement as an instrument of economic policy to support enterprises affected by sanctions became more evident. My analysis shows that the efficiency of such economic policy is questionable if it affects firm dynamics through changing market mechanism of selection of more productive firms.

Literature

Acemoglu, D., Akcigit, U., Alp, H., Bloom, N., and Kerr, W. (2018). Innovation, reallocation, and growth. American Economic Review, 108(11), 3450-91.

Aghion, P., Cai, J., Dewatripont, M., Du, L., Harrison, A., and Legros, P. (2015). Industrial policy and competition. American Economic Journal: Macroeconomics, 7(4), 1-32.

Andrews, D., C. Criscuolo and P. Gal (2015), Frontier Firms, Technology Diffusion and Public Policy: Micro Evidence from OECD Countries, OECD Productivity Working Papers, No. 2, OECD Publishing, Paris, http://dx.doi.org/10.1787/5jrql2q2jj7b-en.

Andrews, D., C. Criscuolo and P. Gal (2016), The Best versus the Rest: The Global Productivity Slowdown, Divergence across Firms and the Role of Public Policy, OECD Productivity Working Papers, No. 5, OECD Publishing, Paris, http://dx.doi.org/10.1787/63629cc9-en.

Bartelsman, E., Haltiwanger, J. and Scarpetta, S. (2013). Cross-country differences in productivity: The role of allocation and selection. American Economic Review, 103(1), 305-34.

Battese, G. E., and Coelli, T. J. (1995). A model for technical inefficiency effects in a stochastic frontier production function for panel data. Empirical economics, 20(2), 325-332.

Berlingieri, G., P. Blanchenay and C. Criscuolo (2017), The Great Divergence(s). OECD Science, Technology and Industry Policy Papers, No. 39, OECD Publishing, Paris, http://dx.doi.org/10.1787/953f3853-en.

Cette, G., Corde, S. and Lecat, R. (2018). Firm-level productivity dispersion and convergence. Economics Letters, 166, 76-78.

Decker, R., Haltiwanger, J., Jarmin, R., & Miranda, J. (2016). Changing business dynamism: Volatility of shocks vs. responsiveness to shocks. Mimeo.

Fadic, M., Government Procurement and the Growth of Small Firms (2018). Available at SSRN: https://ssrn.com/abstract=3004959 or http://dx.doi.org/10.2139/ssrn.3004959

Ferraz, C., Finan, F., & Szerman, D. (2015). Procuring firm growth: the effects of government purchases on firm dynamics. No. w21219. National Bureau of Economic Research.

Gamberoni, E., C. Giordano and P. Lopez-Garcia (2016), Capital and Labour (Mis)Allocation in the Euro-Area: Stylised Facts and Possible Determinants, ECB Working Paper 1981, November 2016.

Hoekman, B., and M. Sanfilippo (2018). Firm Performance and Participation in Public Procurement: Evidence from Sub-Saharan Africa. Robert Schuman Centre for Advanced Studies Research Paper No. RSCAS 2018/16. Available at SSRN: https://ssrn.com/abstract=3157559 or http://dx.doi.org/10.2139/ssrn.3157559

IMF (2018). World Economic Outlook: Cyclical Upswing, Structural Change. Washington, DC, April 2018.

Kumbhakar, S. C., and Lovell, C. K. (2003). Stochastic frontier analysis. Cambridge university press.

Voskoboynikov, I. B. (2017) Sources of Long Run Growth of the Russian Economy before and after the Global Financial Crisis. Russian Economic Journal (Forthcoming).

Appendix
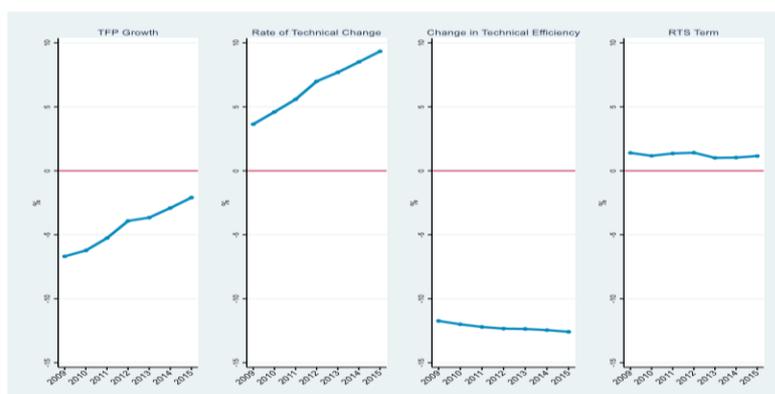
Figure 1. Average TFP growth and its decomposition.
Source: author calculations based on the stochastic frontier estimations.

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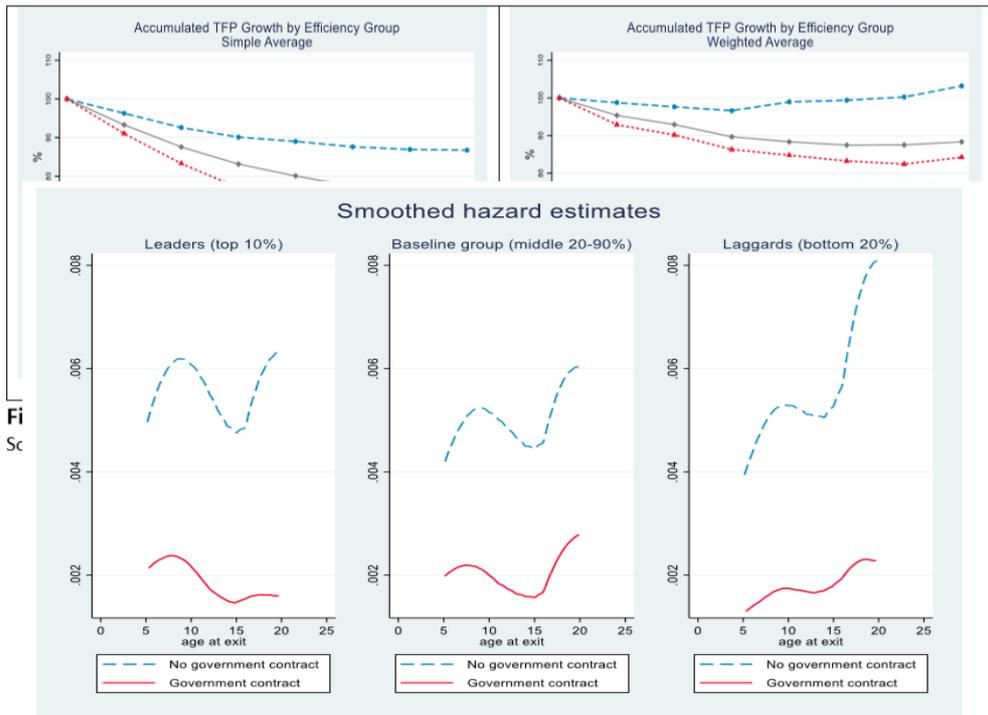
Figure 4. Smoothed hazard estimates by efficiency groups (yearly setup). Immediate effects.
Source: author calculations.
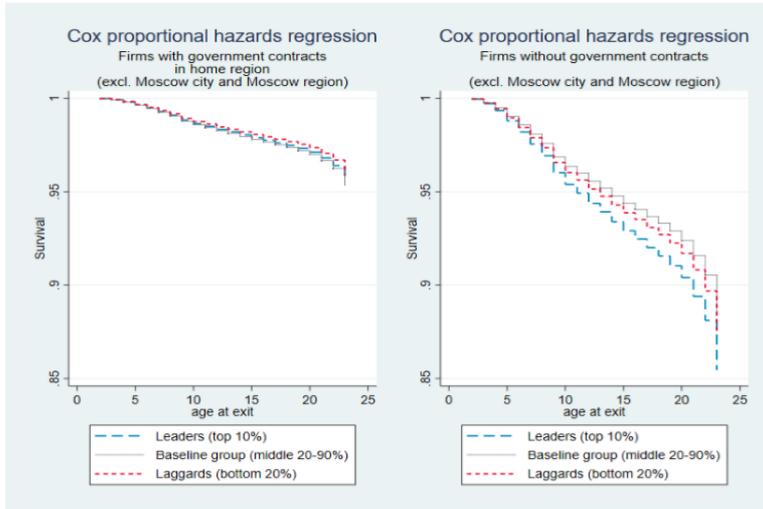
Figure 8. Survival function after Cox proportional hazard regression by efficiency groups for firms with government contract in the home region (yearly setup).
Source: author calculations.

Table 1

	Entire period setup (exit by 2016)				Yearly setup (exits in 2011-2016)			
	obs.	mean	min	max	obs.	mean	min	max
Number of firms	381389				289358			
Number of records	381389	1	1	1	1069862	3.7	1	4
Exits	13488	0.035	0	1	10281	0.036	0	1
Age at exit		11.1	1	24		10.4	2	23

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Table 2

Variable	Desription		Entire period setup (exit by 2016) percent of firms	Yearly setup (exits in 2011-2016) psercent of firms
Efficiency groups	Efficiency level groups based on the author estimations of distance of a firm to stochastic production posibilities frontier. Efficiency level varies from 0 (least efficient) to 1 (most efficient). Efficiency groups were defined within each indistry	Leaders (top 10%)	15.6	14.9
		Baseline group (middle 20-90%)	62.8	67.4
		Laggards (bottom 20%)	21.7	17.7
Government contract dummy	1 if the firm won government procurement contract at least once (i) in the period 2011-2016 for the whole period sample or (ii) in each year from 2011 to 2016 for yearly sample; 0 otherwise	0	64.8	83.2
		1	35.3	16.8
Government contract in home region dummy	1 if the firm won government procurement contract in home region at least once in each year from 2011 to 2016 in yearly sample; 0 otherwise	0		85.7
		1		14.3
Size dummies	Based on employment size groups in SPARK database: less than 10 employees - microfirms, 11-100 employees - small firms, 101-250 employees - medium firms, more than 250 employees - large firms	Micro	74.7	69.8
		Small	20.0	23.5
		Medium	3.1	3.9
		Large	2.2	2.8
Sector dummies	Sectors according NACE Rev. 1.1 Section C. Mining and quarrying	Sector C	1.0	1.1
	Section D. Manufacturing	Sector D	17.9	18.7
	Section E. Electricity, gas and water supply	Sector E	1.8	1.8
	Section G. Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods	Sector G	47.8	48.0
	Section H. Hotels and restaurants	Sector H	4.2	4.4
	Section I. Transport, storage and communications	Sector I	7.2	7.2
	Section K. Real estate, renting and business activities	Sector K	17.9	16.5
	Section O. Other community, social and personal service activities (in subsections 92 "Recreational, cultural and sporting activities" and 93 "Other service activities")	Sector O	2.3	2.4

Table 3

Dependent variable: firm age at exit	Entire period setup (exit by 2016)		Yearly setup (exits in 2011-2016)	
	Coef. (1)	Hazard ratios (2)	Coef. (3)	Hazard ratios (4)
Efficiency level[i], Leaders - top 10%	0.017	1.017	0.182***	1.200***
	(0.025)	(0.026)	(0.029)	(0.035)
Efficiency level, Laggards - bottom 20%	0.009	1.009	0.124***	1.132***
	(0.021)	(0.021)	(0.025)	(0.029)
Firm size[ii], Small	0.432***	1.540***	0.231***	1.260***
	(0.020)	(0.031)	(0.023)	(0.029)
Firm size, Medium	0.564***	1.758***	0.267***	1.306***
	(0.039)	(0.068)	(0.045)	(0.059)
Firm size, Large	-0.026	0.975	-0.341***	0.711***
	(0.057)	(0.056)	(0.067)	(0.048)
Sector dummies[iii]				
Sector C. Mining and quarrying	-0.564***	0.569***	-0.762***	0.467***
	(0.096)	(0.055)	(0.119)	(0.055)
Sector D. Manufacturing	-0.369***	0.692***	-0.429***	0.651***
	(0.024)	(0.017)	(0.028)	(0.018)
Sector E. Utilities	-0.195***	0.822***	-0.404***	0.667***
	(0.062)	(0.051)	(0.079)	(0.053)
Sector H. Hotels and restaurants	-0.636***	0.529***	-0.629***	0.533***
	(0.052)	(0.028)	(0.058)	(0.031)
Sector I. Transport and communications	-0.368***	0.692***	-0.380***	0.684***
	(0.037)	(0.025)	(0.042)	(0.029)
Sector K. Business services	-0.601***	0.549***	-0.599***	0.550***
	(0.026)	(0.014)	(0.031)	(0.017)
Sector O. Private services	-0.929***	0.395***	-0.948***	0.388***
	(0.071)	(0.028)	(0.080)	(0.031)
Number of observations	381,389	381,389	1,069,862	1,069,862

Cox proportional hazards model. Standard errors are in parentheses
'Omitted category: Baseline group (efficiency level between 20-90%). "Omitted category: Micro firms. "'Omitted category: Sector G. Wholesale and retail trade
*** p<0.01, ** p<0.05, * p<0.1

Table 4

| | Entire period setup (exit by 2016) | | Yearly setup (exits in 2011-2016) | |
| | Government contract | | Government contract | |
	no	*yes*	*no*	*yes*
All firms	64.8	35.3	83.2	16.8
Leaders (top 10%)	56.0	44.0	78.4	21.6
Baseline group (middle 20-90%)	64.0	36.0	82.7	17.3
Laggards (bottom 20%)	73.1	26.9	89.1	10.9

Table 5

| Dependent variable: | Entire period setup | |
| Government contract in 2011-2016 | *Coef.* | *Marginal effects* |
(yes 1, no 0)	(5)	(6)
Efficiency level[i], Leaders - top 10%	0.118***	0.026***
	(0.010)	(0.002)
Efficiency level, Laggards - bottom 20%	-0.354***	-0.072***
	(0.009)	(0.002)
Firm size[ii], Small	0.874***	0.200***
	(0.009)	(0.002)
Firm size, Medium	1.375***	0.321***
	(0.020)	(0.005)
Firm size, Large	1.825***	0.419***
	(0.026)	(0.005)
Sector dummies[iii]		
Sector C. Mining and quarrying	-0.448***	-0.088***
	(0.037)	(0.007)
Sector D. Manufacturing	0.131***	0.028***
	(0.010)	(0.002)
Sector E. Utilities	1.768***	0.393***
	(0.032)	(0.006)
Sector H. Hotels and restaurants	-0.614***	-0.117***
	(0.020)	(0.003)
Sector I. Transport and communications	-0.027*	-0.006*
	(0.014)	(0.003)
Sector K. Business services	0.096***	0.021***
	(0.010)	(0.002)
Sector O. Private services	-0.027	-0.006
	(0.024)	(0.005)
Constant	-0.874***	
	(0.006)	
Number of observations	381,389	381,389

Logit model. Standard errors are in parentheses
[i]Omitted category: Baseline group (efficiency level between 20-90%). [ii]Omitted category: Micro firms. [iii]Omitted category: Sector G. Wholesale and retail trade
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 6

Dependent variable: firm age at exit	Entire period setup (exit by 2016) All contracts		Yearly setup (exits in 2011-2016) All contracts		Yearly setup (exits in 2011-2016) Contracts in home region	
	Coef. (7)	Hazard ratios (8)	Coef. (9)	Hazard ratios (10)	Coef. (11)	Hazard ratios (12)
Efficiency level[i], Leaders - top 10%	0.091***	1.096***	0.193***	1.213***	0.242***	1.274***
	(0.029)	(0.032)	(0.031)	(0.038)	(0.038)	(0.048)
Efficiency level, Laggards - bottom 20%	-0.019	0.981	0.109***	1.115***	0.090***	1.095***
	(0.023)	(0.022)	(0.026)	(0.029)	(0.028)	(0.031)
Government contract dummy	-0.956***	0.384***	-0.903***	0.405***	-0.954***	0.385***
	(0.027)	(0.011)	(0.043)	(0.018)	(0.053)	(0.020)
Leaders X Government contract	-0.236***	0.790***	-0.118	0.889	-0.286**	0.751**
	(0.058)	(0.046)	(0.096)	(0.085)	(0.130)	(0.098)
Laggards X Government contract	-0.100*	0.905*	-0.239**	0.787**	-0.220*	0.803*
	(0.056)	(0.051)	(0.115)	(0.091)	(0.132)	(0.106)
Firm size[ii], Small	0.630***	1.877***	0.326***	1.385***	0.169***	1.184***
	(0.020)	(0.038)	(0.023)	(0.032)	(0.026)	(0.031)
Firm size, Medium	0.927***	2.527***	0.442***	1.556***	0.298***	1.347***
	(0.040)	(0.100)	(0.046)	(0.071)	(0.054)	(0.073)
Firm size, Large	0.432***	1.541***	-0.099	0.906	-0.349***	0.706***
	(0.058)	(0.090)	(0.068)	(0.061)	(0.083)	(0.059)
Sector dummies	yes	yes	yes	yes	yes	yes
Observations	381,389	381,389	1,069,862	1,069,862	785,820	785,820

Cox proportional hazards model. Standard errors are in parentheses
[i]Omitted category: Baseline group (efficiency level between 20-90%). [ii]Omitted category: Micro firms
*** p<0.01, ** p<0.05, * p<0.1

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Abstract

The study aims to explore the current fraud prevention trends in the Russian insurance industry. Survey responses from 20 experts and professionals of the leading insurance companies in Moscow were collected. More than a half of them are former police officers who work at security or investigation departments. Mainly qualitative analysis to process the data was employed. According to the experts' opinion, existing gaps in the legislation and difficulties in cooperation with the police are the main sources of inefficiency of fraud prevention strategies utilized by the Russian insurance companies. The respondents agree that both insurers and fraudsters actively use new technologies. Fraudulent claims in compulsory third party liability motor insurance remain the most common activity among Russian criminals, although they quickly expand to health and property insurance. Typically, an insurance fraudster is a 34-year old male with a college/university degree who cooperates with an insurance broker in 42 percent of cases. Based on this, a set of recommendations aimed at increasing the efficiency of insurance fraud prevention was produced.

Key words: Insurance fraud; Experts' Survey; Russia

Introduction

Insurance fraud induces significant financial costs all over the world (Brinkmann and Lentz 2006; Palasinski 2009). This category of crime typically takes place in a form of exaggerated claims, fabricated claims, deliberate injuries, multiple claims or misrepresentation of other kinds of insurance-related information (Derrig 2002). Since many cases of insurance fraud are not detected and prosecuted, accurate estimation of the severity of the issue is problematic (Derrig et al. 2006). Nevertheless, many agencies and insurance companies try to measure the size of the problem. This results in inconsistencies in insurance fraud data (Jay 2012).

According to the estimates of the Russian Central Bank, potential loss due to insurance fraud reaches 25-35 billion rubles ($650-910 million), while the actual loss is 15-20 billion rubles ($390-520 million). The Russian insurers managed to take only a quarter of these cases to court (The Agency of Insurance News 2014). The figure continues to grow over recent years. Such serious deterrents as fines and even prison, if deception is detected, do not submission of fraudulent claims by those who are searching for potential financial gains in Russia. The results of a cross-national survey reported by Dehghanpour and Rezvani (2015), suggest that Russia, the Czech Republic, Ukraine and Denmark have the highest rate of insurance fraud claims among 27 European countries.

Moreover, some Russians treat this crime category as a socially acceptable type of behavior. The same is true for other nations as well. Research in other countries has revealed alarming statistics concerning the public's attitude toward this crime. For example, in Canada, according to a recent study by the Insurance Corporation of British Columbia (CTV News 2018), 47% of people believe auto insurance fraud is an acceptable

practice. Miyazaki (2009) postulates that public acceptance is due to the negative perception of insurers. Publication of their high profits justifies consumer fraudulent activity and minimizes social pressure to investigate and prosecute insurance fraud-related issues. Similarly, Tennyson (2008) concludes that individuals with negative perceptions of insurance institutions express tolerant attitudes toward fraud more often.

These alarming facts allow arguing that one knows little which insurance fraud preventative strategies are currently are the most effective. According to Furlan, Vasilecas and Bajec 2011), there is a large gap in data collection that definitely causes challenges for fraud fighters. For example, since there are multiple agencies and organizations in the United States that collect fraud data, each insurance company has to devise its own reporting information, which is inconsistent and often inconclusive (Coalition Against Insurance Fraud 2012). This is an ideal environment for analysis, which will enable strategies to be developed to prevent insurance fraud from an experts' sample and bridge the existing knowledge gap.

Previous studies suggest that insurance companies have developed strategies in order to prevent this crime's negative financial impact (Bales and Fox 2010). Nevertheless, scholars have documented some current preventative strategies are ineffective (Palasinski 2009; Wilson 2009). These findings suggest that current insurance fraud preventative strategies need an update based on the current situation, which one can gain through, for example, surveying contemporary fraud fighters. Surprisingly, very few scholars draw attention to insurance fraud prevention in Russia and those who do, consider very limited issues (Rusetskaja et al. 2016; Finogenova and Garbuzov 2017; Dmitriev and Novikov 2018).

Therefore, the purpose of this study is to address this gap and get insights from the Russian key insurance fraud experts on the significant current patterns that would assist with insurance fraud prevention. Using survey data, this article addresses the following questions. First, what is the current situation with insurance fraud prevention in Russia? Second, how can one describe a typical fraud scheme in today's Russia? This study contributes to the following domains of research. The first one tries to depict fraudsters' profiles in different countries or industries (Pande and Maas 2013; Dehghanpour and Rezvani 2015; Button et al. 2016). Scholars from the second domain of studies investigate the factors affecting the size of loss due to different fraud categories including insurance (Akomea Frimpong et al. 2016; Timofeyev 2015; Tseng and Su 2014). The third stream of literature is aimed to reveal the causes of insurance fraud (Brinkmann and Lentz 2006; Farashah and Estelami 2014). Researchers from the fourth domain focus on insurance fraud detective and preventative techniques, methods and strategies (Theil 2007; Wilson 2009; Šubelj et al. 2011; van Capelleveen et al. 2016; Tang et al. 2017; Li et al. 2018; Warren and Schweitzer 2018).

In the next section, the insurance fraud is defined and classified. After that, different sources of information are examined to learn what has already been researched on the topic. Then, the survey and respective data, utilized in this study, are introduced. Next, the results are presented and discussed. The last section concludes.

Literature review

Insurance fraud: Definitions and classification

A lot of research papers have been devoted to the concept of insurance fraud and the multiple forms it may take. To start with, the International Association of Insurance Supervisors (IIAS) (2007) defines insurance fraud as "an act or omission intended to gain dishonest advantage for the fraudster or for the purpose of other parties". This may occur by the misappropriation of assets and/or insider trading; deliberate misrepresentation; suppression or non-disclosure of one or more material facts relevant to a financial decision or transaction, and abuse of responsibility, a position of trust or fiduciary relationship.

Derrig (2002) defined insurance fraud as a criminal act, which involves obtaining financial gain from an insurer or the insured party using misrepresentation of facts or false pretenses. It may not be obvious, but insurance fraud goes beyond simply illegal activities and involves various manipulations that are unnecessary and serve unethical purposes (Frees 2015). For instance, according to the explanation by Utah Insurance Department (2015), insurance fraud occurs when individuals deceive an insurance company, agent or other person in an attempt to obtain money to which they are not entitled. This happens when someone puts false information on an insurance application, and false or misleading information is given or omitted in an insurance transaction or claim.

In insurance literature, insurance fraud is usually grouped into four categories, namely, internal fraud, policyholder fraud, intermediary fraud and insurers' fraud (Yusuf 2011). Akomea Frimpong et al. (2016) united the last three categories under external fraud as it comes in the form of policyholder/consumer fraud, which is a fraud against the insurer in the purchase of an insurance policy or the execution of claims by obtaining wrongful coverage or payment (Derrig 2002). In addition, intermediary fraud is defined as fraud committed by insurance intermediaries (independent broker or independent insurance agent) against the insurer or policyholders (IAIS 2007).

Internal insurance fraud

There are many reasons for insurance industry employees to commit fraud in the workplace. Many research papers emphasize the role of either individual or organizational factors that influence a decision to behave in a dishonest way. Among individual factors, authors find values and beliefs to have the most significant effect. For example, recent findings support the theory that, if an employee lacks ethical values, he/she is more likely to consider committing fraud (Said et al. 2018). While this may not seem surprising, individual beliefs tend to make employees adhere more strictly to the corporate rules, avoiding misbehavior in the workplace (Said et al. 2017). Moreover, many researchers come to the conclusion that the lack of developed ethical education among employees make them more vulnerable to the idea of dishonesty to achieve their

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goals (Tseng 2017). Another reason for insurance fraud is the low self-confidence of insurance agents. Evidence suggests that workers who are unsure of their abilities to sell a product, tend to behave unethically with their clients to achieve sales targets anyway (Taek Yi et al. 2012). In order to avoid such situations, the reward structure should be changed, so that employees lose incentives for fraudulent behavior (Pendse 2012).

As for organizational factors, it was found to be typical for insurance industry to have an underdeveloped and highly departmentalized fraud management systems. These result in an inefficient communication between the organizational parts of insurance companies, which allows agents to engage in unethical behaviour with no immediate consequences (Oscelynn 2018). Furthermore, the issue gets worse, because in many companies a worker is not supposed to act when he/she suspects a co-worker is involved in an act of dishonesty. As a result, insurance agents continue with their fraudulent schemes which end up in huge losses to a company and the industry as a whole (Department of Insurance-California 2017). For insurance industry, it implies that a code of ethics is necessary to discourage fraud among insurance agents, which seems to be an effective way to combat the issue at a corporate level (Cheng et al. 2013).

Customer (external) insurance fraud

An important feature of the insurance industry is the high level of customization of its product. For some consumers, it leads to confusion from not being able to make a proper comparison of what is offered to them (Einav et al. 2010). Potentially, it means that consumer fraud is not always planned ahead. For instance, one may consider insurance-related relationships from a co-creation perspective, when customers are not simple recipients of insurance products. It implies that, when the proposition of value made by an insurer lacks some information or is not fully understood by a customer, there is a higher probability of unethical behaviour coming from clients (Lesch and Brinkmann 2011), who had no prior intention to behave fraudulently. To look at the issue from a different side, data from the US suggests that, when an insurance contract is signed in a state with a high level of corruption, individuals are more willing to break the law, because it feels safer for them than in other regions (Goel 2014). In fact, the influence of society is crucial when considering external fraud. Consumers are found to be more likely to perform unethically if they come from countries where common values seem relatively unimportant (Zourrig et al. 2018). According to the research on European countries, our individualistic beliefs to some extent are formed by our close peers, who influence our inclination to behave in dishonest ways with insurance companies (Dehghanpour and Rezvani 2015). The same can be said about employees, whose working environment affects the way they treat clients and ethics. For example, the researchers in France came to an interesting conclusion that, when some types of clients are marginalized by insurance procedures in a company, they are inclined to fraudulent behavior in order to get a product they want (Cova et al. 2016).

Insurance fraud detection

A lot of literature is devoted to the ways insurance fraud acts can be detected. The significance of the issue, for insurance companies and policyholders, is undoubted, because an increasing number of detected fraudulent claims serves to prevent the public from attempting dishonesty in the future (Warren and Schweitzer 2016). The most popular technology-based approaches to combat insurance fraud can be divided into data mining; profiling and supporting tools, such as visualization (Ormerod et al. 2012). Although the use of IT has become more helpful in fraud detection in recent years, a number of researchers show that human participation is needed there, not only for a more efficient quality management of insurance claims, but also to increase the awareness of the public of the consequences unethical behavior may have (Skiba and Disch 2014). The data shows that, for example, collusion between policyholders and service providers is very common and is difficult to detect because of its manipulative nature (Picard and Wang 2015), thus, it should be done by humans. In general, corporate fraud, including the one in the insurance industry, is closely embodied in societal relationships, making it necessary to consider interpersonal connections to make fraud detection faster and more efficient. According to the latest findings, old methods, such as a referral to financial documents, do not provide all the information needed, and the use of media platforms and personal interview is suggested (Dong et al. 2018). This, however, presents a challenge for the industry. Insurance is based on trust, and, according to Palasinski and Svoboda (2014), customer surveillance, while being thorough, risks being too intrusive and may deter potential clients.

Methods and data

Survey

A survey was deemed the most effective method for collecting data to address the research questions posed. A survey was designed and conducted to collect data about the current trends in insurance fraud prevention in Russia. 20 industry professionals completed the questionnaire while attending one of the regular insurance professionals' Moscow conference on November 19, 2018. This figure accounts for around one third of the total number of the attendees and around ten percent of the overall industry professionals Club's members. The survey questionnaire in English is available in the Appendix. The first set of questions is similar to the ones by Skiba and Disch (2014) and includes a wide range of questions related to barriers of fraud prevention. The second set of questions relates to the last examined fraudulent case. This is somewhat similar to the bi-annual surveys conducted by the Association of Certified Fraud Examiners. In addition, demographical data was collected to characterize the experts' profile.

A sampling procedure, used to select insurance fraud experts, was based on the following inclusion criteria: employed in the insurance fraud industry for at least three years, active with industry associations, and have held or currently hold an investigative position. This was a qualitative study rather than quantitative because of the low number of participants.

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Survey research methods are commonly used in social sciences, including fraud-related research, as scholars and professional associations rely on experts' reports to assess many constructs (e.g., ACFE 2018). These researches are based on the assumption that the data from these surveys represent participants' evaluations and responses to the survey items, and that the data and conclusions drawn from them (for instance, about relations between substantive variables) are unbiased (i.e. free from systematic inflation or deflation due to factors unrelated to the focal variables). This assumption might be violated due to the presence of the following factors. The first one is common method variance, i.e., variance that is attributable to the measurement method rather than to the constructs the measures represent (Podsakoff et al. 2003; Podsakoff et al. 2012). The second factor is nonresponse bias, which occurs "when the individuals responding to a survey differ from non-respondents on variables relevant to the survey topic" (Rogelberg and Luong 1998: 60–61). The third factor is insufficient effort responding, which refers to a type of survey responding in which the individual does not pay attention to or read the items and/or the item instructions prior to responding to the item (Bowling et al. 2016; Huang et al. 2015; Huang et al. 2012; McGonagle et al. 2016).

Although the number of experts who participated in our survey was limited to the number of the conference attendees matching the specified inclusion criteria, it was ensured that the factors mentioned above did not take place. First, the participants were not under the time pressure so that they submitted the filled-in questionnaire upon completion by the end of the conference. In addition, we offered detailed instructions, if a participant was unsure about the meaning of any of the questions. Second, the answers were compared with the ones obtained during a pilot study conducted at the headquarters of a large Russian insurance company in order to avoid nonresponse bias. This comparison showed that the results of both studies are similar. Third, the effort can be justified by the average number of words received per open-answer questions, which was equal to 78.55 (see Table 1 for details). Moreover, the questionnaire was designed in a way to include several questions on each of the main aspects of the research (such as tendencies identified and strategies to combat fraud). It was done to (a) ensure truthfulness of participants' answers; (b) gain deeper understanding of the issue; and (c) make the use of qualitative nature of the study.

Table 1. Summary statistics for the number of words in the open questions

Variable	Obs	Mean	Std. Dev.	Min	Max
Number of words in Q1	20	9.05	6.091	0	19
Number of words in Q2	20	14.25	10.036	1	40
Number of words in Q3	20	14.06	14.125	0	52
Number of words in Q4	20	14.95	22.301	0	102
Number of words in Q5	20	9.08	9.919	0	31
Number of words in Q6	20	9.35	8.113	0	33
Number of words in Q20	20	6.55	8.739	0	30
Total number of words per respondent	20	78.55	57.271	7	253

Last, but not least, an advantage of the survey employed in this study was that the respondents were asked not to interact while filling out the questionnaire form. As they followed the suggested procedure, one or more strong personalities were unable to sway the other experts and skew the results (Lewis 2009; Glicken 2003). This was done in order to ensure the validity of the results, which is often viewed as one of the strengths of qualitative research as it attempts to determine whether the findings are accurate from the researcher's and the participant's perspectives (Creswell and Creswell 2017; Crotty 1998).

Russian insurance expert's profile

Table 2 provides detailed information on the sample. All the experts work at the leading Russian insurance companies in Moscow. On average, the expert is a male (60%) aged 41 (in the range between 26 and 60) who has higher education (90%), in either law/law enforcement (55%) or economics/management/administration (35%). Their average experience in the insurance industry is 10 years (ranging from four months to 26 years). (See Table 7). The respondents with few or unspecified years of experience in insurance reported, were included because they hold senior positions and, thus, one can treat them as professionals. More than half of them (55%) are former police officers who work for insurance companies in security and investigation services departments. The vast majority of the experts, among those who mentioned their position, are either senior specialists or department heads.

Table 2. Sample demographics

Gender	Age	Education	Specialties	Years of Experience	Department	Position
Female	-	D.Sc.	Finance	26	University	Professor (former Senior Specialist)
Female	45	Degree	Economics, Law	20	Human Resources	-
Female	43	C.Sc. (PhD)	Economics	20	Internal Audit	Internal Controller/Auditor
Male	50	Degree	Law, Sociology	18	Security Service	Head of Department
Female	33	Degree	Law	13	Loss Adjustment	-
Female	-	Degree	Mathematics	13	Security Service	Employee
Male	45	Degree	Pedagogics (Physics And Mathematics), Law	12	Security Service	Head of Department
Male	40	Degree	Engineering	11	Security Service	Head of Department
Male	44	MBA	Management, Business Administration	11	Security and Investigation	Head of Department
Male	60	Degree	Law, Law Enforcement	10	Information Security and Insurance Control	Leading Specialist
Female	31	Degree	Economics	10	Internal Control	Methodologist
Male	56	Degree	Law	8	Security Service	Head of Security Service Affiliation
Male	37	Degree	Information Security	5	Security Service	-
Male	46	Degree	Law Enforcement	5	Internal Control	Head of Department
Male	30	Degree	Law	5	Security Service	-
Male	34	Degree	Law	3	Internal Control	-
Female	41	Degree	Economics	3	Internal Control	Internal Controller/Auditor
Female	26	Degree	Economics, Accounting, Audit	0	Fraud Prevention	Senior Specialist
Male	30	Degree	Law, Law Enforcement	0	Security Service	Senior Specialist
Male	-	Degree	Law	-	Security Service	Head of Department

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Results and discussion

Trends

Fraudsters constantly change the way they work, and insurance companies have to keep up with the new methods used by the fraudsters as well as with the latest technologies. One can observe a wide use of modern advanced technologies by both fraudsters and insurance companies. Only 2 out of 13 (15%) professionals mention poor technical equipment used by insurance companies in fraud prevention. Despite experiencing technical challenges, relating mostly to "software maintenance", insurers continue the extensive implementation of fraud detection software to reduce their losses. A similar trend exists nowadays in the US (FRISS 2018). As mentioned by some respondents, automation of fraud prevention system becomes more common. At the same time, respondents noticed that IT was used by fraudsters to create more sophisticated schemes.

Predictably, complex data analysis is the most widely used method and considered the most effective for insurance fraud prevention. More than half of the experts mentioned this, either directly or indirectly. This is in line with a recent FRISS' Report (2018), according to which, in 2018, 32% of US insurers used predictive modeling for fraud detection. Previous research documented, that, for many insurers, statistical data analysis is the primary method of fraud prevention, which appears somewhat ineffective, given that they lack a human-based component (Morales and Hurtado 2012; Morley, Ball and Ormerod 2006).

One third of the experts think that fraud in the compulsory third party liability motor insurance is the most popular nowadays in Russia. Button et al. (2017) documented the similar trend in Australia, the UK, and the US. Porrini (2014) provided an explanation for a relationship between premiums and compensation costs existing in Italy: insurance premiums follow the trend of accident frequency and the average cost of claims.

However, two experts referred to a change in practice of Russian 'crook' lawyers, who typically benefit from purchasing the victim's right to claim loss in cases related to compulsory third party liability motor insurance1, by taking other cases relating to other types of insurance, such as life insurance.

The following trends were identified, with respect to the insurance fraud schemes with multiple perpetrators. Firstly, the creation of organized crime groups, which include either insurance companies' employees, public sector employees, police officers or any or all of the above. Secondly, it was reported that groups were created for the purpose of defrauding, in which (some) participants were unaware of their involvement. Thirdly, it was noticed that insurance fraudsters tended to operate in groups and in more

sophisticated ways. This can include collusion with medical doctors and conducting trans-border fraud.

Next, the experts' views on the frequency of the observed insurance fraud cases was summarized (see Table 3). The majority (60%) of experts were of the opinion that the frequency of insurance fraud in Russia is increasing nowadays in Russia. They argued that this trend took place because of "deterioration of economic situation in the country" (3 experts); *"insurance compensations"* (2 experts); *"lack of specialists"* and *"inefficient monitoring procedures"*. One expert explained frequency growth by the fact that *"[insurance] fraud [...] is an easy way to steal money without being punished".* A quarter of experts mentioned that the frequency of insurance fraud in Russia remained stable. Interestingly, one of them claimed that "increasing of insurance fraud can be fought through interaction with the police, municipal authorities, courts, insurance companies under the All-Russian Union of Insurers and the Central Bank". Another expert, however, reported that *"insurance fraud spills over from one category to another, from compulsory third party liability motor insurance to life insurance. When barriers are activated there, it spills over to reinsurance".* Based on this, one can conclude that despite all the successes in fraud prevention, most Russian insurers nowadays do not catch up with the fraudsters.

Table 3. Distribution of experts according to the frequency of insurance fraud perception (Q3)

	Freq.	Percentage
Frequency increases	12	60
Frequency does not change	5	25
Frequency decreases	3	15
Total:	20	100

6 out of 14 (43%) experts consider the imperfection of legislation as one of the most important barriers of insurance fraud prevention. In particular, they mentioned *"insufficient regulation regarding the creation of the Insurance Histories Bureau"*, *"difficulties experienced by insurance companies in obtaining information from state institutions"*, *"difficulties in launching a criminal investigation"*, *"underdeveloped legislation for the prosecution of people accused of fraud"*. A quarter of experts were disappointed with the work of the police in the insurance fraud prevention field. Basically, these barriers corresponded to the ones listed in a recent official Annual Report of the Russian Union of Motor Insures (RSA 2017). When considering the legal/political/social environment in general, only half of the experts were of the opinion that it promotes fighting insurance fraud (see Table 4).

Table 4. Distribution of experts according to how they view the effect of environment (Q2)

	Freq.	Percentage
Environment helps to prevent insurance fraud	10	50
Environment does not help to prevent insurance fraud	8	40
Environment helps to some extent	2	10
Total:	20	100

Specifically, a quarter of the respondents considered social environment to be a barrier for fighting fraud, because Russian society is loyal to insurance fraudsters, as this is not considered to be a serious crime. Interestingly, there is a dissonance in the experts' opinions about the effect of legal environment. While 20% of them share the opinion that it supports fighting insurance fraud, 30% see only the negative effects of the legal environment pointing toward *"gaps in legislation"* and *"protection of fraudsters by the Russian customer rights protection law"*. Regarding the effect of the political environment we got only one generally negative comment, while the other respondents preferred to keep silent on this particular aspect. In general, the fraud fighting efficiency in Russia scored 2.895 (on a scale from 1 to 5) from the experts (see Table 7).

The question about disappointments relating to experts' fraud fighting activities, helped us to gain deeper insights into the barriers underlying insurance fraud prevention in Russia. 16 informative answers can be summarized as follows (see Table 5). 4 out of 16 experts (25%) suffered from the way the police acted with respect to insurance fraud (*"incompetency of police officers, who do not want and cannot investigate insurance fraud"*; *"inaction of the police regarding submitted statements on insurance fraud"*; *"irresponsible attitude to the consideration of insurance crime reports"*; *"stupidity of the police"*). 4 out of 16 (25%) respondents felt frustrated about the internal attitude towards fraud ("loyalty of the top managers towards existing [insurance fraud]"; *"impossibility of persuading the [victim] company to start [criminal] investigation"*; *"absence of necessary strictness from the side of some [internal] services"*). 4 out of 16 experts (25%) experts mentioned a lack of cooperation among insurance companies, *"even if they know they have been victimized by the same fraudsters"*, and insurance companies and other potentially interested parties like banks, governmental authorities and medical organizations. Three out of 16 (19%) of experts were disappointed with the courts (*"engagement of courts"; "courts are not on the side of insurance companies"*, etc.). Finally, 3 out of 16 (19%) respondents were disappointed with the existing legislation (*"the Criminal Code does not work"*; *"underdeveloped legislation"*; *"gaps in legislation"*).

Table 5. Distribution of experts according to the reason of their disappointments (multiple answers were possible) (Q6)

	Freq.	Percentage
The way the police fights insurance fraud	4	25
The corporate attitude towards insurance fraud	4	25
Lack of cooperation among parties potentially interested in insurance fraud prevention	4	25
The way the courts act in insurance fraud-related trials	3	19
Underdeveloped legislation	3	19

Common sense suggests that fraud prevention is a joint task for the Central Bank, the police, relevant governmental bodies and insurance companies themselves. In line with this, the vast majority mentioned either one or a combination of those listed above.

However, remarkably, three out of 20 (15%) experts shared the opinion that nobody is responsible for insurance fraud prevention in Russia (see Table 6).

Table 6. Distribution of experts according to how they view who is responsible for insurance fraud prevention (multiple answers were possible) (Q8)

Responsible authority name	Freq.	Percentage
The Central Bank	7	35
Insurance companies	7	35
All-Russian Union of Insurers (RSS) and/or Russian Union of Motor Insures (RSA)	7	20
The Police or Federal Security Service	2	10
The Federal Financial Monitoring Service (Rosfinmonitoring)	1	5
Nobody	3	15

Russian insurance fraud scheme profile

Among the cases investigated by the experts, the majority relates to either compulsory third party liability motor insurance, life/health insurance or property insurance (35%, 15% and 15% respectively). Such a distribution corroborates experts' opinion on the prevalence of fraud in the branch of compulsory third party liability motor insurance. Table 7 provides the summary statistics on the sample.

On average, the size of (potential)2 loss was estimated to be 1.8 million rubles (less than 27,500 USD). Only in 3 out of 13 (23%) cases, the insurers managed to prevent the loss. The minimal number of perpetrators, in fraudulent schemes, varied between 1 and 10. On average, one can describe the fraudster's profile as male (87%), 34-year old (ranging from 23 to 45), who received a higher education (80%). In 5 out of 12 (42%) of cases, at least one of the fraudsters was an insurance company employee. Remarkably, in the two cases of collusion with an insurance company employee, the amount of loss was either minimal or maximal. With respect to this, the study by Tseng and Su (2014) had showed that the size of actual loss and the fraud type (customer fraud versus insider fraud) may correlate with the decision-making of the car insurance salespeople.

Table 7. Summary statistics

Survey question	Variable	Obs	Mean	St. Dev.	Min	Max
7	Fraud counteraction assessment (1-5)	19	2.895	0.315	2	3
10	Loss, Russian rubles	11	1,782,273	381,6825	100,000	13,000,000
-	Loss prevented	13	0.231	0.439	0	1
11	Minimal number of perpetrators	15	3.867	2.825	1	10
12	Collusion with insurance company employee	12	0.417	0.515	0	1
13	Perpetrators are employees of the same insurance company	15	0.200	0.414	0	1
14	Perpetrators are employees of different insurance companies	12	0	0	0	0
15	Principal perpetrator's gender: male	15	0.867	0.352	0	1
16	Principal perpetrator's age	14	34.357	6.488	23	45
21	Expert's gender: male	20	0.6	0.503	0	1
22	Expert's age	17	40.647	9.460	26	60
25	Expert's years of experience in insurance	19	10.158	7.151	0	26

Almost in every case, experts mentioned certain red flags, which helped to detect fraud. These red flags included, for example: *"suspicious emails"*; *"unusually frequent or extremely large recovery claims (either in absolute or in comparative values)"*; *"recovery claim submitted by regular mail"*; *"insurance recovery appeal submitted after a reasonably large period of time"*; *"financial difficulties experienced by claimants"*; *"unexpected employment contract breach request"*; *"revealed collusion of the claimant with one or more corrupt police officers"*; *"revealed nepotism"*; *"disability occurred in the first year of the contract"*; *"inconsistency between the length of medical treatment and the size of recovery claim"*; *"claims submitted far in advance of the car accident",* etc. In addition, two (10%) experts mentioned tips from the Insurance Histories Bureau as helpful. Predictably, the revealed red flags and detection mechanisms are similar to those used by the ACFE (2018), AICPA (2003), and KPMG (2013) and analyzed by researchers (Moyes 2011; Gullkvist and Jokipii 2013; Yücel 2013

Table 8. Distribution of cases by location (Q19)

Location	Freq.	Percent-age	Gross monthly income per capita 2017*, rubles	Freq. of cases related to compulsory third party liability motor insurance 2017**	Average compensation per case related to compulsory third party liability motor insurance 2017**, rubles	Place in RSA Rating 2017
Russia	15	93.75	31,422	5.5%	78,301	
including:						
St.-Petersburg	2	12.5	42,133	6.4%	67,892	79
Smolensk	2	12.5	25,398	4.4%	65,310	20
Moscow	1	6.25	62,532	5.8%	67,595	69
Moscow Region	1	6.25	41,286	5.8%	73,301	67
Volgograd	1	6.25	21,357	7.0%	94,477	85
Yekaterinburg	1	6.25	35,289	5.6%	77,306	61
Ivanovo Region	1	6.25	24,760	5.9%	122,836	73
Orenburg Region	1	6.25	22,689	5.1%	87,611	48
Rostov-on-Don	1	6.25	27,677	5.1%	117,964	48
Chuvash Republic	1	6.25	17,892	6.1%	52,888	76
Ul'yanovsk	1	6.25	23,133	5.8%	102,203	67
Yaroslavl Region	1	6.25	27,625	5.7%	69,113	63
Siberia	1	6.25	23,925	n.a.	n.a.	-
Other countries: Goa (India)	1	6.25	-	-	-	-
Total:	16	100				

Source: * Federal State Statistics Service of the Russian Federation (2019); ** Russian Union of Motor Insurers (RSA 2018)

Remarkably, in the geographical distribution of cases, Smolensk appeared in the top-two locations together with St.-Petersburg: two cases in each location (see Table 8). So far, with such limited data, one can only speculate about the reasons of such a distribution of cases. It should be mentioned that the conducted study did not have the purpose of explaining the regional differences in insurance fraud. For instance, Smolensk had the largest number of cases in our study, although the relative frequency of cases relating to compulsory third party liability motor insurance in 2017 was rather low (4.4%) according to the RSA (2018).

Conclusion

Much evidence suggest that insurance fraud causes huge costs to insurance companies worldwide, despite all the preventative strategies being realized. The novelty of this study consists in exploring the current trends in insurance branches in Russia, relating to fraud prevention, and depicting the insurance fraudster's profile.

This study suggests that existing gaps in the legislation; difficulties in cooperation with the police and the citizens' loyalty towards insurance fraud in general, are the main sources of the inefficiency of fraud prevention policies, being currently implemented by the Russian insurance companies. The respondents agreed that both insurers and fraudsters actively used new technologies. Fraudulent claims in compulsory third party liability motor insurance remain the most popular activity among Russian criminals, although they quickly expand to health and property insurance. Typically, a fraudster is a male in his mid-30s with a college/university degree, who frequently cooperates with an insurance company. Based on this, the following general recommendations could be made to increase the efficiency of insurance fraud prevention. First, insurance companies should continue advancing in the application of new fraud prevention technologies based on big data analysis and implementation of rigorous scoring methods.

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The limitations of this analysis are mainly driven by (a) a relatively small sample size and (b) overrepresentation of insurance security service employees. Nevertheless, the analysis provided clear evidence that insurance fraud in Russia is combatted with medium efficiency and identified reasons for this. In addition, it characterized typical insurance fraudster's profile in today's Russia.

The following directions for further research are seen as promising: firstly, engage more experts to check the robustness of the findings; and, secondly, conducting a comparative study with non-Russian professionals to explore international differences. It is advised to base the selection of participants, among other criteria, on the region they operate in. It would extend the results to a broader set of contexts and probably explain the difference between study's results and state statistics. What is more, a control question approach may be used, in the future, to make sure that position of each respondent, on the issue, is clear.

References

Akomea-Frimpong, I., Andoh, C., & Ofosu-Hene, E. D. (2016). Causes, effects and deterrence of insurance fraud: evidence from Ghana. Journal of Financial Crime, 23(4), 678-699.

American Institute of Certified Public Accountants (AICPA). (2003). Consideration of Fraud in a Financial Statement Audit. Statement of Auditing Standards No. 99. New York, NY: AICPA

Association of Certified Fraud Examiners (ACFE). (2018). Report to the Nations on Occupational Fraud and Abuse. Austin, TX: ACFE. Retrieved from: https://www.acfe.com/uploadedFiles/ACFE_Website/Content/rttn/2018/RTTN-GovernmentEdition.pdf

Bales, K., & Fox, T. L. (2011). Evaluating a trend analysis of fraud factors. Journal of Finance and Accountancy, 5, 1-10.

Bowling, N. A., Huang, J. L., Bragg, C. B., Khazon, S., Liu, M., & Blackmore, C. E. (2016). Who cares and who is careless? Insufficient effort responding as a reflection of respondent personality. Journal of Personality and Social Psychology, 111(2), 218-229. http://dx.doi.org/10.1037/pspp0000085

Brinkmann, J., & Lentz, P. (2006). Understanding insurance customer dishonesty: Outline of a moral-sociological approach. Journal of Business Ethics, 66(2-3), 177-195.

Button, M., Brooks, G., Lewis, C., & Aleem, A. (2017). Just about everybody doing the business? Explaining 'cash-for-crash' insurance fraud in the United Kingdom. Australian & New Zealand Journal of Criminology, 50(2), 176-194.

Button, M., Pakes, F., & Blackbourn, D. (2016). 'All walks of life': A profile of household insurance fraudsters in the United Kingdom. Security Journal, 29(3), 501-519.

Cheng, C., Hsieh, C., & Yang, Y. (2013). Who would engage in unethical behavior? Should organizations bear the responsibility?. Quality & Quantity, 48(4), 2341-2354. https://doi.org/10.1007/s11135-013-9895-4 Coalition Against Insurance Fraud. (2012). Go Figure: Fraud Data. Retrieved from: www.insurancefraud.org/stats.htm.

Cova, B., Gaglio, G., Weber, J., & Chanial, P. (2016). Organizational sensemaking of nonethical consumer behavior: Case study of a French mutual insurance company. Journal of Business Ethics, 148(4), 783-799. https://doi.org/10.1007/s10551-016-3102-1

Creswell, J. W., & Creswell, J. D. (2017). Research design: Qualitative, quantitative, and mixed methods approaches. Sage Publications.

Crotty, M. (1998). The Foundations of Social Research: Meaning and Perspective in the Research Process. Sage Publications. CTV News. (2018). ICBC customers believe auto insurance fraud accepted in B.C.: survey. Published Thursday, May 24, 2018. Retrieved from: https://bc.ctvnews.ca/icbc-customersbelieve-auto-insurance-fraud-accepted-in-b-c-survey-1.3944558

Dehghanpour, A., & Rezvani, Z. (2015). The profile of unethical insurance customers: a European perspective. International Journal of Bank Marketing, 33(3), 298-315. Department of Insurance-California. (2017). How You Can Combat Insurance Agent Fraud. New York: ALM Media Properties, LLC.

Derrig, R. A. (2002). Insurance fraud. Journal of Risk and Insurance, 69(3), 271-287.

Derrig, R. A., Johnston, D. J., & Sprinkel, E. A. (2006). Auto insurance fraud: Measurements and efforts to combat it. Risk Management and Insurance Review, 9(2), 109-130.

Dmitriev, O. N., & Novikov, S. V. (2018). Development of risk insurance area for Russian hightechnology enterprises. European Research Studies Journal, 21(4), 386-399.

Dong, W., Liao, S., & Zhang, Z. (2018). Leveraging financial social media data for corporate fraud detection. Journal of Management Information Systems, 35(2), 461-487. https://doi.org/10.1080/07421222.2018.1451954

Einav, L., Finkelstein, A., & Levin, J. (2010). Beyond Testing: Empirical Models of Insurance Markets. Annual Review of Economics, 2(1), 311-336. https://doi.org/10.1146/annurev.economics.050708.143254

Farashah, A. D., & Estelami, H. (2014). The interplay of external punishment and internal rewards: An exploratory study of insurance fraud. Journal of Financial Services Marketing, 19(4), 253-264. https://doi.org/10.1057/fsm.2014.25 Federal State Statistics Service of the Russian Federation. (2019). Retrieved from: http://www.gks.ru/

Part 2. Selected papers

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Finogenova, Y.Y., & Garbuzov, A. M. (2017). Frauds' prevention in insurance: Russian and international experience: Protivodeystviye moshennichestvu v strakhovanii: rossiyskiy i zarubezhny opyt. Strakhovoye Pravo, (3), 39-46. Frees, E. (2015). Analytics of Insurance Markets. Annual Review of Financial Economics, 7, 253-277. Retrieved from https://proxylibrary.hse.ru:2126/doi/pdf/10.1146/annurev-financial111914-041815

FRISS. (2018). Insurance Fraud Report. Retrieved from: https://friss.com

Furlan, Š., Vasilecas, O., & Bajec, M. (2011). Method for selection of motor insurance fraud management system components based on business performance: Transporto priemonių draudimo apgavysčių valdymo sistemos komponentų pasirinkimo metodas, grindžiamas Verslo veiklos efektyvumu. Technological and Economic Development of Economy, 17(3), 535-561. https://doi.org/10.3846/20294913.2011.602440

Goel, R. (2014). Insurance fraud and corruption in the United States. Applied Financial Economics, 24(4), 241-246. https://doi.org/10.1080/09603107.2013.877570

Glicken, M. D. (2003). Social Research: A Simple Guide. Pearson College Division.

Gullkvist, B., & Jokipii, A. (2013). Perceived importance of red flags across fraud types. Critical Perspectives on Accounting, 24(1), 44-61.

Huang, J. L., Liu, M., & Bowling, N. A. (2015). Insufficient effort responding: Examining an insidious confound in survey data. Journal of Applied Psychology, 100(3), 828-845. http://dx.doi.org/10.1037/a0038510

Huang, J. L., Curran, P. G., Keeney, J., Poposki, E. M., & DeShon, R. P. (2012). Detecting and deterring insufficient effort responding to surveys. Journal of Business and Psychology, 27(1), 99-114. http://dx.doi.org/10.1007/s10869-011-9231-8 International Association of Insurance Supervisors (IAIS). (2007). Report on the Survey on Preventing, Detecting and Remedying Fraud in Insurance. Basel, Switzerland: IAIS.

Jay, D. (2012). Trend watch: New developments about fraud in America. Journal of Insurance Fraud in America, 3(2).

KPMG. (2013). Global Profiles of the Fraudster. Retrieved from: https://assets.kpmg.com/content/dam/kpmg/pdf/2013/11/global-profiles-of-the-fraudster-v2.pdf

Lesch, W., & Brinkmann, J. (2011). Consumer insurance fraud/abuse as co-creation and coresponsibility: A new paradigm. Journal of Business Ethics, 103(S1), 17-32. https://doi.org/10.1007/s10551-012-1226-5

Lewis, J. (2009). Redefining qualitative methods: Believability in the fifth moment. International Journal of Qualitative Methods, 8(2), 1-14.

Li, Y., Yan, C., Liu, W., & Li, M. (2018). A principle component analysis-based random forest with the potential nearest neighbor method for automobile insurance fraud identification. Applied Soft Computing, 70, 1000-1009.

McGonagle, A. K., Huang, J. L., & Walsh, B. M. (2016). Insufficient effort survey responding: An under-appreciated problem in work and organisational health psychology research. Applied Psychology, 65(2), 287-321. https://doi.org/10.1111/apps.12058

Miyazaki, A. D. (2009). Perceived ethicality of insurance claim fraud: Do higher deductibles lead to lower ethical standards?. Journal of Business Ethics, 87(4), 589-598.

Morales, J. A. R., & Hurtado, S. M. (2012). Estimation of operative risk for fraud in the car insurance industry. Global Journal of Business Research, 6(3), 73-83.

Morley, N. J., Ball, L. J., & Ormerod, T. C. (2006). How the detection of insurance fraud succeeds and fails. Psychology, Crime & Law, 12(2), 163-180.

Moyes, G. D. (2007). The differences in perceived level of fraud-detecting effectiveness of SAS No. 99 red flags between external and internal auditors. Journal of Business and Economics Research, 5(6), 9-25.

Ormerod, T., Ball, L., & Morley, N. (2012). Informing the development of a fraud prevention toolset through a situated analysis of fraud investigation expertise. Behaviour & Information Technology, 31(4), 371-381. https://doi.org/10.1080/01449291003752906

Oscelynn, D. (2018). A Prospective on Incorporating an Enterprise-Wide Fraud Management Program (M.S.). Utica College.

Palasinski, M. (2009). Testing assumptions about naivety in insurance fraud. Psychology, Crime & Law, 15(6), 547-553.

Palasinski, M., & Svoboda, S. (2014). Reducing the risk of insurance fraud by appearances of online surveillance. Psychology, Crime & Law, 20(9), 821-832. https://doi.org/10.1080/1068316x.2013.871012

Pande, V., & Maas, W. (2013). Physician Medicare fraud: Characteristics and consequences. International Journal of Pharmaceutical and Healthcare Marketing, 7(1), 8-33.

Pendse, S. (2012). Ethical Hazards: A motive, means, and opportunity approach to curbing corporate unethical behavior. Journal of Business Ethics, 107(3), 265-279. https://doi.org/10.1007/s10551-011-1037-0

Picard, P., & Wang, K. (2015). Insurance Fraud through Collusion between Policyholders and Car Dealers: Theory and Empirical Evidence. [Ebook]. Retrieved from https://hal.archivesouvertes.fr/hal-01140590/document

Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. Annual Review of Psychology, 63, 539-569.

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. Journal of Applied Psychology, 88(5), 879-903. http://dx.doi.org/10.1037/00219010.88.5.879

Porrini, D. (2014). The Italian motor insurance market: Will the recent interventions solve the old efficiency problems?. The Geneva Papers on Risk and Insurance-Issues and Practice, 39(3), 545-568.

Rogelberg, S. G., & Luong, A. (1998). Nonresponse to mailed surveys: A review and guide. Current Directions in Psychological Science, 7(2), 60-65. https://doi.org/10.1111/14678721.ep13175675

Rusetskaja, E. A., Rusetskiy, M. G., Rybina, G. K., & Chuvilova, O. N. (2016). Insurance fraud: Factors, identification problems, counteraction. The Social Sciences, 11(5), 579-584. https://doi.org/10.3923/sscience.2016.579.584

Russian Union of Motor Insures (RSA). (2017). Annual Report 2017. RSA. Retrieved from https://www.autoins.ru/upload/reports/2017.pdf

Russian Union of Motor Insures (RSA). (2018). Retrieved from https://www.autoins.ru/novosti/tekushchie/?ELEMENT_ID=15655

Said, J., Omar, N., Rafidi, M., & Syed Yusof, S. (2018). Are organizational factors more prevailing than individual factors in mitigating employee fraud?.Journal of Financial Crime, 25(3), 907-922. https://doi.org/10.1108/jfc-09-2017-0087

Said, J., Alam, M., Ramli, M., & Rafidi, M. (2017). Integrating ethical values into fraud triangle theory in assessing employee fraud: Evidence from the Malaysian banking industry. Journal of International Studies, 10(2), 170-184. https://doi.org/10.14254/2071-8330.2017/10-2/13

Skiba, J.M., & Disch, W.B. (2014). A phenomenological study of the barriers and challenges facing insurance fraud investigators. Journal of Insurance Regulation 33(4), 87-114.

Šubelj, L., Furlan, Š., & Bajec, M. (2011). An expert system for detecting automobile insurance fraud using social network analysis. Expert Systems with Applications, 38(1), 1039-1052.

Taek Yi, H., Dubinsky, A., & Un Lim, C. (2012). Determinants of telemarketer misselling in life insurance services. Journal of Services Marketing, 26(6), 403-418.

Tang, X. B., Wei, W., Liu, G. C., & Zhu, J. (2017). An inference model of medical insurance fraud detection: Based on ontology and SWRL. Knowledge Organization, 44(2), 84-96.

Tennyson, S. (2008). Moral, social, and economic dimensions of insurance claims fraud. Social Research, 1181-1204.

Theil, M. (2007). Insurance Fraud: What makes a case look suspicious?. Zeitschrift für die gesamte Versicherungswissenschaft, 96(2), 147-167.

Timofeyev, Y. (2015). Analysis of predictors of organizational losses due to occupational corruption. International Business Review, 24(4), 630-641.

Tseng, L. (2017). Why do lenient claims handling practices exist in the insurance industry? A survey study of ethical decisions by claims adjusters. Managerial Finance, 43(11), 12541273.

Tseng, L. M., & Su, W. P. (2014). Insurance salespeople's attitudes towards collusion: The case of Taiwan's car insurance industry. The Geneva Papers on Risk and Insurance - Issues and Practice, 39(1), 25-41.

Utah Insurance Department. (2015). What is insurance fraud?. Retrieved from: https://insurance.utah.gov/agent/fraud/what.php

van Capelleveen, G., Poel, M., Mueller, R. M., Thornton, D., & van Hillegersberg, J. (2016). Outlier detection in healthcare fraud: A case study in the Medicaid dental domain. International Journal of Accounting Information Systems, 21, 18-31.

Warren, D. E., & Schweitzer, M. E. (2018). When lying does not pay: How experts detect insurance fraud. Journal of Business Ethics, 150(3), 711-726.

Wilson, J. H. (2009). An analytical approach to detecting insurance fraud using logistic regression. Journal of Finance and Accountancy, 1, 11-15.

Yusuf, T. O. (2011). Brokers' incentives and conflicts of interest in the control of opportunism. The Journal of Risk Finance, 12(3), 168-181.

Yücel, E. (2013). Effectiveness of red flags in detecting fraudulent financial reporting: An application in Turkey. Journal of Accounting and Finance, 60, 1-20.

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Zourrig, H., Park, J., El Hedhli, K., & Zhang, M. (2018). The effect of cultural tightness – looseness on fraud perception in insurance services. International Journal of Quality and Service Sciences, 10(2), 138-148.

HR BUSINESS PARTNER COMPETENCIES: INSIGHTS FROM JOB ADVERTISEMENTS ACROSS SIX COUNTRIES

EKATERINA VLAKH — *HIGHER SCHOOL OF ECONOMICS, RUSSIA;* NATALIA VOLKOVA —*INTERNATIONAL LABORATORY OF INTANGIBLE-DRIVEN ECONOMY HIGHER SCHOOL OF ECONOMICS, RUSSIA*

Purpose

Over the past decades, Russian businesses have demonstrated rapid growth that leads to urgent needs in developing Human Resource (HR) management knowledge. However, there is a lack of details about similarities or differences between requirements to HR practitioners in Russia and other countries. Job vacancy texts are the most available sources to collect data about much-needed skills, knowledge and competencies for employers. On the other hand, they reflect both specific features of the local labor market including particular requirements and peculiarities of cultural values. Based on international experience, HR business partner position has recently emerged on the Russian labor market and become sought-after among employers. According to HeadHunter, which is one of the largest Russian job sites, almost 1000 vacancies have been available for these specialists in May. Therefore, understanding HR business partner details across six countries can help to develop advertisements taking into account job roles and expectations under cultural context. This might encourage debates about this position and its development. Moreover, this information can be valuable for education programs.

The aim of this study

The aim of this study is to identify the key job requirements and skills for HR business partners sought by employers in both Russia and five English-speaking countries (Australia, Canada, India, the UK, and the US) and, afterward, juxtapose them with cultural values.

The research was guided by two questions:

1.   What specific knowledge, skills and competencies do employers seek for the HR Business Partner designation across six countries?
2.   To what extent the job requirements of HR business partner can be connected with cultural dimensions developed by Hofstede?

The main theory underlying the study

To explore the cultural values that possibly emerge in job ads, we use the Hofstede dimensional model of national culture. This framework comprises five dimensions based on a 100-point scale that match values in the workplace to cultural context. Taking into account the relevance of this model to advertising, we present a brief overview of these components (de Mooij, Hofstede, 2010).

1) Power distance dimension shows to what extent a particular society 'accepts and expects that power is distributed unequally' in the company. For countries with a higher level of this dimension, the job ads should contain clear details about the social role in a hierarchy.

2) Individualism vs Collectivism. This dimension demonstrates either loosely or tightly knit social framework. The former shows that people take care of themselves or their immediate relatives only, while the latter characterizes trust and strong in-group relationships in exchange for loyalty. This dimension is an essential part of communication style with more non-verbal job ads in collectivistic countries.

3) Masculinity vs Femininity. This dimension represents to what extent male roles such as assertiveness, achievement and success are important for a particular society. Thus, job adverts are likely to highlight the importance of productivity in countries with a higher level of Masculinity.

4) Uncertainty Avoidance dimension conveys to what extent the members of a particular society feel comfortable with uncertainty and ambiguity and find any ways to avoid these situation providing career stability, formal rules etc. (Chipulu et al., 2016).

5) Long vs Short Term Normative Orientation. This dimension reflects the contrast between attitudes of the society towards either the future-oriented goals or historical traditions and shortterm point of view. In this case, the opportunities for further development of employees is likely to emphasize a higher level of Long Term Orientation.

According to de Mooij & Hofstede (2010), researchers should consider a combination of these dimensions to explain differences met in job ads.

Design/methodology/approach

Job ads in both English and Russian were collected from two sources (www.hh.ru and LinkedIn) over a two-month period in a two-month period in 2018. We randomly selected 1 800 vacancies following the proportion of 300 job posts for each country. The 6-dimension model of national culture developed by Hofstede (2010) was used to explore the features of cultural values. To measure the occurrence of keywords and simple noun phrases in the job ads of each country, we employ Rapid automatic keyword extraction (RAKE) based on R-Studio for Windows. Keywords with a ratio of RAKE value at least 2.5 were included.

All Russian phrases frequently occurred in the advertisements were matched to English definitions as shown in Table 1.

Table 1. Matching Russian phrases to English job requirements and personal skills

Original text in Russian	Translation into English	Russian context
Трудовое законодательство	Employment law	"знание трудового законодательства, ТК РФ"
Подбор персонала	Recruitment	"развитие в области подбора персонала; знание методов подбора персонала"
Управление эффективностью	Performance management	"каждый день повышать эффективность работы сотрудников"
Построение отношений	Employee relations	«Участие в качестве эксперта по сложным вопросам трудовых отношений и оплаты труда»
Управление талантами	Talent management	«управление талантами: оценка потенциала команд, развитие ключевых талантов»
Управление изменениями	Change management	«Умение быстро реагировать на изменения, готовность к динамичному темпу и большим объемам задач и коммуникаций; Внедрение изменений организационной структуры, перераспределения функций с учетом необходимости повышения эффективности процессов компании»
Привлечение талантов	Talent acquisition	«подбирать и привлекать в компанию потенциальных, талантливых кандидатов на позиции "Менеджер по работе с клиентами"»
Обучение персонала, тренинги	Training and development	"участвовать в создании системы дистанционного обучения и поддерживать ее актуальность; проводить тренинги по самоорганизации, личной эффективности и другие необходимые команде;"
Коммуникативные навыки	Communication skills	"Имеют отличные коммуникативные навыки и позитивный подход к людям"
Навыки управления	Managerial skills	«Навыки управления проектами и управления изменениями»

Results and analysis

 All English ads were collected from LinkedIn while Russian advertisements came from one of the largest job sites titled HeadHunter. To answer the first research question, the software package was performed to count the simple noun phrases that occurred in vacancies. As a result, the seven most frequent job requirements for each country were identified as shown in Table 2. Additionally, the Russian job ads demonstrated the high demand for recruitment competencies (frequency of occurrences was 263) that was not the case for other studied countries. Another interesting result in Russian adverts was Training and development competencies, which HR business partners need to perform in a company (frequency of occurrences was 196). Moreover, employers in studied countries highlighted the importance of communication and managerial skills with the frequency of occurrences presented in Table 3. However, as it can be seen from the table, Management skills are much more popular in Russian and the United States` texts of job vacancies in omparison to the other 4 countries.

Table 2. Job requirements frequently occurred in the ads

Job requirements	The UK	The US	Russia	Australia	India	Canada
1. Employee relations	198	440	41	91	131	222
2. Performance management	115	329	52	149	121	238
3. Talent management	71	129	23	50	108	103
4. Change management	72	116	42	51	33	112
5. Employee engagement	59	112	29	43	133	118
6. Employment law	110	119	99	26	21	41
7. Talent acquisition	36	108	58	48	117	108

Table 3. Personal skills frequently occurred in the ads

Personal skills	The UK	The US	Russia	Australia	India	Canada
1. Communication skills	69	146	117	51	66	105
2. Management skills	47	86	180	48	26	54

To identify the context of job advertisements in each country, we applied the rapid automatic keywords extraction (RAKE). The method automatically extracts keywords as sequences of one or more words and evaluate the value of each keyword in the text (Rose et al., 2010). The results of RAKE analysis are presented in Table 4.

Table 4. The results of rapid automatic keywords extraction for six countries

Context	RAKE keywords	RAKE value
Russia		
"Successful experience in applying non-standard personnel search methods; Ability to work in	*non-standard situations*	4,58
multitasking mode, to find a way out in unusual situations, attention to details"		
"Providing high-quality and timely support to candidates and employees of the bank on personnel management issues"	*providing quality and timely support*	4,27
India		
"Serve as a strategic partner and change agent to business leaders and management teams on key human capital issues"	*key human capital issues*	4,1
"Design Induction/Orientation programmes for new recruits"	*Orientation programmes*	3,7
"Based on the business and people strategy, incumbent is responsible for managing day to day HR responsibilities from hire to retire process and support the business in all people related issues"	*people related issues*	3,59
UK		
"For your peace of mind, we offer life insurance benefit on top of a contributory pension scheme, as well as income protection"	*life assurance*	5,8
"Support the associated HR Business Partner team with ad hoc administrative and operational HR activity"	*hoc project*	3,5
"to demonstrate in projects a commercial accuman…"	*commercial accuman*	3,42
USA		
"identify training needs and train associates and managers on various HR related matters; The HR Business Partner will provide operational and consultative support to business leaders on people related matters"	*related matter expert*	3,4
"This position will help assess and anticipate HR-related needs, and partner to create and provide strategies or solutions to advance the business"	*provide information*	3,38
"Ability to resolve, manage, and communicate complex issues to all levels.; Works on complex issues where root cause analysis of situations or data require in-depth evaluation of variable factors."	*complex issue*	3,38
Canada		
" Provide leadership and support to managers and employees in the areas of performance counseling, employee retention, policy interpretation and implementation, human rights and employment legislation, conflict resolution and legal/contractual requirements.; Human Rights Act knowledge"	*human rights*	3,73
"Provides advice to hiring manager and assists in resource planning in compliance with recruitment policies and procedures."	*resource planning*	3,1
"Partner with leaders on developing short and longer term people strategies and annual goal setting process to ensure alignment to business groups strategic priorities"	*long term care*	3,1

Australia		
"Develop and maintain HR policies, forms and provide case management services to complex workforce issues including performance management, dispute resolution, grievances and make recommendations on appropriate action"	*Case management*	3,3
"Experience with frontline high-volume workforces is essential.; You will have demonstrated experience of high volume employee relations case management."	*High volume*	3,3
"Lead both formal and informal labour relations processes including grievance administration and Labour Management Committees; Skilled and forward thinking labour relations professional"	*Labour relations*	3,26

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Finally, we matched the frequency of occurrences for simple noun phrases and keywords from RAKE to cultural dimensions developed by Hofstede. Scores based on a 100-point scale were taken from Hofstede website for each dimension in a particular country.

Findings

The findings have indicated that Russian job ads frequently emphasize local employment law and recruitment that could reflect the high Power Distance (93) and Uncertainty Avoidance (95) together with a low level of Individualism (39). While highly individualistic countries (80-91) with low rates of Uncertainty Avoidance (35-51) and Power Distance (35-40) (Australia, Canada, the UK, and the US) have demonstrated the successful background in working on Employee relations or Performance Management as frequent job requirements for this position. As for India, Employee engagement has occurred repeatedly in the job ads that could be relevant to a middle rate of Individualism (48) and a sufficient level of Power Distance (77). Notably, communication skills have been widespread for HR business partners across all these countries with varieties of keywords relating to them, and managerial skills are typical mostly for Russian and the United States` ads.

Originality/value

This is the first study to analyze Russian jobs ads of HR business partner by using the content analysis techniques and juxtapose them with recruitment across cultures.

Keywords: cultural values, recruitment advertising, HR business partner, content analysis

References

Chipulu, M., Ojiako, U., Marshall, A., Williams, T., Neoh, J. G., Mota, C. and Shou, Y. (2016), "Building cultural intelligence: insights from project management job advertisements", Production Planning & Control, Vol. 27 No 3, pp. 133-147.

de Mooij, M., Hofstede, G. (2010), "The Hofstede Model: Applications to Global Branding and Advertising Strategy and Research", International Journal of Advertising, Vol. 29 No1, pp. 85–110.

Hofstede, G., "The 6-D model of National culture", available at: https://www.hofstedeinsights.com/models/national-culture/ (accessed 20 April 2019).

Rose, S., Engel, D., Cramer, N. and Cowley, W. (2010), "Automatic Keyword Extraction from Individual Documents", in Berry M.W. and Kogan J. (Ed.) Text Mining: Applications and Theory, John Wiley & Sons, New York, NY, pp.3-20.

## IDIOSYNCRATIC SHOCKS: ESTIMATION AND THE IMPACT ON AGGREGATE FLUCTUATIONS

POPOVA SVETLANA — *RESEARCH AND FORECAST DEPARTMENT ,THE CENTRAL BANK OF THE RUSSIAN FEDERATION*

The predominant macroeconomic theory has long assumed that business-cycle fluctuations are the results of aggregate macroeconomic changes. Firm-specific or idiosyncratic shocks in these models average out, they have a negligible effect at the aggregate level (Lucas, 1977). However, there is some theoretical evidence on the important role of idiosyncratic shocks in explaining aggregate fluctuations that is also suggested by the real evidence in developed economies. For instance, according to the Organization for Economic Cooperation and Development (OECD (2004)) in 2000 Nokia contributed 1.6 percentage points of Finland's GDP growth.

The hypothesis that business-cycle can be driven by microeconomic shocks of large firms is called the granular hypothesis. Two main explanations of the granular hypothesis are used in economic literature. The first approach is based on the law of large numbers that assumes if firm-level shocks are independent the aggregate fluctuations should have a size proportional to $1/\sqrt{N}$. As $N \to \infty$ idiosyncratic shocks will have a negligible effect in aggregates. However Gabaix (2011) showed that if the firm size distribution is fat-tailed (the presence of very large firms) and it is power-law distributed, the central limit theorem breaks down. In this case volatility of aggregate variables decays slower according to $1/\ln N$. In that case, idiosyncratic shocks will not average out and instead output or productivity shocks of large firms have a potential to drive aggregate volatility (Gabaix (2011), Karasik et al. (2016), Ebeke and Eklou (2017)). The second perspective (Foerster et al. (2011), Acemoglu et al.(2012), Giovanni et al.(2014), Gnocato and Rondinelli (2018)) suggests that aggregate fluctuations can arise from firm-specific shocks as a result of interconnectedness between firms or sectors through input-output linkages. If a sector or a firm is highly connected with others through intermediate consumption, these linkages can distribute firm-specific shocks more intensively.

Using Russian firm-level data over the period 1999-2017 we test the hypothesis that business-cycle fluctuations are not only the results from changes to monetary, fiscal or macroprudential policy but also microeconomic shocks of large firms can generate aggregate shocks that affect GDP. To provide this evidence we set up a methodology to correctly estimate a specific structure of Russian economic activity. Moreover we decompose idiosyncratic shocks to define effects on two channels (direct effect and link effect).

In recent years modern economies are dominated by large firms, their shocks can affect GDP dynamics. For instance, In US the sales of the top 100 firms account for more than 30% of GDP since 2000 (Gabaix (2011)). The similar share for euro area countries accounted for 28.5 percent of GDP over the period 1999-2013 (Ebeke and Eklou (2017)).

Figure 1

Top-100 Firms' Sales as Persentage of GDP, all firms

Figure 2

Top-100 Firms' Sales as Persentage of GDP, non-finance and non-oil firms
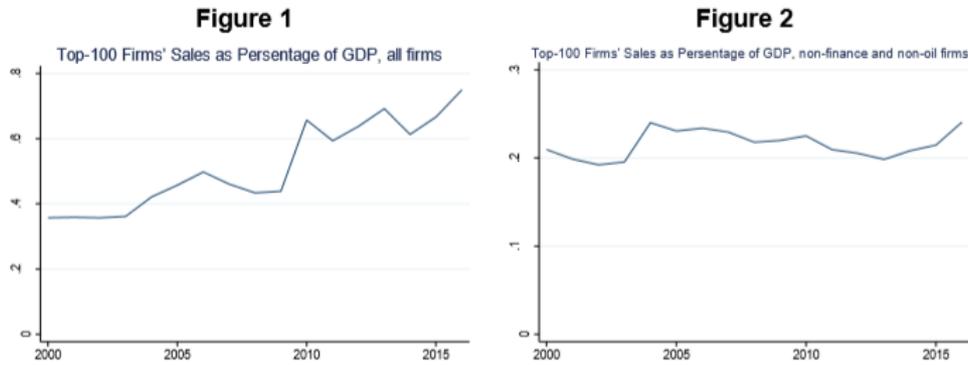
Sources: author calculations, SPARK database, Rosstat.

According to Russian data the average share of the sales of the top 100 nonfinancial, non-oil and non-energy firms in GDP was about 20%2 over the period 19992016 (Figure 2). Taking into account the extractive sector the ratio increases to 50% of GDP (Figure 1). Hence a relatively small number of large Russian firms represent a significant part of the macroeconomic activity. Our hypothesis is that for Russian economy idiosyncratic shocks can be important drivers of aggregate volatility.

Moreover, firm size distribution for Russian companies is fat-tailed (Figure 3), that suggests for Russian economy idiosyncratic shocks can be important drivers for macroeoconomic volatility.

Figure 3. Firm size distribution for Russian companies and normal distribution
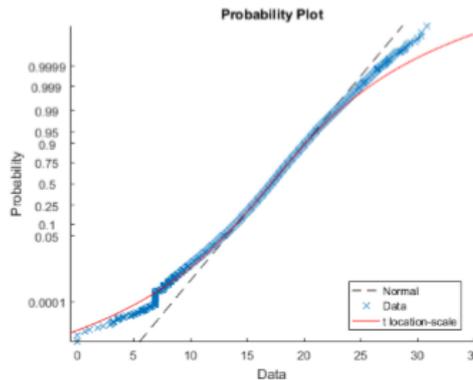
There is sufficient of

a amount

empirical literature for a wide range of countries. However, different approaches and methodology in these works leads to contradictory results in terms of the impact of idiosyncratic shocks. Most of the papers find that idiosyncratic shocks can explain a significant share of aggregate volatility. For example Gabaix (2011) showed that shocks of top-100 US firms explain about one third of variation in output growth. For Canada firms Karasik et al. (2016) also get a significant result, that shocks of large firms can account for in average 46% of the annual variation in manufacturing sales, and at least

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37% of investment growth volatility. In paper Ebeke and Eklou (2017) idiosyncratic shocks of large EU firms contribute 40% of the variance in GDP. However in Stella (2015) using dynamic factor model on quarterly US data the author showed that granular hypothesis can be rejected.

Moreover there is still little empirical evidence on the role of individual firms in explaining aggregate fluctuations in emerging markets. Moreover, large part of existing literature does not include oil and gas sector in their model estimation, hence cannot be applied for the analysis of Russian economy. The analysis for Russian companies can be helpful for forecasting and better understanding the drivers of economic performance and other macroeconomic variables. Analysis of cross-sector heterogeneity and links between sectors and firms can provide additional information for understanding the nature of these shocks.

Methodology

In order to identify idiosyncratic shocks we follow di Giovanni et al. (2014), Gabaix (2011), Karasik et al.(2016), Ebeke and Eklou (2017)).

We define $g_{i,t}$ as a growth rate of sales for firm i in period t, so $g_{i,t} = \log z_{i,t} - \log z_{i,t-1}$, where z_i – firm sales. To test granular hypothesis we decompose actual sales growth rate on the macro-sectoral component and idiosyncratic component for sector j and firm i:

$$g_{it} = \delta_{jt} + \varepsilon_{it} \quad (1)$$

So using regression analysis on Russian firm-level data we estimate idiosyncratic shocks (ε_{it}) as a deviation of the actual sales growth from the macro-sectoral shock that is computed as the average growth rate of sales across all firms in sector. Then we calculate granular shock as weighted average sum of individual idiosyncratic shocks:

$$\Gamma_t^* = \sum_{i \in K} \frac{Y_{i,t-1}}{Y_{t-1}} \varepsilon_{it} \quad (2)$$

where Y_{t-1} – total sales in period $t-1$, $Y_{i,t-1}$ – sales of firm i in period $t-1$.

In this paper we define macro-sectoral component (δ_{jt}) as the average growth rate of sales across all firms in sector j ($\overline{g_{It}}$) and the average growth rate of sales across all firms ($\overline{g_t}$). To identify idiosyncratic shocks we use two approaches:

1) Gabaix (2011) methodology: granular firms as the small number of very large firms (for example 100); 2) Giovanni et al. (2014) methodology: construct granular component across all firms in the economy.

According granular hypothesis the variable Γ_t^* should have an impact on the volatility of macro variables. In order to test this we estimate the share of granular variation in GDP volatility $(g_{Yt} = \mu\Gamma_t^*)$. We estimate simple regression model:

$$Z_t = \beta_0 + \beta_1\Gamma_t + u_t \quad (3)$$

where Z_t – GDP growth rate. R^2 of this regression will show us the impact of granular shock in GDP volatility.

Then we decompose aggregate growth rate in order to estimate the contribution of idiosyncratic volatility and macro-sectoral volatility. If firm-specific shocks do not have any effect on aggregate volatility the following decomposition show lower share of idiosyncratic component. So aggregate sales growth can be written as:

$$g_{Yt} = \sum_{i \in N}\left(\frac{Y_{i,t-1}}{Y_{t-1}}\right)g_{it} = \sum_{j \in J}w_{j,t-1}\delta_{jt} + \sum_{i \in N}w_{i,t-1}\varepsilon_{it} \quad (4)$$

Then we find the variance of sales growth and its decomposition:

$$\sigma_{Yt}^2 = \sigma_{jt}^2 + \sigma_{Ft}^2 + COV_t \quad (5)$$

Where $\sigma_{jt}^2 = Var(\sum_{j \in I}w_{j,t-1}\delta_{jt})$ – macro-sectoral volatility;

$\sigma_{Ft}^2 = Var(\sum_{i \in N}w_{i,t-1}\varepsilon_{it})$ – idiosyncratic volatility;

$COV_t = Cov(\sum_j w_{j,t-1}\delta_{jt}, \sum_i w_{i,t-1}\varepsilon_{it})$ – covariance of the shocks from different levels of aggregation.

In order to understand in greater detail the channels for firms' contribution to aggregate volatility we can further decompose idiosyncratic component. It can be written as the sum of direct effect (individual variances) and linkage effect (comovement between firms):

$$\sigma_{Ft}^2 = \underbrace{\sum_i w_{i,t-1}^2 Var(\varepsilon_{it})}_{Direct\ effect} + \underbrace{\sum_{i \neq j}\sum_i w_{j,t-1}w_{i,t-1}Cov(\varepsilon_{it}, \varepsilon_{jt})}_{Link\ effect} \quad (6)$$

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Data and results

In the paper we use annual revenue data over the period from 1999 to 2017 from SPARK database. In our sample we do not include firms with missing observations over the period. We also exclude firms with:

- sales growth rate greater than 1000%;
- assets less than zero;
- total liabilities less than zero;
- 96, 97 or 99 OKVED codes.

The final sample includes from 36.000 firms in 1999 to 107.000 firms in 2017 covering 59 sectors. Figure 4 demonstrates that growth of aggregate sales over the sample and GDP growth rate move in one direction. We can say that our sample is representative in this respect.

Figure 4. Growth of aggregate sales, GDP and growth rate of top-100 firms sales
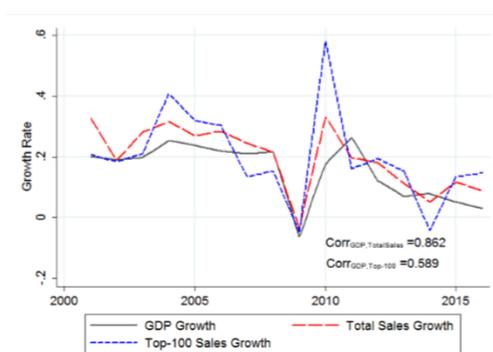
Then we present the results of testing the granular hypothesis following Gabaix (2011). Granular residuals were calculated as follows:

	Firms for granular residuals calculations (K)	Macro-sectoral shock ($\bar{g}$)
G1	All firms from sample	Average sales growth rate over year
G2	All firms from sample	Average sales growth rate over year and sector
G3	Top-100 firms for each year (by sales from previous year)	Average sales growth rate over year
G4	Top-100 firms for each year (by sales from previous year)	Average sales growth rate over year and sector
G5	All firms from sample	Average sales growth rate over year and sector
G6	Top-100 firms for each year and sector (by sales from previous year)	Average sales growth rate over year and sector
G7	Top-100 firms for each year and sector (by sales from previous year)	Average sales growth rate over year and sector for top-100 firms

We estimate two specifications: 1) explained variable – GDP growth rate at current prices; 2) explained variable – gross value added growth rate by economic activities.

We can see that almost all coefficients are not statistically significant. It can be explained by the small number of observation for annual GDP. Moreover 2009 is also in our sample that can potentially bias the coefficient estimates. Further in our research we are planning to use more complicated model to identify the share of idiosyncratic component in GDP fluctuations.

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$$GDP\_growth_t = \beta_0 + \beta_1\Gamma_t + u_t$$

| | Dependent variable: GDP growth |
	G1	G1	G2	G2	G3	G3	G4	G4
Γ_t	-0.341	-0.357	-0.723*	-0.628	-0.084	-0.751	-0.210	-0.653
	(0.396)	(0.387)	(0.403)	(0.365)	(0.680)	(0.584)	(0.684)	(0.612)
Γ_{t-1}		-0.280		-0.271		-0.716		-0.599
		(0.383)		(0.366)		(0.558)		(0.618)
_cons	0.116	0.053	0.033	-0.016	1.165***	0.071	0.153**	0.056
	(0.068)	(0.063)	(0.080)	(0.075)	(0.047)	(0.055)	(0.060)	(0.082)
N	17	16	17	16	17	16	17	16
R^2	0.047	0.184	0.177	0.312	0.001	0.176	0.006	0.108
R^2_{adj}	-0.017	0.059	0.122	0.207	-0.066	0.050	-0.060	-0.029

Standard errors in parentheses
* $p<0.10$, ** $p<0.05$, *** $p<0.01$

$$VAD\_growth_{jt} = \beta_0 + \beta_1\Gamma_{jt} + u_{jt}$$

	G5	G6	G7
Γ_{jt}	-0.009	0.199	-1.984
	(0.044)	(0.910)	(1.984)
_cons	0.140***	0.142***	0.142***
	(0.010)	(0.008)	(0.008)
N	676	676	676
R^2	0.000	0.000	0.001
R^2_{adj}	-0.001	-0.001	0.000

Standard errors in parentheses
* $p<0.05$, ** $p<0.01$, *** $p<0.001$

Then we estimate the contribution of idiosyncratic component and macro-sectoral component to aggregate fluctuations according to the methodology by Giovanni et al. (2014). We decompose actual sales growth for each firm on the firm-specific component and macro-sectoral component according to eq.4.

Idiosyncratic shocks that we used in the model are calculated over:

1) All companies from sample
2) Top-100 companies (we select top-100 firms for each year by sales if company is older than 5 years).

In Table 1 we show the importance of the different components in explaining the volatility of sales growth at firm level. Results report that sales growth variation is dominated by the firm-specific component. The standard deviation of the firm-specific component and

is almost the same as the standard deviation of actual growth rate of sales, moreover the correlation is very high. At the same time macro-sectoral component is rather stable. These results suggest that most shocks hitting by firms are idiosyncratic, not macro or sectoral (Haltiwanger (1997), Castro, Clementi and Lee (2013)).

We next compute the aggregate impact of firm-specific and macro-sectoral components on aggregate volatility (eq.5). Figures below and Table 2 show the main results of the estimation for the whole economy and for top-100 firms.

Table 1. Summary statistics and correlation of actual, macro-sectoral and firm-specific components

	Obs.	Mean	St.Dev.	Corr.
Whole economy				
Actual	1 171 993	0.1544	0.8247	1.0000
Firm-specific	1 171 993	-0.0076	0.8034	0.9807
Macro-sector	1018	0.1834	0.1604	0.1988
Top-100 companies				
Actual	1 700	0.0427	0.6975	1.0000
Firm-specific	1 700	-0.1307	0.6177	0.7637
Macro-sector	391	0.1997	0.4440	0.4685

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Figure 5 presents that the standard deviation of idiosyncratic component comoves with the standard deviation of actual aggregate sales growth, whereas macro-sectoral component is much more stable both for all firms and for the 100 largest firms.

Figure 5. Volatility of actual sales growth and its components

Table 2. The aggregate impact of firm-specific and macro-sectoral components on aggregate volatility

|	Whole economy		Top-100 Firms	
	St. Dev.	Relative St. Dev.	St. Dev.	Relative St. Dev.
Actual	0.2078	1.0000	0.0898	1.0000
Firm-specific	0.1329	0.6396	0.0622	0.6927
Macro-sector	0.1279	0.6155	0.0832	0.9265
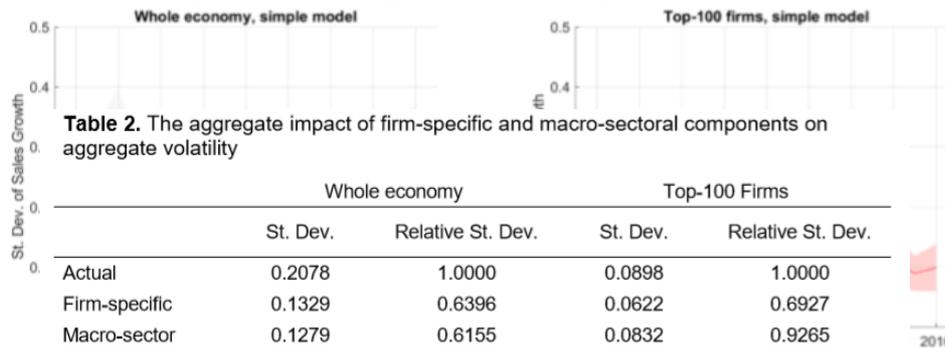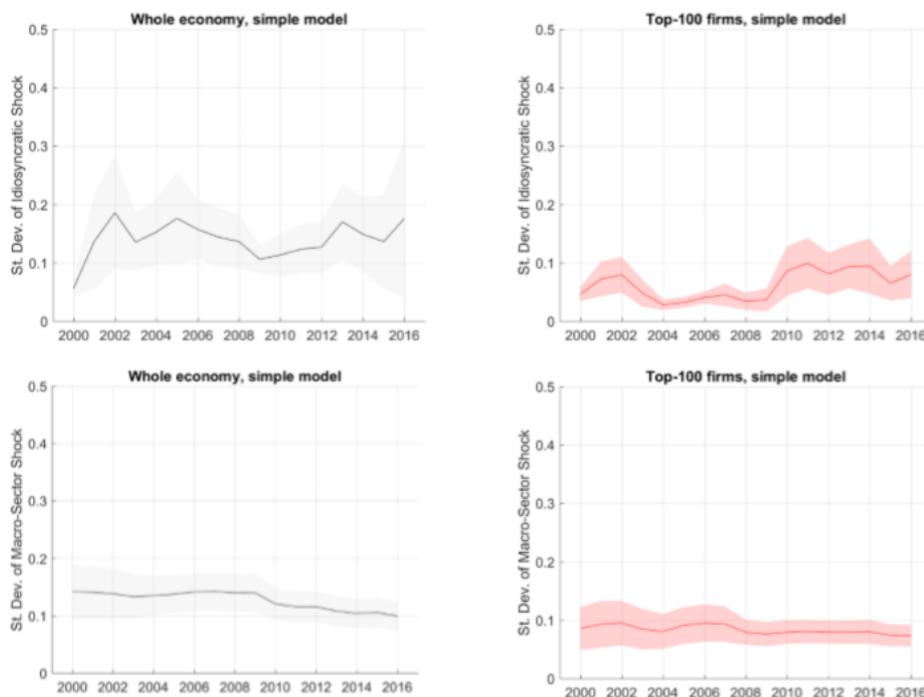
So our results confirm the main result in Giovanni et al. (2014): idiosyncratic component is much more important in explaining aggregate fluctuation then macrosectoral. Standard deviation of idiosyncratic shocks is 0.64 relative to that of actual sales volatility for all firms and 0.69 for top-100 firms (Table 2). However for Russian economy the contribution of idiosyncratic component and macro-sectoral component are almost the same for the whole economy (like in Sweden (Friberg R., Sanctuary M (2016), in Italy (Gnocato N. et al. (2018)). For top-100 largest firms macro-sectoral shocks matter much more for the aggregate sales growth. It can be explained by the fact that for large firms

macroeconomic shocks can have a more significant effect due to greater diversification of assets and activities (exchange rate, oil prices, etc.)

Next we examine the economic mechanism for firms' contribution to aggregate volatility. Figure 6 shows the decomposition of variation of idiosyncratic component on two channels: direct effect (individual variances) and linkage effect (covariances between firms). We can see that covariance component explains the majority of firmspecific volatility (Link relative to firm-specific component is about 83%). If we consider only the top-100 companies as a granular component, for such firms the idiosyncratic volatility is mainly due to the variation of individual shocks, while the covariance of shocks for these companies is rather small.

Figure 6. Decomposition of idiosyncratic component on direct effect and linkage effect
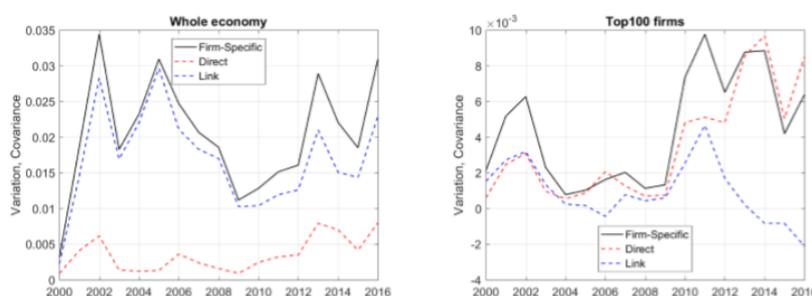
Figure 7. Covariances of firm-specific shocks across sectors and input-output linkage coefficients
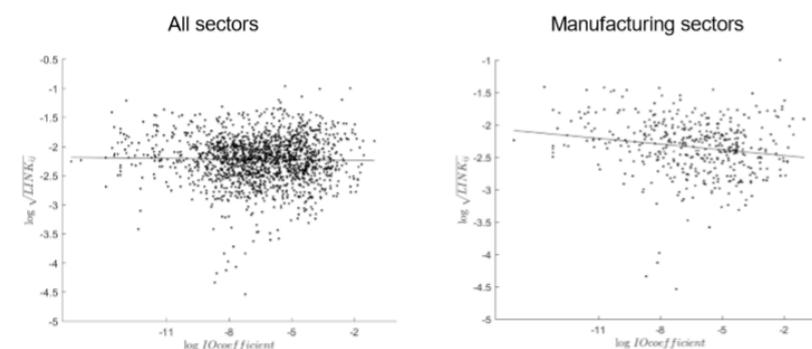

Source: author calculations

In the paper we also try to analyze the role of linkages between firms and understand the nature of this covariance. We estimate the relationship between input-output linkages coefficient from IO tables (Rosstat) and the average of the sector pair Link component. Here we do not find any strongly significant relationship (Figure 7).

HR BUSINESS PARTNER COMPETENCIES: INSIGHTS FROM JOB ADVERTISEMENTS ACROSS SIX COUNTRIES
EKATERINA VLAKH — HIGHER SCHOOL OF ECONOMICS, RUSSIA; NATALIA VOLKOVA — INTERNATIONAL LABORATORY OF INTANGIBLE-DRIVEN ECONOMY HIGHER SCHOOL OF ECONOMICS, RUSSIA

We also suggested that the linkages between firms could be the result of the common shocks on labor markets. But there are no sustainable results also (Figure 8). So the question of analyzing the nature of firms' linkages and networks remains to the further research work.

Figure 8. Covariances of firm-specific shocks across sectors and labor market concentration.

Source: author calculations
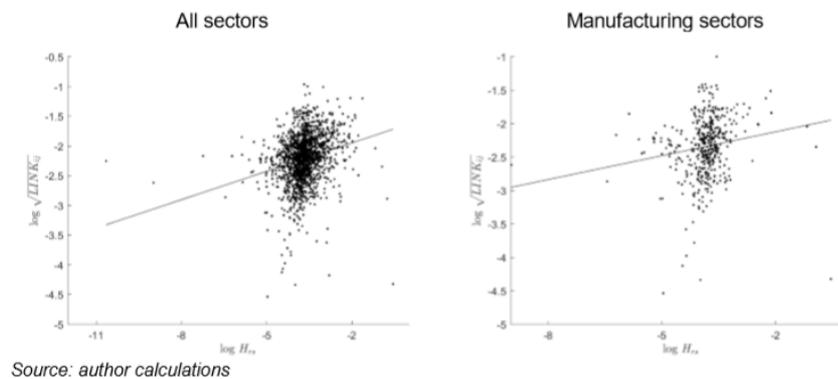
Conclusions

This paper studies the impact of firm-specific shocks on aggregate volatility in Russia using firm-level data over the period 1999-2017. Here we mostly follow di Giovanni et al. (2014) and Gabaix (2011) to estimate firm-specific shocks but we modify the main methodology according to the features of the Russian economy. We anticipate finding an important role of idiosyncratic shocks in explaining a significant share of variation in macroeconomic variables. Furthermore, the main channel of this impact is due to the contribution of the linkages between firms. In terms of policy implications, this suggests to give more consideration to sectoral policies as an important supplement to macroeconomic analysis.

References

Acemoglu D. et al. The network origins of aggregate fluctuations //Econometrica. – 2012. – Vol. 80. – №. 5. – pp. 1977-2016.

Blanco-Arroyo O. et al. On the determination of the granular size of the economy //Economics Letters. – 2018.

Brainard S. L., Cutler D. M. Sectoral shifts and cyclical unemployment reconsidered //The Quarterly Journal of Economics. – 1993. – Vol. 108. – №. 1. – pp. 219-243.

Di Giovanni J., Levchenko A. A., Méjean I. Firms, destinations, and aggregate fluctuations //Econometrica. – 2014. – Vol. 82. – №. 4. – pp. 1303-1340.

Di Giovanni J., Levchenko A. A., Mejean I. Large firms and international business cycle comovement //American Economic Review. – 2017. – Vol. 107. – №. 5. – pp. 598-602.

Ebeke M. C. H., Eklou K. M. The Granular Origins of Macroeconomic Fluctuations in Europe. – International Monetary Fund, 2017.

Foerster A. T., Sarte P. D. G., Watson M. W. Sectoral versus aggregate shocks: A structural factor analysis of industrial production //Journal of Political Economy. – 2011. – Vol. 119. – №. 1. – pp. 1-38.

Friberg R., Sanctuary M. The contribution of firm-level shocks to aggregate fluctuations: The case of Sweden //Economics Letters. – 2016. – Vol. 147. – pp. 811.

Gabaix X. The granular origins of aggregate fluctuations //Econometrica. – 2011. – Vol. 79. – №. 3. – pp. 733-772.

Gnocato N. et al. Granular sources of the Italian business cycle. – Bank of Italy, Economic Research and International Relations Area, 2018. – №. 1190.

Karasik L., Leung D., Tomlin B. Firm-specific shocks and aggregate fluctuations. – Bank of Canada Staff Working Paper, 2016. – №. 2016-51.

Ozdagli A., Weber M. Monetary policy through production networks: Evidence from the stock market. – National Bureau of Economic Research, 2017. – №. w23424.

Stella A. Firm dynamics and the origins of aggregate fluctuations //Journal of Economic Dynamics and Control. – 2015. – Vol. 55. – pp. 71-88.

Part 2. Selected papers

IMPLEMENTATION OF IT SYSTEM IN LACK OF DIGITAL LABOR CONDITIONS: EVIDENCE FROM LARGE RUSSIAN COMPANIES
SOFIA PAKLINA, IULIIA NAIDENOVA — HIGHER SCHOOL OF ECONOMICS, RUSSIA

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SOFIA PAKLINA, IULIIA NAIDENOVA — *HIGHER SCHOOL OF ECONOMICS, RUSSIA*

Introduction

Contemporary information technologies register, codify and store huge amounts of information about processes internal and external to a company. This information can be used to provide a company's management with comprehensive decision-making tools. However, successful implementation of IT systems also requires a qualified labor force.

Russia provides an interesting context to investigate the relationship between IT, labor and company performance. First, since 2014 Russia political relationship with US and European countries has been getting worse because of the Ukrainian crisis after the annexation of Crimea. This lead Russia to the import-substitution strategy of development and tougher competition among firms. Second, Russia is a developing country, which has an opportunity of leapfrogging due to implementation of contemporary digital technologies. However, it requires significant changes in other resources such as labor.

Previous literature generally evidence for the positive contribution of modern technologies in firm performance (for example, Hitt, Wu, & Zhou, 2002; Kohli & Grover, 2008; Mithas, Tafti, Bardhan, & Goh, 2012; Campbell, 2012). Sánchez-Rodríguez and Martínez-Lorente (2011) found that IT resources have an impact on information analysis and workforce management as well as on performance.

However, most authors found the significant impact of IT on firm performance only under certain conditions or after some period after the implementation. The study of Melville, Kraemer and Gurbaxani (2004) supported that IT is valuable, but the extent is dependent upon internal and external factors, including complementary organizational resources of the firm and its trading partners, as well as the competitive and macro environment. This result corresponds to the findings of Huang & Liu (2005), who found that the positive impact of IT capital on firm performance only when a company has the other type of capital – innovation capital. According to resource-based theory (Jay Barney, 1991; Wernerfelt, 1995; J. Barney, Wright, & Ketchen Jr., 2001) only in rare and costly to imitate resources can provide a firm with sustainable competitive advantage. Thus, it should be a unique technology or a unique combination of technology and labor to make a firm competitive in the long horizon.

Yeow, Soh and Hansen (2018) highlight that switching to a new digital strategy leads to strategy- resources misalignments. The alignment process is challenging for the organization as it faces organizational inertia, knowledge gaps, and has to develop new resources. Moreover, employees tend to stick with their competencies resisting to learn new knowledge and there is an issue of cognitive limits. Thus, companies have to move employees between departments or hire new ones.

The current research examines the impact of IT technologies on firm performance taking into account the change in demand for a new digitally skilled labor. We consider the conditions under which the IT technologies provide a company with the benefits and whether there is a substitution or complementation effect between IT technologies and digitally skilled labor.

Data and methodology

In order to investigate the relationship between the implementation of technologies and the demand of a company for digital skills and its impact on company performance, we analyzed the largest Russian companies for the period from 2008 to 2017.

The information about companies' demand for digital skills was derived from one of the most popular job recruitment services in Russia. This part of dataset includes such characteristics of vacancies posted by observed companies as position name, employer name, region, date of publishing, required skills and experience, salary, type of employment, etc. We aggregated this information to a company-year level. Then the data about technologies' implementation was collected through TAdviser3 (from engl. Technologies and Adviser) – the Russian Internet portal and the analytical agency that collects and analyzes data on information systems available in Russia and the CIS and on companies offering services in that area. We concentrated on higher order technologies such as Business Intelligence (BI), Corporate / Business / Enterprise Performance Management and Business Rule Processing. These IT systems allow companies to enhance their performance and become or stay competitive.

Besides the dataset includes the general and financial information about companies such as age of a company, its industry, financial leverage, fixed assets, intangible assets and expenses per employee in mln dollars.

Concerning the methodology, we used regression model with fixed effects on industries and years to control for unobserved factors. The dependent variable is represented by return of sales (ROS) as a proxy for company performance. The variables of main interest are share of vacancies posted by a company that requires some digital skills related to IT systems described above and also the cumulative number of these systems implemented. The set of independent variables was also extended with the interactions between proxies for human capital and implementation of technologies for analysis of possible mutual effects.

Descriptive analysis

The final sample includes the information about 465 largest Russian companies during 2008-2017. The descriptive statistics are shown in the Table 1.

Table 1. Descriptive statistics

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max

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ROS	4,652	0.083	0.139	-0.950	0.020	0.126	0.990
Financial leverage	4,652	3.411	4.148	0.00002	0.661	4.365	19.984
Age	4,652	19.605	25.137	0	8	20	305
Expenses per employee	4,652	3.350	17.317	0.0001	0.332	1.672	759.208
Fixed assets (share)	4,652	0.395	0.297	0.000	0.116	0.667	0.999
Share of vacancies with digital skills	4,652	0.033	0.091	0	0	0.02	1
Number of implemented technologies	4,652	0.498	1.169	0	0	0	10
Intangible assets (share)	4,652	0.013	0.055	0	0	0.003	1

As can be seen, we have very heterogeneous companies in our sample in terms of its performance, financial leverage as a proxy of company risk attitude and also age – the standard deviations of these variables are 0.139, 4.148 and 19.6 respectively. The share of fixed assets across companies varies from 0 to 0.99 with a mean value at 0.395.

Considering the actual and demanded human capital, the average Russian company in the sample spends $30 thousand per employee annually and about 3% of its vacancies requires digital skills. Analysis of technologies implementation revealed that the majority of Russian companies does not have any of them; however, there are cases when a company implemented 10 IT systems of our interest.

The comparison of dynamics for share of vacancies with digital skills and the number of implemented technologies reveals that both indicators have upward trend from 2008 to 2017 (Figure 1).
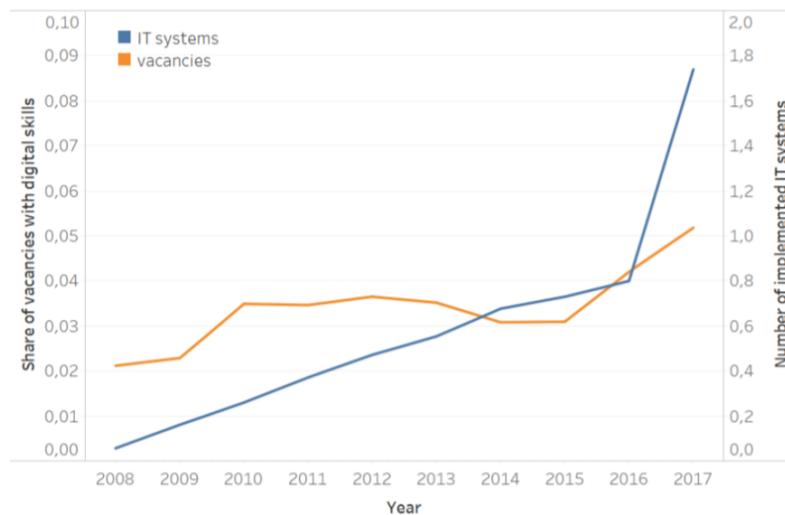
Figure 1. Dynamics of share of vacancies with digital skills and the number of implemented technologies

Preliminary results

Table 2 presents the preliminary results of regression estimation.

	Dependent variable:
	ROS
Financial leverage	-0.002***
	(0.001)
Age	0.001***
	(0.0001)
Expenses per employee	0.006***
	(0.001)
Fixed assets (share)	0.068***
	(0.010)
Share of vacancies with digital skills	0.094**
	(0.037)
Number of implemented technologies	0.004*
	(0.002)

 The effects of control variables are as one could expect. The maturity of a company, its expenses per employee and fixed assets have a positive impact on company performance. The financial leverage is negatively related with return of sales.

R^2	0.403
Adjusted R^2	0.370
Residual Std. Error	0.110 (df = 4118)
F Statistic	12.103*** (df = 230; 4118)
Note:	*$p<0.1$; **$p<0.05$; ***$p<0.01$

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Intangible assets (share)	0.072
	(0.048)
Fixed assets (share) × Share of vacancies with digital skills	-0.122*
	(0.072)
Share of vacancies with digital skills × Number of implemented technologies	-0.009
	(0.012)
Expenses per employee × Number of implemented technologies	0.0003
	(0.001)
Expenses per employee × Share of vacancies with digital skills	-0.014
	(0.013)
Share of vacancies with digital skills × Intangible assets (share)	-1.788**
	(0.694)
Expenses per employee × Intangible assets (share)	-0.015
	(0.037)
Constant	0.053**
	(0.021)
Fixed effects for industries	Included
Fixed effects for years	Included
Observations	4,349

Considering the variables of our main interest we see that both demand for digital skills and number of implemented technologies enhance the performance of a company. Taking closer look at the possible mutual effects, the model showed the significant negative impact of the interaction between fixed assets as a proxy of company size and demand for digital skills. It means that the effect of the absence of required digital skills is more harmful for performance of bigger companies. The same effect is observed for companies with higher amount of intangible assets – the impossibility of using some available intangible assets due to lack of qualified employees decrease company return of sales.

References

Barney, J., Wright, M., & Ketchen Jr., D. J. (2001). The resource-based view of the firm: Ten years after 1991. Journal of Management, 27(6), 625–641. https://doi.org/10.1016/S01492063(01)00114-3

Barney, Jay. (1991). Firm Resources and Sustained Competitive Advantage. Journal of Management, 17(1), 99–120. https://doi.org/10.1177/014920639101700108

Campbell, M. (2012). What a Difference a Year Makes: Time Lag Effect of Information Technology Investment on Firm Performance. Journal of Organizational Computing and Electronic Commerce, 22(3), 237–255. https://doi.org/10.1080/10919392.2012.696944

Hitt, L. M., Wu, D. J., & Zhou, X. (2002). Investment in Enterprise Resource Planning: Business Impact and Productivity Measures. Journal of Management Information Systems, 19(1), 71–98. https://doi.org/10.1080/07421222.2002.11045716

Huang, C. J., & Liu, C. J. (2005). Exploration for the relationship between innovation, IT and performance. Journal of Intellectual Capital, 6(2), 237–252. https://doi.org/10.1108/14691930510592825

Kohli, R., & Grover, V. (2008). Business Value of IT: An Essay on Expanding Research Directions to Keep up with the Times. J. AIS, 9, 1. https://doi.org/10.17705/1jais.00147

Melville, Kraemer, & Gurbaxani. (2004). Review: Information Technology and Organizational Performance: An Integrative Model of IT Business Value. MIS Quarterly, 28(2), 283. https://doi.org/10.2307/25148636

Mithas, Tafti, Bardhan, & Goh. (2012). Information Technology and Firm Profitability: Mechanisms and Empirical Evidence. MIS Quarterly, 36(1), 205. https://doi.org/10.2307/41410414

Sánchez-Rodríguez, C., & Martínez-Lorente, A. R. (2011). Effect of IT and quality management on performance. Industrial Management & Data Systems, 111(6), 830–848. https://doi.org/10.1108/02635571111144937

Wernerfelt, B. (1995). The resource-based view of the firm: Ten years after. Strategic Management Journal, 16(3), 171–174.

Yeow, A., Soh, C., & Hansen, R. (2018). Aligning with new digital strategy: A dynamic capabilities approach. The Journal of Strategic Information Systems, 27(1), 43–58. https://doi.org/10.1016/j.jsis.2017.09.001