Board capital leverage in the emerging capital market.

The evidence for Russian business

Irina Ivashkovskaya[1], Anastasia Stepanova[2] and Evgeniya Morkovkina[3]

Working Paper, March 2017

In today's reality with high speed of informational and technological changes, the human capital of directors and top-management plays a crucial role for decision-making process in a firm. This role depends not only on the character of the business, but also on the market efficiency level and the efficiency of external governance mechanisms in the country. As of today, we know not so much about the role of board capital for the performance of companies operating in emerging markets. We provide empirical evidence for the value added by board capital within one of the largest emerging capital market context. We study board capital and CEO's human capital using the data of 89 Russian publicly traded firms and reveal that board capital has a significant influence on performance despite rather short period of governance traditions in Russia. We apply index approach to measure board capital and identify non-linear relationship between board capital diversity and firm performance. We show the existence of optimal board capital leverage and that it depends on the types of business models, the board's size and the type of expertise. Finally, we show that previous industrial and managerial experience of directors works for bettering firm performance; while choosing new CEO, board should focus on her ability to struggle with the limitations of the emerging capital market.

Keywords: corporate governance; board capital; CEO's human capital; firm performance; emerging markets.

Introduction

[1] National Research University Higher School of Economics, Department of Finance, Corporate Finance Center, ivashkovskaya@yandex.ru

[2] National Research University Higher School of Economics, Department of Finance, Corporate Finance Center, anastasianstepanova@gmail.com

[3] National Research University Higher School of Economics, Corporate Finance Center, evmorkovkina@gmail.com

For years researchers have discussed governance - performance relationship. The most of research papers were focused on board structure and composition. Less attention has been paid to understanding the roles and the value of board members' expertise in bettering the firm performance. The conceptual framework for board capital is already introduced into the literature to capture collective knowledge and expertise of the overall board (Hillman & Dalziel, 2003). However, the specific role of board capital in corporate performance as compared to overall corporate governance mechanism as well as to the professional expertise of CEO and top management teams has neither got much attention, nor relevant empirical findings.

The possible explanation is based on the dominance of agency theory for board's roles that requires rather narrow board's functions focused on control and on setting the incentives for managers to follow the principal's goals. The concentration on the monitoring role of boards against management misbehavior and short - termism leads to imbalance between the requirements of a knowledge economy and the efforts of boards to catch up with the innovative trends for long-term value creation in a company. One important dimension of the board's role, strategic advice, is missing. J.McCahery and E. Vermeulen show that expertise, skills, capabilities and affinities of the board must be viewed as the *third dimension* of corporate governance in addition to the traditional framework of reducing agency costs and risk management (McCahery & Vermeulen, 2014).

Within the global economic space very little is known about the role of human capital of top management and boards in large countries with vast resources and internal markets, which started their transition to the market environment quite recently. As compared to western competitive traditions, these countries have underdeveloped traditions of corporate governance (internal governance mechanisms) as well as lower governance requirements from both government and local stock exchanges (external mechanisms). Does the human capital of CEOs impact the performance in such an environment? Does the human capital of board members make better boards in the economy with rather short history and experience of governance? May board capital or CEO human capital (e.g. their international experience) substitute some missed internal or external mechanisms of corporate governance in emerging environment? Is it worth to invest into diversity of board capital? The business education has a short history in emerging countries. So, should the companies choose a new CEO with industrial, financial or commercial experience? In this study, we attempt to fill these gaps. As such, the goal of the article is to provide new empirical evidence on board capital - performance relationship within one of the largest emerging capital market context. Specifically, we study: 1) the value added of different components of board capital and how it differs for investor's expectations and firm profitability in emerging capital market; 2) the contribution of the board's human capital diversity to firm

performance; 3) the impact by CEO's human capital as compared to board capital on firm performance.

Our study contributes to the literature on board's role-performance relationship. Firstly, by discussing the impact of board capital in the country with very short historical experience of the board's work and market competition, we can reach a better understanding of human side of corporate governance in the global context. Secondly, by testing empirically we identify the drivers of board capital to enhance value creation in large firms in emerging markets. Thirdly, applying the index approach we try to demonstrate how important the diversity of board capital is in the emerging market.

Below, we first describe the relevant literature and empirical findings that give rise to the research questions. Then we provide the insights into our research design, variables and data. We then proceed to empirical tests of our hypotheses based on a sample of Russian non-financial publicly traded companies. Finally, we discuss our findings and present concluding comments.

2. Theoretical background and recent empirical findings

Towards board capital leverage

In the last years much of board roles research has been focused on the need for broader framework to overcome narrow perspectives on governance. It is recognized that overemphasis has been placed on the monitoring and control dimensions of governance (Filatotchev & Wright, 2005). Supporting this argument, we would like to focus on several important directions of the search for deeper governance understanding. Firstly, in existing literature the monitoring function of the board is already enlarged to reduce three-way agency problem (Bratton & Wachter, 2010; McCahery & Vermeulen, 2014). The boards are expected to monitor agent-principal as well as majority –minority shareholder's conflicts and to protect the interests of different types of stakeholders. Secondly, in discussions of the ways to increase the effectiveness of board's roles much attention has been paid to the board independence and board insulation from executives (Gordon, 2007; Masulis & Mobbs, 2011). Third direction is related to a body of literature on trade-off between conformance and performance in board's roles and their different styles. While the monitoring and control functions are more attributed to conformance role and only indirectly to value creation, the performance role should be shaped more proactive and directly focused on value creation and long-term progress of a company (Busco, Frigo, Giovannoni, Riccaboni, & Scapens, 2005; Cornforth, 2004; Huse, 2007). Within fourth direction the scholars develop further this dual framework of board's functions and add some specific suggestions to the performance role of the board. Busco et al. (2006) and A.Elgharbawy and

M.Abdel-Kader (2013) introduce *integrated governance* which addresses enterprise itself and broader area of entrepreneurial activities than agency framework and involves the process of learning and knowledge sharing that the board has to ensure. Moreover, J. A. McCahery and E.P.M. Vermeulen argue that strategic advice of board is missing and therefore, construct *third dimension* of corporate governance in addition to monitoring and control to allow to identify the characteristics of board to ensure strategy development that will give rise to a market-leading company (McCahery & Vermeulen, 2014).

Thus, among the scholars there is strong support for developing governance framework by adding specific features to board's performance role. To address this challenge, we believe that the studies on *board capital* will provide new valuable insights. The notion of *board capital* has been introduced to the literature as a proxy for a board's ability to monitor and to provide adequate resources for strategy development (Hillman & Dalziel, 2003). According to resource - based view of the firm, the differences in performance are explained by the quality and uniqueness of resources and capabilities (Barney,1991; Amit&Schoemaker, 1993). As Teece et al show, human capital is a critical resource which can not be easily reproduced and is difficult to change over long term periods (Teece,Pisano&Shuen,1997). It has the most powerful potential to produce a competitive advantage.

Synthesizing the discussions on boards as a key governance construct, human capital and resource-based views, we contribute to conceptual framework of board capital. We argue that the board capital has distinct features compared to other types of human capital which drive its ability to add value to the firm. First, by its origin board's internal expertise and skills belong to the *tacit knowledge*. The differences between articulable (explicit) and tacit (implicit) knowledge is well recognized in the literature on human capital: the latter is not articulable, cannot be codified and cannot be transferred (Lane&Lubatkin,1998; Liebeskind, 1996). Board capital represents accumulated tacit knowledge at individual member level and at the same time at group-level, it is embedded in collaborative relationships in the board room. Thus, it is a unique collection of inimitable critical competitive assets at both levels requiring interactions of individual human capitals. Moreover, the second distinction is related to board's unique mission and roles. On one side, according to *agency theory* the boards have responsibilities in monitoring a broad spectrum of conflicting interests of owners and agents. In addition to a general monitoring function, the boards are also required to resist short-termism of managers. The agency paradigm often predetermines the excess concentration of the board's work on control functions, establishing the balance of multiple interests and the focus on the composition of the board and therefore its statutory diversity (Ben-Amar, Francoeur, Hafsi, & Labelle, 2013; McCahery & Vermeulen, 2014). This concept underlies the fiduciary duties of the boards and

assumes that the board only indirectly influences strategic decision-making. The board is expected to contribute to the performance through keeping managerial discretion within prescribed boundaries and aiming at minimizing agency costs. The active participation of the board in setting the strategy is not a priority for its work within the agent-principal paradigm (Ben-Amar et al., 2013). The agency paradigm is insufficient in explaining performance role of boards and it provides relatively incomplete understanding of what contributes to better performance.

However, as opposed to agency context, on the other side the value creation within the firm assumes strategic oversight of the boards by finding and approving strategic directions of the firm and the board's ability for advising the CEO. According to *resource based - view*, the competitive perspectives of a firm and its strategic decisions are related to the access to the required resources (Pfeffer & Salancik, 2003). The scholars confirm that sufficient knowledge, information and skills contribute to strategic flexibility of a firm and to the ability to identify new market opportunities in a dynamic markets (Barroso, Villegas, & Pérez-Calero, 2011; Chen, 2014).

Board capital combines both theoretical perspectives and it affects monitoring and control as well as resource provision (Hillman, Dalziel, 2003). Adding to this approach, we believe that in addition to above-mentioned collection of inimitable assets, the second distinct feature of board capital is based on the leverage effect, or *board capital leverage*. Given their role in providing strategic advice, the boards are expected to act as a type of a collective internal consultant to the firm. Doing so, the directors have higher probability to create strategic value identifying strategic vision for the firm and developing firm-specific knowledge on its implementation. It involves leadership in processing information, identifying growth opportunities, applying and developing firm-specific skills for conflicts resolutions. Within strategic advisory role of the board its collective tacit knowledge is leveraged over the top management of the firm. Moreover, the requirements for the CEO human capital and other members of top management team are set up and gradually shaped by the board. A number of papers are focused on specific activities of boards, namely succession planning (Pitcher,Chreim,&Risfalvi,2000), incentives planning (Conyon,Peck,1998). Therefore, board capital leverage can be used to create novel multiple effects in the unique inimitable overall expertise of an organization. Working this way, board capital represents *internal* leverage mechanism. Resource based – view followers assume that the board focuses on the contributions to corporate strategies not only by fostering the access to a variety of resources (information, experience), but also reducing uncertainty in developing strategic decisions (Haynes & Hillman, 2010; Kroll, Walters, & Le, 2007). Therefore, in addition to internal leveraging board capital

becomes an *external* leverage which creates flexibility of the firm and other valuable outcomes by networking and board's social outside relations. Providing internal and external effects, board capital leverage may become better device at both strategic advisory function and monitoring.

Board capital, human capital of CEO and performance: existing empirical evidence

The measurement of board capital is based on several classifications. Scholars rely on *educational level* and *industry-specific* experience (Barroso et al., 2011; Kor & Misangyi, 2008). The first type of indicator is important to measure because better educated directors have stronger abilities for processing different information, understanding market opportunities, developing insights (Chen, 2014) and are more capable of absorbing new ideas and innovations (Lin, Lin, Song, & Li, 2011). To capture the level of education, the authors use the mean of the total number of years of the director's study (Carpenter & Westphal, 2001; Chen, 2014). The directors with stronger industry specific experience are likely to deeper understand the technological trends, competitive changes in the industry, and are capable of advising managers on the major focus of their attention (Tian, Haleblian, & Rajagopalan, 2011). Following Barroso and co-authors (2011) and Chen (2014), board industry-related experience can be measured by assigning dummy variables to the number of positions the particular director had within the industry before joining the company.

When selecting CEO, the boards have to rely on several dimensions of his (her) human capital. For the human capital of CEO, there are several classifications in the papers: based on general skills across the industries, industry-specific skills that can be transferred within the industry, firm-level skills that cannot be easily transferred (Buchholtz, Ribbens, & Houle, 2003; Castanias, 1991); task-related versus non task-related experience capabilities such as age, educational background (Kim & Rasheed, 2014); the CEO's degree subject, for example liberal arts and no-liberal arts degrees (MBA) (Gottesman & Morey, 2010). In respect to the innovative activity of the firm some researchers identify three components: valuable human capital components, unique and generic ones. Valuable knowledge is defined through the ability to increase the ratio of benefits to customers relative to their associated costs (Cabello-Medina, López-Cabrales, & Valle-Cabrera, 2011; Lengnick-Hall & Lengnick-Hall, 2003; Snell, Lepak, & Youndt, 1999; Subramaniam & Youndt, 2005; Wernerfelt, 1984). The unique component of human capital represents specialized knowledge and skills that contribute to the development of new ideas and products (James, 2002). And generic human capital is not a direct source of innovation.

Studies have drawn some distinctions of the roles of human capital for group improvement and for the impact on firm performance. Hillman and Dalziel (2003) looked at the

collective strength of the board and introduced board capital as a collective knowledge and expertise of the overall board. The assessment of market opportunities by the boards and careful analysis of the consequences of different alternatives is reported to be an important prerequisite for better group evaluation of a wide range of options (Amason, 1996; Brodbeck et al., 2007). Moreover boards are supposed to control strategy implementation in respect of the most important strategic drivers (risk, return and value creation). Therefore, they must have adequate knowledge structures, which are sufficient to analyze a broad range of information and wide and varied industry expertise to identify market opportunities and to be capable to improve decision-making within the firm. The scholars show that the executive teams following growth strategies consider the board's advices to be an important resource (McDonald, Westphal, & Graebner, 2008).

The impact of board capital over firm performance is examined in a series of papers on developed countries data. K. Kong-Hee and Abdul A. Rasheed studied the heterogeneity of board experience for the firms with unrelated diversification strategies on a sample of 313 Fortune 1000 firms and found that heterogeneous experience such as diversity in tenure and functional background of board members contribute increasingly to performance as the level of unrelated diversification increases (Kim & Rasheed, 2014). McCahery and Vermuelen examined board practices and behavior that enhance a firm's capabilities to develop innovative products and services. Of the samples of 70 venture capital financed firms involved in IPOs and the top 40 largest world companies from FT-40, they showed that to have a well-balanced board it is important to move beyond the traditional selection criteria (independence, integrity, reliability, finance background) towards a mix of growth-innovation focused skills of members. The authors clearly demonstrate that well-balanced boards are those that dedicate more time to strategy and the development of innovative products and markets (McCahery & Vermeulen, 2014).

It may be concluded, that empirical results on human capital-firm performance relationship on developed market's samples may vary for CEO as compared to board capital. Empirical evidence on this type of relationship in emerging capital markets is not strong and not sufficient. The question of human capital impact in this specific business environment is still not clear. Some papers show non-linear U-sharped curve between tenure of CEO and firm performance (Miller, Shamsie, 2001). But it may depend on the industry. Henderson and co-authors have proved that effective CEO tenure is shorter in dynamic industries, such as technology and internet than in more mature industry, such as food industry. The research about CEO tenure in that industry was made by Henderson (Henderson et. al., 2006). There are a few papers on emerging markets data. On the sample of 977 Chinese companies from 2002 to 2008 it was

proved that financial experience of top management significantly influence decision- making process [Jiang, Zhu, Huang, 2013].

In this paper we focus on boards capital of large companies in an emerging market. Emerging markets are characterized by underdeveloped traditions of corporate governance as well as weak legal protections for investors (e.g. Klapper and Love, 2004; Black et al., 2012). The history of board's work and their monitoring and control functions in Russia is rather short and it lasts about 20 years. In line with other emerging markets, the stock exchange in Russia implies weaker requirements to the disclosure of information by listed companies, than the traditions of developed economies assume. Despite the recent development of disclosure practices in Russia, the transparency in boards - top management relationship is still not sufficient. Thus, in emerging markets' business environment, traditions and external governance mechanisms should be much stronger supported by internal mechanisms. On one side, the holistic role of board capital leverage is expected to fill the gap in governance processes. On the other side, the boards in emerging market may not have earned sufficient strength of team working in the board rooms and experience in leveraging internally.

This paper seeks to answer, first, whether board capital plays an important role in bettering firm performance in specific environment of emerging market. Second, we study which type of experience of directors (international, industrial, managerial, governmental) drives board capital leverage and contributes to the firm performance. On one side, each type of individual tacit knowledge contributes to accumulating inimitable collective skills and extends its diversity. Specific diverse background influences director's pattern of thinking and, therefore, may alter the decision-making process. Our third question is about the roles of educational diversity of board in such an environment. Does the board with the variety of types and degrees of education outperform the board with homogeneous education in emerging market?

To understand whether board capital leverage effects hold, it is important to identify whether the influence of board capital over performance differs from the impact of human capital of CEO in emerging markets with short history of market-based competitive environment. Therefore, in the second part of our paper we examine the CEO's human capital impact on firm performance in Russian market. In post-soviet Russian landscape 25 years ago there was no business education. As of today, CEOs are chosen from three main categories: the people with long experience in the industry (usually ex-COO); persons with the experience in sales (usually commercial or marketing directors); and specialists in finance and accounting with the experience in consulting (usually ex-CFO). We try to demonstrate whether it is worth to choose a CEO with experience in industry, commercial experience or experience in financial

sector. We also pay attention to the conflicts and cooperation of CEO and board. Should the firm look for an insider when appointing a new CEO? Does this task-related experience contribute substantially? Finally, we verify whether it is possible to transfer traditions from the developed to emerging market through people involved in governance. We pay attention both to the foreigners on board, as well as to the natives with international experience.

The rest of the paper is organized as follows. The next section presents our research methods and the data. It is followed by a section that summarizes the empirical results. The final section discusses the findings on board and CEO human capital contributions.

3. Empirical study: methodology

The Model

Board capital depends on a large number of personal factors starting from age and character to the experience and education. Thus, the main complication in studying the board capital is that we have to approximate its quality, value or diversity with a large number of different variables, mostly binary ones. As shown above, board capital is an overall collection of inimitable assets at group level as well. Each factor separately has a slight influence on firm performance. This is the key reason for the popularity of index approach. In this study we, first, use the multiple regression analysis to evaluate the contribution of each factor to the firm performance. Using this approach we reveal the influence of those board capital factors, each of those has quite a significant contribution to firm performance. On the second step, we construct an index of board capital to demonstrate its overall contribution to firm performance. The resulting models are described in more detail later but can be summarized as follows:

$$wQTobin = b0 + b1 \times Board\_index + \sum_{k=2,i=2010}^{k=6,i=2014} b_k \times i_{year} + b7 \times ind\_utilities + b8 \times ln\_tot\_assets + \varepsilon \quad (1)$$

$$wROE = b0 + b1 \times Board\_index + \sum_{k=2,i=2010}^{k=6,i=2014} b_k \times i_{year} + b7 \times ind\_utilities + b8 \times ln\_tot\_assets + \varepsilon \quad (2)$$

$$wROA = b0 + b1 \times Board\_index + \sum_{k=2,i=2010}^{k=6,i=2014} b_k \times i_{year} + b7 \times ind\_utilities + b8 \times ln\_tot\_assets + \varepsilon \quad (3)$$

where Board_index is an index for board capital; i_year is dummy variables for each year, except for 2009; ln *tot*_assets is a natural logarithm of firms' total assets; ind_utilities is a dummy variable controlling the utilities sector.

The construction of board index is similar to the procedure described by Ben-Amar et al. (2013). The index takes into account education (academic degrees and MBA) and experience (international, industrial, managerial and governmental) of each director, measuring the proportion of directors holding academic degrees and those with specific experience. We obtain each firm-year index score by adding one point to each characteristic's contribution into qualitative diversity of board capital. We divide each board's characteristic panel into terciles to rank the degree of appearance of each characteristic in the portrait of board. Then terciles are given values of 0, 1 and 2. The final step of construction of board index is summing all the values under terciles.

The regression equations for testing of CEO's characteristics influence on all three financial indicators have the following forms:

$$wQTobin = b0 + \sum_{i=1}^{i=12} b_i \times CEO\_characteristic_i + \sum_{k=13,i=2010}^{k=17,i=2014} b_k \times i\_year + b18 \times ind\_utilities + b19 \times ln\_tot\_assets + \varepsilon \quad (1)$$

$$wROE = b0 + \sum_{i=1}^{i=12} b_i \times CEO\_characteristic_i + \sum_{k=13,i=2010}^{k=17,i=2014} b_k \times i\_year + b18 \times ind\_utilities + b19 \times ln\_tot\_assets + \varepsilon \quad (2)$$

$$wROA = b0 + \sum_{i=1}^{i=12} b_i \times CEO\_characteristic_i + \sum_{k=13,i=2010}^{k=17,i=2014} b_k \times i\_year + b18 \times ind\_utilities + b19 \times ln\_tot\_assets + \varepsilon \quad (3)$$

where $CEO\_characteristic_i$ is a vector of CEO's characteristics; *i_year* is dummy variables for each year, except for 2009; ln *tot*_assets is a natural logarithm of firms' total assets; ind_utilities is a dummy variable controlling the utilities sector. *Major* variable is excluded from the analysis due to strong correlation with variable *Founder*, it was said earlier that these two variables could substitute each other.

Variables

We measure firm performance with, first, Tobin's q as a market-based measure of performance; second, two profitability measures, return on average assets (ROA) and return on average equity (ROE), as book value -based measures. We use a number of variables approximating board capital and CEO's human capital described in next two paragraphs.

Board Capital

We approximate the board capital with age, degree, educational diversification, and different types of experience (international, industry, government, CEO). *Age* is an average age

of directors at year-end. *Degree* is a proxy for type of education of the board member. First, we attribute 1 to each director holding a PhD or analogue degree, and 2 to each director holding a Doctor degree (the highest scientific degree in Russian 2-levels degree system), otherwise 0. Then we calculate the average for all directors (between 0 and 2). *MBA* is a number of directors holding MBA divided by the total number of directors. We measure the educational diversification *edu_distr* of board by calculating a number of different fields of education of directors. If one director has more than one degree, it counts for all of them. If some members have degrees in similar fields (e.g. mathematicians), it counts one field. *Edu_distr* fluctuates from 1 to 11.

To catch up different types of tacit knowledge embedded in accumulated experience, we use several variables. *Int_exp* is a proxy for international experience of directors. We attribute 1 to each director who worked more than a year abroad (we do not count for education abroad) and to each foreign member of board. We attribute 0, if this experience took place in CIS[4] countries or director is a foreigner from CIS countries. Finally, we measure international experience of board with the percentage of directors with international experience. *Gov_exp* is a proxy for average directors' work experience in government. We attribute 1 to each director who worked or still works at any government bodies, parliaments (federal or regional), army (conscript service excluded), intelligent service, or Federal Security Service. In early 2000s a lot of companies had ministries, or former high office Security servants in board. Government experience often means more close relations with State and lobbing resourse. *Ind_exp* is a proxy for average industry experience of directors. The construction is similar to previous variables. We attribute 1 to directors with more than 1 year of work experience in the industry, in which company operates. *Ceo_exp* aggregates information about experience of directors as a CEO of any firm (today or in the past). The construction is similar to previous variables. With this variable we approximate the experience of large-scale decision-making. *Board_size* shows the number of members in the board at year-end.

Human Capital of CEO

The task-related experience of CEO could be described with several groups of variables. Among them, first, the group of work-related skills and knowledge of CEO. We divided previous work experience into three main areas (financial, commercial, operational): *Fin* is equal to 1 if CEO was CFO or was responsible for financial issues; *Mark* is equal to 1 if CEO was CMO or was responsible for marketing or commercial issues; *Oper* is equal to 1 if CEO was

[4] CIS is Commonwealth of Independent States.

COO or was responsible for operational or product issues. Within work-related group we collected the data on industry experience : *C_ind_exp* shows is equal to 1, if CEO worked within the same or similar industry, where his current company operates. The relationship between international experience of CEO and company performance was proved on the sample of US firms from 1994 to 2004 by Magnuson and Bogs [Magnuson, Bogs, 2006]. Following previous empirical papers on developed countries, we also focus on international professional experience of CEO: *C_int_exp* is a dummy variable, and it is equal to 1, if CEO worked abroad for more than a year. At the same time it is important to underline whether CEO already has an experience of work in this company and he was already exposed to its internal corporate culture, information flows and business processes. To measure these types of skills and knowledge, we use *Tenure* which is measured in full years since an appointment of CEO. The variable *New* shows whether CEO was nominated less than a year ago (equals to 1). If *New* equals to 1, Tenure equals to 0. If *Tenure* is 1 or more, *New* equals to 0.

The second group of task-related variables describes the level of exposure of CEO to the wider range of company's business problems, processes of decision-making than particular job position assumes. The variable *Comp_ins* approximates insider experience of CEO. It is equal to 1, if previous job of CEO was in the current company or company that was acquired by the current company. *Dual* is equal to 1 if CEO and Chairman are one person approximating the duality of CEO. *Founder* is equal to 1, if CEO is a founder or one of the founders of the company. This variable combines the knowledge about the business, company and sector with the interest in firm performance. *Major* equals to 1, if CEO is a major shareholder of the firm, i.e. he owns the largest share of company.

Finally, we introduce the variables to control for the potential cultural diversity of CEO. If he lived in foreign countries with different traditions the variable *For* approximates this type of diversity (traditions, culture, etc.), and it is equal to 1, if CEO was born in any developed country. The age also may indicate the diversity of wider range of skills and is always present in empirical paper on human capital: *C_age* equals to age of CEO on the year-end.

Sample and data

The sample includes the data of 89 companies in Russia with market capitalization of more than 100 million dollars by the end of 2014. In line with previous studies, we focus on listed companies because of the evident lack of disclosure for publicly unlisted companies. The period of analysis is from 2009 to 2014 covering both the global financial crisis of 2008-2009

and the local instability period in 2014. The final sample consists of up to 518 observations. Sample distribution by sectors is presented in Figure 1.

[Figure 1]

The main data source for this study was annual reports of the companies. The data about CEO and board of directors was hand-collected. Financial data was collected from Capital IQ (database of Standard & Poor's agency).

Descriptive statistics

Tables 1 and 2 demonstrate descriptive statistics for the whole sample. See Table 1 for descriptive statistics of quantitative variables; Table 2 for descriptive statistics of binary variables.

[Tables 1 & 2]

Descriptive statistics provides us with the portrait of a typical board of directors of a large Russian company. The board of a large Russian company consists of 10 members on average. In an average board almost 40% of directors hold the academic degrees, while only 9% of them (or less than 1 director) hold an MBA degree. Two-thirds of directors have a previous experience in the sector of company's core business, while only 2 directors have an international experience and experience in government structures (21% and 17% correspondingly). Education is quite diverse inside the board with 4 different types of educations (economics & business, mathematical, technical, etc.) of directors on average.

The CEO of a large Russian company can be very young with the minimal age of 29 and average age of 47 across the sample. The same works for the board; the minimal average age of directors is 32 years while on average the directors' mean age is around 48. The variance is also very high. We see that ranges of boards' and CEO's age are pretty close – 32 to 68 and 29 to 67 respectively. The majority of CEOs has an experience in industry before their appointments. Besides, there is a small number of CEOs who is a founder or a major shareholder, while a lot of CEOs were firms' insiders before their nomination.

Performance variables are substantially volatile from year to year with Tobin's Q decreasing from 1.1 in 2009-2010 to around 0.8 in 2011-2014. However, the average profitability decreases crucially much later (in 2012 for ROE; in 2013 for ROA).

We applied traditional winsorizing procedure to the performance variables in order to smooth the distribution tails. Tobin's Q and ROA were winsorized on low margin at 10% level, while ROE was winsorized on both sides – low at 10% and high at 5%. Board's size was smoothed on both sides at 10% level and CEO's tenure – on the high margin at 1% level.

Empirical Results

Board Capital: multiple regression analysis

In next two paragraphs, we try to clarify whether board capital has a significant influence on firm performance in Russia. According to the methodology described above, we, first, estimate the multiple regressions with the pull of separate board's characteristics.

The equations include year dummy variables, control variables of firms' total assets and dummy for utilities industry. Degree variable was excluded from consideration because of strong correlation with board's average age and working experience in government structures. Regressions were estimated both with fixed and random effects, however, Hausman test shows that fixed effects model gives more consistent estimates. Results are presented in Table 3.

[Table 3]

Our key finding is that board capital matters to better firm performance in Russia. Despite the lack of governance experience in an emerging market, the diversified board leverages up the firm performance by adding knowledge and vision in large–scale Russian listed companies. Our results support several important detailed findings.

Firstly, we highlight the types of board skills that contribute to the firm performance. If some board members have managerial experience approximated by previous CEO experience, the board is more successful in developing the implementable strategy and providing the advisory role. We suppose the directors with top management experience have not only tacit knowledge, but also necessary skills that allow better analyzing the situation from different angles, identifying valuable growth opportunities and thoroughly understanding the ways to implement them. Secondly, we found that the industrial experience of a director is also a positive driver of Russian firm performance. We believe, that directors coming from the exact sector have tacit knowledge concerning the risks and the limitations of the business model. This 'close-to-life' view allows developing a strategy that matches the specific individual features of the company and the trends in the exact sector. Thirdly, we found that, contrary to our hypothesis, the international experience of board's members does not contribute to firm performance in Russia, while even potentially decreasing the Tobin's q and profitability of large companies. This finding is contradictory, and thus requires further research.

Our findings indicate that educational diversity of board in Russian company matters for firm performance, but this influence is significant for firm profitability measured by ROE only. Capital market does not pay attention to the education, while diversity in education contributes to the tacit knowledge of board (both, group- and individual level), thus increasing board capital and leveraging up the firm results.

In addition, we show that the average age of a board's members has a U-shaped influence on firm performance with the negative impact for most companies (negative part of the curve).

Board Capital: index approach

On the second step of the analysis, we construct the board's human capital index following the methodology we described above. Board Capital index is a proxy variable for measurement of the tacit knowledge accumulated by the firm's board. The board index fluctuating between 2 and 14 (523 observations) has a mean of 7.3 and a standard deviation of 2.6. Regressions are again estimated with both fixed and random effects; however, Hausman test indicates that efficient estimates can be obtained through random effects specification. The results are presented in Table 4. Both linear and quadratic forms are tested.

[Table 4]

Using the index approach, we demonstrate the non-linear effect of board human capital on firm performance. When the index is quite high (more than 7.5), it has positive influence on firm performance, that is, the diversity of board capital contributes significantly to the firm's Tobin q. At the same time, when the index is low (the board's human capital is not diverse), the index has a reverse influence of firm performance. Moreover, we have not found contribution of board capital index to firm's profitability as measured by book value-based metrics, i.e. the board capital leverages up only the market performance of the firm. Intuitively, this finding gives us the evidence for the trade-off strategy for core corporate governance mechanism construction. Constructing or reshaping the board of directors we should realize the trade-off between the speed of decision making process and necessary accumulated capital of board that depends mostly on the sector and the character of business. U-shaped form also sheds some light on the existence of two preferred types of the boards (focused and diversified).

Board size and diversity: interaction analysis

The demonstration of non-linear influence of board capital on firm performance gave us a motivation to deepen the analysis of interactions between board size and board diversity. Should a small board be diversified? Can large board be concentrated in terms of experience and education? We realize the difference in decision-making process between companies with large and small boards. The traditional intuition for the board size choice is a trade-off between the speed of decision-making and the sum of skills, knowledge and other human capital characteristics provided by directors. However, we consider this issue with the special focus not to the exact size, but to the board capital and its leverage.

The interaction analysis (See Table 6) gave us the whole picture. Let us consider two

different types of boards, a large board of 14 directors and a concentrated one of 7 directors. The increase of board diversity index for 1 grade leads to the increase of Tobin's Q by 2 pp. for large board, while decreasing Tobin's Q by 5 pp. for small-board company. The breakeven point is around 12 directors.

Going further, we should conclude that increasing the number of board members above an average size without controlling their qualitative characteristics – education and experience - does not have favourable effect for the firm performance.

Using the dataset we can provide the illustration for several types of companies with large, diversified boards. First of all, that works for diversified holdings operating several business units in different sectors of economy (e.g. JSFC Sistema). Diversified business of those companies requires a diversified tacit knowledge in the board room, or substantial board capital, to leverage up the performance of different business units. Second, we derive that the large, diversified board can leverage up the performance of knowledge-intensive corporations with high R&D expenditures (e.g. Norilsk Nickel). When a company operates in high-technological (or 'new') sector, the decision-making process may differ significantly from project to project. The character of the investment projects in knowledge-intensive companies requires the diverse knowledge, as well as the networking and other board capital applicable for different sectors. Since the turnover of the board cannot be extremely intensive, the good strategy is to construct a large and diversified board for such type of the firms.

Finally, the results proved the intuition about the trade-off between small and concentrated boards vs. large diversified ones. Moreover, the last finding gives us one more argument to conclude that for the medium-size boards the good effect of diverse board is cancelled out by its direct and indirect costs including the speed of decision-making process.

Human Capital of CEO

On the last step of the empirical analysis we study the CEO's human capital impact on firm performance in Russian market. Results are presented in Table 5.

[Table 5]

These findings shed light on the qualities of CEO that the boards in Russia must ensure to get high – level CEO. In business environment of emerging Russian economy, it is profitable to hire a CEO with the experience in financial sector. He or she could have been a consultant, investment banker, often ex-CFO. At the same time, the strategy to choose a new CEO with the operational experience (e.g. ex-COO) seems to be less successful. This finding supports the idea

that capital market limitations create more important problem in an emerging market, than the specific features of the business process during recent years. Moreover, our results support the conclusion that the international, industrial or insider background of CEO does not matter for firm performance in Russia.

We also pay attention to the conflicts and cooperation of CEO and board. While insider experience does not matter, the founder serving as a CEO of his or her own company has sound contribution to its market performance. We believe that motivation of founder-CEO is higher than motivation of hired CEO as well as the trust of investors to the CEO with major stockholding.

Conclusion and discussion

In this paper, we have studied board capital - firm performance relationship in the large emerging capital market with rather new governance and management mechanisms. Our paper is among the first ones where these linkages are studied in a specific emerging market context. We shed light on the global process of increasing role of human capital in firm development and on how it works in rather specific business landscape with 20-25 years of market traditions. Our findings have enabled us to draw four groups of conclusions.

The first group is made up of the findings on the role of board knowledge and expertise. Despite rather short history of governance practices, Russian boards does succeed in developing and adjusting individual and group knowledge to contribute to corporate performance. But the board capital-performance pattern is not monotone, as compared to developed markets (see e.g. Kim & Rasheed, 2014). The U-shaped pattern with the positive influence at high level of board capital diversity predetermines how companies may develop their boards to leverage up the firm performance.

Applying the index approach to measure the diversity of board capital, we prove that for the companies with the homogenous boards, that is, when the majority of directors have similar background, a couple of new directors with different education or experience will not contribute to increasing firm performance. At the same time, for companies with quite heterogeneous, balanced boards, it is worth to enlarge the board capital diversity by inviting directors with diverse education and experience.

The second group of conclusions is related to *optimal board capital leverage* in listed Russian firms. Our empirical findings show that the break-even point depends on the types of business-models. The interaction terms analysis shows that the higher positive values for board

capital index-performance relationship belongs to knowledge intensive companies and multiproduct diversified companies. This type of analysis also provides more evidence on the large and small board and their potential to leverage up the performance. We conclude that the company has a trade - off between the small and focused board providing mostly monitoring function and large diversified board providing advisory function to the firm as well. The choice between these two types of boards depends on the sector and the character of the business. Finally, the optimal board capital leverage depends on a combination of types of resources the boards offer in Russian business environment. We showed that a board dominated with large industrial and managerial experience contributes to bettering firm performance in emerging markets, while board dominated with directors with international experience may even worsen the corporate performance in emerging market.

The third group of findings is derived from CEO human capital empirical results. We prove that when choosing a new CEO, the board should pay specific attention to the experience of a candidate. Weaknesses and limitations of capital market in an emerging country lead us to the idea that CEO should have a background in finance making the ex-CFOs and consultants to be the best choice. At the same time, the strategy to choose a new CEO with the operational experience is proven to be less successful. Finally, we showed that in Russia, in line with our expectations, the best CEO is the founder of a company. The higher the motivation of CEO, the better the trust of investors in an emerging market, and thus the higher the firm market performance.

Our research highlights the need to examine in more details the determinants of optimal board capital leverage in emerging markets. Further developments of board capital leverage will require thorough analysis of types of resources that the boards could provide at different life-cycle stages of the firm. It is also worth to explore how each particular type of resources (boards capital component) is related to performance according to the challenges of life-cycle stage. We also see a room for improvements in empirical studies of the role of boards by exploring the patterns of relationship between the components of board capital and the its different roles for monitoring/control function and strategic advice.

Finally, among the future research directions we also see a potential based on our current findings related to the comparison of CEO and board capital impact over performance. We also strive to study further the unbalanced boards with not enough diverse human capital. How to deal with them to increase gradually firm performance without costly conflicts between stakeholders?

Acknowledgements

The authors would also like to express our thanks to Irina Skvortsova from the Center of Corporate Finance of the National Research University Higher School of Economics for their technical support.

References

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*(1), 58–107. http://doi.org/10.1257/jel.48.1.58

Amason, A. C. (1996). DISTINGUISHING THE EFFECTS OF FUNCTIONAL AND DYSFUNCTIONAL CONFLICT ON STRATEGIC DECISION MAKING: RESOLVING A PARADOX FOR TOP MANAGEMENT TEAMS. *Academy of Management Journal*, *39*(1), 123–148. http://doi.org/10.2307/256633

Barroso, C., Villegas, M. M., & Pérez-Calero, L. (2011). Board Influence on a Firm's Internationalization. *Corporate Governance: An International Review*, *19*(4), 351–367. http://doi.org/10.1111/j.1467-8683.2011.00859.x

Bebchuk, L. A., & Weisbach, M. S. (2010). The State of Corporate Governance Research. *Review of Financial Studies*, *23*(3), 939–961. http://doi.org/10.1093/rfs/hhp121

Ben-Amar, W., Francoeur, C., Hafsi, T., & Labelle, R. (2013). What Makes Better Boards? A Closer Look at Diversity and Ownership. *British Journal of Management*, *24*(1), 85–101. http://doi.org/10.1111/j.1467-8551.2011.00789.x

Bratton, W. W., & Wachter, M. L. (2010). THE CASE AGAINST SHAREHOLDER EMPOWERMENT. *University of Pennsylvania Law Review*, *158*(3), 653–728. Retrieved from http://www.jstor.org/stable/20698344

BRODBECK, F. C., KERSCHREITER, R., MOJZISCH, A., & SCHULZ-HARDT, S. (2007). GROUP DECISION MAKING UNDER CONDITIONS OF DISTRIBUTED KNOWLEDGE: THE INFORMATION ASYMMETRIES MODEL. *Academy of Management Review*, *32*(2), 459–479. http://doi.org/10.5465/AMR.2007.24351441

Buchholtz, A. K., Ribbens, B. A., & Houle, I. T. (2003). THE ROLE OF HUMAN CAPITAL IN POSTACQUISITION CEO DEPARTURE. *Academy of Management Journal*, *46*(4), 506–514. http://doi.org/10.2307/30040642

Busco, C., Frigo, M. L., Giovannoni, E., Riccaboni, A., & Scapens, R. W. (2005). Beyond compliance: why integrated governance matters today: the idea is for financial professionals to help their companies address performance and knowledge

management, too. *Strategic Finance*, 35–44. Retrieved from http://go.galegroup.com/ps/i.do?id=GALE%7CA135120044&sid=googleScholar&v=2.1&it=r&linkaccess=fulltext&issn=1524833X&p=AONE&sw=w

Cabello-Medina, C., López-Cabrales, Á., & Valle-Cabrera, R. (2011). Leveraging the innovative performance of human capital through HRM and social capital in Spanish firms. *The International Journal of Human Resource Management*, *22*(4), 807–828. http://doi.org/10.1080/09585192.2011.555125

Carpenter, M. A., & Westphal, J. D. (2001). The strategic context of external network ties: Examining the impact of director appointments on board involvement in strategic decision making. *Academy of Management Journal*, *44*(4), 639–660. http://doi.org/10.2307/3069408

Castanias, R. P. (1991). Managerial Resources and Rents. *Journal of Management*, *17*(1), 155–171. http://doi.org/10.1177/014920639101700110

Chen, H.-L. (2014). Board Capital, CEO Power and R&D Investment in Electronics Firms. *Corporate Governance: An International Review*, *22*(5), 422–436. http://doi.org/10.1111/corg.12076

Cornforth, C. (2004). The Governance of cooperatives and mutual associations: a paradox perspective. *Annals of Public and Cooperative Economics*, *75*(1), 11–32. http://doi.org/10.1111/j.1467-8292.2004.00241.x

Filatotchev, I., & Wright, M. (2005). *The Life Cycle of Corporate Governance*. Edward Elgar. Retrieved from http://econpapers.repec.org/RePEc:elg:eebook:3718

Gordon, J. N. (2007). The Rise of Independent Directors in the United States, 1950-2005: Of Shareholder Value and Stock Market Prices. *Stanford Law Review*, *59*(6), 1465–1568. Retrieved from http://www.jstor.org/stable/40040395

Gottesman, A. A., & Morey, M. R. (2010). CEO educational background and firm financial performance. *Journal of Applied Finance*, *20*(2), 70–83. Retrieved from http://go.galegroup.com/ps/i.do?id=GALE%7CA340424918&sid=googleScholar&v=2.1&it=r&linkaccess=fulltext&issn=15346668&p=AONE&sw=w

Haynes, K. T., & Hillman, A. (2010). The effect of board capital and CEO power on strategic change. *Strategic Management Journal*, *31*(11), 1145–1163. http://doi.org/10.1002/smj.859

Hillman, A. J., & Dalziel, T. (2003). BOARDS OF DIRECTORS AND FIRM PERFORMANCE: INTEGRATING AGENCY AND RESOURCE DEPENDENCE PERSPECTIVES. *Academy of Management Review*, *28*(3), 383–396. http://doi.org/10.5465/AMR.2003.10196729

Huse, M. (2007). *Boards, Governance and Value Creation: The Human Side of Corporate Governance*. Retrieved from https://books.google.com/books?hl=ru&lr=&id=lb5VhT8DaSAC&pgis=1

James, W. M. (2002). Best HR Practices for Today's Innovation Management. (the Human Side). *Research-Technology Management*, *45*(1), 57. Retrieved from https://www.questia.com/library/journal/1G1-82353654/best-hr-practices-for-today-s-innovation-management

Kim, K.-H., & Rasheed, A. A. (2014). Board Heterogeneity, Corporate Diversification and Firm Performance. *Journal of Management Research (09725814)*, *14*(2), 121–139. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=97418692&site=bsi-live&scope=site

Kor, Y. Y., & Misangyi, V. F. (2008). Outside directors' industry-specific experience and firms' liability of newness. *Strategic Management Journal*, *29*(12), 1345–1355. http://doi.org/10.1002/smj.709

Kroll, M., Walters, B. A., & Le, S. A. (2007). The Impact of Board Composition and Top Management Team Ownership Structure on Post-IPO Performance in Young Entrepreneurial Firms. *Academy of Management Journal*, *50*(5), 1198–1216. http://doi.org/10.2307/AMJ.2007.20159920

Lengnick-Hall, M. L., & Lengnick-Hall, C. A. (2003). HR's role in building relationship networks. *Academy of Management Executive*, *17*(4), 53–63. http://doi.org/10.5465/AME.2003.11851841

Lin, C., Lin, P., Song, F. M., & Li, C. (2011). Managerial incentives, CEO characteristics and corporate innovation in China's private sector. *Journal of Comparative Economics*, *39*(2), 176–190. http://doi.org/10.1016/j.jce.2009.12.001

Masulis, W. R., & Mobbs, S. (2011). Are All Inside Directors the Same? Do They Entrench CEOs or Enhance Board Decision- Making? *Journal of Finance*, *66*(3), 823–872. Retrieved from http://www.afajof.org/details/journalArticle/2883821/Are-All-Inside-Directors-the-Same-Evidence-from-the-External-Directorship-Market.html

McCahery, J. A., & Vermeulen, E. P. M. (2014). Understanding the Board of Directors after the Financial Crisis: Some Lessons for Europe. *Journal of Law and Society*, *41*(1), 121–151. http://doi.org/10.1111/j.1467-6478.2014.00659.x

McDonald, M. L., Westphal, J. D., & Graebner, M. E. (2008). What do they know? The effects of outside director acquisition experience on firm acquisition performance. *Strategic*

Management Journal, *29*(11), 1155–1177. http://doi.org/10.1002/smj.704

Nahapiet, J., & Ghoshal, S. (1998). SOCIAL CAPITAL, INTELLECTUAL CAPITAL, AND THE ORGANIZATIONAL ADVANTAGE. *Academy of Management Review*, *23*(2), 242–266. http://doi.org/10.5465/AMR.1998.533225

Pfeffer, J., & Salancik, G. R. (2003). *The External Control of Organizations: A Resource Dependence Perspective* (Vol. 9). Retrieved from https://books.google.com/books?hl=ru&lr=&id=iZv79yE--_AC&pgis=1

Snell, S., Lepak, D., & Youndt, M. (1999). Managing the Architecture of Intellectual Capital: Implications for Strategic Human Resource Management. *Research in Personnel and Human Resource Management*, *17*(Supplement 4), 175–193.

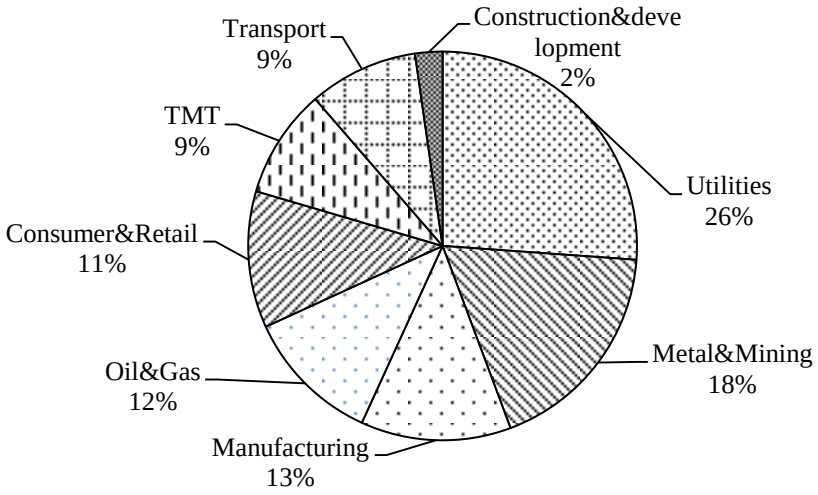
Subramaniam, M., & Youndt, M. A. (2005). THE INFLUENCE OF INTELLECTUAL CAPITAL ON THE TYPES OF INNOVATIVE CAPABILITIES. *Academy of Management Journal*, *48*(3), 450–463. http://doi.org/10.5465/AMJ.2005.17407911

Tian, J. J., Haleblian, J. J., & Rajagopalan, N. (2011). The effects of board human and social capital on investor reactions to new CEO selection. *Strategic Management Journal*, *32*(7), 731–747. http://doi.org/10.1002/smj.909

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal*, *5*(2), 171–180. http://doi.org/10.1002/smj.4250050207

Appendices. Figures and Tables.

Firms operate in 8 sectors (utilities, metals & mining, manufacturing, oil & gas, consumer & retail, telecommunication and media, transport, construction & development) with the highest concentration in utilities and metals and mining sectors.



Picture 1 - Sample distribution by sectors

Tables 1 & 2.

Age is an average age of directors at year-end. Degree is a proxy for education of the board member. MBA is a number of directors holding MBA divided by the total number of directors. We measure the educational diversification edu_distr of board by calculating a number of different fields of education of directors. Int_exp is a proxy for international experience of directors. Gov_exp is a proxy for average directors' work experience in government. Ind_exp is a proxy for average industry experience of directors. Ceo_exp aggregates information about experience of directors as a CEO of any firm (today or in the past). The construction is similar to previous variables. With this variable we approximate the experience of large-scale decision-making. Board_size shows the number of members in the board at year-end.

Fin is equal to 1 if CEO was CFO or was responsible for financial issues; Mark is equal to 1 if CEO was CMO or was responsible for marketing or commercial issues; Oper is equal to 1 if CEO was COO or was responsible for operational or product issues. C_ind_exp shows is equal to 1, if CEO worked within the same or similar industry, where his current company operates. C_int_exp is a dummy variable, and it is equal to 1, if CEO worked abroad for more than a year. Tenure is measured in full years since an appointment of CEO. New shows whether CEO was nominated less than a year ago (equals to 1). Comp_ins is equal to 1, if previous job of CEO was in the current company or company that was acquired by the current company. Dual is equal to 1 if CEO and Chairman are one person approximating the duality of CEO. Founder is equal to 1, if CEO is a founder or one of the founders of the company. Major equals to 1, if CEO is a major shareholder of the firm.

For is equal to 1, if CEO was born in any developed country. C_age equals to age of CEO on the year-end.

Table 1 - Descriptive statistics of data for quantitative variables

Variable	*Number of observations*	*Mean value*	*Std. Dev.*	*Min. Value*	*Max. Value*
Age	501	47.919	6.235	32.333	68.182
Degree	508	0.377	0.325	0	1.364
MBA	508	0.093	0.130	0	0.571
int_exp	508	0.208	0.228	0	0.833
gov_exp	508	0.167	0.170	0	0.636
ind_exp	508	0.663	0.224	0	1
ceo_exp	508	0.457	0.264	0	1
edu_distr	502	3.857	1.365	0	7
board_size	508	9.567	2.023	7	13
c_Age	515	47.503	8.904	29	67
Tenure	516	4.052	4.170	0	17
ROA	518	0.049	0.078	-0.061	0.519
ROE	517	2.232	3.558	-0.122	9.626
QTobin	495	0.909	0.604	0.337	4.829
ln_tot_assets	503	8.098	1.594	2.728	12.921

Table 2 - Descriptive statistics of full sample for binary variables

Variable	*Number of observations*	*Mean value*	*Std. Dev.*	*Min. Value*	*Max. Value*
Fin	516	0.134	0.341	0	1
mark	516	0.112	0.316	0	1
oper	516	0.486	0.500	0	1
For	516	0.031	0.174	0	1
c_int_exp	516	0.211	0.409	0	1
c_ind_exp	516	0.924	0.265	0	1
Comp_ins	516	0.621	0.486	0	1
Dual	516	0.033	0.179	0	1
founder	516	0.147	0.355	0	1
Major	516	0.161	0.368	0	1
New	516	0.186	0.390	0	1

Table 3 - Influence of boards' characteristics on Tobin's Q, ROA and ROE

Dependent variable	*Tobin's Q*		*ROE*		*ROA*	
Model specification		*AR(1) robust standard errors*		*AR(1) robust standard errors*		*AR(1) robust standard errors*
Constant	5.425***	1.166	-25.277**	-2.718	-0.237	0.187
	(1.744)	(1.332)	(10.512)	(4.014)	(0.262)	(0.272)
Age	-0.128*	-0.113	1.467***	0.366	0.009	0.009
	(0.066)	(0.085)	(0.399)	(0.456)	(0.010)	(0.013)
Age²	0.001**	0.001	-0.016***	-0.004	-0.000	-0.000
	(0.001)	(0.001)	(0.004)	(0.005)	(0.000)	(0.000)
MBA	-0.155	-0.043	-2.558	1.592	0.016	0.017
	(0.309)	(0.346)	(1.969)	(1.791)	(0.048)	(0.058)
int_exp	**-0.815****	-0.539**	0.155	-0.701	-0.097**	-0.061
	(0.258)	(0.273)	(1.600)	(1.479)	(0.040)	(0.047)
gov_exp	-0.039	-0.066	-4.730***	-0.180	-0.006	0.003
	(0.266)	(0.288)	(1.626)	(1.598)	(0.040)	(0.049)
ind_exp	**0.381***	0.110	1.789	-0.243	0.022	0.013
	(0.211)	(0.254)	(1.264)	(1.238)	(0.032)	(0.042)
ceo_exp	**0.507****	0.219	-2.155*	-0.936	0.012	0.041
	(0.209)	(0.226)	(1.290)	(1.230)	(0.032)	(0.038)
edu_distr	-0.038	-0.014	0.400**	0.031	-0.001	0.004
	(0.030)	(0.033)	(0.185)	(0.178)	(0.005)	(0.006)
board_size	-0.021	-0.019	0.020	-0.127	-0.006	-0.004
	(0.025)	(0.028)	(0.154)	(0.157)	(0.004)	(0.005)
ln_tot_assets	-0.153**	-0.179*	-0.574	-0.758	0.010	-0.011
	(0.063)	(0.091)	(0.356)	(0.531)	(0.009)	(0.013)
R^2 within	0.2345	0.1280	0.5769	0.5263	0.1192	0.1124
F-statistics	7.35	2.71	34.18	21.71	3.40	2.48

*p<0.1; **p<0.05; ***p<0.01

Table 3 demonstrates the results of usual multiple regression analysis and more rigorous analysis with standard robust errors which are correlated along with AR(1) process (autocorrelation). Year dummies were included for taking into consideration time heterogeneity of financial dependent variables.

Age is an average age of directors at year-end. MBA is a number of directors holding MBA divided by the total number of directors. We measure the educational diversification edu_distr of board by calculating a number of different fields of education of directors. Int_exp is a proxy for international experience of directors. Gov_exp is a proxy for average directors' work experience in government. Ind_exp is a proxy for average industry experience of directors. Ceo_exp aggregates information about experience of directors as a CEO of any firm (today or in the past). The construction is similar to previous variables. With this variable we approximate the experience of large-scale decision-making. Board_size shows the number of members in the board at year-end.

Table 4 - Influence of board's human capital index on Tobin's Q, ROA and ROE

Dependent variable	*Tobin's Q*		*ROE*		*ROA*	
Model specification	*Linear*	*Quadratic*	*Linear*	*Quadratic*	*Linear*	*Quadratic*
Constant	2.223	2.396*	-14.340**	-14.702**	0.004	-0.000
	(1.450)	(1.447)	(7.004)	(7.010)	(0.204)	(0.204)
Board_index	-0.027*	-0.160***	-0.070	0.204	-0.002	0.004
	(0.015)	(0.062)	(0.072)	(0.293)	(0.002)	(0.009)
Board_index^2		0.010**		-0.020		-0.000
		(0.004)		(0.020)		(0.001)
Age	-0.009	-0.003	0.646**	0.624**	0.001	0.001
	(0.059)	(0.059)	(0.286)	(0.287)	(0.008)	(0.008)
Age^2	0.000	0.000	-0.007**	-0.006**	-0.000	-0.000
	(0.001)	(0.001)	(0.003)	(0.003)	(0.000)	(0.000)
board_size	-0.028	-0.030	0.008	0.009	-0.003	-0.003
	(0.020)	(0.020)	(0.092)	(0.092)	(0.003)	(0.003)
ind_utilities	-0.307**	-0.300***	-0.647	-0.657	-0.027	-0.027
	(0.127)	(0.127)	(0.522)	(0.521)	(0.016)	(0.016)
ln_tot_assets	-0.052	-0.053	0.482***	0.485***	0.007	0.007
	(0.033)	(0.033)	(0.142)	(0.142)	(0.004)	(0.004)
R^2 *within*	0.1893	0.2011	0.5298	0.5308	0.0961	0.0965
Wald chi2	72.51	80.03	414.24	414.86	43.32	43.63

*p<0.1; **p<0.05; ***p<0.01

Regressions are again estimated with both fixed and random effects; however, Hausman test indicates that efficient estimates can be obtained through random effects specification. The results are presented in Table 4. Both linear and quadratic forms are tested. Wald chi-squared statistics are higher for quadratic specifications than for linear ones for all the dependent variables, meaning that the quadratic form fits the model better. As control variables year dummies were included for taking into consideration time heterogeneity of financial dependent variables.

Table 5 - Influence of CEO's characteristics on Tobin's Q, ROA and ROE

Dependent variable	*Tobin's Q*	*ROE*	*ROA*
Constant	1.620***	2.155	-0.006
	(0.327)	(1.473)	(0.044)
C_Age	0.002	0.007	0.000
	(0.004)	(0.020)	(0.001)
Tenure	-0.002	0.016	-0.000
	(0.010)	(0.046)	(0.001)
Fin	**0.166***	0.505	-0.010
	(0.094)	(0.444)	(0.013)
Mark	0.063	-0.570	0.043***
	(0.111)	(0.507)	(0.015)
Oper	**-0.138***	**-0.666***	-0.006
	(0.076)	(0.354)	(0.010)
For	0.083	0.481	-0.043
	(0.191)	(0.902)	(0.027)
C_int_exp	-0.017	0.178	0.002
	(0.093)	(0.426)	(0.012)
C_ind_exp	0.059	-0.653	-0.012
	(0.130)	(0.620)	(0.018)
Comp_ins	-0.043	-0.036	0.008
	(0.071)	(0.327)	(0.010)
Dual	-0.097	0.489	0.048**
	(0.157)	(0.717)	(0.021)
Founder	**0.380*****	0.018	0.008
	(0.105)	(0.473)	(0.014)
New	-0.002	0.067	-0.007
	(0.054)	(0.235)	(0.008)
ind_utilities	-0.209*	-0.482	-0.009
	(0.114)	(0.488)	(0.015)
ln_tot_assets	-0.075***	0.353***	0.005
	(0.029)	(0.123)	(0.004)
R^2 *within*	0.2029	0.5209	0.1121
Wald chi2	90.78	420.44	56.58

*p<0.1; **p<0.05; ***p<0.01

Note: Regressions were estimated with both fixed and random effects, however, Hausman test indicates that efficient estimates can be obtained through random specification. Standard robust errors are correlated along with AR(1) process and presented in parentheses. As control variables year dummies were included for taking into consideration time heterogeneity of financial dependent variables.

C_age equals to age of CEO on the year-end. Tenure is measured in full years since an appointment of CEO. Fin is equal to 1 if CEO was CFO or was responsible for financial issues; Mark is equal to 1 if CEO was CMO or was responsible for marketing or commercial issues; Oper is equal to 1 if CEO was COO or was responsible for operational or product issues. For is equal to 1, if CEO was born in any developed country. C_ind_exp shows is equal to 1, if CEO worked within the same or similar industry, where his current company operates. C_int_exp is a

dummy variable, and it is equal to 1, if CEO worked abroad for more than a year. New shows whether CEO was nominated less than a year ago (equals to 1). Comp_ins is equal to 1, if previous job of CEO was in the current company or company that was acquired by the current company. Dual is equal to 1 if CEO and Chairman are one person approximating the duality of CEO. Founder is equal to 1, if CEO is a founder or one of the founders of the company.

Table 6 – Interaction between board capital index and board size

Dependent variable	*Tobin's Q*		
Model specification	*Linear*	*Quadratic*	*Interaction with board size*
Constant	2.223	2.396*	2.839***
	(1.450)	(1.447)	(0.503)
Board_index	-0.027*	-0.160***	-0.130**
	(0.015)	(0.062)	(0.061)
Board_index^2		0.010**	
		(0.004)	
board_size	-0.028	-0.030	-0.096*
	(0.020)	(0.020)	(0.050)
*Board Size*Board_index*			0.011*
			(0.066)
Age	-0.009	-0.003	
	(0.059)	(0.059)	
Age^2	0.000	0.000	
	(0.001)	(0.001)	
ind_utilities	-0.307**	-0.300***	-0.338***
	(0.127)	(0.127)	(0.121)
ln_tot_assets	-0.052	-0.053	-0.064**
	(0.033)	(0.033)	(0.030)
R^2 within	0.1893	0.2011	0.1861
Wald chi2	72.51	80.03	76.51

*p<0.1; **p<0.05; ***p<0.01

Regressions are again estimated with random effects. Both linear and quadratic forms are tested. Wald chi-squared statistics are higher for quadratic specifications than for linear ones for all the dependent variables, meaning that the quadratic form fits the model better. Variable ***Board Size*Board_index*** is for the interaction between board size and board capital index. As control variables year dummies were included for taking into consideration time heterogeneity of financial dependent variables.