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Special Issue on the Role of CEO's Personal Traits

The leading roles of chief executive officers (CEO) is widely recognized by scholars in different areas of research. Their contributions to decision-making, strategy development, business restructuring constitute transformative leadership and the ability to initiate and lead organizational changes. In standard corporate finance the contributions of CEO personal traits are in most papers studied through the lens of human capital - corporate financial performance relationship and via their positions in governance mechanism. Traditional corporate finance assumes that all agents including CEOs act on a rational basis generating unbiased estimates and decisions. The traditional framework provides many useful insights and findings, but still the overall portrait of the CEO's role can be considered incomplete. When we focus the studies on the second type of personal traits which summarizes the styles of CEO behavior, we may get rather different type of their impact over the company's decisions and performance. The behavioral finance does not stick to the assumption of CEO's rationality. It does not continue to suppose that CEOs process information without emotional biases. On the contrary, it offers new insights to explain the CEO's roles due to the new assumptions that subjective issues, such as previous experience, emotional factors, cognitive anomalies will also influence the process of information processing and therefore final decisions.

Given the difference in both frameworks, we believe that it is important to better understand whether different types of personal traits namely human capital, on one side, and on the other side - individual biases of a CEO have similar impact over the company especially in emerging capital markets. The articles from this First Special issue on the role of top management address some of above-mentioned challenges in corporate financial decisions provide the evidence from emerging capital markets. To our mind, lower maturity of some institutional structures, information flows on macro level as well as at company's level in this type of business environment provide additional arguments in favor to expect the growing body of new findings on the CEO's roles.

Moreover, at times of turbulence, high uncertainty, new globalization trends which are due to the shifts in world integration and increasing role of the largest emerging markets in internalization these markets and companies require much more attention to the role of top management, CEOs and Boards how to secure their resilience and growth.

Editor-in-Chief,
Irina Ivashkovskaya

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Influence of CEO Human Capital and Behavioral Characteristics on Economic Profit of Russian Companies

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Abstract

We investigate how different personal traits of a chief executive officer (CEO) influence value creation in one of the largest emerging capital markets in Russia. Our research model considers several components of human capital of a CEO. Moreover, we include CEO's behavioral biases looking at overconfidence measured by industry adjusted ratio of capital expenditures and narcissism captured by the analysis of CEO's photos following previous academic research approaches. The CEO power is applied to understand its impact over value creation and possible mitigating effect. Our sample consists of 111 Russian publicly traded companies and 235 CEOs for 8 years (from 2013 to 2020). We apply economic profit criteria to measure corporate performance with economic value added (EVA) which captures the spread between actual return on capital derived from financial reports and overall cost of capital based on the risks of a company collected from Bloomberg . We use first-order differences in company's contribution to EVA after adjustments to the industry and overall market contributions to EVA for the sample. We find empirical evidence that CEO's human capital affects value creation measured by first-order differences to industry adjusted EVA yearly. Furthermore, the CEO power has positive impact over value creation in Russian corporations while behavioral biases such as overconfidence ad narcissism do not have significant relationship with the changes in EVA.

Keywords: CEO, human capital, overconfidence, narcissism, CEO power, economic value added, emerging capital markets

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Introduction

The role of top managers in corporate decisions and they affect company's performance is among important and controversial topics in academic agenda. It has been very popular in managerial and social studies for many years. In corporate finance research the human-side of corporate financial performance becomes even more critical due to possible behavioral biases of top managers and chief executive officers (CEO) that are rooted in their irrational decision-making in investing, financing, strategic deals and other types of financial decisions. On one side, irrational behavior can lead to overestimation of future outcomes, errors in budgeting and financial planning, asset pricing and resource allocation. On the other side, it may result in underestimation or misunderstanding of risk drivers and their impact over the company in the short run and in the future. Therefore, the role of personal traits of top management and CEOs can be controversial and their combination may lead to positive and at the same negative effects of particular corporate decisions.

The studies on different groups of personal traits of a CEO including human capital characteristics and the metrics to capture its quality, behavioral characteristics and their possible metrics are mostly focused on developed market data. Such studies require rather wide scope of data, especially in case of behavioral traits to develop the variables for research models. The personal traits of CEO and their relationship with company's performance for emerging capital markets are understudied which can be explained also by the scarce data that is required to run such research. Despite the difficulties to have persistent data for personal traits measures, the empirical evidence on possible positive and negative effects of CEOs is needed. This paper is among the first to contribute to the literature on the role of both human capital and behavioral traits in emerging capital market. We study publicly traded companies in Russia to get the data, metrics and results.

The paper is structured as follows. Section 2 underlines main approaches from the literature review on the roles of human capital and behavior of a CEO. The section 3 develops the hypotheses, and defines the variables and research model. Section 4 presents empirical part of the research. Section 5 concludes. The paper has different annexes summarizing the classification of literature in the Appendix A and the descriptive data on variables in Appendix B.

Literature Review

Academic literature mainly considers such components of human capital as education, relevant experience (tenure in the current company, internal and external experience), government experience and other acquired professional connections. A classification of academic papers that consider the influence of these three groups of characteristics is presented in Appendix A. Studies of the role of the CEO age characteristic produce mixed results. A series of papers show that it is typical for younger CEOs to adhere to a more aggressive and risky corporate strategy of company acquisitions [1] and even more aggressive strategies of working capital management, and that such results are resistant to industry-specific effects and various model specifications . Another group of papers emphasizes the reverse dependence: more mature CEOs are prone to less risky company management, they are less motivated to improve their value in the labor market and more motivated to preserve the already achieved results [2; 3].

When considering CEO education, the authors demonstrate that a higher educational level enhances the ability to analyze large amounts of information and make management decisions in a resource-constrained environment [4], and that it is related to the development of employees' capacity for innovation [5]. The studies confirm a positive relationship between a CEO's educational level and corporate performance. Using the data of 350 companies for 1999-2017, A. Urquhart and H. Zhang revealed a greater impact of CEOs with PhD degrees on return on equity, as well as the fact that when this degree is granted by a top educational institution, it exerts the greatest impact [6]. Professional management education is just as important for CEOs. Thus, T. King et al. studied the operating efficiency of Chinese banks and showed that banks managed by MBA holders outperformed their competitors in terms of operating results [7].

An analysis of empirical papers suggests that CEO experience exerts a significant impact on corporate processes. CEO tenure produces an ambiguous influence on the company. Accumulated experience helps to make more informed decisions in stable industries [8]. W. Drobetz et al. emphasize the particular importance of prolonged tenure in a company when stakes are high: in case of implementation of a large investment project, management of a significant cash balance or a crisis [9]. C. Chahyadi, P. Wineka point out that executives with external experience make riskier investment decisions [10]. Crossland et al. also show that CEO external experience is related to growth in strategic innovation implemented in the company [11]. Studies suggest that industry-specific experience has a significant impact on strategic decisions [12] and CEO working style [13]. A positive relationship was revealed between the level of corporate entrepreneurship and CEO's professional connections in political circles [14]. Chief executive officers with financial expertise stand out due to their more active financial policy that decreases the cash balance, while increasing leverage and reducing investment in risky innovations [15].

The issue of why and how cognitive biases occur in decision-making is still relevant today and is discussed by scientists, business experts and psychologists all over the world [16]. Behavioral characteristics are based on irrational estimates when CEOs make decisions, they may lead to a overestimation of possible outcomes and, on the contrary, an underestimation of their risks. Acting in a more or less "irrational" way, people fall prey to a range of cognitive, emotional and social pressures that makes them opt for non-optimal solutions, which may impede the achievement of their goals.

Many authors in their studies consider irrational characteristics against the background of a chief executive officer's narcissism and overconfidence [17–19]. *Narcissism* is defined as excessive self-esteem that makes a person seek constant confirmation of his/her supremacy over other people and uniqueness [20]. People of this type use emotional self-regulation strategies in order to feel successful and important, thus exhibiting impulsive and impressive behavior in an attempt to satisfy their constant need for attention [21]. Narcissistic CEOs prefer to act in a daring and risky way, driven by their need to be admired [22]. Thus, V. Scotter asserts that purchases, especially major ones, are one of the most notable initiatives that may be taken up by the chief executive officer. CEO self-confidence is based on the "better-than-average" effect, which implies that CEOs tend to overestimate their own skills and knowledge, thinking they rank above average. It is related to three main factors: illusion of control, a high commitment to outstanding achievement and abstract guides, which impede the comparison of different people's achievements [23]. Only such CEOs or only the firm benefit from their biased beliefs [24]. One of the most obvious examples is the struggle between CEO self-confidence and personal aversion to risks that are undesirable from the shareholders' viewpoint [25]. When a manager is not prone to risk, overconfidence may make him/her undertake risky projects that a rational manager would reject after taking the risk into consideration. Appendix A also summarizes the studies dedicated to the influence of CEO behavioral characteristics on company operations.

As a rule, behavioral characteristics are presented as irrational features of a certain person. The biases of a chief executive officer are a potentially crucial factor that influences corporate performance [26]. For example, CEOs with strongly pronounced behavioral characteristics tend to use strategies and compete driven by their personal needs instead of corporate objectives [27]. Such actions may have positive consequences: firm performance may improve due to an increase in the number of innovations and acceptance of various investment opportunities [28; 29]. However, the authors point out the negative consequences as well: higher-risk decisions that top managers usually evaluate only over a short-term horizon, potentially causing a decline in corporate performance in the future [22].

The above analysis of empirical studies shows that an executive's irrational character traits do not always have a negative impact on the company. It is true that a narcissist running a company strives to enhance its risk profile, but at the same time a person of this type boosts innovation growth and earnings per share [22; 30]. Self-confident chief executive officers exploit innovation opportunities for growth more efficiently [31; 32].

The issue of the optimal CEO power level is no less important [36]. Numerous authors believe that CEOs can exert a significant influence on the heads of company business units and to make important corporate decisions, thus cancelling out the efficiency of corporate governance [34].

The key papers dedicated to this topic are presented in Appendix A. Literature offers a variety of ways to measure CEO power. Taking into consideration the specific nature of Russian corporate governance and limited published data about chief executive officers' characteristics in publicly available sources, hereinafter we will use the variables that reflect whether a CEO is the company founder and the share of independent directors on the board of directors [35–36]. Thus, Khresna et al. arrived at the conclusion that there is a significant level of interrelation between a highly powerful CEO and a company's high productivity, high market value, longer presence in the market, as well as introduction of new products [37; 38]. At the same time, executives with greater power use a lot of various incentives for making management decisions that are beneficial for them, which does not always provide favourable results [39]. Other papers show that highly powerful CEOs promote significant innovation activity and a achieve high financial results [40; 41]. Besides, some authors disapprove of endowing a chief executive officer with unlimited control over company operations. Disruption of checks and balances in the corporate control system ultimately undermines company value [42; 43].

In order to evaluate the influence of individual CEO characteristics on corporate performance, it is necessary to choose an indicator to measure them. We think it is important to use the *return on equity spread*, or the value by which the actual return on equity in a certain period differs from the risk-required return. Usually RI (residual income) is used for this purpose. It is based on the return on equity spread, which allows to take into consideration the vector of change in the company value for shareholders. Chief executive officer's individual characteristics, which comprise human capital and behavioral characteristics, may produce a positive or a negative impact on the return on equity spread and, consequently, on the economic value added. In this research we apply calculation without adjusting for financial statements because we rely on the data provided by Bloomberg (formula 1):

$$EVA = (ROIC - WACC) \cdot Invested\ Capital, \quad (1)$$

where *EVA* is the company's economic value added;

ROIC is return on invested capital;

WASS is the weighted average cost of capital;

Invested Capital is invested capital.

Against the background of the topic of the present research, it is important to note that economic value added provides corporate management with the correct incentive to create value for shareholders. Stewart distinguishes 4 advantages of this indicator for creating a system of efficient corporate governance [44]:

- *Operational efficiency*. In order to maximize EVA, it is necessary to optimize expenses and generate more revenue, i.e., look for the ways to increase profit while avoiding capital raising. Besides, these measures have a positive impact on other business performance indicators;

- *Efficient asset management*. EVA is the only indicator that demonstrates the actual change of the assets' book value. Thus, EVA motivates managers to optimize supply chains, speeding up the rate of asset turnover for reducing current assets. Also, EVA maximization leads management to reject investment projects that do not cover the cost of capital even if it reduces sales, EBITDA or profit.
- *Growth with regard to return*. EVA also motivates managers to invest in innovation, scaling and promoting growth, provided that return on equity exceeds the cost of capital. This allows to make investment decisions on the basis of the required return on invested capital, even if the return on these projects will be below the target ROI adopted by the company.

Optimal decision-making. Use of the EVA indicator demonstrates the influence of an investment decision on reported corporate performance, thus optimizing the procedure of making investment decisions. When managers follow the EVA paradigm, they generate the ideas that would have never been considered if accounting indicators prevailed in their minds as a target.

On the basis of the above arguments, we would like to point out that the EVA indicator presents the strategic and operating efficiency of decisions made by the company management. For this very reason we use this value in the present research as the resulting indicator of chief executive officer's management quality (i.e. the dependent variable).

Hypotheses and the Research Model

An analysis of empirical papers helps us to determine the logic of influence of each CEO characteristic on the economic value added of the company represented as EVA (economic value added) increment and to generate the following **hypotheses** for further research.

Hypothesis 1. There is a positive interrelation between CEO age and the increment of corporate EVA.

The experience accumulated with advancing age helps to make more intelligent management decisions [45].

Hypothesis 2. The higher the CEO education level, the larger the corporate EVA increment.

Prove that more educated CEOs are more capable of quick processing of diversified information, understanding of market opportunities, making proper management decisions, thus improving the quality of corporate governance [6].

Hypothesis 3. As CEO tenure increases, the EVA increment grows on a year-to-year basis.

There is a positive interrelation between the length of tenure and quality of operational and strategic planning [46].

Hypothesis 4. There is a positive interrelation between the extension of CEO tenure and corporate EVA increment.

W. Drobetz et al. show that the thoroughness of understanding of internal processes and business specifics influences the efficiency of investment decisions and risk level, which follows from the length of CEO tenure in the company in question [9].

Hypothesis 5. CEO external experience exerts a positive influence on the EVA increment.

Previous relevant external experience is believed to have a positive impact on performance; it promotes the development of more flexible thinking when making operational and strategic decisions [47].

Hypothesis 6. CEO government experience exerts a positive impact on the EVA increment.

Academic literature states that a chief executive officer's government experience brings about a more restrained investment policy, reduces the likelihood of corporate fraud and increases the number of business connections in the government authorities related to the company's field of activity [48; 49].

Hypothesis 7. CEO financial expertise has a positive impact on the corporate EVA increment year-to-year.

As a rule, executives with financial experience conduct a more active corporate financial policy, strive to decrease cash account balance and increase debt obligations, invest less in R&D, thus reducing the number of implemented innovations, attract external funding more actively during crisis periods, and have a more responsible attitude to dividend payout and capital gain [15].

Hypothesis 8. There is a statistically significant negative interrelation between CEO narcissism and corporate EVA increment.

A series of papers show that a chief executive officer's narcissism may lead to the company taking significant risks that may negatively impact financial performance and return on investment [50].

Hypothesis 9. There is a negative and significant interrelation between CEO self-confidence and the corporate EVA increment.

Self-confident executives tend to pursue an aggressive investment policy, which consists in a revaluation of return on investment and an underestimation of attending risks [51; 52].

Hypothesis 10. CEO power has a positive influence on corporate EVA increment.

Powerful chief executive officers may use their power to implement breakthrough innovation more swiftly, creating fundamental value [53; 54].

Description of the Sample and Variables of the Research Model

The sample consists of data on 111 Russian companies over an 8-year period (2013–2020) and is compiled on the basis of several criteria. In line with the previous studies dedicated to this topic, in the first instance, we selected only listed companies with full information in the annual reports and with explanation reports for at least 4 years of the analyzed

period. The majority of these companies are listed on the Moscow Stock Exchange (MOEX), nevertheless, there also are firms listed on the London Stock Exchange (LSE) and New York Stock Exchange (NASDAQ). First, we did not include serious market players that shape their industry in the analysis. Second, we would have to sacrifice a significant number of observations, which may have a negative impact on the quality of the empiric part of the research. Another selection criterion was the company size. We decided to remove companies with average revenue under RUB 120 mln for the research period from the sample because such enterprises are considered to be microenterprises in accordance with the Decree of the Government of the Russian Federation No. 265[1] of April 4, 2016 and cannot act as debt market participants according to minimum requirements for MOEX issuers[2].

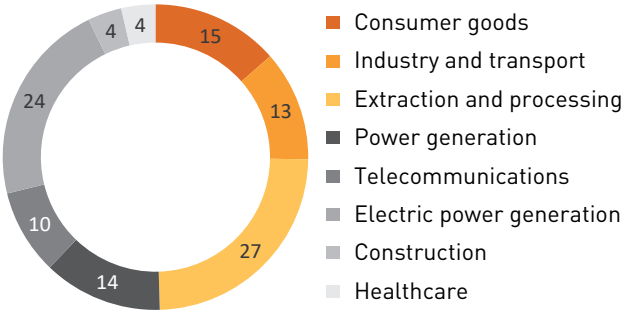
Then we used Bloomberg, Thomson Reuter Eikon and Factset databases to collect data for EVA and other financial indicators. All data gaps were filled in using corporate financial statements. All non-financial data that characterizes chief executive officers for each year of the analyzed period was collected manually from publicly available information sources, including annual company reports.

Dates of CEO entry into office and termination of powers were determined on the basis of annual reports and appendices to them. In the year of replacement, the new chief executive officer was indicated[3]. The chief executive officers who occupied their position for less than a year were eliminated from our analysis because of the premise that such chief executive officers were most unlikely to significantly influence corporate operations and because it was technically impossible to combine two observations with different variable values.

Ultimately the selection comprised 888 observations (111 companies for 8 years and 235 CEOs), where only 758 observations had EVA data, hence, could be us.ed in the model. Also, the sample contains omissions for other variables, therefore, .the final number of observations in the models may vary insignificantly depending on their number in an equation. The research uses companies only from the non-financial sector of economy. All companies were classified by sectors of economy accordin.g to the GICS[4] methodology offered by Bloomberg.

Figure 1 presents the distribution of companies from the sample by economy sector.

Figure 1. Distribution of companies by economy sectors



The companies are distributed by sectors of the Russian economy irregularly, which may influence the quality of analysis. We intentionally eliminated Sistema Public Joint Stock Financial Corporation from the sample, even though it met all the selection criteria. This organization is the only holding in the sample whose core activity is investment and whose portfolio comprises assets from various industries: PJSC MTS – telecommunications, Etalon Group – construction, STEPPE Agroholding – consumer goods, etc. At the same time, PJSC MTS accounts for 71% of the revenue of Sistema PJSFC and is included in our analysis as a separate organization, thus making it impossible to classify Sistema PJSFC as a telecommunications company. We also eliminated Rosseti Centre, PJSC from the sample due to the consolidation of top management with Rosseti Centre and Volga Region PJSC in 2016 in order to avoid the duplication of the variables related to chief executive officer's characteristics.

We use the *first-order differences of EVA* as the explanatory variable. However, industry-related trends and the market environment in general influence the economic value added. As long as the purpose of this paper is to analyze the CEO's influence on corporate operations, we have to evaluate only the part of EVA that the chief executive officer may affect. For this reason, we decided to clear EVA from industry-related and market effects. To that end, we used the approach described in the paper by McKinsey & Company which determines the actual amount of economic value added of the company after deduction of industry-related and market influence. It should be noted that in the original paper RI (residual income) was used which differs from the EVA original model in special adjustments to the data of financial statements. However, the Bloomberg system does not contemplate such adjustments, therefore EVA calculation tallies with RI calculations. The applied methodology of adjustment for industry-related factors is based on the paper by [55]) and is described in formula 2:

[1] Decree of the Government of the Russian Federation of April 4, 2016 No. 265 On Marginal Revenue from Entrepreneurship for Each Category of Small and Medium Business Enterprises. URL: https://www.consultant.ru/document/cons_doc_LAW_196415/

[2] Minimum requirements to MOEX issuers. URL: https://bondguide.moex.com/articles/debt-market/4

[3] It often happened that in the course of data collection for the variable describing CEO narcissism, evaluated by the photo from CEO's speech, annual reports were issued after the reporting date in the middle of the subsequent year and stated the name of the new chief executive officer who had not yet assumed office in the reporting period. In such cases we indicated the chief executive officer actually holding the office and the narcissism value was indicated as equaling the value of the previous year.

[4] Global Industry Classification Standard.

$$RI_{\text{company contribution}} = RI_{\text{company}} - \\ -RI_{\text{industry mean}} - RI_{\text{sample mean}}, \quad (2)$$

where is the economic value added of the company cleared from the industry-related and market influence;

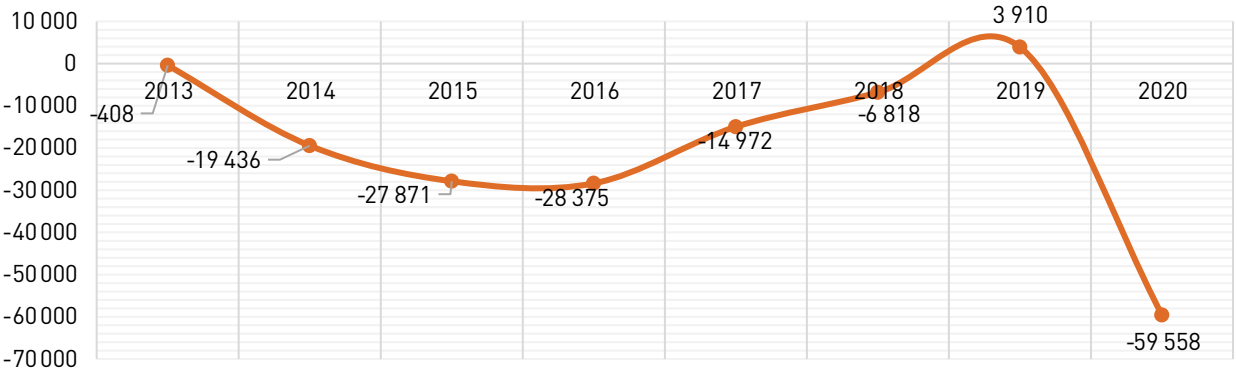
RI_{company} is the economic value added of the company;

$RI_{\text{industry mean}}$ is the mean value of economic value added in the industry to which the company belongs;

$RI_{\text{sample mean}}$ is the mean value of economic value added in the market.

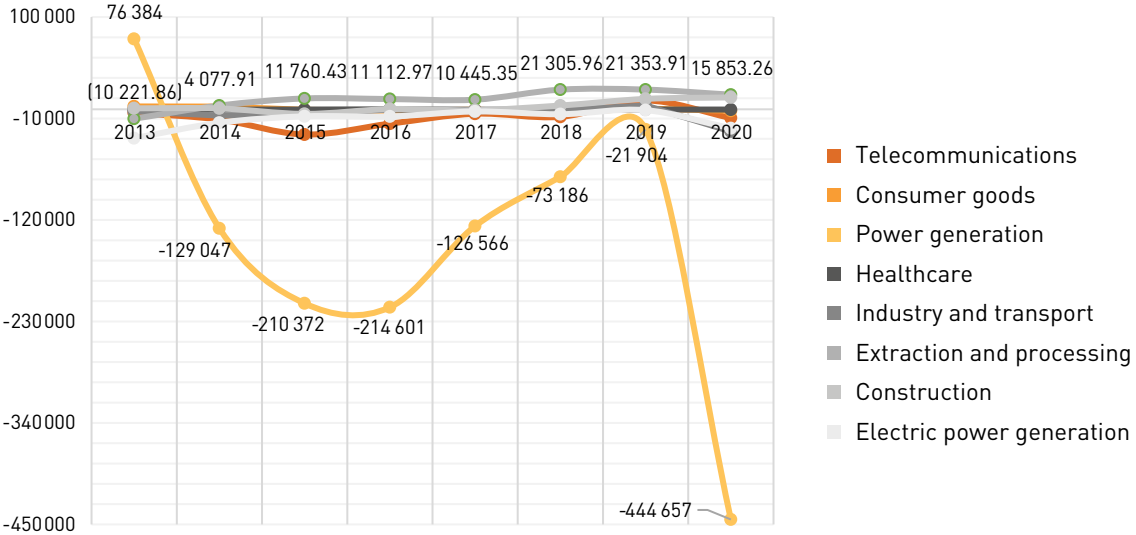
This allows to exclude the mean contribution of the industry and market from the value of the enterprise's economic value added. Figure 2 presents the dynamics of the mean economic value added for the sample in 2013–2020.

Figure 2. Dynamics of the mean economic value added for the sample, 2013–2020



The provided data shows that the mean market value of economic value added is rather volatile and was negative in the majority of periods. So, in 2020, the economic value added was the smallest for the period in question, amounting to RUB –59.6 bln. due to the coronavirus pandemic that dealt a major blow to enterprises. Figure 3 presents the dynamics of economic value added broken down by industry.

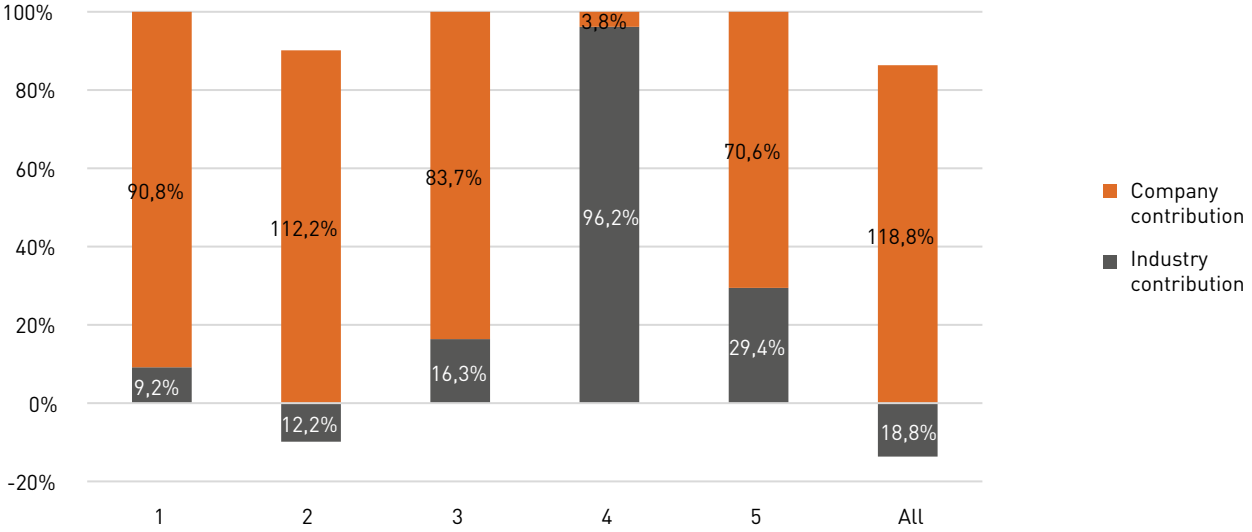
Figure 3. Dynamics of economic value added broken down by industry, 2013–2020



Let us examine the extraction and processing sector, which has managed to produce a positive economic value added since 2014. The reverse situation is observed in the power generation sector, where economic value added has not achieved positive results since 2014. Graphical analysis leads us to conclude that the power generation sector has the greatest impact on EVA in the sample. Thus, further in this research we will apply EVA data cleared from industry-related and market effects.

To sum up, in Figure 4 we present the contribution of the industry and the company to economic value added by quantiles (patterns).

Figure 4. Industry contribution and company contribution to economic value added



Note that with a breakdown into quantiles, as well as across the whole sample, company contribution prevails. It is indicative of CEO importance in creating fundamental value. There are two versions of EVA that will be used in the model: as first-order differences (model designation: *Delta_EVA*) and as percentage deviation (model designation: *Perc_EVA*).

We collected 10 variables for each company, which describe the chief executive officer for each year. See below the description and analysis of each variable.

CEO age

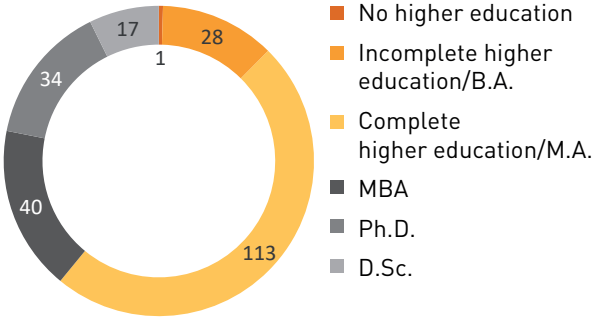
The variable representing CEO age (model designation: *Age* and *Age_2*) is a continuous variable and is defined as the number of years of the chief executive officer's age in the corresponding year. The data has been collected manually from official corporate websites, annual reports and publicly available Internet sources and presented in Appendix B – Characteristics of CEO Human Capital for the Sample of CEOs from Russian Companies. The average age in the sample is 48 and it varies from 30 to 72. Besides, the most common age of chief executive officers is between 39 and 45. Some studies point out the quadratic dependence between age and corporate financial performance. In order to take this feature into consideration, we decided to introduce the variable describing age in quadratic form into the model.

CEO Education Level

Distribution of chief executive officers on the basis of education (designation in the model: *Edu_Dum*) is presented in Figure 5.

Drawing on the experience of previous studies and analysis of collected data, we decided to use the education level in the model as a dummy variable, which takes on the value of 1 if the chief executive officer has a high level of education (an MBA, Doctor of Science or PhD), 0 – otherwise [6]. It is necessary to define a group of chief executive officers with an atypical educational level because almost all the CEOs in the sample have a basic educational level (bachelor's or master's degree).

Figure 5. Distribution of CEO Education Levels



CEO Tenure

The variable representing the chief executive officer's experience (designation in the model: *Tenure*) is continuous and is determined as the number of years of a CEO's employment by the current company in the corresponding year. As we see from Appendix B, the average experience of a chief executive officer from the sample amounts to 6 years, varying from 1 to 37 years. The most common tenure is 1 year. Distribution of chief executive officers by the number of years of tenure in the current company shows that CEO replaceability is characteristic of the sample: 34% of executives occupy their positions for less than 2 years. At the same time, 16% are in office for over 10 years. Note that sometimes there is a quadratic dependence between a chief executive officer's experience and corporate performance. In order to take this feature into account, we decided to introduce a variable describing age in quadratic form into the model.

The variable representing a chief executive officer's internal experience irrespective of the position (designation in the model: *Internal_Exp*) is continuous and is defined as the number of years of the chief executive officer's employment by the company, including subsidiary companies, in the corresponding year. Appendix B offers the descriptive statistics of the variable, which characterizes a chief executive officer's internal experience. The average chief executive officer's internal experience amounts to 10 years, ranging from 1 to 45 years. The most common CEO expe-

rience span is 1 year. Two groups of chief executive officers represent distribution of internal experience: in the first group the experience ranges from 1 to 6 years. As a rule, these executives are employed as CEOs from the start. In the second group, internal experience is significantly more extensive: from 12 to 18 years. These executives were hired by the company a long time ago and made a career up to the chief executive officer position.

CEO External Experience

The variable characterizing CEO external experience (designation in the model: *External_Exp_Dum*) is continuous. It is determined as the number of years of CEO employment by other companies. We did not find information on 3 chief executive officers (13 observations). Appendix B presents the descriptive statistics of the considered variable. On average, chief executive officers occupied the same position in other companies for 3 years. Besides, the most common experience span (mode) is 0 years. At the same time, there are CEOs in the sample with very extensive experience, i.e., 24 years. Taking into consideration the fact that there is a small range of variation of CEO external experience, we used a dummy variable. 1 means that such experience exists (irrespective of its length), 0 – that it doesn't exist.

The next variable is a chief executive officer's government experience (designation in the model: *Gov_Exp*). Government service is understood as an executive position in government authorities. Out of 234 chief executive officers in the sample, 60 have government experience, which amounts to a quarter of the sample (we didn't find validated information about 2 persons). Government experience was introduced in the model as a dummy variable that takes on the value of 1 if the chief executive officer has such experience, and 0 – if there is no evidence of such experience.

CEO Financial Expertise

The variable describing a chief executive officer's financial expertise (designation in the model: *Fin_Exp*) shows their experience in the position of chief financial officer, financial control officer, as well as in the field of audit or financial consulting. Out of 234 chief executive officers in the sample, 78 have corresponding experience, and there is no data about 3 executives. Similar to government experience, this variable was added to the model as a dummy, taking on the value of 1 if the chief executive officer had financial expertise and 0 – otherwise.

Explicative Variables Related to CEO Behavioral Characteristics

Narcissism

In order to create the Narcissism variable (designation in the model: *Narcis*), we used the size of the chief executive officer's photo in his/her speech publication, which is included in the corporate annual report. Such an approach allows to take into consideration the psychological make-up of a person with a narcissistic striving to always be in the limelight and attract as much attention as possible. This method of evaluating narcissism is common among authors (see, for example: [47; 56; 57]. In our research we assigned points on a scale of 1 to 5 to each photo depending on its size [58]. See the methodology of assigning points in Table 1.

Table 1. Methodology of evaluation of the CEO's photo size

Assigned points	Description
1	CEO's speech without a photo
2	CEO's photo together with other managers
3	CEO's photo takes up less than half a page
4	CEO's photo takes up more than half a page
5	CEO's photo takes up the whole page

Having analyzed 880 annual reports of the companies included in the present research sample, the authors presented the distribution of the chief executive officers' photo sizes in Appendix B. In order to add the narcissism variable to the regression at the next stage, we converted the collected data on the CEO photo size into a dummy variable: the observations which obtained 5 points in the narcissism evaluation were assigned the value of 1, all other observations were assigned the value of 0.

Self-confidence

A chief executive officer's self-confidence (designation in the model: *Self_Conf*) was assessed using the approach described in the paper by C. Chahyadi and P. Wineka, i.e., based on the amount of company's net investment [10]. Net investment was evaluated through the difference of investment and depreciation. The reason for this is that self-confident chief executive officers are used to assuming risks and implementing a global investment program in order to achieve swift company development, while others approach major investment with caution and are not willing to take additional risks.

With this approach, company size may produce a significant influence on the results because absolute values are used. For this reason, we decided to move from absolute values to a ratio by means of dividing annual net capital expenditures (CAPEX – R&D) by the enterprise's total assets. Thus, we eliminated the factor of company size when evaluating the actual investment amount. Below is the formula for CEO self-confidence assessment:

$$\frac{(\text{CAPEX-D\&A})}{\text{Total Assets}} \quad (3)$$

where CAPEX is investment per year;

D&A is depreciation and amortization per year;

Total Assets is the amount of total corporate assets.

In this research, CEO self-confidence was evaluated on an annual basis for the period of 2013–2020. The calculated ratio assigned to each chief executive officer was compared to the industry average value. Thus, we eliminated the industry-related factor, because the mean value of the ratio varied significantly in different industries: from –0.023 in telecommunications to 0.021 in the extraction and processing industry. Figure 6 provides summary information on mean values of ratios across industries in 2020.

Figure 6. Industry-related ratio values, 2020

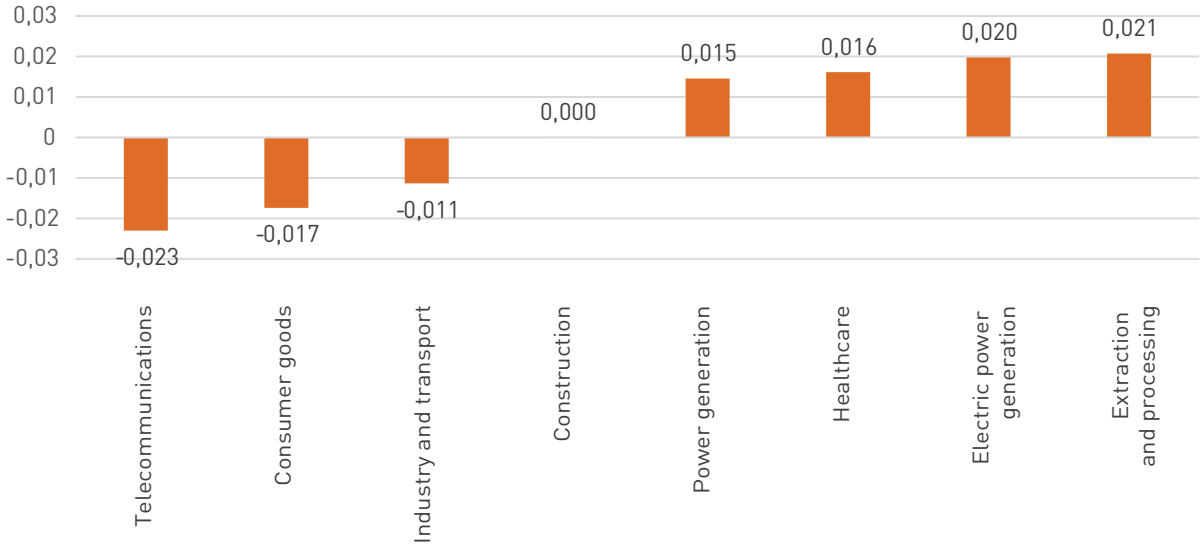
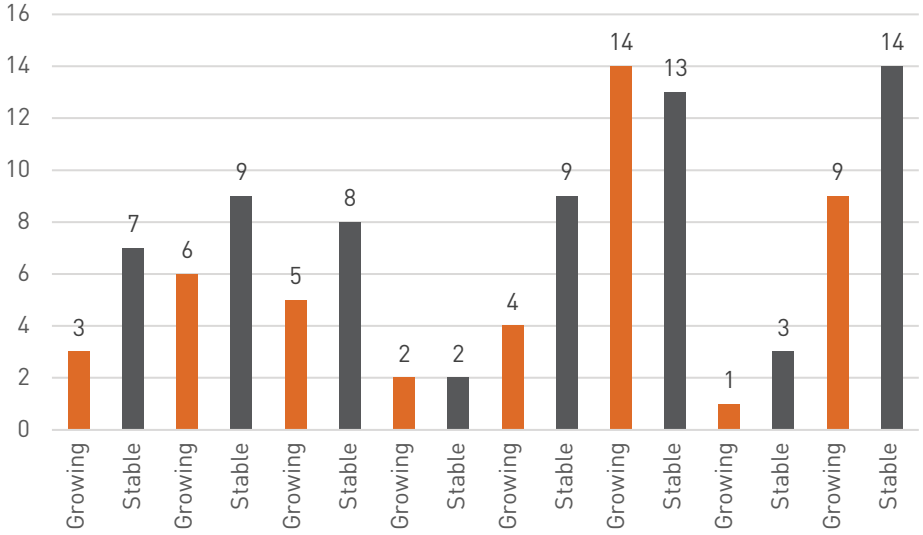


Figure 7. Distribution of companies by life cycle stages within industries



We also made a decision to take an enterprise's life cycle into account because companies at the initial maturity stage are involved in active investment and their CAPEX is significantly higher than the industry average. The principal metric for evaluating an enterprise's life cycle stage was the rate of growth of company revenue. We evaluated the mean growth rate of company revenue in 2013–2020 and compared it to the industry average. If the industry average was exceeded, the company was classified as "growing", otherwise – as "stable". Thus, within each industry companies were divided by lifecycle stage: growing or stable. Figure 7 presents distribution by life cycle stages within industries.

The value of net investment to total assets ratio of a certain company on a yearly basis was compared to the mean value of companies in the same industry and at the same life cycle stage. If this value was exceeded, the chief executive officer was assigned the status of a "self-confident" one. This methodology helped to avoid a number of problems related to the factors of company size, industry affiliation and the life cycle stage of the company.

Explicative variables Related to CEO Power

A chief executive officer's power (designation in the model: *Power_Dum*) was assessed applying the approach described in a paper by M. Sariol and A. Michael, based on the analysis of the share of independent directors in the total number of the members of the board of directors and the CEO being the company founder [54]. The share of independent directors and whether CEO is or is not the company founder were converted into dummy variables. Thus, the share of independent directors in the board of

directors was calculated for each year and compared to the median value of the whole sample. If the median value of the sample for a certain year was exceeded, the value of 0 was assigned, if the value was below the median value – the value of 1 was assigned. The logic consists in the fact that the chief executive officer has a great power, while the share of independent directors is rather small. A high value of the share of independent directors that exceeds the median value across the sample is indicative of tight control by independent directors, which partially limits CEO power. If the chief executive officer is the company founder, it means that he/she has significant power and increased influence on business processes. If the CEO is the founder, this variable takes on the value of 1, otherwise – 0. The summary variable indicative of the power level was calculated as the sum of dummy variables, which characterize the independence of directors and the variable that shows whether the CEO is the company founder. Thus, the classification is as follows: 0 – a low level of power, 1– a medium level of CEO power, 2 – a high level of CEO power.

According to the analysis of the sample, the majority of observations concerning CEO power showed a low and medium level of power, amounting to 56% и 40% respectively. At the same time, just 4% of observations showed a high level of chief executive officers' power. The level of CEO power in the model was used as a dummy variable, which takes on the value of 1 if the chief executive officer has a medium or high power level and 0 – if the power level is low. Table 2 offers a brief list of all variables and their designations.

Table 2. Model variables

Group	Variable	Designation	Description
Biographical characteristics	Age	Age Age_2	CEO age (number of years) Squared CEO age (number of years)
	Education	Edu_Dum	1 – if CEO has an MBA, Doctor of Science degree or PhD 0 – otherwise
Experience	Tenure	Tenure Tenure_2	CEO tenure in the current company Squared CEO tenure in the current company
	Internal experience	Internal_Exp	Internal experience
	External experience	External_Exp_Dum	CEO external experience
Specific skills	Government experience	Gov_Exp_Dum	1 – CEO has government experience 0 – otherwise
	CEO financial expertise	Fin_Exp_Dum	1 – CEO is experienced in finance 0 – otherwise
Behavioral characteristics	Narcissism	Narcis_Dum	1 – CEO is assigned 4 or 5 points on narcissism evaluation 0 – otherwise
	Self-confidence	Self_Conf_Dum	1 – the ratio of self-confidence assessment is above average among the companies from the same industry and with the same life cycle 0 – otherwise
Power	CEO power	Power_Light_Dum	1 – CEO has a medium or high power level 0 – otherwise

Further on, the above-listed variables will be used to build the model.

Empirical Analysis

The research was conducted in several stages. At the first stage, we performed multiple regression analyses in order to assess the individual contribution of each characteristic feature of the chief executive officer in EVA. We also verified two types of dependent variables: EVA in first-order differences (Delta_EVA) and EVA in percentage deviation (Perc_EVA). Finally, the tested equations appear as follows:

$$Delta\_EVA_{i,t} = \beta_0 + \beta_1\, Age\_2_{i,t} + \beta_2 Age_{i,t} + \beta_3\, Tenure\_2_{i,t} + \beta_4 External\_Exp_{i,t} + \beta_5 Internal\_Exp_{i,t} + \beta_6 Edu\_Dum_{i,t} + \beta_7 Gov\_Exp_{i,t} + \beta_8 Fin\_Exp_{i,t} + \beta_9 Self\_Conf_{i,t} + \beta_{10}\, Narcis\_Dum_{i,t} + \beta_{11} Power\_Light\_Dum_{i,t} \sum_{k=2,i=2014}^{k=8,i=2020} i_{year} + \varepsilon_{i,t}; \quad (4)$$

$$Perc\_EVA_{i,t} = \beta_0 + \beta_1\, Age\_2_{i,t} + \beta_2\, Tenure_{i,t} + \beta_3 External\_Exp_{i,t} + \beta_4 Internal\_Exp_{i,t} + \beta_5 Edu\_Dum_{i,t} + \beta_6 Gov\_Exp_{i,t} + \beta_7 Fin\_Exp_{i,t} + + \beta_8 Self\_Conf_{i,t} + \beta_9\, Narcis\_Dum_{i,t} + \beta_{10} Power\_Light\_Dum_{i\,t} + \sum_{k=2,i=2014}^{k=8,i=2020} i_{year} + \varepsilon_{i,t}. \quad (5)$$

At the second stage we compiled two indices: the Depth Index and Width Index. We did it in an attempt to reveal the joint contribution of personal characteristics. The logic of creating indices is described in more detail below in the Index Approach section. The tested equation appears as follows:

$$Delta\_EVA_{i,t} = \beta_0 + \beta_1\, DEPTH_{i,t} + \beta_2 WIDTH_{i,t} + + \beta_3 Self\_Conf_{i,t} + \beta_4\, Narcis\_Dum_{i,t} + + Power\_Light\_Dum_{i,t} + \sum_{k=2,i=2014}^{k=8,i=2020} i_{year} + \varepsilon_{i,t.} \quad (6)$$

v

The resulting sample allows to apply the panel data structure. In this case, the fixed effects and random effects models are most popular. From the viewpoint of econometric justification of the interrelation between a chief executive officer's characteristics and economic value added, the fixed effects model is the best. Not all available variables describe firm behaviour completely (behavioral, psychological aspects, strategic decisions are not fully identified by the set of variables we use). Therefore, there is heterogeneity – individual effects of the firm, which is the principal motive for applying the fixed effects model. These arguments are supported by literature dedicated to this topic, which analyzes the advantages and disadvantages of using the fixed effects model when assessing the influence of a chief executive officer's decisions on corporate operations. At the same time, the literature on this topic confirms that the random external effects model (?) may be better for creating dependences [59]. Graphical data analysis does not eliminate heteroscedasticity unambiguously, therefore we conducted the Breusch-Pagan and White tests. According to them, in all cases the zero hypothesis is rejected in favour of the alternative one, which indicates the presence of heteroscedasticity in the random value of the considered model. For this reason, robust standard errors are subsequently used in all models.

The final list of regressors in the model is compiled based on correlation analysis. Its results are presented in Appendix C. Regressors of Internal_Exp and Tenure_2 are characterized by the strongest relationship of 49.9%. It is generally classified as a moderate relationship, and one may choose not to take it into consideration. Also, often along with square of the variable, the same, but non-squared variable is introduced into the equation – in this case, Age and Age_2. Obviously, in this case correlation analysis will demonstrate a high value of the ratio, but it also does not imply multicollinearity.

At the first stage we evaluated equations (4) and (5). We used a bidirectional fixed effects model in order to take into account structural changes that take place over time for all sample items (specific characteristics of each year, influence on the dependent variable of upsurges and downfalls characteristic of the economy in general). The results are presented in Table 3.

Table 3. Results of model construction (first stage)

	(1)	(2)	(3)	(4)
	FE_1	FE_2	RE_1	RE_2
VARIABLES	Perc_EVA	Delta_EVA	Perc_EVA	Delta_EVA
Age_2	−0.0032**	−0.092*	−0.0011	−0.062**
	(0.002)	(0.050)	(0.001)	(0.028)
Age		9.751*		5.990**
		(5.093)		(2.772)
Tenure_2		−0.130**		−0.0932***
		(0.063)		(0.0267)
External_Exp	0.133	0.627	−0.0303	0.157
	(0.160)	(0.712)	(0.091)	(0.368)
Internal_Exp	−0.156	0.446	−0.0296	0.073
	(0.281)	(0.369)	(0.0340)	(0.206)
Edu_Dum	1.652	−2.746	0.966	−1.992
	(2.366)	(4.394)	(1.192)	(3.331)
Gov_Exp	4.531	−0.711	0.713	−9.408**
	(3.224)	(4.596)	(1.116)	(4.052)
Fin_Exp	−7.298**	3.983	−1.427	−1.614
	(3.069)	(4.182)	(1.125)	(4.214)
Narcis_Dum	4.384**	1.966	3.014	1.747
	(2.140)	(13.75)	(1.898)	(7.410)
Self_Conf	−2.380***	−3.705	−1.841**	0.688
	(0.878)	(10.98)	(0.826)	(7.445)
Power_Light_Dum	−1.622*	1.490	−0.954	6.188*
	(0.943)	(3.820)	(0.801)	(3.171)
Y14	1.809	−3.311	1.844	−3.802
	(1.376)	(13.60)	(1.287)	(13.49)
Y15	−2.607***	−0.0562	−2.497***	−0.580
	(0.897)	(9.086)	(0.627)	(8.794)
Y16	−2.921***	12.09	−2.950***	12.74
	(0.857)	(9.736)	(0.608)	(9.205)

	(1)	(2)	(3)	(4)
	FE_1	FE_2	RE_1	RE_2
VARIABLES	Perc_EVA	Delta_EVA	Perc_EVA	Delta_EVA
Y17	−4.011***	18.93**	−3.569***	20.04**
	(1.096)	(9.483)	(0.732)	(8.515)
Y18	−3.779***	14.49*	−3.475***	15.26**
	(1.198)	(7.447)	(0.681)	(6.430)
Y19	−3.083**	28.65***	−2.856**	30.02***
	(1.404)	(10.66)	(1.130)	(9.822)
Y20	11.16***	−50.52**	11.01***	−47.88**
	(3.480)	(22.39)	(3.619)	(22.39)
Tenure	0.380		0.0129	
	(0.280)		(0.0422)	
Constant	12.31***	−256.0**	7.081***	−144.1**
	(4.182)	(122.4)	(2.625)	(67.35)
Observations	641	758	641	758
R-squared	0.199	0.071		
Number of ID	91	102	91	102

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1.

The results were contradictory. The fixed effects model, where the dependent variable is the first-order differences of EVA cleared from industry influence (FE_2), did not reveal a high significance of the majority of CEO characteristics, and R2 in this model turned out to be extremely low (7.1%). In the random effects model, the majority of significant regressors were obtained when using the dependent variable as first-order differences: CEO power at a 10% significance level, age and government experience at a 5% level, tenure – at a 1% level. Therefore, we will subsequently use this model (RE_2). According to the Hausman test, the zero hypothesis, which claims the absence of correlation between individual effects and regressors is accepted, and in our case the random effects model is found to be more suitable.

Index Approach

Some studies group human capital variables into two indices. The first one – the Width Index – is indicative of the variety of functional and relevant experience of the chief executive officer. It comprises age, education, tenure and external experience. The second index – the depth of chief executive officer's capital – shows his/her involvement in the industry to which the company belongs. Industry-specific expertise is a result of the current or previous experience in the industry and specific financial experience and government service. Therefore, in this research the depth index of a CEO's human capital is included in the tenure, such as financial expertise and government experience. Each index is compiled as the sum of dummy variables. Quantitative variables (age and all types of experience) were transformed into dummy variables as follows. Age (1 – if CEO age exceeds the median value of the sample, 0 – otherwise), tenure (1 – if this experience exceeds the median value of the sample, 0 – otherwise), internal experience (1 – if before the appointment CEO has already been employed by the current company, 0 – otherwise), external experience (1 – if any, 0 – otherwise). Education, which in our research was assessed on a scale of 1 to 5, was transformed into a dummy variable as 1 if a CEO holds an MBA, Doctor of Science degree or PhD, 0 – otherwise. Correlation analysis (Appendix B) did not reveal the regressors that could cause multicollinearity.

Then we evaluated an equation (6) using temporary fixed effects similar to the first stage. Results are presented in Table 4.

Table 4. Results of model construction (second stage)

VARIABLES	(1) FE_3 EVA_Comp	(2) RE_3 EVA_Comp
DEPTH	12.36**	1.292
	(5.231)	(4.863)
WIDTH	−0.407	−2.784
	(4.349)	(4.535)
Narcis_Dum	−30.71	−24.55
	(22.28)	(18.60)
Self_Conf	−11.58	−8.364
	(9.224)	(8.471)
Power_Light_Dum	2.573	−2.004
	(6.400)	(6.871)
Y14	56.92***	56.22***
	(14.55)	(14.65)
Y15	58.85***	55.37***
	(11.95)	(11.72)
Y16	44.43***	41.68***
	(14.60)	(14.14)
Y17	33.52***	31.06***
	(11.58)	(10.80)
Y18	21.47*	19.24*
	(12.08)	(10.98)
Y19	8.324	6.237
	(15.13)	(14.26)
Y20	58.34***	55.25***
	(20.12)	(19.24)
Constant	−4.567	16.41
	(17.01)	(15.42)
Observations	648	648
R-squared	0.09	
Number of ID	91	91

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1.

The Hausman test for these models also showed that the random effects model is more suitable (Appendix C). It confirms again that there are contradictions when choosing the methodology for analyzing the influence of CEO characteristics on the fundamental company value.

When we applied the indices, the fixed effects model with the EVA dependent variable cleared from industry influence revealed a significance of the Depth Index at a 5% significance level. Nevertheless, this model's R2 turned out to be extremely low, which indicates that this model explains the dependent variable poorly and that it cannot be used to verify the hypotheses. Apart from these results, the main problem of use of the index approach is that the variables in the index cannot be interpreted individually.

Analysis of Results

The considered research tested models with various specifications. Variables in the fixed effects model were significant, however, R2 turned out to be extremely low, therefore we had to use other model specifications. We conducted the Hausman test, which showed that the random effects model was more suitable. Nevertheless, the same sign preceding significant variable ratios in both versions of the models was indicative of result sustainability. Let us compare the obtained results with proposed hypotheses.

Hypothesis 1. There is a positive interrelation between CEO age and increment of corporate EVA.

Tests revealed a downward parabolic relationship between CEO age and EVA increment. Thus, CEO age has a positive impact on the increment of economic value added up to a certain point, after which the relationship becomes negative. So, CEOs demonstrate the highest financial performance within a certain age interval. It is a common situation when young CEOs are not experienced enough, while mature ones are too conservative.

Hypothesis 2. The higher the CEO education level, the larger the corporate EVA increment.

The analysis revealed no relationship between the CEO education level and the increment of economic value added. It may be due to a relatively recent implementation of the Bologna Process in Russia, which resulted in the addition of a significant number of executives who had graduated from higher educational institutions in the USSR to the sample.

Hypothesis 3. As CEO tenure increases, the EVA increment grows on a year-to-year basis.

The analysis revealed a parabolic relationship between CEO tenure and EVA increment pointed downward. Thus, we found out that the relationship is of a nature similar to that in Hypothesis 1. So, we detected a positive effect of CEO tenure on the increment of economic value added up to a certain point in a chief executive officer's career.

Hypothesis 4. There is a positive interrelation between the extension of CEO tenure in a company and corporate EVA increment.

Analysis shows no relationship between CEO tenure and EVA increment. Russian economy is an emerging one, which explains its high volatility and frequent change of trends. Consequently, tenure does not always produce a positive impact on the quality of a chief executive officer's management.

Hypothesis 5. CEO external experience exerts a positive influence on the EVA increment.

The performed research did not confirm the influence of a CEO's external experience on the increment of economic value added. It is uncharacteristic of Russian executives to change companies and industries frequently. As a rule, when they embark upon a career from the bottom, they progress up to the top of the career ladder within the same company.

Hypothesis 6. CEO government experience exerts a positive impact on the EVA increment.

The hypothesis was not confirmed, and a negative dependence was discovered between a chief executive officer's government experience and the increment of economic value added in the random effects model (may have an unstable relationship in spite of the results of the Hausman test). It is a common situation in Russia when a public officer is appointed an executive in a company with a major share owned by the government, and such companies demonstrate lower results than private ones. Besides, the sample comprises a significant number of government-regulated companies.

Hypothesis 7. CEO financial expertise has a positive impact on the corporate EVA increment year-to-year.

The analysis revealed no relationship between the considered indicators. The primary objective of the chief executive officer encompasses strategic company governance issues. The chief financial officer is responsible for the financial block and he / she has to have corresponding knowledge.

Hypothesis 8. There is a statistically significant negative interrelation between CEO narcissism and the corporate EVA increment.

The conducted research did not confirm the influence of a chief executive officer's narcissism on the increment of economic value added. It may be due to the nuances of evaluating CEO narcissism level based on his / her photo size in the corporate annual report. As a rule, the PR department is in charge of design and processing of such documents, and it may influence the photo size. It is also possible to use other proxies to represent narcissism.

Hypothesis 9. There is a negative and significant interrelation between CEO self-confidence and the corporate EVA increment.

This research revealed no relationship between CEO self-confidence and the fundamental value. In this study, investment policy was indicative of the chief executive officer's self-confidence, in particular, the amount of net capital investment. At the same time, in large companies several years may pass between making an investment decision (influenced by self-confident CEOs) and an increase of CAPEX on the books.

Hypothesis 10. CEO power has a positive influence on corporate EVA increment.

In this research, we revealed a positive relationship between a significant chief executive officer's power level and the increment of economic value added in the version with random effects. This result may have an unsteady relationship. At the same time, it should be noted that power was understood as CEO's possession of at least one of the following characteristics: CEO is the founder or there is a rather small share of independent directors on the board of directors. In further studies on this topic, one may perform a more rigorous analysis, which would require the executive to possess more characteristics of a high-power level.

Thus, there is no consensus yet in the study of the influence of CEO characteristics on corporate operations. Even when the same sample is used, contradictory conclusions are obtained depending on the model specification. Nevertheless, the same sign preceding ratios of significant variables in both versions of models was indicative of the significance of results. The research allowed to make a range of conclusions on the influence of a chief executive officer's personal characteristics on the generation of the company's economic value added. So, CEOs achieve the best financial performance within a certain age interval because CEOs who are too young are not experienced enough, while mature ones are excessively conservative. This relationship is also observed in case of CEO tenure. Chief executive officers with limited experience do not have comprehensive knowledge of the industry specifics and executives' behavior psychology. At the same time, chief executive officers with vast experience are usually of mature age, which entails a more conservative attitude. We also detected a negative relationship between a chief executive officer's government experience and the company's increment of economic value added, which is explained by a lower efficiency and over-regulation of government-owned companies in comparison to private ones. Apart from that, a significant CEO power level exerts a positive impact on the economic value added. As for other variables used in this research, no significant relation with the economic value added was discovered.

So, CEO characteristics from the following categories influenced corporate operations: in human capital – age, tenure and government experience; and in CEO power (ОБОРВАНА ФРАЗА). Other analyzed characteristics produced no significant impact on the model for the following reasons. The corporate governance institution comprising the interaction between the chief executive officer and the board of directors has been developing in Russia only in the last two decades, which is insufficient for a complete adjustment of the checks and balances system. Apart from that, there is a large number of companies in the Russian economy with a significant share owned by the government; hence, their operations are governed by political, rather than economic incentives. In general, we should mention a rather specific sample where the number of companies differs greatly depending on the industry. In regard to the sample, it is important to note that every

fifth company belongs to the electric power sector, which is under significant government regulation and uses (?) non-market mechanisms of managing the supply and demand balance. Besides, there is a large number of companies with a majority owner who has a stronger impact on corporate operations than CEO or the board of directors. EVA was used in the paper as the dependent variable; it has a range of characteristics that impede its use as a criterion representing the influence of CEO characteristics on corporate operations. It is also essential to remember that EVA is based on accounting indicators and does not take the company size into consideration.

Further studies of this topic may continue along several lines. First, one may verify the applicability of the obtained results in financial companies. Second, behavioral characteristics may be expanded, adding the level of risk acceptance, reputation and optimism, which may be evaluated through an analysis of the text of the chief executive officer's speech from the corporate annual report. Third, the set of metrics evaluating the CEO power level may be expanded. In addition to the ones used in the present research, one may study the share of the chief executive officer's remuneration in the total top management's remuneration, CEO's share in the authorized capital and other variables. Fourth, one may assess the joint influence of characteristics of the chief executive officer and the board of directors on the company's fundamental value.

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Appendix A. Classification of Academic Papers Dedicated to Analysis of Influence of a Chief Executive Officer's Characteristics on Corporate Operations

Table 1. Classification of Empirical Papers about the Influence of Age and Education Level of a Chief Executive Officer on Corporate Operations

No.	Paper	Sample	Dependent variable	Conclusions	Research limitations
			1. CEO Age		
1.1	Robert B. Burney, Hui Liang James, Hongxia Wang (2021) Working Capital Management and CEO Age	2,654 US public non-financial companies from 1993 to 2018	Working capital requirement (WCR) = accounts receivable + inventory – accounts payable Adjustment for revenue and industry	**Young executives employ more aggressive strategies** of working capital management (larger accounts payable and smaller inventories).	Aggressiveness of CEO strategy is analyzed only through the working capital requirement, other indicators of corporate operations have not been taken into consideration.
1.2	Margaret A. Abernethy, Like Jiang, Yu Flora Kuang (2019) [3] Can Organizational Identification Mitigate the CEO Horizon Problem?	3,047 observations, 2001-2015, 8 industries (non-financial)	Natural logarithm of R&D expenses; Number of profit forecasts made by the company for a year.	**CEOs who are approaching retirement** strive to decrease R&D expenses.	The research comprises only CEOs, while a company's chief financial officer and chief operations officer influence the making of corresponding decisions.
1.3	Serfling M.A. (2014) [45] CEO Age and the Riskiness of Corporate Policies	2,356 firms and 4,493 unique chief executive officers, 1992-2010 (Compustat), chief financial officers are eliminated	Risk proneness as volatility of earnings per share. The way in which CEO influences risk is investment policy.	**Maturer CEOs reduce the risk** by means of a less risky investment policy: they invest less in R&D, the operations and company acquisitions are more diversified, the operating leverage is smaller, the financial policy is less risky.	It is assumed that preferences of senior officers in relation to risk are similar to chief executive officer's preferences.
1.4	Jingoo Kang (2016) [2] Labor Market Evaluation Versus Legacy Conservation: What Factors Determine Retiring CEOs' Decisions About Long-Term Investment?	3,536 observations of 579 largest US companies, 1992-2006	Amount of strategic investment made for the purposes of commitment to the principles of corporate social policy.	**As a rule, retiring executives place a priority on short-term results.** The authors point out that in this case CEOs pay the least attention to the labor market evaluation, while they are more preoccupied with further strategic changes.	A biased sample (only large US companies were considered), characteristics of corporate property have not been taken into account (family- and government-owned companies may adhere to other principles of social responsibility).
1.5	Wallace N. Davidson, Biao Xie, Weihong Xu, Yixi Ning (2007) The Influence of Executive Age, Career Horizon and Incentives on Pre-Turnover Earnings Management	597 S&P 1500 companies with replaced CEOs, 1992–1998	Current discretionary accruals act as a proxy for revenue management because this component responds to management manipulations most easily.	**Aged executives (2 years to retirement) are more likely to manipulate corporate revenues.**	Probability of revenue manipulation is related not just to CEO age, but also to the specific character of labor remuneration (ratio of salary and bonuses in the remuneration structure).
			2. CEO Education Level		
2.1	Andrew Urquhart, Hanxiong Zhang (2022) [6] PhD CEOs and Firm Performance	Sample compiled of chief executive officers from 350 companies listed in FTSE, 1999-2017	Company performance (ROA adjusted for the industry)	A PhD chief executive officer increases performance by 3.03%, a chief executive officer with the Doctor of Sciences degree granted by a top 100 university increases the company performance by 4.65%, **which is indicative of value added of the chief executive officer who has graduated from a high-level educational institution**.	Only ROA is used as a measure of performance, the authors do not analyze the effect of special management education (MBA).
2.2	Lifa T., Suying G., Shuming Z. (2010) [4] The Interactive Mechanism of Human Capital and Innovative Strategy on Corporate Performance & Its Empirical Analysis	197 firms in 11 industries listed on Shanghai and Shenzhen stock exchanges in 2008	Human capital (average duration of education) of top management and rank-and-file employees	**Influence of human capital of top management and human capital of employees** on corporate performance **is statistically significant** when they are considered simultaneously.	The specific nature of the industry and corporate expenses on creation and pursuit of an innovation strategy is not taken into consideration. Also employee motivation, morale, mental health and satisfaction with and adherence to corporate values are not taken into account.
2.3	Shuying W., Shuijuan Z., BObO L. (2016) Effect Of Diversity On Top Management Team to the Bank's Innovation Ability-Based on the Nature of Ownership Perspective	17 financial organizations, 2006-2015	Innovation ability of the bank (amount of bank commission)	**When CEO has a higher level of education, their ability to analyze information is greater.**	A biased sample because the prevailing share of the Chinese financial market is represented by government-owned banks.

Table 2. Classification of Empirical Papers by Influence of Chief Executive Officer's Experience on Corporate Operations

Tenure					
3.1	Antia M., Pantzalis C., Park C.J. (2010) CEO Decision Horizon and Firm Performance: An Empirical Investigation	2,389 observations of S&P 1500, 1992-2003	CEO Decision Horizon: $DH_{i,t} = (TENURE_{ind,\,t} - TENURE_{i,\,t}) + (AGE_{ind,\,t} - AGE_{i,\,t})$	**CEO tenure influences decision horizon.** Managers who intend to leave office become "short-sighted," preferring projects with a short payback period, thus, impeding the creation of long-term value.	Chief executive officer's remuneration structure (ratio of salary to bonuses), CEO behavioral characteristics are not taken into account.
3.2	Henderson A. D., Miller D., Hambrick D. C. (2006) [32] How Quickly Do CEOs Become Obsolete? Industry Dynamism, CEO Tenure, and Company Performance	2 industries: IT and food industry in 1955-1994. IT – 228 chief executive officers, food industry – 98 chief executive officers. CEO tenure from 1 to 36 years.	3 annual profitability indexes: ROS = Net income / Sales; ROA = Net income / Net assets; ROIC = Net income / (Shareholders equity + Debt).	**Gain in productivity related to CEO's accrued experience pays off only in the stable industry** of food manufacturing. In the dynamic IT sector, CEO performs strongly just in the first year in office, then corporate productivity inevitably decreases.	Industries with pronounced dynamism (IT) and stability (food manufacturing) are examined. The issue of whether the obtained conclusions may be used in the less dynamic industries remains open.
3.3	Patrick L. McClelland, Vincent L. Barker, Won-Yong Oh (2012) [59] CEO Career Horizon and Tenure: Future Performance Implications under Different Contingencies	Sample of 220 firms is selected randomly from the Standard & Poor's list 500 for 2001	Future ROA (for the period of t+2), Market-to-book multiplier	**CEO paradigm grows obsolete ever-more-rapidly along with prolongation of tenure in dynamic industries,** thus inflicting damage on the future results of corporate operations.	A biased sample because companies from the S&P 500 list were studied, a short research horizon (1 year).
3.4	Jung R., Oh Won-Yong, Chang Y.K. (2018) [46] Experience-Based Human Capital or Fixed Paradigm Problem? CEO Tenure, Contextual Influences, and Corporate Social (Ir) Responsibility	278 US industrial companies (1,652 observations), 2003-2008	CEO tenure	Prolongation of CEO tenure is not the reason for increased costs in projects with corporate social responsibility; in this case **the likelihood of a company's irresponsible behavior towards social obligations decreases**.	The research considers only the mature US market.
3.5	Borgi H., Ghardallou W., Alzeer M. (2021) [60] The Effect of CEO Characteristics on Financial Reporting Timeliness in Saudi Arabia	476 companies listed on the Tadawul stock exchange , 2014-2017	Number of days between the last day of the year and the corporate financial statement publication date	**Companies in which CEOs occupy their position for a longer period publish their IFRS financial statements quicker.**	Saudi Arabia has a range of institutional peculiarities, which makes it difficult to extrapolate the obtained conclusions to other conditions and jurisdictions.
Internal Experience					
4.1	Drobetz W., Meyerinck F., Oesch D., Schmid M. (2018) [9] Industry Expert Directors	1,860 non-financial companies from the S&P 1500 list, 2000-2010	Tobin's Q	**The effect of chief executive officer's vast experience is most pronounced in companies with large investment programs, considerable money reserves and in the midst of crises.** On the contrary, it is weaker in dynamic industries, i.e., those with high indicators from viewpoint of growth rates in sales, R&D expenses and merger operations.	The research analyzed members of the board of directors, i.e., CEO's and board's influence on corporate operations is not taken into consideration.
CEO External Experience					
5.1	Crosland C., Zyong J., Hiller N., Hambrick D. (2014) [11] CEO Career Variety: Effects on Firm-level Strategic and Social Novelty	250 companies from Fortune 250, 1999-2005	**Strategic dynamism** is measured through corporate strategic changes CEO's job history is studied to define coding career experiences	**Chief executive officer's external experience has a positive relationship with strategic novelty,** which manifests itself in strategic dynamism and strategic uniqueness (deviation from the industry's main trends). CEO career variety also manifests itself in staff turnover and non-homogeneity of the top management team.	A biased sample because the largest US companies were studied.

CEO External Experience					
5.2	Chahyadi C., Doan T., Naym J. (2021) [47] Hiring the Right CEO: How Does the Type of CEO Industry Experience Affect Firm Performance, Firm Risk-Taking Behavior, and CEO Compensation?	4,816 observations from the Standard & Poor's database Execucomp, 1992-2017	Return on assets (ROA); Firm's behavior related to risk (CAPEX / Total assets); Amount of chief executive officer's remuneration.	**Hiring of chief executive officers with inter-industry experience does not enhance long-term financial performance.** **Executives with inter-industry experience invest less in R&D.** Also, executives with inter-industry experience get larger remuneration.	In the research, CEO inter-industry experience is considered in general, without breaking up into positions occupied in the past and fields of activities.
5.3	Chahyadi C., Wineka P. (2019) [10] How Does CEO Career Origin Influence Firm's Risk-Taking?	3,006 replacements of chief executive officers from Standard & Poor's Execucomp database, 1992-2010	Company's risk: Investment in R&D = R&D / Total assets; CAPEX = (CAPEX – D&A) / Total assets; Leverage = (Long-term debt + short-term debt) / Total assets.	**Executives who come from other companies make more risky investment decisions:** they invest more in R&D (by 1.77%), reduce CAPEX and use more borrowed funds (increase the leverage).	The research was performed for a mature market; industry-related characteristics of the amount of R&D investment, CAPEX and leverage were not taken into account.
	Dokko G., Wilk S.L., Rothbard N. (2009) Unpacking Prior Experience: How Career History Affects Job Performance	968 observations, analysis of archives of a large American insurance company (the name is not disclosed)	Knowledge and skills that correspond to objectives; Efficiency. Both metrics were taken from annual evaluations of the company employees' competencies.	**Previous relevant experience obtained in another position or in another organization has a positive influence on employee efficiency** through their knowledge and skills.	The research was conducted for one company in a specific industry (insurance).

Table 3. Classification of Empirical Papers by Influence of Specialized Experience of the Chief Executive Officer on Corporate Operations

Government Experience					
6.1	Wei L.-Q., Ling Y. (2015) [14] CEO Characteristics and Corporate Entrepreneurship in Transition Economies: Evidence from China	198 polling forms filled in by CEOs and CFOs of Chinese corporations in 2011	CE (corporate entrepreneurship): sum of the company's innovative, high-risk and strategic investments	**Political orientation of chief executive officer's network contacts has a positive impact on the level of corporate entrepreneurship.**	The research was performed using data from a transitional economy, influence of CEOs' foreign experience and impact of developing network contacts with competitors and suppliers were not assessed.
6.2	Koch-Bayram I.F., Wernicke G. (2018) [48] Drilled to Obey? Ex-Military CEOs and Financial Misconduct	Government-owned US firms that provided share options to executives, 1996-2005 (2,926 observations per year and 1,265 individual CEOs)	Data on companies' financial fraud	**Ex-military executives are less prone to participate in manipulations with financial statements and to provide backdated share options.**	The research considers only government-owned companies, which makes the sample biased.
6.3	Ullah I., Fang H.-X., Ur Rahman M., Iqbal A. (2022) [61] CEO Military Background and Investment Efficiency	224 firms in 2009-2017, Bank of Pakistan database	Return on investment (revenue growth, Tobin's Q)	**Executives with military background produce a positive influence on corporate return on investment (mitigation of the agency problem and mercenary behavior).**	A highly specific sample of Pakistani companies.
CEO Financial Expertise					
7.1	Custodio C., Metzger D. (2014) [15] Financial Expert CEOs: CEO's Work Experience and Firm's Financial Policies	4,277 chief executive officers in 1993-2007	Company's financial policy: account balance, leverage and policy of distribution to shareholders.	**As a rule, companies managed by financial experts have a smaller account balance, more debts and participate more in redemption of shares,** which is more beneficial for shareholders.	Decisions on corporate financial policy are made by a team of top managers, rather than at CEO's sole discretion.
7.2	Yang C., Xia X., Li Y., Zhao Y., Liu S (2021) [63] CEO Financial Career and Corporate Innovation: Evidence from China	Chinese companies listed in A-share, 2008-2015 (4,299 observations)	Number of patents registered by the company within the period	**Executives' previous financial experience produces a significant and negative influence on the corporate innovation activity** (decrease of the number of issued patents by 17.5%).	The number of patents obtained by the company is considered its innovation activity, which is not indicative of the level of innovation implementation.
7.3	Kalelkar R., Khan S. (2016) CEO Financial Background and Audit Pricing	6,811 observations except for non-financial and non-commercial companies from the Compustat database, 2004-2013	Company's expenses for audit	**Companies whose executives have a financial background pay less for audits.**	The cost of audit services is often defined by negotiations between top management and auditors, which is not taken into consideration in this research.

Table 4. Classification of Empirical Papers by Influence of the Chief Executive Officer's Behavioral Characteristics on Corporate Operations

No.	Paper	Sample	Dependent variable	Conclusions	Research limitations
Narcissism					
8.1	Aabo T., Eriksen N.B. (2021) [51] Corporate Risk and the Humpback of CEO Narcissism	475 US manufacturing firms, 2010- 2014	Company risk – volatility of earnings per share	**Moderate narcissism of the chief executive officer – in comparison to a very low and very high level – is related to an increase in acceptance of corporate risks by approximately 12%.**	CEO narcissism is considered in an isolated way, influence of other personal and behavioral characteristics is not taken into consideration.
8.2	Olsen K. J., Dworkis K. K., Young S. M (2014) [58] CEO Narcissism and Accounting: A Picture of Profits	477 largest US companies included in Fortune 500 for 2010	Price of the company's ordinary shares and EPS. One of measures of CEO's narcissism is the size of photo in the annual report (1 to 5).	**Companies with narcissistic executives have higher earnings per share and share price** than firms with non-narcissistic executives.	The cause-and-effect relationship between CEO narcissism and chosen indicators of corporate performance is not obvious.
8.3	Gerstner W.-C., Konig A., Enders A., Hambrick D. (2013) [21] CEO Narcissism, Audience Engagement, and Organizational Adoption of Technological Discontinuities	33 large pharmaceutical companies (revenue over 400 mln per year) headquartered in the USA, 1980-2008	Number of strategic innovations in biotechnology implemented by the company for each year.	**Narcissistic chief executive officers are a factor that hastens the company's response to emergence of new breakthrough technology.**	The authors do not divide innovations into successful and unsuccessful, showing that a narcissistic CEO will eagerly implement any new technology irrespective of its commercial efficiency.
8.4	Zhang H., Ou A. Y., Tsui A. S., Wang H. (2017) [28] CEO Humility, Narcissism and Firm Innovation: A Paradox Perspective on CEO Traits	206 chief executive officers from Chinese companies	Feeling towards innovation activity among company employees	Chief executive officer's narcissism **combined with** humility **increases** corporate innovation activity.	The authors emphasize that combination of humility and narcissism is characteristic of Chinese philosophy in particular. Consequently, it makes one wonder whether the obtained research results can be reasonably extrapolated onto other cultures.
8.5	Chaterjee A., Hambrick D. C. (2011) [56] Executive Personality, Capability Cues, and Risk Taking: How Narcissistic CEOs React to Their Successes and Stumbles	152 chief executive officers in 134 unique IT companies, 1992-2006	Risk acceptance: CAPEX, D&A, M&A	**Highly narcissistic executives are much less sensitive to recent unbiased results and much more susceptible to social approval and praise**, which influences investment decision-making.	Such measures of risk acceptance as total costs, CAPEX, D&A and M&A has certain limitations. The costs are considered in their entirety, without an analysis of investment riskiness and portfolio diversification.
Self-Confidence					
9.1	Hirshleifer D., Low A., Teog S. (2012) [32] Are Overconfident CEOs Better Innovators?	2,577 executives from 9,807 observations, 1993-2003	Standard deviation of daily earnings per share during the financial year	**Self-confident executives exploit** opportunities of innovation growth **more efficiently** and transform them into company value. The maximum effect is observed when CEO assumes office during a company's growth stage.	Using innovation growth opportunities may result in serious victories, as well as serious losses of the company. Influence of industry-related specifics on research results.
9.2	Mundi H.S., Kaur P. (2019) [31] Impact of CEO Overconfidence on Firm Performance: An Evidence from S&P BSE 200	157 firms and 2,371 observations, 2000-2015	Tobin's Q and return on assets	Corporate performance indicators show that **organizations with self-confident chief executive officers have a higher return on assets and Tobin's Q** in comparison to other firms in the sample.	A biased sample because only companies from S&P 200 were studied.

Table 5. Classification of Empirical Papers by Influence of Chief Executive Officer's Power on Corporate Operations

№	Paper	Sample	Dependent variable	Conclusions	Research limitations
CEO Power					
10.1	Park J.-H., Kim C., Chang K., Lee D.-H., Sung Y.-D. (2018) [43] CEO Hubris and Firm Performance: Exploring the Moderating Roles of CEO Power and Board Vigilance	200 largest com panies listed, including the Korean Stock Exchange (KOSPI 200) for 2001–2008	Financial performance of the firm was measured through the industry average return on assets (Ad-ROA). For control of industry influence on corporate performance: Ad-ROA= industry median ROA – ROA of the company; The indicator is averaged for two years to reduce error.	**Chief executive officer's power aggravated the negative influence of the** hubris **characteristic** on corporate financial performance.	The authors point out that it is difficult to reveal an "isolated" impact of power on corporate financial performance taking into consideration various internal and external factors that define the organization's performance. Such factors comprise: luck, natural environment and other CEO characteristics.
10.2	Chiua J., Chen C.-H., Cheng C., Hung S. (2021) [40] Knowledge Capital, CEO Power, and Firm Value: Evidence from the IT Industry	US companies from the IT industry, 2007-2014	Tobin's Q and return on assets	**Organizations with powerful executives** and increased knowledge capital **have strong financial performance.** Hence, it follows that probability of financial crisis in the company is reduced.	The research study comprises only companies from the IT industry, thus, the obtained results cannot be the same for companies from other industries due to unique characteristics.
10.3	Sariol M., Michael A. (2017) [54] The Influence of CEO Power on Explorative and Exploitative Organizational Innovation	300 companies, number of years > 5, 2006–2013. We checked each of 220 chief executive officers for the above period.	Degree of radical and incremental innovation. These variables were measured through the number of presentations of new products of any type.	**More powerful executives – taking into consideration their proneness to risk – will strive to increase radical innovation.** The obtained results explain the creation of the corporate innovation program from the point of view of power.	A small sample and a short research period. To provide a higher veracity of obtained results, the authors propose to use more CEO power-related characteristics.
10.4	Chiu J., Li Y.-H., Kao T.-H (2022) [40] Does Organization Capital Matter? An Analysis of the Performance Implications of CEO Power	US firms listed on the NYSE, AMEX and NASDAQ stock exchanges, 1992-2014. The sample consists of 14,000 observations.	Tobin's Q	A chief executive officer may influence company value by controlling company equity. **The greater power the chief executive officer has,** the greater his/her opportunities for corporate growth and development are, which increases the company value.	A biased sample due to use of data on the companies only from the American market.

Appendix B. Characteristics of CEO Human Capital for the Sample of CEOs from Russian Companies

We collected 10 variables for each company, which describe the chief executive officer for each year. 5 out of 10 variables are continuous, the remaining ones are binary. The description and analysis of each variable is presented below.

CEO Age

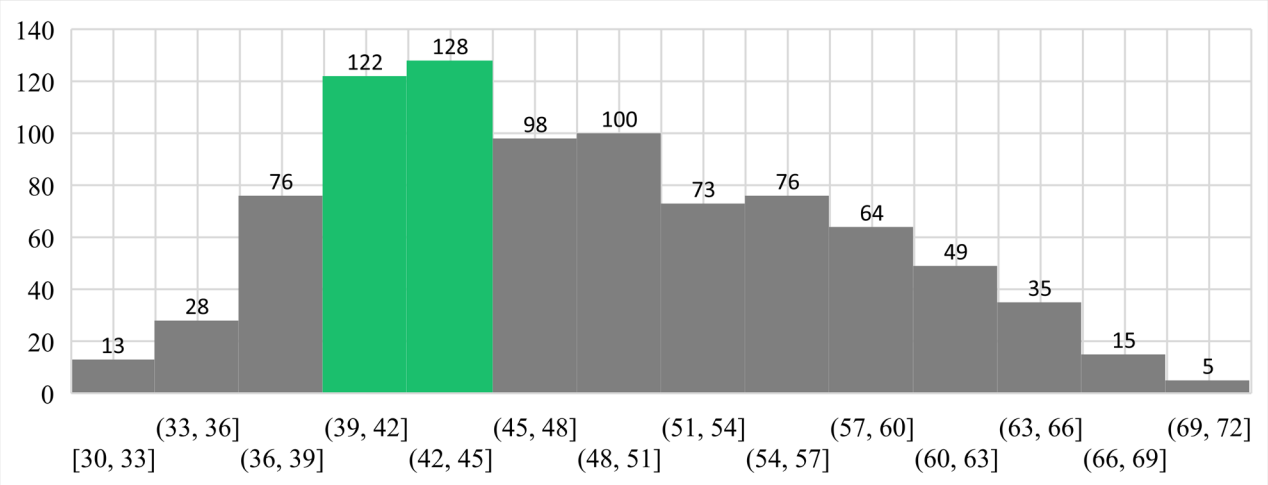
The variable representing CEO age (model designation: *Age* and *Age_2*) is a continuous variable and is defined as the number of years of a chief executive officer's age in a corresponding year. The data has been collected manually from official corporate websites, annual reports and publicly available Internet sources. The descriptive statistics of the age variable is presented in Table 1.

Table 1. Descriptive statistics of the CEO age variable

Mean	Median	Mode	Standard deviation	Minimum	Maximum
48	48	43	8.66	30	72

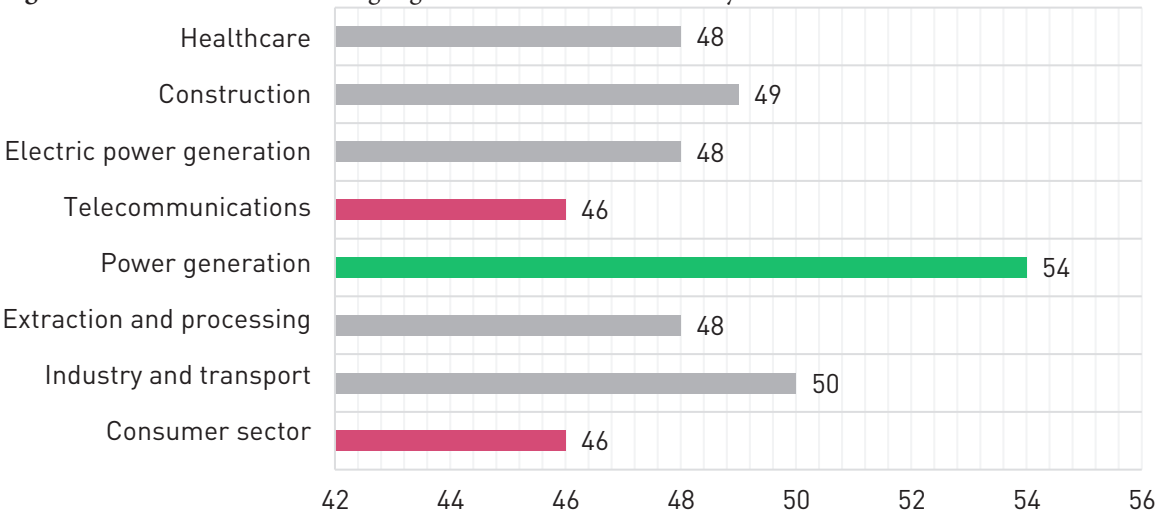
The average age in the sample is 48, and it varies from 30 to 72. Besides, the most common age of chief executive officers is between 39 and 45. Distribution of chief executive officers by age is offered in Figure 1.

Figure 1. Distribution of chief executive officers' age in the sample



Analyzing the distribution of the chief executive officers' average age by sectors, which is presented in Figure 2, we would like to note that young chief executive officers prevail in the consumer and telecommunications sectors, which may be due to a rather short CEO tenure in the above industries. At the same time, more mature chief executive officers prevail in the power generation industry. It may be caused by the need for significant experience and the specific nature of the industry.

Figure 2. Distribution of the average age of chief executive officers by sectors



Some studies point out the quadratic dependence between age and corporate financial performance [2]. In order to take this feature into consideration, we decided to introduce the variable representing age in quadratic form into the model.

CEO Education Level

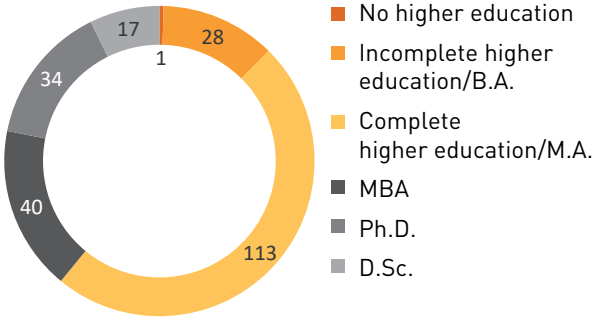
Education level was evaluated according to the chief executive officer's education (designation in the model: *Edu_Dum*). Each observation was assigned the value of 0 to 5 in conformance with the methodology presented in Table 2.

Table 2. Methodology of Evaluation of CEO Education Level

Points	Education level
0	No higher education
1	Incomplete higher education or a bachelor's degree
2	Complete higher education or master's degree
3	Master of Business Administration (MBA)
4	Doctor of Science
5	PhD

Distribution of chief executive officers by the education level is shown in Figure 3.

Figure 3. Distribution of CEO education levels



We should note that 48.7% of executives hold a complete higher education degree or a master's degree, 40 persons (17%) have an MBA, 34 persons (15%) are Doctors of Science. CEOs with a PhD degree and incomplete higher education are less frequent – 17 (7%) and 28 persons (12%), respectively. Only one chief executive officer doesn't have a higher education degree, and there is no data on 2 persons. Taking into consideration the specific character of the chief executive officer's activity, which implies a profound understanding of corporate business processes as well as the ability to manage a significant number of subordinates in a competent way, it is no less important to determine the number of CEOs with an MBA. Our sample comprises 40 such CEOs.

Drawing on the experience of previous studies and analysis of collected data, we decided to use the education level in the model as a dummy variable which takes on the value of 1 if chief executive officer has a high level of education (an MBA, Doctor of Science or PhD), 0 – otherwise [7]. It is necessary to define a group of chief executive officers with an atypical educational level because almost all CEOs in the sample have the basic educational level (bachelor's or master's degree).

CEO Tenure

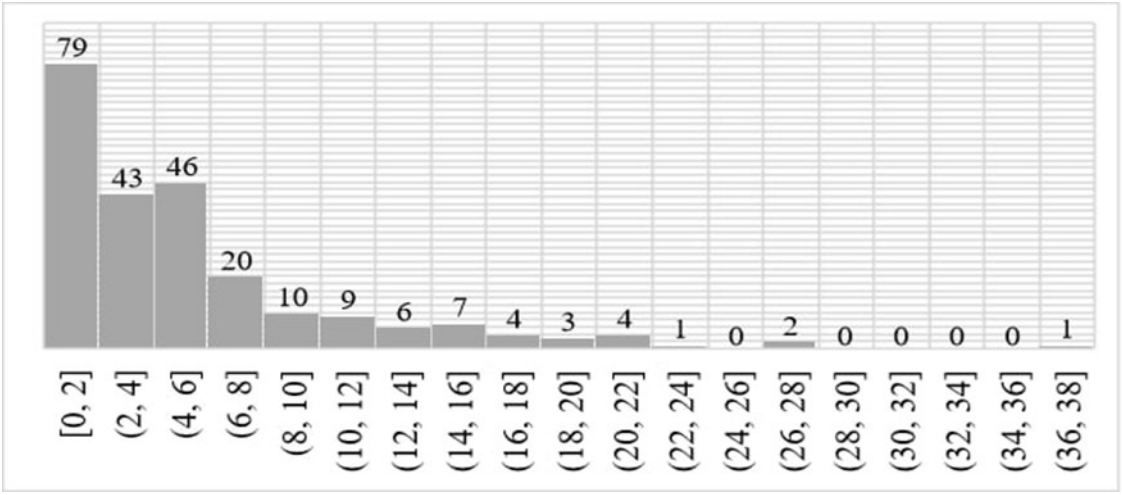
The variable representing the chief executive officer's experience (designation in the model: *Tenure*) is continuous and is determined as the number of years of a CEO's employment by the current company in the corresponding year. Table 3 presents the descriptive statistics of the CEO tenure variable.

Table 3. Descriptive statistics of the CEO tenure variable

Mean	Median	Mode	Standard deviation	Minimum	Maximum
5	4	1	5.7	1	37

The average experience of a chief executive office from the sample amounts to 6 years, varying from 1 to 37 years. The most common tenure span is 1 year. The distribution of chief executive officers' experience is presented below in Figure 4.

Figure 4. Distribution of chief executive officers' experience in the sample



Distribution of chief executive officers by the span of tenure in the current company shows that CEO replaceability is characteristic of the sample: 34% of executives occupy their positions for less than 2 years. At the same time, 16% are in office for over 10 years.

Note that sometimes there is a quadratic dependence between a chief executive officer's experience and corporate performance [52]. In order to take this feature into account, we decided to introduce a variable describing age in quadratic form into the model.

Internal Experience

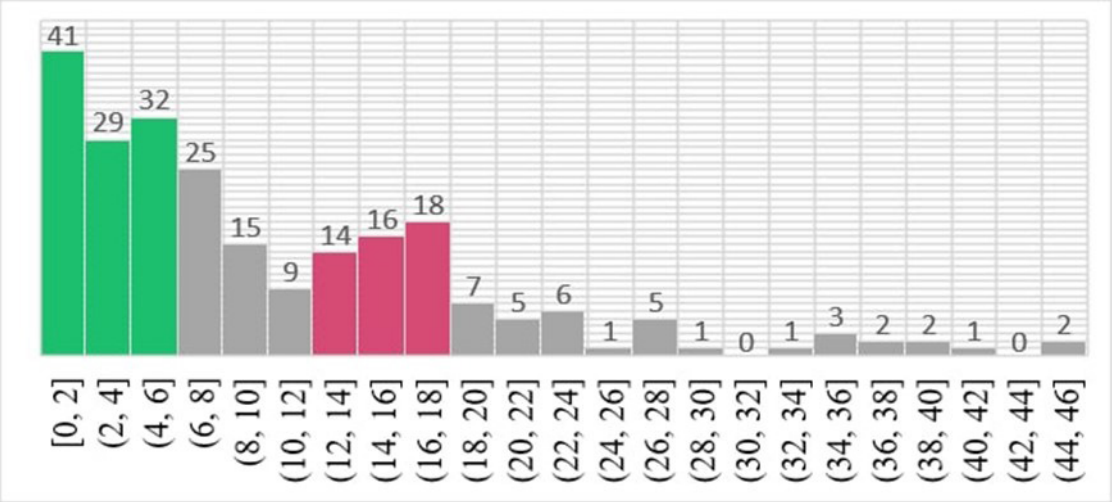
The variable representing a chief executive officer's internal experience irrespective of the position (designation in the model: *Internal_Exp*) is continuous and is defined as the number of years of the chief executive officer's employment by the company, including subsidiary companies, in the corresponding year. Please refer to Table 4 for the descriptive statistics of the variable that characterizes the chief executive officer's internal experience.

Table 4. Descriptive statistics of the internal experience variable

Mean	Median	Mode	Standard deviation	Minimum	Maximum
10	8	1	9.38	1	45

The average chief executive officer's internal experience amounts to 10 years, ranging from 1 to 45 years. The most common CEO experience span is 1 year. Figure 5 below presents the distribution of the CEOs' internal experience across the sample.

Figure 5. Distribution of the CEOs' internal experience across the sample



The internal experience distribution diagram shows 2 groups of chief executive officers: in the first group, internal experience ranges from 1 to 6 years. As a rule, these executives are employed as CEOs from the start. In the second group, internal experience is significantly longer: from 12 to 18 years. These executives were employed by the company a long time ago and made a career up to the chief executive officer.

External Experience

The variable characterizing a CEO's external experience (designation in the model: *External_Exp_Dum*) is continuous. It is determined as the number of years of a CEO's employment by other companies. We did not find information on 3 chief executive officers (13 observations). Table 5 presents the descriptive statistics of the considered variable.

Table 5. Descriptive statistics of the external experience variable

Mean	Median	Mode	Standard deviation	Minimum	Maximum
3	1	0	4.81	0	24

On average, chief executive officers occupied the same position in other companies for 3 years. Besides, the most common experience span (mode) is 0 years. At the same time, there are CEOs in the sample with very extensive experience, i.e., 24 years.

Taking into consideration the fact that there is a small range of variation of CEO external experience, it is reasonable to introduce this variable as a dummy. 1 means that such experience exists (irrespective of its length), 0 – that it doesn't exist.

Government Experience

The next variable is a chief executive officer's government experience (designation in the model: *Gov_Exp*). Government service is understood as an executive position in government authorities. Out of 234 chief executive officers in the sample, 60 have government experience, which comprises a quarter of the sample (we didn't find validated information about 2 persons).

Government experience was introduced into the model as a dummy variable that takes on the value of 1 if the chief executive officer has such experience, and 0 – if there is no evidence of such experience.

CEO Financial Expertise

The variable describing a chief executive officer's financial expertise (designation in the model: *Fin_Exp*) shows their experience in the position of the chief financial officer, financial control officer, as well as in the field of audit or financial consulting. Out of 234 chief executive officers in the sample, 78 persons have corresponding experience, and there is no data about 3 executives.

Similar to government experience, this variable was added to the model as a dummy, taking on the value of 1 if the chief executive officer had financial expertise and 0 – otherwise.

Appendix C. Results of Correlation Analysis

	Delta_EVA	Age_2	Age	Tenure_2	External_Exp	Internal _Exp	Edu_Dum	Gov_Exp	Fin_Exp	Narcis_Dum	Self_Conf	Power_Light_ Dum
Delta_EVA												
Age_2	−0.102											
Age	−0.095	0.996										
Tenure_2	−0.192	0.312	0.297									
External_Exp	0.027	0.065	0.062	-0.111								
Internal _Exp	−0.093	0.342	0.339	0.499	−0.255							
Edu_Dum	−0.043	0.175	0.172	0.079	−0.080	0.056						
Gov_Exp	−0.072	0.243	0.246	0.122	−0.103	0.038	0.279					
Fin_Exp	−0.043	-0.139	-0.153	0.139	0.024	−0.026	0.210	0.018				
Narcis_Dum	−0.019	0.049	0.039	0.074	0.029	0.065	0.146	−0.003	0.106			
Self_Conf	−0.004	0.084	0.081	0.015	0.033	0.087	0.073	0.035	0.003	0.096		
Power_Light_ Dum	0.042	−0.056	−0.045	0.006	0.048	0.022	−0.045	−0.075	−0.251	−0.098	−0.118	

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Impact of CEO Overconfidence on M&A Performance in the US: A Content Analysis

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Abstract

Despite the high activity on the market for corporate control, more than 60% of M&As are unsuccessful and contribute to damage to the value of the acquiring company. We still have little evidence on the impact of M&A deals in different countries and industries on shareholer value, as well as the factors that influence this impact. Academic researchers and practitioners continue to seek out the factors that influence M&A performance, but results are still inconclusive, indicating the need for further research into acquisition performance and factors that influence the overall success of M&A deals. This paper examines the impact of CEO overconfidence on the performance of M&A deals in the United States. In contrast to previous studies, we, first of all, use earnings call transcripts in content analysis as the base to measure CEO overconfidence; secondly, we apply cluster analysis to identify the factors that force CEOs to structure their speech during earnings calls in a similar manner; and, thirdly, we assess the impact of CEO overconfidence on the performance of high-tech deals. The study is based on a sample of 492 M&A transactions implemented during the post-crisis period, 2009–2019. Using the event study method to assess the performance of M&A deals and regression analysis, we prove that CEO overconfidence has a negative impact on the success of M&As. However, when considering a subsample of deals in which the target company operates in a high-tech industry, we failed to identify a significant impact of overconfidence on M&A performance. As a result of cluster analysis, we identified a cluster of 165 companies with a common structure and similarity of CEO speeches, which are not explained by the companies' affiliation with similar industries. This suggests that overconfident CEOs tend to use and structure their speeches similarly.

Keywords: CEO overconfidence, M&A deals, speech tone, event study, high-tech deals, content analysis

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Introduction

Traditional approaches to strategic deal research assume that a company's top management analyses and then plans a future deal based on rational considerations. We move from the traditional financial paradigm in analysing M&A deal performance to behavioural effects, focusing on the performance of M&A deals driven by economic agents whose behaviour does not conform to the assumption of rationality. More precisely, we focus on overconfidence, the tendency of people to think they are better than they really are with respect to characteristics such as ability, judgment, or prospects for a successful life outcome [1] and examine its influence on M&A performance. Overconfidence has long been popular as an explanation for failed mergers. R. Roll [2] first formalized this concept, and subsequent researchers have continued to study the effects of CEO overconfidence on M&As, indicating in most cases that CEOs with such a characteristic tend to increase the frequency of M&As and negatively affect the performance of the deals [3–7].

In this paper we employ content analysis to measure the CEO overconfidence, which is new in the field of assessing its effects on value creation for shareholders in M&As. Today, sentiment analysis embedded in various sources of corporate information is widely used in behavioral finance. Content analysis makes it easy to analyze sentiment and tone in financial documents, press articles, press-releases, social media networks, etc., using embedded dictionaries. It allows to gain a deeper understanding of the incentives and perspectives underlying managers' and boards' activities related to M&As. We use semantic analysis of the texts of annual earnings conference call transcripts. Although most researchers prefer to use financial reports and letters to shareholders, we believe that the transcripts of earnings calls are the best tool for the analysis as they provide a record of live communication between the CEO, other top managers, and external participants.

Our paper also contributes by using machine learning tools and cluster analysis to identify the behavioral aspects of the CEO's speech during quarterly earnings calls and to identify factors that determine common trends in CEO behavior and speech during these conference calls.

Additionally, we contribute to the existing research by assessing the impact of CEO overconfidence on the performance of high-tech M&As. Since 1990, there has been a substantial increase in M&A activity in high-tech industries due to the need to acquire firms to obtain new skills and new technical and technological knowledge [8]. Nowadays we observe impressive activity in acquisitions of innovative firms. The technology sector is becoming the key sector today in terms of volume and number of M&A deals. Behavioral finance literature reveals that overconfident CEOs are risk-taking persons who are confident in their efforts, have a greater tendency towards innovation and prefer to make deals with targets from high-tech industries. If the acquired innovation is successful, it can offset the observed negative effect of CEO overconfidence. But innovations are challenging, time-consuming and risky and may not translate into the higher firm value. In our paper we try to understand whether high-tech M&As are successful when initiated by overconfident CEOs.

The remainder of the paper is structured as follows. The literature review section discusses the measures of CEO overconfidence in M&As, focusing on content analysis; presents the results of recent empirical research on the effect of CEO overconfidence on M&A performance; and sets forth the hypotheses. The methodology section describes the measure of CEO overconfidence, CEO clustering method and the variables used in the empirical analysis and shows the criteria for the sample selection procedure. The penultimate section provides a discussion of the results, and the last section concludes the paper.

Literature Review

Measures of CEO overconfidence in M&As

Overconfidence is defined as an overestimation of one's own abilities and of outcomes related to one's personal situation (the "better-than-average" effect) [9]. In other words, managers assess themselves as being better than the average, explaining that they have skills and experience inherent only to them [10]. Overconfident CEOs usually overestimate the mean returns on investment projects and underestimate risk probability.

The challenging part in exploring CEO behavioral patterns and the influence on M&A deals is to find the most unbiased methodology of measuring CEO overconfidence. The analysis of academic literature allows us to single out various proxies for CEO overconfidence (Table 1). Some of them are more popular, such as CEO stock options [3; 10], content analysis [1; 3], the net buyer measure [10], while others, such as the relative compensation, recent organizational performance, frequent acquirers and synergies forecast error [7], are used less frequently. Among these various techniques, content analysis is currently gaining popularity. Content analysis itself comprises two main methods. The first one is based on the CEO's image in the media. The idea of this method is to search for certain keywords in press articles, interviews with CEOs and references to them in social networks. The CEO is considered overconfident if the number of references in press about him/her as an "overconfident individual" exceeds the number of references as "conservative and cautious" [3]. This method has certain shortcomings, such as extreme subjectivity in media assessments, which can be attributed to the willingness to create a negative public image of a particular CEO for various reasons. Moreover "press coverage suffers from an important endogeneity problem: mergers may change the tenor of press coverage. The press may perceive acquiring CEOs as more confident, or managers may try to convey confidence during acquisition bids" [3].

The second new measure of CEO overconfidence in the M&A sphere involves examining the CEO's speech to identify the overconfident tone. P. Garrard et al. [11] defined

a close connection between individual linguistic features and cognitive biases. From the viewpoint of psychology, D.M. Merkl-Davies and N.M. Brennan [12] found out that overoptimism and strong confidence of the CEO's tone of the speech is an indicator of overconfidence. They also mentioned that the analysis of CEO's speech is the most objective tool to estimate the true level of CEO overconfidence [12]. The object of the analysis are the words spoken by the CEO. The researchers often use CEO tweets, management earnings forecasts [13]; letters to shareholders [14]; earnings press release – MD&A section, 10-K or 10-Q filings [15], whereas earnings call transcripts seem to be more suitable for content analysis [12]. Earnings calls consist of the company's quarterly results, forecasts and a Q&A session, which is the largest part of the transcript. Therefore, a transcript of an earnings call, which is a live communication, creates an opportunity to evaluate the specifics of CEO behavior more precisely. The CEO has little control over the tone of his/her speech, in contrast to, for example, the text of a letter to shareholders written and edited in advance. The content analysis of CEOs' quarterly earnings calls, known as the "bag of words" method, contributes to the detection of the so-called overconfident tone [16].

By analyzing the content of earnings call transcripts, machine learning tools provide an opportunity to conduct a deeper content analysis and divide the sample into certain clusters for further analysis and identification of factors that unite particular CEOs. Clustering provides an opportunity to thoroughly analyze earnings call transcripts and find the specifics of CEO speech construction and factors that affect the speech tone. Clustering analysis is important in that it can demonstrate that company-specific and personal factors, rather than only industry-specific factors, influence the CEO's speech structure and behavior. For example, all CEOs of pharmaceutical companies can be expected to discuss R&D expenses, whereas high-tech company CEOs discuss only technological innovations. It means that the CEOs are grouped (clustered) based on the industry specific characteristics, as during earning calls they discuss issues related to their industry of operation. However, *we expect that CEOs' speech structure is not industry-specific only, but is related to his/her personal and company characteristics.*

CEO Overconfidence and M&A deals

The hubris hypothesis proposed by R. Roll [2] suggests that company decision makers tend to overestimate their own abilities when making M&A decisions. In other words, the decision to merge is explained only by the irrational behavior of the acquiring company's management and the belief that only they are capable of identifying synergistic merger opportunities that are unobservable to others. Thus, in subsequent studies CEO overconfidence has come to be considered one of the factors explaining the activity and performance of M&A deals. The impact of CEO overconfidence on M&A outcomes has attracted the attention of many researchers. The results of empirical papers demonstrate that overconfident CEOs are more likely to initiate deals when their company has internal financing sources; usually prefer to undertake diversifying deals; and tend to make more M&As than rationality-driven managers, who on average create significantly lower value for acquirer's shareholders [3; 6; 7]. The empirical papers that examine the impact of CEO overconfidence on M&A performance are summarized in Table 1.

Table 1. CEO overconfidence and its impact on M&A performance

Authors and year of publication	Sample	Measurement of CEO overconfidence	Results	Direction of the CEO overconfidence impact on M&A performance
U. Malmendie, G. Tate, 2008 [3]	477 large publicly-traded U.S. firms, over 1980 to 1994	1.Option-based method; 2. CEO press portrayal	The market reacts much more negatively to the announcement of M&A deals initiated by overconfident than non-overconfident CEOs	–
J.A. Doukas, D. Petmezas, 2007 [17]	5334 successful acquisitions by U.K. public companies, over 1980–2004	Option-based method	Overconfident bidders create positive announcement returns, but they are considerably lower than the returns realized by non-overconfident bidders	–
R. Brown, N. Sarma, 2007 [4]	312 Australian firms, over 1994–2003	CEO press portrayal	1. CEO overconfidence is significant in the explanation of the acquisition decision; 2. Effective corporate governance, as measured by a higher proportion of independent directors on the board, significantly mitigates CEO overconfidence	+/–

Authors and year of publication	Sample	Measurement of CEO overconfidence	Results	Direction of the CEO overconfidence impact on M&A performance
A.C. Kolasinski, X. Li, 2013 [5]	15,204 US firm-year observations over 1988–2006	Option-based method	Acquisitions initiated by overconfident CEOs tend to be more value destroying than the deals made by non-overconfident CEOs	-
H. Hwang et al., 2020 [6]	13,754 US firm-year observations over 1996–2014	Option-based method	Power-led overconfident CEOs tend to make more M&As, use stocks to pay for the deals, and make diversifying M&As	-
I. Skvortsova, A. Vershinina, 2021 [18]	237 M&A deals closed by Russian firms over 2005–2019	1. the company's current performance 2. CEO prior professional experience	1.CEO overconfidence destroys value 2. All corporate governance mechanisms can mitigate CEO irrationalities in M&A	-
A. Ismail, C.P. Mavis, 2022 [7]	497 US deals over 1993–2013	Synergies forecast error	CEO overconfidence is positively related to M&A premium and negatively related to abnormal returns on the bidder's stock	-

Table 1 shows that almost all the researchers prove the negative impact of CEO overconfidence on M&A performance, suggesting that overconfident CEOs usually over-estimate their ability to generate returns, and, as a result, overpay for target firms and undertake value-destroying deals. But how can this negative effect of CEO overconfidence be neutralized? R. Brown and N. Sarma [4] show that the higher the proportion of independent directors on the board, the lower the effect of CEO overconfidence and, consequently, the lower the probability of company participation in M&As. A.C. Kolasinski and X. Li [5] also conclude that strong and independent boards restrain M&As driven by CEO overconfidence. R.W. Masulis et al. [19] argue that separation of the positions of CEO and chairman could mitigate CEOs' empire-building and force them to be more selective in their M&A decisions, leading to increased value for shareholders. Previous unsuccessful experience as a factor influencing the decrease in CEO overconfidence was considered only by A.C. Kolasinski and X. Li [5]. The authors consider negative experience in terms of realized losses from an insider purchase and find that once-overconfident CEOs make better acquisition decisions after they experience personal stock trading losses.

Table 1 also indicates that researchers mostly prove the negative impact of CEO overconfidence on M&A performance for companies in developed capital markets, such as the USA, UK, and Australia, and there is only one paper that addresses this question in an emerging capital market and also proves the negative effects of CEO overconfidence for Russian firms. Following the arguments of the previous authors, we also expect that:

H_1: CEO overconfidence has a negative impact on the M&A performance of US companies

CEO overconfidence and the performance of high-tech M&As

Nowadays, a striking trend on the corporate control market are M&A deals aimed at business digitalization, and the purchase of technologies and innovations. The technology, media & telecommunications (TMT) sector is now becoming the key sector in terms of the volume and number of transactions on the global market. The digitalization of the economy is intensifying companies' efforts to digitalize their products and services and is generally stimulating them to raise their technological level. M&A deals continue to be the fastest and least expensive way to gain access to competitive technology compared to building and developing a proprietary base. Considering the abovementioned factors, it is vital to understand how CEO overconfidence impacts M&A performance in this market.

Behavioral finance literature states that overconfident CEOs are risk-taking and prefer to make deals with targets from innovative (high-tech) industries [1]. It is widely known that innovation is challenging, time-consuming and risky. The closing of high-tech M&A deals is considered as an indicator of superior future-oriented "vision." Therefore, researchers stated that overconfident CEOs tend to conduct such M&A deals more frequently [1]. Using a sample of US firms over 1980–1994, A. Galasso and T.S. Simcoe [20] also show that overconfident CEOs are more likely to initiate a significant change in their firm's innovation strategy and have greater flexibility to make changes in their firm's strategic direction. On the other hand, D. Hirshleifer et al. [1], empirically prove that firms with overconfident CEOs have higher stock return volatility on a sample of US firms over 1986–2003. Overconfident CEOs invest more heavily in R&D and achieve greater innovation as measured by

patent and citation count, but the greater innovative output for given R&D input achieved by overconfident CEOs does not necessarily translate into higher firm value. From the other side , A. Galasso and T.S. Simcoe [20] show that there is a positive relationship between CEO overconfidence and firm's value. E. Karnoukhova and A. Stepanova [21] also find that powerful CEOs positively contribute to the performance of high-tech companies. Considering these arguments and the fact that in most cases stock market reacts positively to the accouchements of high-tech M&As, we hypothesize that:

H_2: CEO overconfidence has a positive impact on the high-tech M&A performance of the US companies

Methodology

Overconfidence measurement

To identify the "overconfident tone" of the CEO, content analysis of the earnings calls' transcripts is used. For content analysis purposes, quarterly earnings call transcripts of the sample companies for the period prior to the M&A transaction were downloaded from the S&P Capital IQ database with subsequent data processing. Research in psychology and finance proves that overconfident people tend to use more positive and confident words than negative and uncertain ones [12; 15]. For that reason, T. Loughran and B. McDonald [15] developed a dictionary based on the Harvard business school's dictionary of positive, negative and other word tints. Besides that, the dictionary is constantly updated by T. Loughran and B. McDonald. As of May 2020, T. Loughran and B. McDonald divide the list of 3052 words into positive, negative, strong, and weak modals categories[1]. Table 2 provides the examples of the words on the list.

Table 2. Examples of words from T. Loughran and B. McDonald's dictionary

Positive	achieve, benefit, boost, confident, delight, encourage, enjoy, outperform
Negative	abandon, bribe, complain, dissatisfy, exaggerate, imbalance, misappropriate, suffer
Uncertain	approximately, doubt, instability, risk, volatility
Strong modal	always, best, definitely, must, strong
Weak modal	almost, could, depend, possibly, suggest

To calculate the proxy of overconfidence, which is the overconfident tone, a continuous variable reflecting the degree of CEO's overconfidence tone is built:

$$\text{Overconfidence tone} = \frac{(\text{Positive} + \text{Strong Modal}) - (\text{Negative} + \text{Uncertain} + \text{Weak Modal})}{\text{Total number of words}}. \quad (1)$$

Overconfidence tone measurement means that the higher is the indicator, the higher is the overconfidence level of the particular CEO. The logic of using the abovementioned formula is that the relationship of words with different tones to the sum of total number of words in the earnings call transcript describes the CEO's speech tone and indicates the presence of overconfidence if it is larger than zero. It means that the usage of the formula shown above indicates a CEOs' way of presenting call participants with almost the same content by using different sets of words (different dictionary) [15].

Due to the large volume of the earnings call transcripts, data science tools are used. For that reason, Python programming language is applied to calculate the overconfident tone. Python allows to analyze a large amount of data in a very short time and provide an output of calculation. The Python script of overconfidence calculation is presented in the Appendix. The written script aims to identify the words from the dictionary list with the tone consideration in the earning call transcripts. If a word in the report coincides with the word that is in the dictionary list, the program identifies the category to which a particular word belongs and goes through the whole transcript, providing the overconfidence tone indicator at the end.

CEO clustering method

The novelty of this study is the use of advanced machine learning tools to cluster CEOs and identify similarities that bring them into a single cluster. To use this tool effectively, the sample was divided into four groups. Dividing them into four groups allows to separate them subsequently into several clusters and find the one that helps explain the characteristics inherent in the CEOs of a given cluster. For this purpose, the first group is divided into two clusters, the second – into three, the third – into four, and the fourth – into five. The aim is to find a cluster that ranks companies by factors other than industry. After that, further steps are needed to manually identify all possible factors.

[1] URL: https://sraf.nd.edu/textual-analysis/resources/

To do this, the sample is initially divided into two separate clusters with no analysis attributes other than industry affiliation. A similar scenario takes place in the case of the third and fourth clusters. When the sample is divided into five clusters, it is revealed that the group of 165 companies is unified by factors other than industry. Manual analysis and the Python programming language were used to find these factors. The main purpose of using this method is to identify the factors that lead to this common behavior and motivate CEOs to use a similar communication style during calls, thereby giving a new direction to the literature on CEO behavior analysis.

M&A performance measurement

To estimate the performance of M&A deals, we apply the standard event study method. Normal (predicted) returns are generated using the market model:

$$R_{jt} = \alpha_j + \beta_j R_{mt} + \varepsilon_{jt}, \quad (2)$$

where R_m is the return on a market index (S&P 500) on day t; β_j measures the sensitivity of firm j to the market; α_j measures the mean return over the period that is not explained by the market; $t \in (t_1; t_n)$ is the estimation period, ε_{jt} is the statistical error; $E(\varepsilon_{jt}) = 0, \text{var}(\varepsilon_{jt}) = \sigma^2$.

The abnormal return here is

$$AR_{j\tau} = R_{j\tau} - \hat{\alpha}_j + \hat{\beta}_j R_{m\tau} \quad (3)$$

where, $R_{j\tau}$ is the actual return, $\epsilon(T_1; T_m)$ is the event window.

We employ a 3-day (−1; +1) and 11-day (−5; +5) event windows to calculate cumulative abnormal returns (CARs) [22]. We take 255 trading days prior to the event window as the estimation period to calculate the predicted return for each firm.

The general test used for all hypotheses is the following [23; 24]:

$$H_0 : CAR = 0$$

Test statistics are defined as follows:

$$t = \frac{CAR(T_1; T_m)}{\sqrt{m\delta^2(t_1; t_n)}}, \text{ where } \delta^2(t_1; t_n) = \sum_{t=t_1}^{t_n} \delta^2(AR_t), \quad (4)$$

where m is the length of the event window.

CEO overconfidence and M&A performance

The next step in our analysis is to understand the impact of CEO overconfidence on the M&A performance. For that purpose, the following ordinary least squares (OLS) regression is used[2]:

CAR=β_0+β_1 Overconfidence+ β_2 Total revenue 3-year CAGR+β_3 Log(firm size)+β_4 CEO age+β_5 Education dummy+β_6 Difference tenure and year of transaction+β_7 GDP growth rate. (5)

The dependent variable is cumulative abnormal return (CAR) for a single deal, which is explained by the independent variable, CEO overconfidence, and a set of control variables:

3-year total revenue compounded annual growth rate: the level of the acquirer's revenue growth in the 3 years prior to the year of the M&A deal announcement.

Log firm size: the total value of assets for the year before the transaction.

CEO age: the age of the CEO at the moment of M&A deal.

CEO education dummy: 1 if CEO has an MBA, JD or PhD degree, and 0 otherwise

Difference between tenure and year of transaction: the variable shows the length of the CEO's management period prior to the transaction date.

Quarterly GDP growth rate: the variable forms overall market's expectations towards its growth or decline, which affects the market reaction to M&A deals.

The summary statistics of the final model's explanatory variables and the dependent variable is presented in the Appendix.

Data

The timeframe of the deals is between 2009 and 2019. Thus, we examine the period after the 2008–2009 crisis and before the COVID-19 pandemic.

We use the S&P Capital IQ and BoardEx databases to identify an initial sample of publicly traded deals and to download information about the personal characteristics of executives and board of directors. We further require that (1) a deal results in acquisition of the majority stake – at least 50% + 1, (2) both an acquirer and a target are not from financial or utilities sectors – exclusion is based on SIC codes (6000–6999 for financial companies and 4900–4999 for utilities firms), (3) an acquirer is a public company, while a target might be either a public or private company, (4) total transaction value exceeds $1 mln.

Our requirements yield the sample of 492 US deals.

37% of the deals in our final sample were high-tech acquisitions where the targets are high-tech companies. Companies are considered high-tech according to the SIC (Standard Industrial Classification) codes that are presented in the Table 3 [25].

[2] The final model is chosen based on how well it explains the changes of the dependent variables, as well as the model's appropriateness in regard to Gauss-Markov's assumptions. For that reason, several tests on unbiasedness, multicollinearity, and homoscedasticity of the residuals were implemented.

Table 3. SIC codes for high-tech industry

High-tech industry	SIC Codes
Software	737
Medical technologies (incl. drugs)	283, 382, 873
Communications	366, 481, 489
Computer equipment	357
Electrical equipment	360 – 365, 367

In the resulting research sample, 316 of the transactions were domestic, and the remaining 176 were cross-border deals. It is interesting to note that of the 176 cross-border deals, twenty of the target companies are in emerging capital markets and the remaining 156 target companies are in developed countries. In regard to payment methods, it is worth noting that 305 deals are paid in cash, while the remaining 187 deals are paid in stock or a combination of stock and cash. As for deal size, the minimum deal amount is $1 million, and the maximum is $27 million.

Results

CEO clustering

Cluster analysis revealed a subsample of 165 companies with a common structure and similarity in CEO speeches during quarterly earnings calls/reports, independent of the companies' industry characteristics. The critical task is not to show that the overconfident tone is unrelated to industry characteristics, but to find the roots and factors that create this differentiation between the overall sample and the specific cluster of 165 companies. For this reason, a labor-intensive analysis was conducted to identify several possible combinations of factors that influence CEOs to behave similarly and, therefore, demonstrate similar behaviors during quarterly earnings calls. The analysis was conducted manually and includes a large number of combinations that could affect the tone of the CEO's speech. Several financial, non-financial, and personal characteristics of CEOs were analyzed, and a table of key differences between the entire sample and the subsample is presented in Table 4.

Table 4. Differentiation factors between clustered and the whole sample

Indicators that have different values for the whole sample and clustered sample	Average value for the whole sample	Average value for the cluster of 165 companies
Firm age as of one year before the M&A deal	63 years	72 years
Market capitalization as of one year before the M&A deal	$8703 mln	$7086 mln
Total assets value as of one year before the M&A deal	$7708 mln	$7900 mln
R&D expenses as of one year before the M&A deal	$163 mln	$119 mln
FCFF as of one year before the M&A deal	$384 mln	$285 mln
Number of transactions of the CEO in 2009–2019	16 deals per CEO	13 deals per CEO
Returns on assets as of one year before the M&A deal	4%	7%
Total debt to equity ratio as of one year before the M&A deal	74%	69%
CAR over a 10-day event window	0.005%*	0.003%*
Percentage of overconfident CEOs	86%	90%

*** – significant at 1% significance level, ** – significant at 5% significance level,

* – significant at 10% significance level.

The table represents the main differences between the clustered sample of 165 companies and the whole sample. The main differences between the two groups are the following: the clustered 165 companies are on average 9 years older, have an about $1,7 bln smaller market capitalization a year prior to the M&A deal, but have a higher total asset value. Moreover, they spend around $44 mln less on R&D expenses, as well as have around $100 mln less free cash flow in the year prior to the transaction. It seems that the whole sample's average indicators show that clustered companies are smaller in value and investments, but in regard to efficiency, it is essential to observe that they have a higher average return on assets and lower debt-to-equity ratio in the year preceding the deal, which indicates the higher efficiency of the clustered companies. It can be combined with the fact that clustered companies are older, thus, have more experience and optimized operations. Besides that, the percentage of overconfident CEOs is larger in the subsample of clustered companies, which directly affects the M&A performance indicator of CAR, too. It is observed that the average CAR for an 11-day event window is significantly lower for the subsample of 165 clustered companies, based on the t-test differences, which additionally proves the negative impact of CEO overconfidence on M&A outcomes. In addition to this fact, it can be argued that overconfident leaders use and structure their speeches in a similar way. To show this difference, an example of the earning calls of two companies from pharmaceutical industry is used. CVS Pharmaceuticals is selected from the clustered sample, while Vertex Pharmaceuticals is selected from the remaining part of the sample. The two companies from the same industry show the difference in their CEOs' behavior during quarterly earning calls. CVS' CEO concentrates mostly on the company's financial performance, i.e., in the following quote is from the transcript of the earnings call: "Today, we reported adjusted earnings per share from continuing operations of $0.65, which was at the high end of our expectation, and we generated $1.7 billion in free cash flow year-to-date, so we are well on track to meet our $2.5 billion targets for the year." As can be observed, at the beginning of the call CEO presents the company's financial indicators. A quote from the beginning of the call made by Vertex Pharmaceutical's CEO is as follows: "I'm pleased to say that our business is outperforming on multiple fronts. As we enter the second half of the year, we are on track to achieve or exceed our 2019 goals, and we're well-positioned for continued innovation and growth in the future." It can be seen that there are no exact indicators of the company's efficiency, but there is an emphasis on the company's goals and its positioning. The same pattern was observed when comparing other companies in the cluster sample of 165 companies and the rest of the sample. The above example shows that the executives of the clustered 165 companies try to focus more on quantitative metrics that show how they and their companies are performing, while the executives from the rest of the sample mostly emphasize qualitative analysis and company vision.

CEO overconfidence and CAR

The first step in our empirical analysis of the effects of CEO overconfidence on M&A results is devoted to M&A performance estimation using the event study analysis. Table 5 shows that stock market positively reacts to the announcements of M&A deals on the US market. CAARs for a 3-day and an 11-day event windows are positive and statistically significant at 5% and 10% level, respectively. It is important to note that these returns are quite low– slightly below 1% for all event windows, which is consistent with the results of previous researchers [26; 27].

Table 5. CARs for the full sample

Full sample of 492 deals				
Indicators	Min	Average	Max	P-value
CAR 3 (–1; +1)	–0.1890	**0.0073****	0.2368	0.0107
CAR 11 (–5; +5)	–0.2282	**0.0066***	0.2721	0.0903

*** – significant at 1% significance level, ** – significant at 5% significance level,

* – significant at 10% significance level.

The results of our regression analysis presented in Table 6 shows that CEO overconfidence has a negative effect on M&A performance and contributes to the destruction of the acquirer's value. So, the proposed Hypothesis 1 is not rejected at 1% level. This result is in line with the outcomes of the previous studies [3; 5].

Table 6. Impact of CEO overconfidence on M&A deal performance

Variables	CAR (–1; +1)	CAR (–5; +5)
CEO Overconfidence	–1.122***	–1.177***
Total revenue's 3-year CAGR	–0.001***	–0.001***
Education dummy	–0.004	0.007
Log (firm size)	0.000	–0.006**
Transaction-tenure difference	0.006	–0.001
CEO age	0.001	0.001*
GDP growth rate	–0.381	–0.461*
Constant	0.016	0.033
Number of observations	492	492
R^2	0.063	0.050
F-test	3.439	3.139

*** – significant at 1% significance level, ** – significant at 5% significance level,

* – significant at 10% significance level.

CEO overconfidence and CAR for high-tech companies

A separate analysis for a subsample of high-tech companies is performed on the same event windows as for the overall sample. The main question is to understand whether CEO overconfidence has a positive impact on M&A performance when a target is a high-tech company. First, CARs are calculated for the subsample of high-tech M&As. The results are presented in Table 7. As in the case of a general sample, we observe positive and significant stock market reaction to the announcements of such deals. The positive market reaction shows that in an innovative economy, the availability of high-tech production is critical for most corporations. The acquisition of technology through M&A enables such companies to gain a significant competitive advantage, which subsequently has a favorable effect on the market value of shares.

Table 7. CARs for high-tech M&As subsample

Sample of 187 high-tech companies				
Indicator	Min	Average	Max	P-value
CAR 3 (–1; +1)	–0.1652	0,0050**	0.2257	0.0291
CAR 11 (–5; +5)	–0.2173	0,001*	0.2102	0.0687

*** – significant at 1% significance level, ** – significant at 5% significance level,

* – significant at 10% significance level.

At the next step we build the regression analysis that shows the statistically insignificant impact of CEO overconfidence on the performance of M&A deals (Table 8). Thus, the proposed Hypothesis 2 is rejected. The logic may lie in the overall structure and goals of a company's acquisitions of high-tech firms. Many companies acquire technology firms to gain access to technology or research, know-how, market expertise or a highly skilled workforce. Therefore, the role of the acquiring company's CEO may not have an impact on the possible major gain from a particular M&A transaction.

Table 8. Impact of CEO overconfidence on M&A deal performance

Variables	CAR (–1; +1)	CAR (–5; +5)
CEO Overconfidence	0.532	–0.982
Transaction-tenure difference	0.0009	–0.001
CEO age	–0.0009	–0.001
Constant	0.058*	0.094*

Variables	CAR (–1; +1)	CAR (–5; +5)
Number of observations	187	187
R2	0.023	0.023
F-test	1.440	1.423

*** – significant at 1% significance level, ** – significant at 5% significance level,

* – significant at 10% significance level.

Conclusion

In recent decades, increased competition and the globalization of financial markets have led to an active growth in the volume and number of mergers and acquisitions (M&A). The high activity in the corporate control market has led to a growing academic interest in studying the performance and determinants of the performance of these transactions. According to a number of researchers and practitioners, one of the factors that determine the success of M&A deals is the overconfidence of the acquiring firm's CEO. In this article, we continue and expand the line of research on the impact of CEO overconfidence on M&A performance by (1) applying content analysis to measure CEO overconfidence, (2) analyzing the speeches of CEOs to reveal the factors that force them to structure their speeches in the same way, and (3) estimating the impact of CEO overconfidence on high-tech M&As, which are mostly positively assessed by stock markets.

Using event study and regression analysis, we found that CEO overconfidence has a significant negative impact on M&A performance, indicating that an overconfident CEO is more likely to believe that the market is mispricing the deal (as opposed to him), or is simply taking a risk, hoping that the situation will play out contrary to expectations. Further analysis showed that in high-tech M&As, the impact of CEO overconfidence on deal performance becomes insignificant.

As a result of the cluster analysis conducted to identify the factors that determine the general trends in CEO behavior during the earnings call, we identified a cluster of 165 companies with a common structure and similarity of CEO speeches that are not explained by the companies' affiliation with similar industries. This suggests that overconfident CEOs tend to use and structure their speeches similarly. The analysis of differences between the identified cluster and the remaining research sample showed that CEOs belonging to the cluster try to focus more on a company's quantitative indicators, while CEOs from the rest of the sample mainly focus on qualitative analysis and company vision. We also found differences in the financial characteristics of the companies belonging to the cluster of 165 companies and the rest of the sample. Another interesting result is that this cluster had a higher number of overconfident CEOs than the rest of the study sample, which contributes to a more restrained, statistically significant market reaction to M&A announcements.

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Appendix

Table A1. The Python script of overconfidence calculation

```
import glob
import re
import pandas as pd
```

```
df = pd.read_csv('words.csv', names = ['w', 's'])
df['w'] = df.w.map(lambda x:x.lower())
df.s.value_counts()
```

```
Negative        2355
Positive         354
Uncertaity       297
Weak modal        27
Strong Modal      19
Name: s, dtype: int64
```

```
negative = list(df.loc[df.s == 'Negative', 'w'])
positive = list(df.loc[df.s == 'Positive', 'w'])
uncert = list(df.loc[df.s == 'Uncertaity', 'w'])
weak = list(df.loc[df.s == 'Weak modal', 'w'])
strong = list(df.loc[df.s == 'Strong Modal', 'w'])
```

```
texts = glob.glob('text/*.txt')
```

```
general_coef = []
names = []
for doc in texts:
    with open(doc, encoding='cp1252') as file:
        data = file.read()
        data = data.replace('\n', ' ')
        data = ''.join(i for i in data if not i.isdigit())
        data = re.sub('[^A-Za-z0-9]+', ' ', data)
        data = data.lower()
        data = data.strip()
        data = data.split(' ')
    negative_c = 0
    positive_c = 0
    uncert_c = 0
    weak_c = 0
    strong_c = 0
    for i in data:
        if i in negative:
            negative_c +=1
        elif i in positive:
            positive_c += 1
        elif i in uncert:
            uncert_c += 1
        elif i in weak:
            weak_c += 1
        elif i in strong:
            strong_c += 1
    coef_ratio = ((positive_c+strong_c)-(negative_c+weak_c+uncert_c))/len(data)
    names.append(doc[5:])
    general_coef.append(coef_ratio)
```

```
dff = pd.DataFrame.from_dict({'company':names, 'value' : general_coef})
```

```
dff.to_excel('Martoun.xlsx', index = False)
```

Table A2. Summary statistics of variables for the whole sample

Variable	Obs	Mean	Std.Dev.	Min	Max
CAR	492	.004	.099	-.6	.44
Overconfidence	492	.01	.009	-.02	.05
Total revenue's 3-year CAGR	492	11.176	24.408	-89.785	308.018
Log (firm size)	492	7.579	1.672	3.776	12.127
CEO age	492	52.986	7.548	30	77
Education dummy	492	.413	.493	0	1
Transaction-tenure difference	492	8.715	6.998	0	40
GDP growth rate	492	.035	.014	-.031	.06

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CEO Age and Cash Holdings around the World: The Moderating Role of Legal Origin

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Abstract

The worldwide growth in the level of corporate cash holding has prompted scholarly interest. Grounded on the precautionary motive of cash, we aim to provide a behavioural explanation to this phenomenon by exploring the relation between CEO age and corporate cash holdings. We further examine the institutional factor that may exert an influence on this relationship through a country's legal systems, based on the notion that business corporations are part and parcel of the nexus of the institutions. Using an international sample of 24,989 firms from 90 countries, we find that CEO age is positively associated with the level of cash holdings. The positive impact is weakened when firms operate in countries with greater investor protection and better financial development. We demonstrate that older CEOs from common law, German law and post-socialist countries have a propensity to hold less cash. Additional robustness test supports our empirical findings.

Keywords: cash holdings, CEO age, legal origin

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Introduction

Firms worldwide have considerably increased their level of cash holdings in recent years [1; 2]. Deloitte has reported that at the end of year 2014, the top 1,000 non-financial companies globally are holding $2.8 trillion in cash. Precautionary motive has contributed greatly in explaining this high cash holdings across firms around the world [3]. The special interest lies in the fact that cash holdings provide an important means through which firms ensure liquidity to cushion against bankruptcy risk especially during periods of financial distress. However, from an investment point of view, cash are negative net present value (NPV) projects as interest earned on cash are generally much lower than investors' required rate of return [4].

Since Opler, Pinkowitz [5], corporate cash holdings has gained extensive attention in the literature of finance. Traditional economic theory mainly explains the motivation of cash holdings using trade-off, financial hierarchy and agency theory, which assume that CEOs are rational [5; 6]. However, these empirical studies do not incorporate human factors by which behavioural biases affect corporate policies. The upper echelon theory which considers bounded rationality and perception of decision makers explains this phenomenon in the behavioural finance study [7]. As holding cash is a corporate policy which entails risk perception, it is plausible that top executives' behavioural biases toward risk influences how much cash a firm holds.

Executives' risk perceptions are largely unobservable, but studies based on upper echelons theory have found that risk tolerance can be predicted from readily observable characteristics such as age [8–10]. Age is closely associated with adult development of an individual. The physiological, psychological and mental characteristics of an individual such as energy, wisdom, enthusiasm, ambition and decisiveness change with age [9]. Prior literatures exhibit that age affects individuals' risk tolerance through capacity such as information processing ability, cognitive ability, moral development and ethical behaviour and wisdom advancement [11–14].

Despite extensive research, there is no consensus regarding the relationship between CEO age and risk behaviour across countries. Prior studies on the age of CEOs have demonstrated that firms in different countries vary widely in the riskiness of corporate policies. For example, Davidson, Xie [15] find that older CEOs in the United States are associated with greater income-increasing earnings management. Belghitar and Clark [16] demonstrate that managerial risk appetite of CEOs from UK firms increases with age as older CEOs are more confident in taking risky decisions. Using sample data of A-share firms in China, Xie [17] also shows that younger CEOs in publicly listed Chinese companies behave more cautiously and conservatively. On the contrary, Attia, Yousfi [18] find that older directors in France tend to be risk-averse and invest less in risky R&D expenditure.

As compared to corporate risk taking, the role of CEO age has received considerably less attention in the literature on cash holdings. To the best of our knowledge, Orens and Reheul [19] is the only recent study focusing on cash holdings. Their studies reveal that older CEOs in Belgian firms are more concerned with precautionary motive of cash and retain higher cash levels than younger CEOs. We contend that one possible explanatory factor for lack of agreement on the role of CEOs age with regards to conservatism in corporate policies across countries may be the part played by the legal environment.

This can be determined by institutional theory, based on the notion that business corporations are part and parcel of a nexus of institutions [20], and that institutions operate according to the formal rule of the game of the society in the country [21]. The rule of game imposed by a country's institutional framework provides incentives for certain behaviours [22]. Legal origin, which is the major institutional framework of a country, has been shown to affect CEOs' strategic choices through the mechanism of investor protection [23, 24]. For example, Dittmar, Mahrt-Smith [25] and Gupta and Pathak [26] contend that managers from civil law origin are likely to maintain a lot of cash because civil law countries with weaker investor protection allow them to spend this fund on projects that increase their non-pecuniary benefits.

In this paper, we attempt to provide evidence on the relation between CEO age and firms' cash holding policies, viewing holding of cash as a conservative policy counting on precautionary motive. Using a sample of 24989 firms' observations from 90 countries, we further investigate the role of legal origins in explaining the variation of the relationship between CEO age and cash holding around the world. We find that there is a positive association between CEO age and cash holding. We further demonstrate that influence of CEO age is conditioned on certain legal origins. We consider alternative moneyness specifications and the findings are robust to alternative measures of cash holdings.

Our study has several contributions. In a broader context, our study contributes to the literature on upper-echelons theory. An emerging body of finance literature has considered how CEOs' demographics affect corporate policies. Gender, education level, career tenure and experience are some of the examples of CEOs' personal characteristics under study [27–29]. Specifically, we add to the research exploring the implication of CEO age on corporate policies.

We contribute to cash holding literature by showing that CEO age, an important managerial trait, affects the value of cash holding of a firm. To explain cross-sectional differences in cash holding, prior literature has extensively examined and discussed from the insights of traditional economic theories which disregard CEO characteristics and behavioural biases that may affect corporate policies and decisions. We incorporate behavioural components that reflect the idiosyncrasies of CEO and provide evidence that observable managerial characteristics influence cash accumulation of a firm.

Existing literature has primarily focused on how CEO age affects investment and financial policies [8], restructuring activities [10] and acquisition [9]. There is scant research

that investigates the impact of CEO age on cash holdings, except study by Orens and Reheul [19]. Nevertheless, Orens and Reheul [19] only examine the effect of CEO age as one of the demographics in explaining the cash holdings in private (unlisted) small and medium-sized enterprises. We advance this study by focusing on the age of CEOs and analysing the cash holding policy of public listed companies across countries.

We also provide evidence that institutional context, as a moderating factor modifies the impact of CEO age on cash holding. Differences in the environment are the result of history, legal systems, standards, traditions and country-specific circumstances. Legal origin, an essential institutional element, has been shown to play an important role in cash accumulation of a firm. We conjecture that legal origin affects firm behaviour, through their roles in shaping the investor protection environment and fostering financial development.

Prior studies mainly focused on the two broad families of laws, that is civil law and common law when discussing the effects of legal origins on cash holdings [25; 26]. We advance this prior research by classifying civil law regimes into French, German and Scandinavian code of law, and include more countries in the world to provide a more comprehensive analysis.

Literature Review

CEO age and cash holdings

Cash is the lifeline of a firm as cash is often used as insurance against various risk factors to which a firm is exposed. Precautionary motive has become the utmost important factor for a firm to hold cash. Bates, Kahle [30] draw attention to the importance of cash holdings for liquidity especially during periods of limited access to external financing. Boileau and Moyen [31] argue that precautionary motive inducing firms to be prudent to self-insure against future adverse shocks. However, there are also negative aspects of holding cash. Holding liquid assets such as cash implies an opportunity cost due to the lower rate of return relative to other investments of the same risk, especially if the firm forgo more profitable investment to hold that level of cash [32].

The extant literatures generally ground on rational economic theories to explain variation in corporate cash holding. Cash holdings can be explained by the trade-off, financial hierarchy and agency theory [5]. These traditional economic theories assume rational behaviour of CEO, and hence many empirical studies do not incorporate human factors in examining the determinants of firms' cash holdings policies. In contrast to assume rationality of human behaviour, the upper echelons theory argues that decision makers are characterised by bounded rationality and thus make strategic choices based on their cognitive, psychological and personal interpretation of the situation. The theory predicts that organisational strategic choice can to some extent be explained from the background characteristics of CEOs [7]. The cognitive characteristics and personal interpretations can be proxied by attributes such as gender, tenure, education background and age of CEOs [33].

Age variable has been used as a dimension to study systematic change of individual behaviour over time in conception and interpretation of psychological development research. Age determines the cognitive ability and ability of processing information of a person. Prior empirical work generates conflicting predictions on how CEO age affects risk behaviour. One stream of research focuses on the aging effect and associates elderly CEOs with conservative behaviour. Older adults are under greater recency effects due to declining memory functions [34]. Older managers prefer quiet life as they get older [10]. Older CEOs who are more susceptible to the dysfunctional effects of high information processing demand tend to be more risk averse [7; 11].

Another strand of studies predicts that older CEOs tend to take more risk. Research on development of wisdoms argue that older adults are wiser than younger adults as they have better accuracy and confidence in judgement tasks. They are better in using judgement, intuition and inference prior to making decisions [13]. CEO age is a proxy for level of experience in risk taking [35] and older individuals inevitably have more experience as compared to younger individuals. Probability domain familiarity by Sitkin and Pablo [36] propose that with greater experience in taking risk, an individual is less likely to perceive uncertainty of the risk outcome and the risk will seem to be more reasonable.

Older managers are found to have lesser ability to integrate and process information effectively in making decisions [11]. Declining cognitive ability due to aging reduces ability to evaluate and manage risk properly [12]. Hambrick and Mason [7] reveals that older executives have less physical and mental ability to grasp new ideas and learn new behaviours. Yim [9] posits that a CEO who is 20 years older is nearly 30% less motivated to undertake acquisition. Bertrand and Schoar [28] exhibit that older CEOs are more conservative as older generation executives prefer quiet life and are generally less aggressive. Thus, we predict the following hypothesis:

H1: There is a positive relationship between CEO age and cash holding.

Moderating role of legal origins

In the absence of generalisable results concerning CEO age and corporate outcomes across countries, this paper also aims to examine institutional factor that may address this absence of homogenous conclusions. Institutional theory recognises that firms operate within institutional context that affect their action, in which organisations operating in the same environment will seek greater legitimacy by adopting homogenous behaviours [37]. Actors in the institution weigh the strategies in a given social context based on their framing of the situation [38]. As such, it is reasonable to assume that general regulation of a country is expected to influence the orientation of people who participate in the setting of such law enforcement system. Taking into account prior research on risk behaviour, differences between countries tend to focus on legal aspects [39–41].

Research on legal origin is mostly derived from the work of La Porta, Lopez-de-Silanes [42]. The law and finance theory emphasise two channels through which legal origin exert impacts on financial development. The first channel is political channel which postulates that legal traditions differ in terms of rights of individual investors relative to the rights of the State [43]. The second channel is adaptability channel which stresses that legal traditions differ in the ability to respond to the changing socioeconomic conditions [44].

Prior literature generally categorises legal origin into two broad traditions, namely common law and civil law. Common law is prevalent in England and its former colonies as the United States, Canada and Australia, New Zealand and also many countries in Africa and South East Asia. Common law, also known as English law is a source of liberty. Legal rules in the common law systems are made by judges, based on precedents and guided by general principle [45]. The English common law achieved its modern form in the 16th and 17th centuries when Parliament and the English kings battled for the control of the country. Ultimately, the Parliament and the court stood on the side of private property owners and restricted the crown's discretion to change the property rights. Common law thus evolved to protect private property rights against the crown. Over time, courts extended such protection of property owners to investors.

Civil law is based on codification. The civil law countries are further classified into three family codes of law, namely French-origin, German-origin and Scandinavian-origin. French commercial code has much influence in France, Spain, Brazil, Mexico, Belgium and Netherlands, and the German one influences countries such as Austria, Japan, Korea and Switzerland. The Scandinavian code is more influenced by common law and sets out the laws of five countries, namely Denmark, Finland, Iceland, Norway and Sweden. French and German civil codes in the 19th century were constructed to solidify the power of the state and the state dominance has resulted in legal tradition that limited the rights of the individual investor [46].

A country's legal environment and the level of investor protection affects corporate policies and value of a firm [47]. Stronger investor protection environment leads firms to undertake riskier but value-enhancing investment policies by reducing managers' motivation to preserve their private benefits [48]. Managers, as an insider of a firm, may opt to be conservative in directing corporate investment to protect their private benefits. Protection of investors' rights mitigate the magnitude of such private benefits to insiders by reducing the tendency of managers in holding cash and forgoing risky projects with positive net present value. Dittmar, Mahrt-Smith [25] show that the higher the level of investors' protection, the lower the level of cash holding. Ferreira and Vilela [49] also find that cash holdings are negatively related to countries with stronger investor protection.

The political channel generally holds that countries whose legal rules originate in the common law traditions evolve to protect property owners significantly better than civil law countries [50; 51]. As better investor protection induces holding of less cash for undertaking risky but value-enhancing investment [48; 49], firms in common law system which promote private property protection have a tendency to undertake greater level of corporate risk taking and hold lower level of cash. Dittmar, Mahrt-Smith [25] has shown that firms in common law countries have lower median cash to net assets than countries whose laws originate in the civil law traditions. Similarly, Gupta and Pathak [26] also find firms operating in common law systems hold significantly lower cash as compared to firms from civil law systems. Based on these arguments, we contend that with stronger investor protection under common law systems, older CEOs in common law countries are expected to hold less cash.

H2a: The positive relationship between CEO age and cash holding is weakened in common law countries.

In civil law countries, legal rules are made by legislatures, and judges are not supposed to surpass the law. Courts in civil law are less likely to take the side of investors in resolving complicated disputes [52]. The political channel stresses that civil law advances state power with adverse implications on financial development [50]. Civil law is associated with government interference in economic activity and weaker protection of rights. As a result, corporate insiders who find a way to expropriate investors can proceed without fear of adverse judicial ruling as expropriation is not explicitly prohibited by the law [43].

Before the French Revolution, jurisprudence was an important part of French law. The revolution has deviated French law radically by eliminating jurisprudence [53]. Under Napoleonic legal doctrine, judges do not interpret the law but just simply apply the law [54]. Germany explicitly rejected the French deviation and maintained its historical roots in judicial discretion. According to this corollary, French civil law countries have more rigid systems and foster financial development less effectively than German law countries [50].

The French legal origin countries have the worst quality of law enforcement. As compared to French origin, German and Scandinavian legal origin countries receive better efficiency of the judiciary [45]. French civil law countries have the weakest protection, German origin countries are comparatively having stronger protection, and Scandinavian civil law countries are similar to German one [45]. Ferreira and Vilela [49] exhibit that firms with weaker investor protection accumulate up to twice as much cash. Thus, we postulate that firms in French origin which have the weakest protection are expected to hold higher levels of cash, while German and Scandinavian origin which have stronger investors are expected to hold less cash.

H2b: The positive relationship between CEO age and cash holding is strengthened in French law countries.

H2c: The positive relationship between CEO age and cash holding is weakened in German law countries.

H2d: The positive relationship between CEO age and cash holding is weakened in Scandinavian law countries.

The socialist countries had a legal origin based on Soviet law. La Porta, Lopez-de-Silanes [45] do not take into con-

sideration socialist countries in their research. This is because the law of these countries changes rapidly during the transition out of socialism. Finance literature also does not provide clear theoretical guidance regarding the protection of investors' rights in socialist countries. Prior research have shown that financial development of transition economies has a prominent influence on firms' cash holding [55, 56]. As such, rather than looking at the perspective of investor protection, we examine the effect of legal origin by exploring the impact of financial development of post-socialist countries.

Eastern and half of central Europe were dominated by socialist regimes for more than 50 years. The economy was run bureaucratically, and reinforced obedience and played it safe behaviour [57]. Socialist ideology was not conducive for economic and financial development as it was built on an ideology that hindered independent innovative culture. Research on entrepreneurship holds that socialist ideology is detrimental to the economic environment as entrepreneurship is considered as something extraneous [58].

While socialist ideology suppresses risk taking behaviour, post-socialist attempts to create market-oriented economies [59]. Following the disintegration of the Soviet Union in 1991, the former Soviet republics and many Eastern European nations have moved from socialism to capitalism. Certain East Asia countries have also moved from a central planning towards a market-oriented economic system [60; 61]. There is an increasing recognition among post-socialist countries that free-market orientation is essential to the financial and economic development of a country [62].

The transition process which requires social reforms and loosening of restrictions on the private sector has resulted in institutional transformation and rapid economic changes [61; 63]. Prior studies have documented that free-market orientation in post-socialist countries have fostered private-sector entrepreneurship. Estrin, Meyer [64] contend that transition economies have provided the basis for an entrepreneurial market economy through reform in the legal, institutional and policy structures. Manolova, Eunni [65] demonstrate that the gradual change in values and behaviours in post-socialist countries toward market competition have promoted risk taking and entrepreneurship. As risk taking is associated with less cash holding, we predict that post-socialist countries tend to accumulate less cash. Wu, Rui [56] have shown that firms in transition economies with higher financial development hold less cash for payables. As such, we older CEOs in post-socialist countries are expected to maintain lower levels of cash holdings.

H2e: The positive relationship between CEO age and cash holding is weakened in post-socialist law countries.

Research Methodology

Data

This study adopted a cross-sectional design. We obtained firm-level data from S&P Global database for the year of 2019. We require that our sample firms have corporate cash holdings data available. This has yielded a sample of 24,892 public listed firms from 90 countries. There are approximately 200 countries in the world but many do not maintain a stock market.

Variables

Our dependent variable is cash holdings. Following previous studies, we measure cash holdings (CashHoldings) as the ratio of cash and cash equivalents to net assets, where net assets are computed as book value of total assets less cash and cash equivalents [5]. Our independent variable is CEO age (CEOAge), measured as age of CEO in the given year. Our moderating variable is legal origin. We classify legal origins (Legal) into five categories, as denoted by the following dummy variables equal to one: common law (Common), French civil law (French), German civil law (German), Scandinavian civil law (Scand), and post-socialist law (PostSoc).

We control a series of variables that are potentially associated with cash holdings. Based on prior studies [66; 67], we include firm size (LogFirmSize, measured as the natural logarithm of the book value of total asset), leverage (Leverage, measured as long-term debt over the book value of total assets), firm age (FirmAge, measured as the number of years from the establishment of the firm to the year of observation), CEO duality (CEODuality, dummy variable equals to one if the CEO is also the chairman) and gender (Gender, dummy variable equals to one if the CEO is male).

Empirical model

We perform our analysis by running OLS regressions clustering at country and industry level. To examine whether CEO age is related to cash holdings, we specify the baseline model as follows:

$$CashHoldings_i = \alpha_i + \sum \beta_k Control_i + \beta_1 CEOAge_i + \varepsilon_i. \quad (1)$$

We test the moderating effects of legal origins on the relationship between age of CEO and cash holdings using the five legal origins:

$$CashHoldings_i = \alpha_i + \sum \beta_k Control_i + \beta_1 CEOAge_i + \\ + \beta_2 Legal + \beta_3 \left(CEOAge \times Legal\right) + \varepsilon_i. \quad (2)$$

Research Results

Descriptive statistics and correlations

Table 1 reports the summary statistics for the regression variables used in this study. We show the mean, standard deviation, minimum and maximum values of the variables. The mean cash and cash equivalents scaled by net assets is 39.71%. This exhibits that firms all over the world generally keep a large portion of their assets in cash. Table 2 presents the Pearson's correlation matrix of the variables used in our study.

Table 1. Summary statistics for variable characteristics

Variables	Mean	S.D.	Min	Max
CashHoldings	0.3971	1.2440	0.0001	10.0033
CEOAge	54.5541	9.9333	20	97
Common	0.5573	0.4967	0	1
French	0.0962	0.2948	0	1
German	0.1711	0.3766	0	1
Scand	0.0348	0.1833	0	1
PostSoc	0.1317	0.3381	0	1
LogFirmSize	7.0814	3.8581	−11.5129	21.1220
Leverage	0.3279	0.7787	0	6.8167
FirmAge	38.2570	36.6459	1	654
CEODuality	0.2452	0.4302	0	1
Gender	0.7362	0.4407	0	1

Table 2. Pearson correlation of explanatory variables

		1	2	3	4	5	6	7	8	9	10	11	12
1	CashHoldings	1											
2	CEOAge	−0.0063	1										
3	Common	0.0756*	−0.0073	1									
4	French	−0.0568*	−0.0062	−0.3659*	1								
5	German	−0.0158*	0.1921*	−0.5097*	−0.1482*	1							
6	Scand	0.0236*	−0.0732*	−0.2131*	−0.0619*	−0.0863*	1						
7	PostSoc	−0.0481*	−0.1616*	−0.4369*	−0.1270*	−0.1769*	−0.0739*	1					
8	LogFirmSize	−0.2680*	0.1072*	−0.4064*	0.0695*	0.3772*	−0.0522*	0.1229*	1				
9	Leverage	0.0175*	0.0179*	0.1121*	−0.0174*	−0.0714*	−0.0202*	−0.0540*	−0.2684*	1			
10	FirmAge	−0.1423*	0.1703*	−0.1287*	0.0739*	0.1797*	0.0226*	−0.1104*	0.3012*	-0.0572*	1		
11	CEODuality	−0.0208*	0.1407*	0.0289*	0.1071*	−0.0935*	−0.1067*	0.0335*	−0.0213*	0.0516*	-0.059*	1	
12	Gender	−0.008	0.0359*	0.3527*	−0.2952*	−0.1155*	−0.2233*	−0.0145*	−0.0374*	0.0353*	-0.0109*	-0.0103*	1

Note: This table reports the correlations of the variables in a multivariate analysis.

* Denotes significance at the 5% level (two-tailed).

Results

All financial variables are winsorized at the 1% and 99% levels to avoid problems with outliers. Hypothesis 1 predicts the relationship between age of CEOs and cash holdings. As shown in Table 3, for our baseline regression, we find that the coefficient on cash holdings is 0.0051 and statistically significant at the 1% level. Thus, this finding supports the hypothesis that CEO age are positively related to firms' level of cash accumulations.

Table 3. Effect of CEO age on cash holdings

Variables	CashHoldings
	Model 1
CEOAge	0.0051***
	(0.0008)
LogFirmSize	−0.0894***
	(0.0022)
Leverage	−0.0836***
	(0.0106)
FirmAge	−0.0023***
	(0.0002)
CEODuality	−0.0865***
	(0.0173)
Gender	−0.1621***
	(0.0186)
Constant	1.0599***
	(0.0466)
No. of observation	24853

Notes: Figures in ( ) are the robust standard error.

***, ** and * denote the significance at the 1%, 5% and 10% respectively.

Table 4 presents the results on the moderating effect of legal origin to the relationship between age of CEOs and cash holding. Model 2a test hypothesis H2a on the interaction effect of common law on the relationship between CEO age and cash holdings. Model 2b, 2c and 2d examine the moderating effect of French law, German law and Scandinavian legal origins respectively. Model 2e test H2e on how post-socialist law affect the relationship.

As reported in Model 2a, we find that the interaction coefficient of common law dummy variables to be significantly negative, with coefficient estimate -0.0045 significant at the 10% level. It signifies the role of legal tradition effects on cash holding and indicates that older CEOs in common law countries hold reasonably lower level of cash.

It is also found in Model 2c that for older CEOs who manage firms in a jurisdiction with a legal origin based on German law, the coefficient estimates on cash holdings is -0.0070 and is significant at the 5% level. This shows that cash holding level of older CEOs are weakened in German law countries. Similarly, as shown in Model 2e, cash holdings of older CEOs are weakened in post-socialist law countries, with coefficient estimate of -0.0041 significant at the 1% level. We do not find significant result for French law and Scandinavian law countries.

Table 4. Impact of legal origin on CEO age-cash holdings relation

Variables	CashHoldings				
	Model 2a	Model 2b	Model 2c	Model 2d	Model 2e
CEOAge	*0.0078***	0.0051***	0.0027*	0.0048***	0.0053***
	(0.0031)	(0.0019)	(0.0015)	(0.0017)	(0.0016)
LogFirmSize	*−0.1024****	−0.0886***	−0.1065***	−0.0899***	−0.0892***
	(0.0249)	(0.0258)	(0.0259)	(0.0258)	(0.0261)
Leverage	*−0.0859***	−0.0831**	−0.0904**	−0.0845**	−0.0839**
	(0.0367)	(0.0351)	(0.0374)	(0.0352)	(0.0353)
FirmAge	*−0.0023****	−0.0023***	−0.0024***	−0.0023**	−0.0024**
	(0.0009)	(0.0009)	(0.0008)	(0.0009)	(0.0009)

Variables	CashHoldings				
	Model 2a	Model 2b	Model 2c	Model 2d	Model 2e
CEODuality	*−0.0755*	−0.0767	−0.0257	−0.0893*	−0.0853
	(0.0465)	(0.0528)	(0.0531)	(0.0531)	(0.0529)
Gender	*−0.1124*	−0.1842	−0.1797	−0.1729	−0.1612
	(0.1664)	(0.1613)	(0.1470)	(0.1499)	(0.1554)
Common	0.045				
	(0.1953)				
CEOAge ×Common	*−0.0045**				
	(0.0024)				
French		−0.0379			
		(0.1450)			
CEOAge × French		−0.0011			
		(0.0027)			
German			0.8411***		
			(0.2258)		
CEOAge ×German			−0.0070**		
			(0.0031)		
Scand				−0.4399	
				(0.3798)	
CEOAge ×Scand				0.0071	
				(0.0064)	
Post-soc					0.1901
					(0.1189)
CEOAge ×Post-soc					−0.0041***
					(0.0005)
Constant	1.0833***	1.0786***	1.2472***	1.0899***	1.0516***
	(0.2344)	(0.3090)	(0.3178)	(0.3151)	(0.3173)
No. of observation	24812	24812	24812	24812	24812

Notes: Figures in ( ) are the robust standard error. ***, ** and * denote the significance at the 1%, 5% and 10% respectively.

Robustness Tests

We replicate our analysis by using alternative proxy of cash holding. In our main analysis, we follow Opler, Pinkowitz [5] to measure cash holdings using the ratio of cash to net assets. However, this measure may generate large outliers if firms hold most of their assets in cash [30]. To reduce this potential problem, we follow Bates, Kahle [30] to measure cash holdings using ratio of cash to the book value of total assets. We rerun all regressions using this alternative measure and the findings are consistent with our original result.

Table 5. Robustness Test using alternative proxies of cash holding

Variables	CashHoldings					
	Model 1	Model 2a	Model 2b	Model 2c	Model 2d	Model 2e
CEOAge	0.0007***	0.0013**	0.0006	−0.0003	0.0007	0.0010**
	(0.0001)	(0.0006)	(0.0006)	(0.0005)	(0.0005)	(0.0004)
LogFirmSize	−0.0161***	−0.0222***	−0.0159***	−0.0221***	−0.0162***	−0.0167***
	(0.0003)	(0.0034)	(0.0044)	(0.0038)	(0.0044)	(0.0030)
Leverage	−0.0117***	−0.0133**	−0.0114	−0.0147**	−0.0117	−0.0116***
	(0.0016)	(0.0064)	(0.0075)	(0.0068)	(0.0075)	(0.0033)
FirmAge	−0.0005***	−0.0005***	−0.0005***	−0.0006***	−0.0005***	−0.0005**
	0.0000	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
CEODuality	−0.0220***	−0.0175*	−0.019	−0.0004	−0.0224	−0.0237***
	(0.0027)	(0.0103)	(0.0155)	(0.0125)	(0.0152)	(0.0048)
Gender	−0.0252***	−0.0004	−0.0322	−0.0316	−0.0265	−0.0272
	(0.0029)	(0.0324)	(0.0274)	(0.0253)	(0.0285)	(0.0220)
Common		−0.0415				
		(0.0538)				
CEOAge ×Common		−0.0010*				
		(0.0006)				
French			−0.0248			
			(0.0377)			
CEOAge ×French			−0.0001			
			(0.0005)			
German				0.2695***		
				(0.0797)		
CEOAge ×German				−0.0019**		
				(0.0009)		
Scand					0.0521	
					(0.0560)	
CEOAge ×Scand					−0.0012	
					(0.0010)	
Post-soc						0.0976***
						(0.0234)
CEOAge ×Post-soc						−0.0013**
						(0.0004)
Constant		0.3377***	0.2985***	0.3628***	0.2933***	0.2768***
		(0.0474)	(0.0679)	(0.0603)	(0.0680)	(0.0516)
No. of observation	24958	24917	24917	24917	24917	24917

Notes: Figures in ( ) are the robust standard error. ***, ** and * denote the significance at the 1%, 5% and 10% respectively.

Discussions of Results

A considerable body of literature in finance documents have analysed corporate cash policies. In this study, employing upper echelons theory as a framework, we focus on the age of CEOs and investigate their attitude toward holding of cash. We contend that older CEOs tend to be more conservative by holding a lot of cash. Consistent with our hypothesis 1, we generally find that older CEOs are more likely to accumulate cash as compared to younger CEOs. We further theorise the role of institutional context, represented by legal origin, in moderating this relationship. Our corroboration of hypothesis 2a to 2e shows that if these CEOs perform their duties in firms located in countries with better investors' rights protection and with economies that foster financial development, older CEOs may have greater incentives to accumulate less cash. We have revealed that older CEOs in common law, German law and post-socialist countries hold less cash. These results hold to the robustness tests on alternative cash holdings measurement.

Our main results confirm the positive impact of CEO age on cash holdings of a firm. Older CEOs are commonly known as risk-averse due to reduced ability to evaluate and manage risk properly and less efficient in integrating and processing information when making decisions [11, 12]. They tend to be more conservative, thus perceiving cash holding as an unduly precautionary mechanism. As a result, they hold a lot of cash to maintain liquidity for protecting the firm against cash shortfalls.

We complement the study by Orens and Reheul [19] which examines the effect of CEO age as one of the CEOs' demographics in explaining the cash holdings in private (unlisted) small and medium-sized enterprises. They observe that older CEOs in Belgium tend to hold higher levels of cash. As such, our findings are in line with their results. In addition, we enrich their study by testing this perspective using public listed companies around the world and show that the cash holding varies widely across countries.

Differences in the legal environment transcend companies, making investor protection mechanisms and financial development levels in some countries more effective in influencing the firms' cash holding policies. In an institutional environment with weaker laws and justice, the managers' propensity to pursue personal benefits are higher [48]. They may present greater opposition to undertake risky but value-enhancing investment projects. Legal tradition with greater rights protection decreases managers' incentive to accumulate cash that can be consumed as private benefits [25].

It is thus expected that the cash holdings of CEOs vary with the legal regimes in which the firms are located. Three out of the five of our hypothesised relationships obtained empirical support. We find that older CEOs of firms based in common law countries demonstrate lower levels of cash holdings. This supports the view that better investor protection mechanisms in common law countries have reduced the tendency of CEOs to hold more cash on the grounds of increasing their private benefits. Our results is consistent with study by Dittmar, Mahrt-Smith [25] which have exhibited that firms in common law countries hold 35% less cash than those in civil law countries

Nevertheless, we find that not all civil law countries hold a lot of cash. Most of the prior literature mainly divide the legal traditions in the world into common law and civil law origins, and associate civil law origin with weaker protection of investors' rights. We further classify the civil law regimes into French, German and Scandinavian code of law. We observe that older CEOs managing firms operating in German law countries have a lower tendency to accumulate cash. This is because German civil law maintains its judicial ruling and enforces stronger investor protection. As such, older CEOs in German law regimes are less likely to hold more cash and spend funds on projects that increase their private benefits.

We fail to find clear evidence concerning the moderating effect of French law and Scandinavian law. We are not able to find evidence in French law jurisdictions which is associated with relatively low investor protection. This finding is a bit puzzling as there is an intuitive link between level of investor protection and level of cash holdings in prior studies. Previous literature has documented that older CEOs managing firms in the French regime with weakest protection are deemed to hold a lot of cash. Besides, we also find that there are no statistical differences in cash holdings of the older CEOs from firms located in countries with Scandinavian civil law. The lack of significance might be partly due to the relatively low number of CEOs based in countries with Scandinavian legal origin.

We find that older CEOs of firms domiciled in post-socialist countries present lower levels of cash holdings. Transition economies involve fundamental reforms in legal policy and radical restructuring of formerly planned economies. Post-socialist countries with transition economies attempt to provide a conducive environment for financial development which facilitate market competition. This has promoted radical behavioural changes toward innovative, entrepreneurial and risk taking in post-socialist countries. As such, older CEOs in post-socialist countries may hold less cash to undertake risky and value-enhancing investment projects.

Conclusion

Traditional theories provide rational economic views on levels of corporate cash holdings. Alternative to these economic arguments, we contend that the cash policy of a firm is also depends on the risk perception of CEOs, as cash holding is often used as the insurance against various firm risks. Drawing upon upper echelon theory, we demonstrate that age, as an observable characteristic of CEOs, can be used to predict firm risky policies. While the relation between age of CEO and risk tolerance has been the focus of previous literature, inconclusive findings have been reported across different countries in the world. We expect that countries' legal traditions explain the diverse risk behaviour across countries, using cash holdings as the proxy for conservative policy.

Using a world dataset of firms in 90 countries, we find some evidence of legal origins impacting the cash holdings of CEOs. We show that countries with stronger institutional environments and better financial development moderates the positive relationship between CEO age and cash holdings. Older CEOs of firms domiciled in such country-specific settings are more likely to maintain lower levels of cash holdings.

Our study offers important contributions to prior literature. Broadly, we add to the literature that employ upper echelons theory in predicting firm behaviours using CEO personal attributes. Specifically, we provide insights on observable attributes of CEOs, namely CEO age as one of the determinants of firms' cash holdings policies. Existing literature has primarily focused on the impact of CEO age on corporate policies. Less is known, however about the effect on cash holdings. Orens and Reheul [19] examine the effect of CEO age as one of the demographics in explaining the cash holdings in private small and medium-sized companies. We complement and extend this study by documenting that generally CEO age positively affects the cash holdings of public listed companies across countries.

Our evidence shows that firms in countries with better investor protection display greater tendency to hold less cash for investing in risky investment projects that may enhance the value of the firm. Based on these results, our study adds support to the literature that emphasises the importance of legal origins in protecting the rights of property owners [49-51]. Particularly, we complement studies by Dittmar, Mahrt-Smith [25] and Gupta and Pathak [26] that examine the role of a country's legal origins in predicting corporate cash holdings

Study by Dittmar, Mahrt-Smith [25] divide the sample data of 45 countries to common law tradition vs those with civil law tradition. Gupta and Pathak [26] which focus also on common vs civil law systems use a sample data from 18 countries for study years of 2001–2017. We conduct a more refined analysis by employing a sample of 90 countries in the world. Besides, we further classify civil law origin into French, German and Scandinavian law, and take into consideration post-socialist countries. In this respect, we enrich previous studies by expanding our sample of analysis to international firms with the aim to provide comprehensive evidence for examining the inconclusive findings of the relation between CEO age and cash holdings across countries.

Our findings also partially complement corporate risk taking literature such as study by Davidson, Xie [15] and Belghitar and Clark [16] which find that older CEOs in common law countries, namely the United Kingdom and United States are less risk averse. Our result is also in line with the study by Xie [17] which find that older CEOs in China, a post-socialist country which has carried out fundamental reforms of its economic system by transforming from centrally planned to market-oriented economies, behave more aggressively than younger CEOs.

Lastly, our study offers several practical implications to investors, regulators and policy makers. We suggest that investors should realise that not all old-aged CEOs have greater tendency to accumulate cash. Better investor protection rights and financial development reduce the propensity of CEOs to hold higher levels of cash for their private benefit. Older CEOs managing firms domiciled in such country-specific settings are more likely to undertake investor-friendly financial policies. We also suggest that regulators and policy makers should focus on strengthening the legal system and law enforcement of the country in protecting the rights of the investors.

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How Does CEO's Human Capital Influence Innovation Strategy of Russian Banks?

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Abstract

The paper evaluates influence of human capital of top management on innovation strategy on the basis of study of innovation activity of Russian commercial banks in the period of 2017–2019. We have compiled a rating of commercial banks for retail segment innovations, selected the four least innovative banks. We have studied the key indicators of human capital of top management in eight chosen banks. The paper has revealed the interrelation between different elements of human capital of top management and innovation strategies of Russian commercial banks. We have defined personal traits which portray a manager who exerts influence on innovations in a company.

The paper is intended for investors in emerging markets which try to understand the evaluation mechanisms of impact of the financial companies' current management on their future development path, for analysts engaged in forecasting trends related to optimization and automation in retail banking and assessment of corporate innovative capacity.

Keywords: bank, human capital, innovation strategy, top management, innovation rating, human capital rating

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Introduction

Innovation was always the formula for business success. Nowadays financial institutions are leaders in innovation implementation which is directly related to change of the traditional business model in the banking sector. The paper topic is of relevance because of accelerating changes in the sphere of financial institutions which align with the strategy of making high-demand high-tech products in the retail banking segment. It is no secret that top management determines the corporate innovation strategy and exerts the fundamental impact on search for advanced solutions and their implementation. Does human capital of top management influence generation of innovation?

The academic community suffers from shortage of papers on defining the main determinants of human capital capable of making an influence on innovation strategy. The existing studies are mainly focused on non-financial sectors such as automobile industry [1], information technology [2; 3].

The object of our research is Russian commercial banks from top 50 in terms of total assets as at the end of 2019 which have been assessed from the point of view of innovation implemented for the retail segment in 2017–2019 when development towards issue of digital banking technology was at its peak. We have selected eight banks: four the most innovative ones (Tinkoff Bank, Raiffeisen, Sovcombank and SberBank) and four the least innovative banks (Zenit bank, Russian National Commercial Bank (RNCB), MTS bank and Ural Bank of Reconstruction and Development (UBRR)).

On the basis of the research results we:

- have developed the author's rating of commercial banks in innovations of retail banking;
- have collected typical profiles of top management of the four most innovative banks and the four least innovative commercial banks on the basis of characteristics of human capital, revealed differences between them;
- have complied an author's rating of human capital of top management for the chosen banks;
- have revealed the interrelation between different elements of human capital of top management and innovation strategies of retail Russian banks.

The Ways to Study and Measure Innovation and Human Capital

Innovation may be divided into two types [4]:

- *Sustainable* or maintaining one (improvement of the product range by implementation of the functions which offer to the customers what they really need and which increase productivity of existing products).
- *Breakthrough* innovations (brand new products which differ fundamentally from customer preferences which allow to expand the customer base, compete or even start a new business line. Old products lose out competition because the industry landscape changes).

In order to make the most of innovations the banks have to implement them integrally and on a systematic basis. The distinctive features of the leading companies are innovation encouragement, development of the culture which facilitates innovation and implementation of the processes contemplating innovation. Definitely, banks pay considerable attention to applying of reliable financial indicators for evaluation of innovation projects: 60% of polled bank executives say that they use *ROI* for this purpose [5].

In order to measure the extent of innovation the authors apply different approaches. So, S. Kaplan [6] asserts that among Fortune 1000 the following indicators are the most common ones: the annual R&D budget as a percentage of annual sales; number of patents applied for in the previous year; total amount or R&D budget in percentage of sales; number of active projects; number of ideas offered by employees; percentage of sales of the products offered in recent years. At the same time G. Aase et al. [7] think that many companies lack thoroughness in study of return on innovation and offer to choose the efficiency indicator which turns the money spent on research and development into sales of new products.

Increasingly frequently quality of human capital is considered as the main competitive advantage. Human capital of top management is a separate unit and the most important driver of economic growth. Human capital is knowledge, skills, competence and other paraphernalia represented by particular persons or their groups, acquired during their life and used in market environment.

Creative abilities, intellect, resourcefulness, ability to find nonstandard solutions to complex problems are of great importance in the innovation process. Otherwise speaking human capabilities are the basic capital of the company. The managerial theory divides human capital into basis capital and specific capital [8].

At the macroeconomic level human capital is recognized as the most important determinant factor of innovation [9]. Specific human capital of a company is considered to be crucial for innovation encouragement and productivity improvement, however, specific capital is almost of no value for the Russian emerging market.

According to the upper echelons theory organizations are the mirror of their top managers and the top management team faces the problem of shaping and implementing the strategy of innovation [10].

Human capital of top management accumulates throughout the lifetime and can influence the company's efficiency. An aggregate of individual human capitals is unquestionably an organization's asset. Human capital is a multiplier which produces a synergetic effect, a value generation factor. At the same time human capital components may

equal zero when taken separately. The organizations which disregard the social part of personal skills and resources and fail to create a synergy between human and social capital are hardly able to fulfill their employees' potential in order to enhance innovation opportunities.

Results of analysis of publications dedicated to influence of human capital of top management on innovation [1–3, 11–19] show that it has a direct positive impact on company's operations and its financial performance. Consequently, human capital is the key resource of a firm and a source of its value enhancement which does not just generate value by means of interaction with innovation strategy but also defines the strategy trajectory.

However, human capital components influence innovation to a different extent:

1) **Education level** of CEO and management team exerts a positive and significant impact on the scope of innovation activity of companies. Managers with higher education are prone to innovation risk while those with lower education prefer conservative risk.
2) **A short career horizon**[1] makes CEO avoid risks and, thus, stay off investment into risky breakthrough innovation which is partially due to the amount of R&D expenses.
3) **Powerful managers** are more likely to use research innovation (introducing to the market of the products non-existent before). CEOs who are company founders with a high level of knowledge implement innovation of higher quality.
4) **Relations in education, common social networks and partnerships** exercise influence on implementation of innovation. Innovation is also generated by means of access to resources and opportunities which belong to external companies and organizations with which a company is related through alliances and cooperation agreements.

Evaluation of Influence of Human Capital of Top Management on Innovation Strategy

Digital transformation changes requirements to human capital which facilitates achievement of breakthrough results. Financial institutions strive for hiring talented leaders who can initiate changes and allow their knowledge and experience influence the process. The traditional profile of leaders is replaced with a brand new one.

Before the research the author generated several hypotheses which allow to assess influence of human capital of top management on innovation strategy.

Hypothesis 1. Commercial banks with the highest quality of human capital of top management are the leaders in innovation in the retail segment.

Hypothesis 2. Banks from top 10 in terms of total assets are the most innovative ones in the retail segment.

Hypothesis 3. Stable social relations and reputation influence directly the innovation strategy.

Hypothesis 4. Power is a mediator which strengthens influence of human capital of top management on innovation.

Hypothesis 5. Field-specific experience in the career of a top manager enhances the ability to generate and maintain innovation.

The research consisted of three stages.

Stage 1. Development of the innovation rating of commercial banks in innovation of the retail segment.

The formula for compiling the innovation rating is as follows:

$$Innovation\,rating = \sum_{i=1}^{8} IRi \quad (1),$$

where *IRi* is a score of the *i*-th component of the bank's innovativeness in the retail sector.

Stage 2. Compiling of a rating of human capital of top management in the most and the least innovative companies.

On the basis of analysis of literature about influence of human capital of top management on innovation we chose four key variables: education, career variety, power and networks. Also on the basis of an expert opinion we decided to add social integration and reputation. Thus, the formula for compiling the rating is as follows:

$$\text{Human capital raiting} = \sum_{i=1}^{6} HCRi \quad , (2)$$

where *HCRi* is a score of the *i*-th component of human capital of top management of the bank.

Stage 3. Study of interrelation between indicators of human capital of top management of chosen banks and distinctive features of their innovation strategy. Analysis of results.

Compiling of the Innovation Rating

In order to compile the innovation rating we selected 50 largest Russian banks in terms of their total assets as at the end of 2019. The limits of values range from RUB 29,958,900 mln owned by Sberbank to RUB 69,121 mln possessed by Roscosmosbank. Thus, the maximum assets exceed the minimal ones a little more than 400 times. Despite such significant spread in values each bank has been studied by the key variables which allowed to define its level of digital development.

The first variable is **innovative products in the retail sector** (biometric identification; voice identification combined with interactive voice response (IVR); chat bots which answer customers' questions automatically; integration with social networks; digital wallet including the

[1] COE's career horizons (average age of 55) are time left to pension age. A manager who's retirement is close has a shorter career horizon.

Faster Payments System (FPS); trading platforms – instruments for deals in the stock market made by a trader or investor as well as for online orders; near field communication (NFC) – non-cash payments which optimize payment processing and allow to conduct daily transactions in a safe way; protection from cyberthreats; finance management including online bank, convenient ATM services, services of purchase of the ecosystem products, advanced payment solutions etc.; credit provision; artificial intelligence).

For each implemented technology a bank was assigned one point. The obtained points were totaled up and leaders in implementation of innovation technology were defined (Table 1).

Table 1. Top 5 of banks leading in implementation of innovative products in the retail sector

Bank	Points (innovations)	Score
Sberbank of Russia	61	10
VTB	40	10
Tinkoff Bank	40	10
Alfa Bank	38	10
Pochta Bank	37	10

Source: The data for the rating was obtained from annual reports of banks for 2017–2019 and from news feed of official websites of the banks.

The second variable is **internet banking rank of the consulting agency Marks Web**. Internet banks are evaluated here on the basis of two categories: the best ones for daily use and for a digital office. The research methodology consists in comparative analysis from the point of view of functionality and customer friendliness. At the same time technical characteristics of services are not taken into consideration. The *Daily Banking* rating comprises the banks which provide the simplest and clearest way to perform daily operations and furnish information on products. The leaders in the *Digital Office* category are the banks where the number of customers' contacts with the bank office or the hot line is minimal and the majority of key operations may be performed online.

In order to compile the rating of five innovation banks in the *Daily Banking* and *Digital Office* categories we added together the points assigned by *Marks Web* for 3 years (Table 2).

Table 2. Top 5 banks according to *Marks Web* rating for 2017–2019

Bank	Points assigned by Marks Web	Score
Tinkoff Bank	403.4	10
Raiffeisenbank	298.7	10
Alfa Bank	294.1	10
Sberbank of Russia	293.2	9
Pochta Bank	292	9

In order to assess the third variable – **customer satisfaction with mobile applications** – we used the rating for *iPhone* in *App Store* and *Android* in *Play Market* for 2019.

In *App Store* the rating is calculated as weighted average of customers' evaluations in Russia. In *Play Market* it is made on the basis of particular algorithms where the last evaluations are of greater importance. For our calculation we obtained the mean value of two ratings (Table 3).

Table 3. Top 5 banks according to the rating in *App Store* and *Play Market*

Bank	Mean value according to ratings in App Store and Play Market	Score
Alfa Bank	4,85	10
Sberbank of Russia	4,8	10
Raiffeisenbank	4,8	10
Home Credit Bank	4,75	10
Surgutneftegazbank	4,7	9

The fourth variable – **employees' rating on Banki.ru** – allows to make an opinion on working environment in a bank. See the leaders as at the end of 2019 in Table 4.

Table 4. Top 5 banks according to employees' rating at Banki.ru

Bank	Banki.ru rating	Score
UniCredit Bank	45.6	10
Tinkoff Bank	44.8	10
Absolut Bank	42.1	10
Avangard	36	10
Russian Standard Bank	34.7	10

Source: URL: https://www.banki.ru/services/official/methodology/

Also when we compiling the rating we took into consideration as the fifth variable the **professional award Bank of the Year** at the web of Banki.ru which comprises 19 nominations in various spheres: consumer loan; deposit, mortgage loan; advertising campaign; online loan application, people's rating; special offer etc. (Table 5).

Table 5. Топ 5 banks which got the Bank of the Year award at Banki.ru

Bank	Score
Sberbank of Russia	3
Alfa Bank	3
Tinkoff Bank	3
Pochta Bank	3
Gazprombank	2

We used evaluation on the basis of total assets as one of **control variables** for compiling the rating (Table 6)

Table 6. Top 5 banks according to total assets as at the end of 2019

Bank	Assets, mln RUB	Score
Sberbank of Russia	29,958,900	10
VTB	15,516,100	10
Gazprombank	6,582,198	10
Alfa Bank	3,749,640	10
Otkrytie FC Bank	3,263,633	10

The next **control variable** is return on equity (ROE). Investors consider return on equity around the mean value of S&P 500 which equals 14% to be an acceptable correlation and less than 10% – an unacceptable one (Table 7).

Table 7. Top 5 of Russian commercial banks according to return on equity

Bank	ROE, %	Score
Tinkoff Bank	35.4	10
Express Volga	28.7	10
Vozrozhdenie	24.5	10
Roscosmosbank	23.5	10
Novicombank	23.3	10

Another **control variable** – return on assets (ROA) – is indicative of profitability of bank's operations. A high value of this indicator means that assets are used efficiently (Table 8).

Table 8. Top 5 Russian commercial banks according to return on assets

Bank	ROA, %	Score
Absolut Bank	12.9	10
Tinkoff Bank	5.4	10
Home Credit Bank	4.8	10
Express Volga	3.9	10
Roscosmosbank	3.6	9

The innovation components considered above were evaluated for each bank, transferred into points and added together. The maximum value of 60 points was assigned to Tinkoff Bank, the minimum value of 6 points – to Investtorgbank. On the basis of obtained values top 50 commercial banks according to total assets were ranged from 1 to 50.

Tinkoff Bank with 60 points, Raiffeisen with 57 points, Sberbank Russia with 49 points were the leaders. As long as Raiffeisen Bank is a subsidiary bank of Austrian *Raiffeisen Bank International* we will assume that this may influence the business model and management in a specific way, so we will add another comparable Russian bank – Sovcombank with 45 points. In total we have chosen four commercial banks according to innovation technology in the retail segment (Table 9).

In order to choose the least innovative banks we excluded from the rating eight banks according to the following criteria:

- they are bankrupts (Transcapitalbank, National Bank Trust, Moscow Industrial Bank, Moscow Regional Bank, Rusfinance Bank, Investtorgbank);
- the bank's management is represented by foreigners only (ING Bank – a subsidiary of ING Group);
- the bank is a government agent (Roseximbank).
- Totally we chose four banks: UBRR with 17 points; RNCB with 15 points; MTS Bank and Bank Zenit with 14 points each (see table 9).

Table 9. Rating of innovativeness of commercial banks in the retail segment

Rating	Bank	Total score
1	Tinkoff Bank	60
2	Raiffesenbank	57
3	Sberbank of Russia	49
4	Sovcombank	45
5	Home Credit Bank	42
6	Russian Standard	42
7	Pochta Bank	41
8	Alfa Bank	41
9	Bank Saint Petersburg	38

Rating	Bank	Total score
10	Citybank	36
11	UniCredit Bank	36
12	Novicombank	36
13	AK Bars Bank	35
14	Bank Uralsib	35
15	Vostochny Bank	35
16	VTB	33
17	Express Volga	33
18	Moscow Credit Bank	33
19	Vozrozhdenie	33
20	Otkrytie FC Bank	32
21	Rosbank	31
22	Renaissance Credit	30
23	Gazprombank	28
24	Vserossisky Bank Razvitiya Regionov	28
25	Absolut Bank	26
26	SMP Bank	26
27	Rosselkhozbank	25
28	Surgutneftegazbank	25
29	Bank Russia	24
30	Bank DOM.RF	24
31	BM-Bank	24
32	Bank Avangard	23
33	Cetelem Bank	21
34	Credit Europe Bank	20
35	Roscosmosbank	20
36	OTP Bank	19
37	Bank Peresvet	19
38	Zapsibcombank	18
39	UBRR	17
40	Roseximbank	16
41	Transcappitalbank	15
42	RNCB	15
43	ING Bank	15
44	MTS Bank	14
45	Bank Zenit	14
46	National Bank Trust	12
47	Moscow Industrial Bank	11
48	Moscow Regional Bank	8
49	Rusfinance Bank	8
50	Inversttorgbank	6

Compiling the Rating of Human Capital of Top Management in the Most and the Least Innovative Companies

We chose four banks – leaders in implementation of innovation in the retail sector and four outsiders. Further we will study the key variables of human capital of top management which are also assigned points further added together and ranged[2].

As mentioned above, we consider a three-year period since 2017 to 2019, hence, the major figures could have been replaced. If during this period several managers occupied a certain position performing the same function the weight of the obtained coefficient will be calculated proportionate to the period of office.

Education

Tinkoff Bank (top 4). 3 of 5 key top managers have master's degree: CEO – Oliver Hughes; CIO – Vyacheslav Tsyganov; CSO – Stanislav Bliznyuk. The distinctive feature is the top management team which is stable and unchanged since 2010 which is indicative of the management's great involvement and loyalty to the company.

2 Data on human capital of top management has been obtained from https://finparty.ru, from annual reports of the company for 2017–2019 and from the system of mass media content analysis https://new.scan-interfax.ru/app/summary

Chief financial officer Ilya Pisemsky has a field-specific education. He is the only one with MBA degree granted by F.W. Olin Graduate School of Business in 2002.

Raiffeisenbank (top 4). There are two top managers from Austria in the board with master's degree: the head of risk management Wass Roland and the chief financial officer Gert Hebenstreit. CEO, CIO and one of the directors of the retail block have a field-specific education. It is remarkable that similar to Tinkoff Bank the board remained almost unchanged for 3 years (except for the managers of the retail block).

The bank in focused on development of technology and therefore in 2018 it appointed N. Shvetsov as CIO which was a newly introduced position.

Sovcombank (top 4). The structure of the board of Sovcombank is similar to the one of the two previously considered banks and has been stable for several years. The position of the chief technology officer was created rather recently – in 2019 and it was occupied by Boris Albert, graduate of Lomonosov Moscow State University majoring in Applied Mathematics and Informatics.

The education rating of Sovcombank top managers is a little lower than the one of the two previous banks: CEO Dmitry Gusev is the only person with a Ph.D. in economics. But almost all managers have field-specific education which is indicative of serious professional skills in the units they are in charge of.

Sberbank (top 4). In the considered period the board of Sberbank changed more often: CTO was replaced thrice and the director of the retail block was replaced once. This may be indicative of the necessary changes in technology applied by a bank with an advanced ecosystem.

The bank sets a high bar in terms of education: CSO Yulia Chupina has an MBA granted by the Higher School of Company Administration and Management in Barcelona (Spain) and the company CEO German Gref is a Ph.D in economics. Another distinctive feature is that all management has field-specific education.

Bank Zenit (antitop 4). In the three recent years the board chairman was replaced once, now CEO is Alexander Tishchenko who has an MBA of London Business School. Also CSO Konstantin Rybakov has an MBA diploma of London Business School. There is no position of the chief information officer in the top management of the bank Zenit. Unlike previous banks from top 4 the chief accountant, not CFO, is in charge of the financial block.

RNCB (antitop 4). The management team of the bank looks incomplete: there are no CIO/CTO and CSO/CRO – chief strategy officer/chief risk officer. Chief accountant manages the financial block. Head of the retail block Nikolay Bilan is the only person with master's degree. However, all managers including CEO have field-specific education which is a business achievement factor.

MTS bank (antitop 4). Board chairman Ilya Filatov is an MBA holder of the Higher School of Economics of International Business of the Academy of National Economy of the Russian Federation Government. It is the only MBA diploma received in Russia among all top managers of the banks considered in this research. CRO of MTS bank Nikolay Shekhovtsov has an MBA of the University of Virginia. Chief accountant Alexey Eltyshev performs the functions of the chief financial officer.

UBRR (antitop 4). The key top managers of UBRR are CEO, IT director (the position was created in 2019), chief accountant and head of the retail block. Head of the retail block Vadim Belopolsky has a degree of Candidate of Sciences in Automated Management Systems.

Career Variety

Tinkoff Bank (top 4). It is no secret that Tinkoff Bank is a technology-oriented bank and it is due to experience of the majority of its top managers in information technology. CEO Oliver Hughes who manages Tinkoff since 2007 has a field-specific experience in foreign companies as well as the chief financial officer Ilya Pisemsky.

Raiffeisenbank (top 4). 4 out of 6 bank top managers joined it as far back as mid 1990s – early 2000s which is indicative of a high loyalty. CFO and CRO have previous experience in the Austrian group of Raiffeisenbank. All managers of the Russian commercial subsidiary bank have field-specific education.

Sovcombank (top 4). Head of the retail block Andrey Spivakov is the most experienced one among managers. CEO and CTO have a field-specific experience in a foreign company.

Sberbank (top 4). Employment history shows that CTO David Rafalovsky and CSO Yulia Chupina worked in foreign companies in the field of "technology" and "strategy" respectively. As mentioned above, several chief technology officers succeeded one another in Sberbank recently. David Rafalovsky who joined the team in 2018 and a year before left the office of the deputy head of the technology block in *Citigroup* in the USA and moved to Russia has, probably, the most unusual top manager profile.

Bank Zenit (antitop 4). All top managers of Bank Zenit have worked in the financial sector throughout their career. CSO Konstantin Rybakov and head of the retail block Dmitry Yurin started their career in Sberbank in mid 1990s.

RNCB (antitop 4). The board of RNCB is experienced only in the financial sector. No information about work in foreign companies was found.

MTS Bank (antitop 4). The profile of top managers of MTS Bank is unlike the profile of top managers from other banks from antitop 4. Many managers started their career in large banks.

UBRR (antitop 4). We found information that three out of four top managers worked only in UBRR. It is common knowledge that head of the retail block Vadim Belopolsky worked in the international company *VISA International*.

Networks

Sovcombank (top 4). Board chairman Dmitry Gusev is a friend of the bank cofounder Mikhail Klyukin (member of the supervisory council). Dmitry and Mikhail are graduates of Financial Academy under the Government of the Russian Federation majoring in Finance and Credit of 1998 and 1999 respectively.

Sberbank (top 4). German Gref's scientific tutor in the postgraduate study in St. Petersburg State University was a famous politician Anatoly Sobchak. Later the board chairman worked in the Center for Strategic Research where he prepared a successful economic program for Vladimir Putin for his 1st presidential term.

Power

Power is a mediator and it will be calculated on the basis of two components:

the share of outstanding stock which belongs to the top manager;

quoted speech index *Interfax Scan* which compares the number of publicashions on the basis of one direct speech fragment of a manager.

Tinkoff Bank (top 4). CFO Ilya Pisemsky with 90% turned out to be the most "listened to", it means that he has the largest number of publications on the basis of direct speech. CEO, CIO, CFO and CSO have shares in the authorized capital of the bank (Table 10).

Table 10. Power indicators in Tinkoff Bank

Position	Top manager	Quoted speech index, %, 2019	Shares in ownership
CEO	Oliver Hughes	66	+
CIO	Vyacheslav Tsyganov	15	+
CFO	Ilya Pisemsky	90	+
CSO	Stanislav Bliznyuk	5	–

Raiffeisenbank (top 4). Board chairman Sergey Monin has the quoted speech index of 84%.

Sovcombank (top 4). CEO Dmitry Gusev has the citation index of 67% and 5.92 % votes in the total amount of voting shares.

Sberbank (top 4). Vice-chairman of the board Svetlana Kirsanova is the most "heard" person with 77%. German Gref has a share in the authorized capital of 0.0045% and CFO Alexander Morozov – 0.0025% (Table 11).

Table 11. Power indicator in Sberbank

Position	Top manager	Quoted speech index, %, 2019	Shares in ownership
CEO	German Gref	71	+
CTO	Vadim Kulik (2017)	50	-
CFO	Alexander Morozov	76	+
CSO	Yulia Chupina	39	-
Retail block	Svetlana Kirsanova	77	-

Bank Zenit (antitop 4). Board chairman of Bank Zenit Alexander Tishchenko has 5.8% shares of this financial institution.

Social Integration

Social integration is understood as an active and independent use of social networks. As it turned out, just several top managers of the considered banks operate their pages in social networks by themselves.

Reputation

Reputation will be determined on the basis of *Interfax Scan* index which evaluates correlation between positive/negative/neutral sentiment in public speeches.

Tinkoff Bank (top 4). CSO has an obviously positive sentiment which amount to 9% (Table 12).

Table 12. Sentiment of top managers in Tinkoff Bank

Position	Full name	Sentiment
CEO	Oliver Hughes	
CIO	Vyacheslav Tsyganov	
CFO	Ilya Pisemsky	
CSO	Stanislav Bliznyuk	

Raiffeisenbank (top 4). CEO of Raiffeisenbank has neutral sentiment, neither negative, nor positive utterances prevail.

Sovcombank (top 4). CEO Dmitry Gusev has an insignificantly prevailing positive sentiment equaling 1%.

Sberbank (top 4). Vadim Kulik showed the most interesting results: 11% of positive and 9% of negative sentiment (Table 13). As an experiment we decided to interpret the content of the negative aspect, conducted semantic analysis and defined the key words with a "negative message" in news for 2017. As a result, we defined the following word combinations: "typical lawsuits", "job for fired persons" and "provide cut down". It turned out that "typical lawsuits" meant automation of typical lawyers' operations which resulted in cutting down of three thousand jobs due to implementation of robot lawyer. "Job for fired persons" meant cooperation of the Russian Post with Sberbank in order to

provide jobs for fired bank employees. We may make the conclusion that a negative sentiment is not grounds for underestimation of utterances.

Table 13. Sentiment of top managers in Sberbank

Position	Full name	Sentiment
CEO	German Gref	
CTO (2017)	Vadim Kulik	
CFO	Alexander Morozov	
CSO	Yulia Chupina	
Retail block	Svetlana Kirsanova	

Results of Compiling the Rating of Human Capital of Top Management

The obtained results on each key indicator of human capital of top management were translated into points and the final values were added together. If within the considered period a top manager occupied the position for a certain time he/she was assigned weight (proportionate to the term in office) and multiplied by the final value calculated for this person (Table 14).

Table 14. Human capital rating in the considered companies for 2017–2019

Rating	Bank	Total points	Category according to the innovation rating
1	Sberbank of Russia	41	Top 4
2	Tinkoff Bank	32	Top 4
3	Raiffeisenbank	21	Top 4
4	Sovcombank	21	Top 4
5	MTS Bank	17	Antitop 4
6	UBRR	13	Antitop 4
7	Bank Zenit	13	Antitop 4
8	RNCB	12	Antitop 4

Research Results

Let us consider the hypotheses generated at the beginning of the research.

Hypothesis 1 that *commercial banks with the highest quality of human capital of top management are the leaders in innovation in the retail segment* **was confirmed.** Commercial banks with the highest quality of human capital – Sberbank of Russia, Tinkoff Bank, Raiffeisenbank and Sovcombank – according to the performed research are the most innovative ones in the retail segment in 2017–2019.

Hypothesis 2 that *banks from top 10 in terms of total assets are the most innovative ones in the retail segment* **was not confirmed.** Just three banks from top 10 in terms of total assets were included in the innovation rating: Raiffeisenbank, Sberbank and Alfa Bank. It means that corporate resources have no decisive influence on the innovation strategy, on the contrary, human, knowledge and social capital exercise this influence (Table 15).

Table 15. Comparison of top 10 bank rating according to total assets to innovation rating

Bank	According to total assets	Innovation rating
Sberbank of Russia	1	3
VTB	2	16
Gazprombank	3	23
Alfa Bank	4	8
Otkrytie FC Bank	5	20
Rosselkhozbank	6	27
Moscow Credit Bank	7	18
Raiffeisenbank	8	2
UniCredit Bank	9	11
Rosbank	10	21

Hypothesis 3 that *stable social relations and reputation influence directly the innovation strategy* **was confirmed.** It turned out that social relations have a direct impact on quality of human capital, and consequently, on innovation strategy. Examples of CEOs from Sberbank and Sovcombank substantiate it, board chairmen of these companies have stable relations. Reputation also exerts a direct influence on efficiency of human capital.

Hypothesis 4 that *power is a mediator which strengthens influence of human capital of top management on innovation* **was confirmed.** Managers in possession of a large share of stock are quoted more often, they strive to protect private interests from bankruptcy risk and are more motivated to determine the growth vector of innovation strategy.

Hypothesis 5 that *field-specific experience in the career of a top manager enhances the ability to generate and maintain innovation* **was not confirmed.** This conclusion disagreed with results of research [14] which asserted that the career advancement level and field-specific professional experience guaranteed strategic changes and implementation of innovation.

Conclusion

We compiled the following author's ratings on the basis of findings of the research dedicated to defining influence of

human capital of top management on innovation strategy in Russian banks:

Rating of innovation commercial banks in the retail segment which evaluates the number of highly technological products for the period of 2017 to 2019, ratings of online banks, mobile applications, feedback on working conditions in banks and nominations for product innovations.

Rating of human capital of top management for the four most and least innovative banks comprising such parameters as education, career variety, social relations, social integration, power and reputation.

Consequently, the following interrelations were revealed:

Commercial banks with the strongest and most significant in terms of rating human capital of top management are leaders in innovation of the retail segment. Results of foreign studies [13, 16] on influence of key elements of human capital on innovation strategy confirm it.

Top 10 banks in terms of total assets are not the most innovative ones in the retail segment. Banks' resources have no significant impact on the innovation strategy and human capital accumulated throughout life does have such impact. So, VTB is the 2nd in terms of total assets while in the innovation rating it is the 16th, Gazprombank is the 3rd and the 23rd respectively. However, for example, Alfa Bank follows Gazprombank in terms of assets while in the innovation field it improves constantly and occupies the rightful 8th place.

Managers with stable social relations show a greater strategic dynamism. Reputation also turns out to be a forceful factor which influences the ability to create and maintain innovation. Top managers who have acquired strong and long-term social bonds throughout their lives have a competitive advantage: they influence significantly the innovation potential of banks.

Power increases influence of human capital of top management on innovation. The public managers most frequently quoted by print media have a competitive advantage, have more authority for taking major decisions and define the growth vector of the banks of a lower technological level.

Field-specific experience in career does not have a significant impact on the ability to introduce corporate strategic changes concerning innovation. This conclusion disagreed with conclusions offered in paper by C. Crossland et al. [14] who assert that relevant field-specific professional experience guarantees generation of new technology.

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Do CEO Behavior Biases and Personal Traits Influence ESG Performance? The Evidence from Emerging Capital Market of Russia

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Abstract

The impact of behavioral biases and personal traits of the CEO on corporate decisions and performance has become the important agenda for management, governance and finance research. But still the empirical evidence on the influence of behavioral biases on the implementation of sustainability principles into company's strategies is missing not only in emerging markets, but for developed markets as well. We aim to fulfill this gap by findings on the role of behavioral characteristics of a CEO and how they affect the effectiveness of the ESG (Environmental, Social and Corporate Governance) approach to company management in one of the largest emerging capital market of Russia. We first focus on CEO's optimism, narcissism, self-confidence, and the lack of confidence of the CEO and their impact over ESG performance.

To identify behavioral biases, we use textual analysis and the "bag of words" method applied to the written letters to the shareholders by CEOs of Russian companies in 2017–2019 on a sample of 38 companies with official external ESG ratings. Our results confirm a significant influence of optimism and narcissism on the effectiveness of the ESG approach, but self-confidence does not appear to be statistically significant. Moreover, our findings prove significance of some personal traits such as industry experience and technical educational background. Our findings validate and complement prior research on personal characteristics of CEOs and provide novel data on the impact on ESG in emerging capital markets.

Keywords: ESG, behavioral biases of CEO, personal traits of CEO

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Introduction

The evaluation of ESG (Environmental, Social, and Governance criteria) has become an important line of research in the field of corporate governance and management. ESG is an approach to management decision making which aims to ensure corporate sustainable development and mitigate risks which encompasses social, environmental and governance factors. It implies actions promoting achievement of social welfare which is not part of corporate interests and legal requirements [1], voluntary integration of society problems into commercial operations of a company, and a companies relations with concerned parties.

ESG-focused practices are ostensibly aimed at achieving public social welfare and development of inclusive capitalism focusing on the the roles of wide stakeholder base of any company. Such activities influence the operating and financial performance of businesses over the long term, and therefore require strategic planning [2; 3]. According to the Green Bond Principles of ICMA[1], a practitioner of ESG has to develop and implement their practice all through the management decisions' chain.

Such a strategic process cannot be implemented without the CEO. In accordance with the behavioral theory of corporate finance, people's beliefs do not necessarily evolve into rational and sequential decisions [4]. This means that in defining future policies, the CEO will rely not only upon economic logic based on rationality of risk-return relationship, but also upon his/her opinion, instinct, and experience. As a result, not only the CEO's desire to create value for the investors, but also personal prejudices related to environmental and social interaction problems may determine strategic actions related to ESG policy.

Data from capital markets confirm the importance of implementing the practices aimed at sustainable development. The global volume of responsible investment increased by one-third biennially from 2014 to 2018[2]. At the end of 2020, the amount of investment only in ESG funds was $51.1 billion[3] which is twice as much as the results of 2019. Companies which observe ESG principles get capital flows from ever-growing number of investors all over the world. A poll by PWC[2] involving 162 investment companies and direct investment funds found that as of 2019, 83% of respondents were concerned about climate-related risks in their portfolio, while 77% were anxious about the carbon footprint of companies from the portfolio[4]. Investment professionals, in their strategies of portfolio construction, also observe 'Sustainable Development Goals' (SDG), defining and ranking them in order to develop an investment strategy. 67% of respondents spoke of such an approach in 2019. For comparison, in 2016, 38% of people polled stuck to this approach[4]. Over time the number of ESG committees inside companies has also increased. In 2016 27% of the largest global investors had on the staff specialists or a team responsible for evaluation of sustainable development, by 2019 this indicator had increased to 35%.

In Russia, creation of general approaches, principles and rules of ESG development principles is at the initial stage. The Central Bank of the Russian Federation actively regulates ESG processes. It has developed special recommendations for implementation of responsible investment principles. The Central Bank adopted a framework known as the 'Concept of Implementation of Responsible Investment Principles by the Central Bank of the RF' which accelerated practical application of the ESG approach by Russian companies. This is confirmed by a PWC report[5], according to which in Russia legal requirements are one of the key drivers for adding ESG in the investment process (41%). Customer requests for such evaluation are at the same importance level (41%), while only the ambition to manage the portfolio risks surpasses these reasons (56%).

Polls of investors and dynamics of ESG development in Russia show a serious and growing interest of the market in transparency of company operations and their ESG practices. So, according to the poll conducted in 2017–2018 by PRI and the Professional Investors Institute CFA, 19% of respondents included ESG factors in their assessment of shares' fair value and just 4% in assessment of bonds. In the respondents' opinion, the corporate governance component had the greatest impact on investment analytics results (81% for shares and 62% for bonds). At the time of the poll the E and S components did not seem so important to the respondents. However, over the longer term they emphasized a growing importance of these aspects when taking investment decisions. Respondents have forecasted a triple growth of influence of social factors on share value by 2022 (from 11% in 2017 to 30% in 2022) while the influence of environmental factors should increase fourfold (from 7% in 2017 to 26% in 2022). At the same time, the significance of the corporate governance parameter, in the respondents' opinion, should remain almost unchanged in order to evaluate the shares' value and bond income.

In view of the above, the ESG issue for Russian companies apparently captures new trends and perceives the investors' request. Focus on ESG motivates a company to oper-

[1] ICMA (2018) Green Bond Principles. URL: https://www.icmagroup.org/assets/documents/Regulatory/Green-Bonds/Green-Bonds-Principles-June-2018-270520.pdf

[2] PwC (2019). PwC ESG факторы в инвестировании PE Responsible Investment Survey 2019. URL: https://www.pwc.ru/ru/sustainability/assets/pwc-responsible-investment.pdf

[3] НРА (2020). Особенности подходов к оценке ESG интеграции. URL: https://fs.moex.com/f/14217/nra-chetverikov-viktor.pdf

[4] PwC (2019). PwC PE Responsible Investment Survey 2019. URL: https://www.pwc.com/gx/en/services/sustainability/publications/private-equity-and-the-responsible-investment-survey.html

[5] PwC (2019). PwC ESG Factors in Investment PE Responsible Investment Survey 2019. URL: https://www.pwc.ru/ru/sustainability/assets/pwc-responsible-investment.pdf

ate more openly, making sustainability reports, including sections in their annual reports on social, environmental and other initiatives for the good of society, and improvement of corporate culture. According to analytical reviews of the Russian Union of Industrialists and Entrepreneurs for 2003[6] and 2018[7], the number of companies making non-financial reports grew from 5 to 176.

However, dependence of efficiency of ESG practices implementation on CEO's personal and behavioral characteristics still lack empirical evidence with Russian and world data. Our research objective is to determine whether the efficiency of the ESG approach in Russian business practice is affected by the CEO's personal and behavioral characteristics. We assess these characteristics by analyzing CEO announcements by the "bag of words" method.

In the first part of this paper we review literature dedicated to ESG implementation in Russian companies. On the basis of analysis of empirical research papers, we put forward hypotheses and describe the research methodology, including methods of estimating variables in models. We describe the sample used to test models and findings of the research and their interpretation.

Review of Studies of ESG Efficiency Practices

ESG Approach to Corporate Governance

Investors, analysts, and portfolio managers tend increasingly to focus not just on results in financial markets and dynamics thereof, but also take into consideration corporate ESG aspects, and their compliance with the principles of responsible investment.

Properly-made ESG reports help to get a better understanding of company operations because improvement of transparency fosters loyalty and enhances the confidence of stakeholders [2]. The improvement of a company's attractiveness in the minds of investors strengthens relations with other concerned parties, improves operational performance, and provides financial gain in the long run [5].

From the perspective of the competitive strategy theory, sustainable development activity may yield a competitive advantage to a company [6]. ESG practices may enhance the company image and raise brand recognition by improving corporate identity [7].

Studies confirm that voluntary ESG reports accelerate sales growth, attract talent, reduce the cost of capital, and consequently increase the company value over the long term [2]. Stakeholders presume that a company with high ESG indicators will be stronger in a competitive environment [2]. This is the assumption which contemplates that concerned parties will reward "good management" by means of investments, consumption, and higher productivity. Consequently, an improvement in ESG transparency will give the management more incentives to enhance internal regulation and servicing of stakeholders' interests [2; 8], thus, causing a long-term increment in the company value. However, ESG is considered to be an efficient means of company value maximisation, not just due to its influence on demand. This practice may assist in reducing expenditures for the replenishment of corporate resources [1] and controlling corporate risks [6; 9], among other things, using ESG for hedging [6; 10].

So, according to the stakeholder theory, enterprises engaging in ESG may as a result satisfy the interests of their stakeholders, owners' needs, enhance loyalty of customers, employees and increase the asset value of the brand [6; 11]. As previously stated, ESG initiatives are a strategic choice which influences company operations [1; 12]. The CEO plays a significant part in such a strategic choice. He/she influences financing and investment decisions of the company [6]. It is assumed that corporate strategy depends heavily on the CEO's views, his/her experience, and personal qualities. In particular, a CEO's personality characteristics play a decisive part in assessment and dealing with external contextual factors (for example, uncertainty). Taking into consideration the fact that the CEO's instructions and values influence the strategic choice of companies, the logical conclusion is that the implementation of ESG in company operations is also affected by the personal values and personal qualities of the chief executive officer [13–15].

Research has shown that the personality of the senior executive is an important component of implementation of sustainable development practices [7; 16]. Of course, non-financial decisions depend on a lot of factors, but initiatives such as ESG is an important strategic decision which depends on a director's preferences and characteristics [17; 18]. This conclusion is thoroughly consistent with the core message of the upper echelons theory: "companies are indicative of top manager's values and knowledge" [19]. Also, this theory predicts that the CEO's or other top managers' personality may play an essential part in attaining operating results.

Personal Characteristics and their Influence on the Development of Corporate ESG Practices

Currently, the majority of studies of corporate behavioral finance focus on such CEO's personal characteristics as self-confidence and optimism. Self-confidence and optimism are the two strongest behavioral drivers [20; 21]. An unbiased manager, thinking in a highly rational manner, may be subject to unreasonable ideas caused by self-confidence [20].

[6] RUIE (2006) Non-Financial Reports of Companies Operating in Russia: Practice of Social Reporting Development. Analytical Review. URL: https://rspp.ru/12/4005.pdf

[7] RUIE (2017). Analytical Review of Corporate Non-Financial Reports: issues of 2015–2016. URL: https://rspp.ru/document/1/7/4/743222fc4c6650093518c635d0e8ecdd.pdf

Self-confidence is a common psychological trait [22–24] indicative of people's inclination to perceive themselves better than they really are from the point of view of their characteristics, aptitude, judgements, and prospects. A self-confident manager is a person overestimating prospects of success of an investment project assuming that he has all accurate and necessary information [20; 25]. As a rule, this characteristic feature manifests itself as an unrealistic optimism and an inflated self-esteem.

ESG practices may be considered a new space for corporate operations where new factors develop rhetoric and new management methods. Self-confident managers are most likely not just to invest excessively but to increase investments, especially risky ones, e.g. aimed at research and development [26; 27]. The tendency of such managers towards innovation may have a positive impact on ESG implementation because such a CEO is more likely to try something new and give the company an opportunity to develop in this field [6; 28].

An insecure manager will avoid innovation and more unpredictable decisions of change of the corporate policy including investment policy. He/she is, for example, less likely to invest a free cash flow into emission reduction projects and environmentally-friendly resource utilisation projects due to uncertainty, and a risky nature of such financial placement [20].

When managers choose a strategy, they will take sustainable development principles into consideration in order to get public support, and to obtain the community's approval of their activity and make it legitimate [29]. A company's image and its customer relations may suffer if it has no socially useful policies implemented. It may also cause consumer boycotts. But without the influence of significant external factors, even such a negative scenario over the long term is unlikely to incentivise self-confident CEOs. Aiming at bigger personal allowances and advantages such as a higher salary or status and profile, an egocentric CEO may quit the job in the company in order to improve his/her position [29; 30]. Self-confident CEOs will invest in benefits for concerned parties if it serves their interests, i.e. only when the community's benefits are in line with their own, private benefits. As long as personal interests are their motivation, they are less likely to be motivated by the philanthropic effect of the implemented ESG practice [30].

The results of study of the interrelation described above are contradictory. On the one hand, some studies show a negative dependence between self-confidence and ESG practice [10; 20; 31; 32]. For such directors, sustainable development operations are less important than their own interests and they reduce CSR (corporate social responsibility) activities [20; 31]. On the other hand, ESG is good PR for the company, a way to create a positive reputation in the minds of investors. That means that CEOs will adhere to the sustainable development principles in management and pay more attention to ESG.

It should be noted that in developed markets, such as the US market, a negative relationship of the considered components has been found out [10] while the studies in emerging markets of Eastern Asia show significant positive relationship [33–35]. A range of factors may be responsible for the diverse effect. First, it may be a cultural pattern. The research by del Mar Miras-Rodríguez et al. [36] emphasises that norms regarding care for the environment based on laws and regulatory support have a huge impact on acceptance of environmental practices. Second, it may be the absence of government control which prompts leaders to ignore their negative impact on the environment. Third, it may be the choice of an ESG component. The same decisions will have different influence on possible components of sustainable development. Despite a great influence of personal characteristics on any corporate policy, it is important to emphasise that such an influence affects management aspects most of all [20; 37; 38].

Studies of interrelations between CEO characteristics and environmental and social indicators are worth analyzing individually. Self-confidence or its absence has no significant impact on the environmental aspect either in the long or in the short term [10; 20]. The reason is that environmental issues are of such great importance and influence that a CEO, irrespective of his/her degree of confidence, has to take environmental protection measures. But Qin [39] established that self-confident managers have lower environmental grades.

Similar results in previous papers have been obtained for the social aspect of ESG. In the short term, its dependence on CEO's self-confidence turned out to be insignificant, and besides this, long-term results are indicative of a negative dependence [20]. This may be due to the fact that often self-confident directors face the threat of unwanted personnel turnover [20; 40].

Studying behavioral traits, we first define several characteristics: overconfidence, narcissism and optimism. Cha & Park [33] and Gao, Han [6; 35] confirmed the relation between these two indicators, assuming that overconfident CEOs will use CSR as a tool of satisfying their narcissistic needs. Consequently, narcissism may also be considered a personal characteristic, exerting an especially serious impact on the perspective through which a CEO processes information. Narcissism is related to the need to be in the spotlight, to be an authority or a leader, to be better than others, or to be respectable, and it is characterised by a tendency towards excessive self-concern [37; 41]. As a result, narcissists are interested in activities clearly noticeable by the public [1]. They are constantly seeking praise, honours, and awards [1; 13; 15; 42]. In this respect, ESG is a great way to be the focus of attention and public admiration.

For narcissists, sustainable development activities provide an opportunity to heighten interest in themselves and improve their image [13; 15]. In view of this, the need to study the role of CEOs' personal characteristics as determinants of their behavior which influence corporate performance is increasingly accepted [13; 43–45]. Studies show that more narcissistic CEOs are more likely to be committed to ESG implementation, because they may consider this practice as an opportunity to improve a positive attitude to themselves

performing socially desirable actions [1]. At the same time, they are more likely to place emphasis on the outward appearances of such activity instead of the decisions aimed at the adjustment of the corporate internal state [13]. For example, it affects the corporate social profile because narcissism has a negative impact on labour remuneration equality [29; 46] and a positive impact on CEO's unethical behavior and a propensity towards exploitation [47].

A selfish type driven by self-interest will be more analytical in decision making concerning resource allocation, and in his pattern of social decision making a computational-style of reasoning will prevail [29; 48]. Such a calculation will always target external conditions, defining whether a collectively beneficial result will serve the CEO's interests [29]. Due to self-reliance, a narcissistic CEO may take less note of other people's opinions. As long as ESG activity may yield results only over the long-term the final decision will depend on a director's personal susceptibility to such changes [1]. This exacerbates the agency problem: when priorities and strategic objectives are set, only views and interests of the CEO may be taken into consideration leaving out interests of the company and its owners [1; 49].

Narcissists concentrate more on complex and bold actions, strategies, policies, and practices in order to be praised and admired. Such a director will strive to reinforce company standing and take decisions beneficial for the company because his/her drive for status and publicity may enhance entrepreneurial abilities [37; 50] or result in increased earnings of shares [37; 51]. On the other hand, due to proneness of a CEO to overestimate their ability to generate profit, narcissism may cause volatility in corporate performance [37; 52], financial risks [37; 53], risks related to implementation of breakthrough innovation [13; 54], legal vulnerability [37; 55] overinvestment strategies, and low financial productivity [37; 56].

Another trait often added to the self-confidence definition is optimism. This characteristic feature, alongside overconfidence, is the strongest convincing factor which influences decision making. CEO's self-confidence has a positive correlation with an optimistic mood of reporting [20; 57]. As mentioned above, overconfident managers are inclined towards unrealistic optimism while corporate reporting with such CEOs acquires a positive tone. The latter elicits a positive response from investors. So, an optimistic CEO gives positive signals to the market and concerned parties, thus attracting them [58].

Research on the dependence of ESG efficiency on such behavioral characteristics as narcissism and optimism, as well as the case of self-confidence, fail to provide a clear understanding how sustainable development is affected by a CEO's behavior. Despite the fact that narcissism and optimism are among the most popular characteristics considered in the literature, they have been studied insufficiently in the area of ESG. At the same time, there exist recent studies of narcissism while the interrelation with optimism we are interested in may be found in an indirect way only, through results of research dedicated to related topics.

The Influence of a CEO's Personality Characteristics on Corporate ESG Performance

An important aspect of research is the consideration of CEO views acquired under the influence of surrounding culture, epoch, experience gained, education which actually are constituent parts of human capital. These characteristics, along with psychological traits, may influence the company's activity vector and its strategic objectives.

Corporate ESG efficiency depends on experience, tenure, and functional background [7; 18]. The educational variable is the most important one for the study of corporate governance. Two categories may be applied for the research: the presence of an academic degree (bachelor, master, PhD) and the field of education. These components are used as a proxy for the top manager's cognitive framework [7].

Education is one of the most important aspects of human capital related to the influence of a CEO's personality on business performance [16; 17; 59–62]. This component is used as a proxy for a top manager's cognitive framework [7]. According to prior research, the educational level may influence disclosure of information on sustainability [7; 63]. It is interesting to note that directors with an MBA tend to be less philanthropic [64] and invest less in R&D as compared to other managers [7]. CEOs with an MBA tend to be more interested in the short-term effects of management [7; 64] which is in contradiction with the ESG concept which requires commitment to a long-term result.

According to previous papers, not only the educational level, but also the kind of education, and the branch of topic studied, all influence ESG efficiency. Pursuant to Fernandez-Gago et al. [65] three fields of education should be identified as significant: business/economics, engineering and technical, and natural sciences. The conducted studies revealed that in the majority of cases CEOs with engineering or technical education have a positive influence on the efficiency of sustainable development [66–68]. Such directors are more willing to participate in R&D and implement innovative solutions at their enterprise [7; 69]. A positive dependence between the natural science education of a manager and the efficiency of ESG practice in a company is rarer [7; 20; 67; 68]. Economic education produced no significant effect [7; 64]. However, by no means all results support the hypothesis of a significant influence of the type of education on the efficiency of corporate non-financial activity. Thus, Kutzschbach et al. [7] failed to detect significance in any of the studied models. After dividing ESG into individual components, the authors found that natural science education may influence the management component. Impact on other parameters (E and S) remained insignificant.

Tenure is another important characteristic feature of CEO's human capital. The resource-based theory [70] contemplates that an individual's tenure is related to the improvement of CSR as long as the CEO acquires more knowledge on the industry and company [17]. Therefore, it is a prerequisite for ensuring successful operations in the field of

sustainable development. Recent studies yielded diverse results: some results confirming a positive dependence [68], some affirm a negative interrelation [18; 71] and some even show no significance [7; 72; 73]. In general, tenure is considered a proxy for CEO's experience. Studying CEO's experience as such, one may assert that its positive influence not just on efficiency of ESG practices inside a company [74] but also on their diversity [75] is highly probable.

However, tenure related to a position in a company or working in an industry is not the only way to measure experience. Age is often used for this purpose. Determining dependence in this way, researchers often observe that it is of an inverted U-shape with a positive sign. In other words, first a director accumulates knowledge and after some time, at the point of the so-called peak of the obtained parabola, the CEO's decisions tend to grow more conservative. If we take a linear dependence, researchers indicate that it is often negative [76; 77] or insignificant [7]. However, it should be noted that age may have a positive significant impact on the development of social factors for a company [7].

Another variable which may influence the extent of a CEO's impact on corporate performance is the CEO's power. In the majority of studies dedicated to ESG, the variable of 'efficiency duality' – a classic variable for the study of corporate governance – is the proxy used to measure it. It shows that the CEO is the chairman of the board of directors as the second job [17]. Recent studies suggest a predominantly insignificant influence of duality on ESG [17; 78; 79] but there are results indicative of a negative [17; 80] and a positive relation [2]. The positive one manifests itself in the fact that a greater CEO's power enhances the influence of ESG disclosure on the company value, because the concerned parties associate ESG information disclosure with a stronger commitment to sustainable development practice [2]. After analysing influence on the environmental, social and governance components, previous studies define a positive significant effect on environmental and social factors [2].

Research Hypotheses

The ambiguity of previous results heightens the interest in a study of the interrelation between the indicators of a CEO's personal characteristics and indicators of sustainable development. However, it is difficult to consider ESG regardless of its components, therefore we decided to test hypotheses of dependence of ESG practice elements on the CEO's personal characteristics. The reason is that the significance of a CEO's personal characteristics may vary depending on the dependent variable considered in the model. For example, an indicator may have an impact on the governance component, but have no influence on other variables and, as a result, ultimately have no effect on the overall ESG evaluation.

The influence of personal characteristics on corporate performance will be verified by the following hypotheses:

Hypothesis 1. A CEO's self-confidence has a negative influence, while optimism, narcissism, and lack of confidence have a significant positive influence on the efficiency of ESG practices.

Hypothesis 2. Self-confidence, lack of confidence, optimism, and narcissism have a significant influence on corporate environmental performance.

Hypothesis 3. Optimism, narcissism, and lack of confidence have a significant positive effect on the social factors of commercial activity while self-confidence has a negative effect.

Hypothesis 4. Optimism, narcissism, self-confidence, and lack of confidence significantly influence corporate profitability.

The influence of personality characteristics on ESG performance will be verified by the following hypotheses:

Hypothesis 5. The level of education has a significant influence on corporate environmental efficiency (E), social (S) and corporate governance (G) and a positive influence on the ESG efficiency of a company.

Hypothesis 6. Technical education exerts a positive influence on corporate ESG efficiency and has a significant effect on the environmental efficiency (E), social (S) and corporate governance (G) of a company.

However, it is possible that the methodology of considering educational fields offered by Fernandez-Gago et al. [65] is not perfect and fails to account for such important factors as management skills. It may be important because specialized management education (including an MBA or an advanced training in management) may have a significant impact on ESG efficiency. Hence, such a background grants a CEO the skill of taking unbiased decisions less exposed to his/her personal characteristics and signals.

Hypothesis 7. An advanced qualification in management (e.g. MBA, an advanced training or a professional education focusing on management) has a positive influence on ESG performance.

Another important characteristic feature of human capital often considered in the papers dedicated to the study of a CEO personality's influence on decision making is tenure. The majority of papers confirm a negative influence on corporate ESG efficiency [17; 18; 76] therefore, most probably, Russian data will show a similar relationship.

Hypothesis 8. An experience in the industry has a negative influence on corporate ESG efficiency and its components.

Research Methodology

The use of an ESG efficiency indicator or rating is a multi-aspect and reliable method for evaluating quantitatively the ESG indicator. We have chosen the S&P rating, which analyses the ESG profiles of more than 7,300 companies all over the globe. It comprises Russian companies since 2013. In the period of 2017 to 2019, the rating was assigned to 38 Russian companies.

See below for the basic model which will be modified in accordance with the change of the considered dependent variable. The variable will also influence the model illus-

trating the values of various personal characteristics: optimism, narcissism, overconfidence or nonconfidence. As a result, the model will have 16 modifications, each of them will study one of the suggested hypotheses.

$$ESG_t / E / S / G = \beta_0 + \beta_1 \times Personal\ Characteristic_{i,t} + \beta_2 \times CEO\_tenure_{i,t} + \beta_3 \times CEO\_Power_{i,t} + \beta_4 \times Edu\_Level_{i,t} + \beta_5 \times Ind\_Exp\_dummy_{i,t} + \beta_6 \times Technical\_Edu_{i,t} + \beta_7 \times Managerial\_Edu_{i,t} + \beta_8 \times Leverage_{i,t} + \beta_9 \times Sales\_Growth_{i,t} + \beta_{10} \times Size_{i,t} + \beta_{11} \times Year\_2018_{i,t} + \beta_{12} \times Year\_2019_{i,t}.$$

Several main steps have been taken to make a sample of Russian companies which integrate ESG practices in their activity. The first stage defined the research period. As the first investors' requests for including of E and S components in the assessment of share fair value emerged in 2016, we assume that in 2017 companies perceived this request, and started to implement environmental, social and governance factors into their operations. Thus, the research uses data for the period of 2017 to 2019. Selection of companies is based on the rating of the largest Russian companies RAEX-600[8]. Companies of the financial sector, investment corporations and joint-stock companies (except for PJSC) in the rating lists were excluded from our selection. Then, we added financial data and ESG indicators from the Capital IQ database. The final sample encompassed only the companies from the RAEX list of selected companies, with performance indicators according to the S&P rating. There were just 38 of them. It should be noted that the rating of some companies within the period we are interested in was incomplete, i.e. they were not assigned points for all 3 years. As a result, the final sample comprised 89 observations for 38 companies from 10 industry sectors. Appendix 1 describes all variables used in the analysis. We collected data on the CEOs of the chosen organisations including personal characteristics. We decided to analyse optimism, narcissism, overconfidence, and nonconfidence on the basis of evaluation of the chief executive officer's address to shareholders or the so-called CEO's letters from the annual report. It was established at the data collection stage that not all companies' annual reports have the necessary address in English. For this reason, in this research we cannot analyse a range of companies (e.g. MMK (Magnitogorsk Iron and Steel Works), Bashneft) despite the fact that they have a rating for ESG efficiency practices. Some companies replaced CEO's letters with an interview or did not add them to the English version of the report, or failed to add them in all years. Therefore, the sample for them is limited, but it has not been eliminated from the research.

The optimism level was calculated using the dictionary of 'Loughran-McDonald Sentiment Word Lists' and the methodology offered in the paper by Fedorova et al. [81]. We then processed the texts, converted them into lower case, and eliminated punctuation.

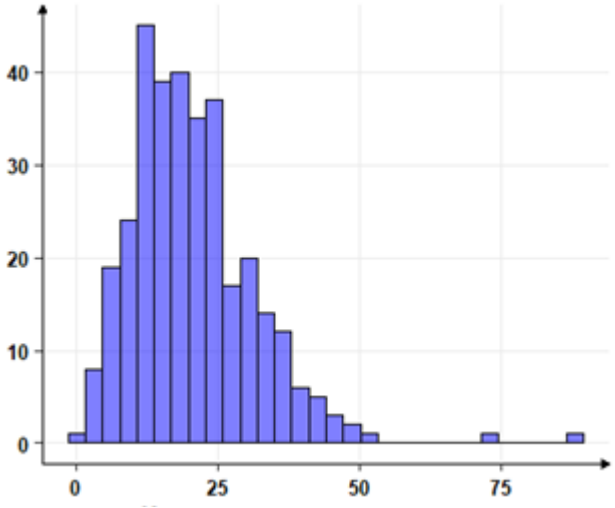
The narcissism level was calculated using text data by the methodology offered in the paper by Chatterjee & Hambrick [82]. It was necessary to define personal pronouns such as: I, my, mine, etc. (they are also called "I-words") and pronouns denoting a lot of people: we, our, their and so on. The evaluation was obtained by division of the first group of personal pronouns by the sum of both groups of pronouns.

The last block of personal characteristics consisted of two variables of self-confidence and insufficient confidence of the CEO. We applied the methodology and lists of words described in the paper by Malmendier et al.[21] in order make calculations. We calculated the words characterising the CEO as a self-confident person ("confident", "confidence", "optimistic", "optimism") and the words with an opposite meaning characterising his/her insufficient confidence "not confident", "not optimistic"; "reliable", "cautious", "conservative", "practical", "frugal", "steady"). We calculated each word's entry for all words on the list, one word may be mentioned and calculated several times.

Results of Empirical Tests

We analyzed personal characteristics on the basis of the collected CEOs' addresses. Finally, we calculated the frequency of positive words (Figure 1), negative ones (Figure 2) and distribution of the optimism level (Figure 3) in the texts.

Figure 1. Distribution of positive words in CEOs' letters



[8] RAEX (2018) top 600 of Russian companies in terms of sales scope. URL: https://raex-a.ru/rankingtable/top_companies/2018/main

Figure 2. Distribution of negative words in CEOs' letters

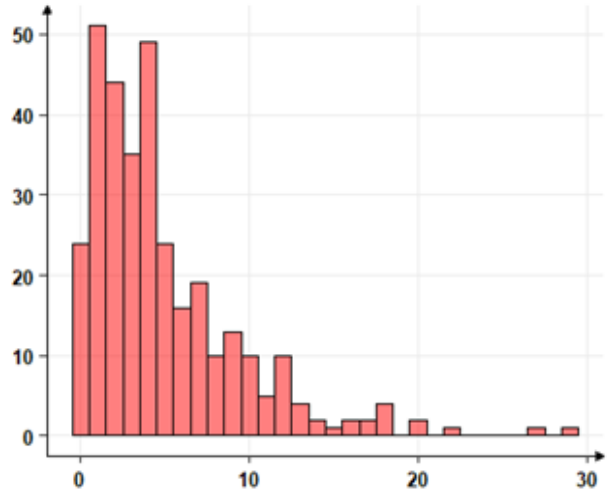
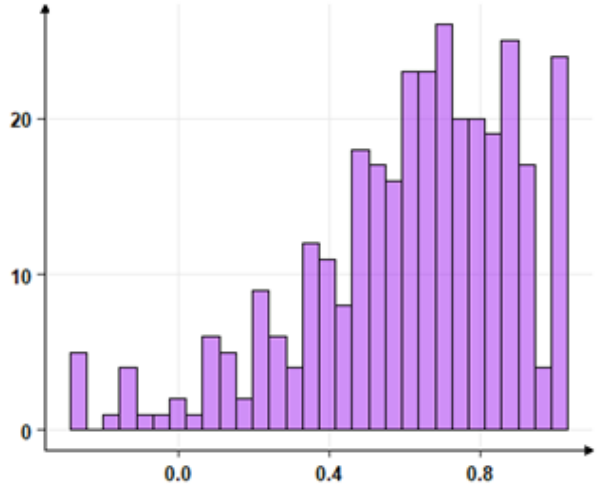
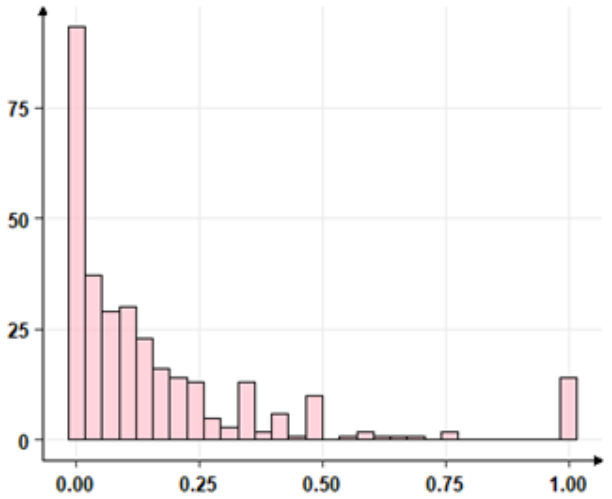


Figure 3. Distribution of the optimism level in CEOs' letters



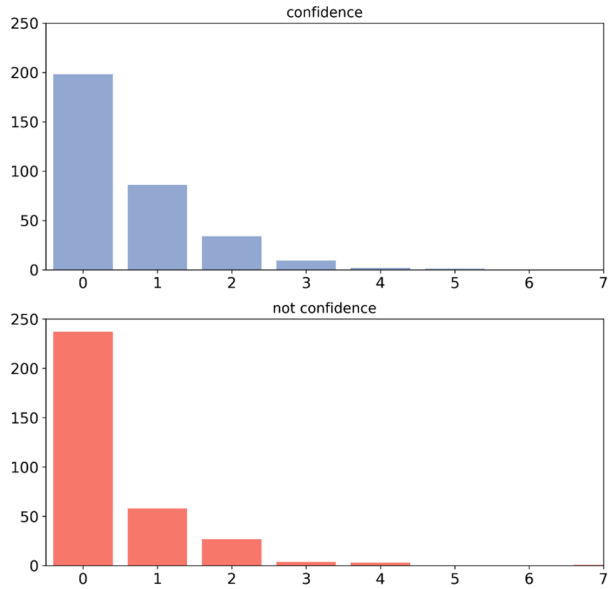
Then, we calculated the narcissism level. The obtained results showed that 24 CEOs' letters made within the period we are interested in contained no "I-words", so they had a zero narcissism level. See the distribution of assessments in other letters in Figure 4.

Figure 4. Distribution of the narcissism level in CEOs' letters



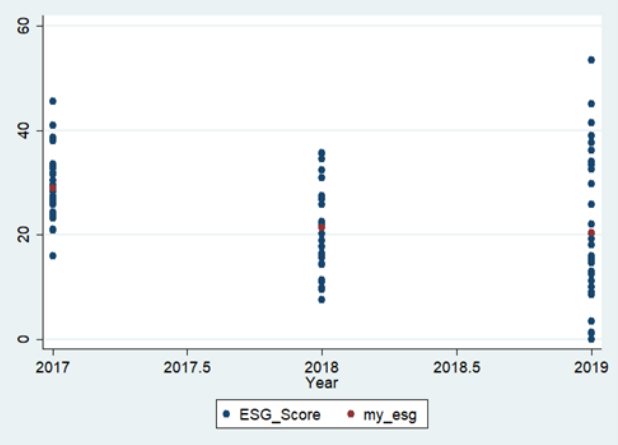
We also calculated self-confidence and non-confidence characteristics. Figure 5 shows distribution of these words in texts.

Figure 5. Distribution of words related to overconfidence in CEOs' letters



The results show that an extremely small number of words from each category (no more than 4) occur in the texts, and in the majority of texts there are no words of any of the categories. Thus, predominantly Russian CEOs avoid using words which insinuate their personal characteristics in their letters. Hence, on the basis of such data it will be difficult to make definite conclusions on dependence of ESG and its components' efficiency on CEO's self-confidence and insufficient confidence. Probably, it may cause insignificance of the effect of the studied indicators.

Figure 6. Deviation of the ESG in force from the trend



After limiting the number of observations of personal characteristics, we decided to consider the resulting sample for homogeneity. Analysis was performed on the basis of the dependent variable. As a consequence, we determined that data concerning ESG efficiency is rather diverse, and the majority of observations deviate from the trend (Figure 6). Further, this may generate the heteroscedasticity problem. Due to the limited available data it is impossible to elimi-

nate outlying data or adjust the indicators, therefore in case of the heteroscedasticity problem we will normalise results by means of introducing the robust error method in the regression models.

As for control variables, their list remains unchanged in all models, therefore the data description will be uniform. See in Appendix 2 the descriptive statistics both for control indicators and for ESG practices' and personal characteristics' indicators.

Results of Study of Personal Characteristics' Influence on Corporate ESG Efficiency

According to the results of regression analysis represented in Table 1 among all CEO's personal characteristics, only optimism exerts a significant positive influence on ESG efficiency. Human capital characteristics also showed their significance. For example, a CEO's engineering and technical education and tenure has a positive impact on ESG. Experience in the industry and the year dummy (2018 and 2019) exerted a negative influence.

It is of interest to note that the constant turned out to be significant in the models too. This means that variation of corporate ESG efficiency depends to a great extent on other factors left out of consideration in the model, hence, not related to CEO's characteristics.

Table 1. Results of testing models 1.1–1.4

	Model 1.1	Model 1.2	Model 1.3	Model 1.4
Optimism	9.748447*			
Narcissism		−7.678686		
Overconfidence			0.6024688	
Nonconfidence				0.676311
CEO_tenure	0.3482264*	0.2034229	0.2888686	0.2880416
Ind_Exp_dummy	−4.905093*	−6.524254**	−6.202394**	−6.546387**
CEO_power	0.8920204	−4.997045	−2.895095	−2.885116
Edu_level				
2	2.936184	3.011957	2.925465	2.901591
3	−8.203743	−3.694878	−6.817018	−6.421077
Technical_edu	3.483152	6.365575***	5.107188**	5.129805**
Size	−0.8783167	−0.9344737	−0.6941498	−0.7135826
Leverage	−0.0281178	−0.0432797	−0.0398979	−0.0402873
Sales_growth	−0.3203323	−0.3346762	−0.3449515	−0.3712975
Managerial_edu	−0.8063035	−0.0364078	−0.855171	−0.7941756
_Iyear_2018	−6.137969**	−6.315478**	−6.232567**	−6.048954**
_Iyear_2019	−4.503927*	−5.091331**	−5.509663**	−5.473402**
_cons	38.22782***	47.04587***	41.94846***	42.51076***

Results of the Study of Influence of Personal Characteristics on Corporate Environmental Profile

According to the obtained coefficients, no single personal characteristic has a significant impact on environmental assessment. However, we detected an interrelation with human capital components. So, tenure, engineering and technical education and a candidate of sciences degree exerted a positive influence on environmental practices. Experience in the industry has a negative impact on implementation of the measures aimed at environmental care. The constant showed no significance in any model related to environmental efficiency. This means that there are no omitted variables in this sample which could describe additional changes of the dependent variable (Table 2).

Table 2. Results of testing models 2.1–2.4

	Model 2.1	Model 2.2	Model 2.3	Model 2.4
Optimism	8.438621			
Narcissism		−2.676294		
Overconfidence			−1.203572	
Nonconfidence				1.127798
CEO_tenure	0.4526051*	0.3183509	0.4040991*	0.3990382*
Ind_Exp_dummy	−7.638083**	−9.869949**	−9.560794***	−9.110734***
CEO_power	−8.809697	−14.55004	−11.30999	-12.28921
Edu_level				
2	8.768558***	9.38975**	8.257347**	8.860043***
3	−9.638108	−5.959847	−8.658551	−7.7156
Technical_edu	4.290533	7.002537**	5.849969**	5.691054*
Size	0.1475106	0.294005	0.3526767	0.261715
Leverage	−0.0398712	−0.0561681	−0.0534194	−0.04978
Sales_growth	−0.3492457	−0.4202961	−0.3551649	−0.4188
Managerial_edu	−4.364723	−4.131233	−4.418046	−4.30222
_Iyear_2018	−1.774941	−1.181149	−1.313355	−1.70285
_Iyear_2019	5.515476*	4.777551	4.735122	4.680065
_cons	13.1244	17.31546	16.72533	17.17631

Results of the Influence of Personal Characteristics on the Corporate Social Profile

Results show that among a CEOs' personal characteristics two parameters have a significant influence: optimism – a negative influence, and narcissism – a positive one. Also, the CEO's technical education may exert a significant positive influence. Such characteristics as experience in the industry and CEO's power have a negative impact. Variables of the leverage and sales growth rate may have an adverse effect.

A negative impact is also noticeable for year dummy variables (Table 3).

Table 3. Results of testing models 3.1–3.4

	Model 3.1	Model 3.2	Model 3.3	Model 3.4
Optimism	11.45082**			
Narcissism		−12.53142*		
Overconfidence			0.2682911	
Nonconfidence				−0.4764856
CEO_tenure	0.2025941	−0.1377277	0.1300212	0.1273837
Ind_Exp_dummy	−6.275686*	−7.703844***	−8.317005**	−8.354481***
CEO_power	−3.857698	−14.40441*	−7.408554	−7.131891
Edu_level				
2	2.781148	3.272706	2.389058	2.240385
3	−4.754233	3.606231	−2.998227	−3.281339
Technical_edu	2.559683	5.431059***	4.494786	4.582648
Size	−0.8162348	−0.716471	−0.5468443	−0.5145155
Leverage	−0.0348587**	−0.0570691**	−0.0484279***	−0.0492421***
Sales_growth	−0.2860718**	−0.3783551	−0.2998129**	−0.2741788
Managerial_edu	0.7282884	1.683143	0.6988511	0.6457425
_Iyear_2018	−10.26674***	−9.880108***	−10.14543***	−10.03723***
_Iyear_2019	−6.694383***	−8.226287***	−7.761507***	−7.779467***
_cons	39.25529***	48.71483***	43.01215***	42.76271***

Results of the Study of Influence of Personal Characteristics in Company Profitability

We have established that among all CEO's personal characteristics, only optimism influences management practices performed by companies. Besides this, tenure and engineering and technical education exert a significant positive influence on management quality. Experience in the industry, leverage increase, and a rise in the sales growth rate and of the dummy variable for 2018 have a negative impact (Table 4).

Table 4. Results of testing models 4.1–4.4

	Model 4.1	Model 4.2	Model 4.3	Model 4.4
Optimism	10.8742*			
Narcissism		-2.472007		
Overconfidence			1.630164	
Nonconfidence				-1.385656
CEO_tenure	0.5046112**	0.3637766	0.4628622*	0.475811*
Ind_Exp_dummy	−8.080147**	-10.13939***	-9.548786**	-10.0755***
CEO_power	8.017345	3.012007	3.546269	4.53749
Edu_level				
2	4.117173	3.327273	3.834483	3.373263
3	−10.95967	−7.755338	−9.279979	−10.19015
Technical_edu	4.997618	8.291692**	6.460094	6.849973*
Leverage	−0.0407292**	−0.0555463***	−0.0515859***	−0.0545511***
Sales_growth	−0.4193618***	−0.4252885***	−0.4461795***	−0.3536733**
Managerial_edu	2.933608	3.422315	2.726794	2.562304
_Iyear_2018	−5.500865***	−5.562213***	−5.888837***	−5.220689**
_Iyear_2019	−2.923758	−3.824811	−3.999526	−3.882668
_cons	19.35845***	28.39676**	27.10438***	28.51122***

It should be noted that the list of factors included in the model is not exhaustive because the constant remained significant. This indicates that there are aspects not related to CEO's characteristics which still exert a significant influence on the corporate management quality.

Discussion of Results

The main objective of this research consists in the study of the dependence between a CEO's personal characteristics and the individual components of ESG. Testing of the models showed that not all CEO personal characteristics influence the efficiency of sustainable development practices. However, characteristics related to a manager's confidence were among those that were relevant. This result may be influenced by problems related to data collection. At the stage of data collection we detected that, unlike their foreign colleagues, Russian CEOs are not prone to using words in their letters revealing either a lack of confidence or, on the contrary, overconfidence. There are only a few specific words we searched for in the studied publications, hence, it is difficult to make unambiguous conclusions on managers' self-confidence. Probably, if we evaluate interviews, public speeches or other sources related to CEOs, the result may be different. However, the data studied for 2017–2019 showed no significant effect, and consequently hypotheses 1 and 3 are partly confirmed.

The optimism criterion turned out to be significant and had a positive influence on the efficiency of the ESG indicator itself as well as on the evaluation of its components. As long as the ESG rating is rendered largely on the basis

of company reports, an optimistic tone included in such information may improve the rating. Analysis of reports may create the impression that company management is able to take successful strategic decisions [58]. In turn, this factor improves the indicators of readiness to risk and assuredness of concerned parties that corporate decision making is well-organized, and the management is able to avoid vulnerability of business in due time. Since this paper is the first to study the interrelation between optimism and ESG efficiency, we have no opportunity to compare the result with previous studies, and to confirm or disprove it.

The last personal characteristic described in this research is narcissism. Among all ESG components, narcissism had a significant impact only on the variable of corporate social practices, thus confirming hypothesis 3 and rejecting all other hypotheses. It may be caused by a negative influence of the narcissistic CEO's personality on labour remuneration equality [29] which may result in a decrease in workforce diversity and increase in personnel turnover.

Proceeding to human capital characteristics, it should be noted that each characteristic included in the model, except for specialised management education, had an effect on at least one ESG component. We start discussing the results from the characteristic of CEO tenure. It turned out to be significant for all dependent variables apart from social practices. The results confirm conclusions of previous academic research which asserted that a longer tenure improved CEO knowledge of the industry and company [17]. Having a good understanding of the strengths and weaknesses of his/her business, including in comparison with competitors, the CEO will take more effective decisions not just in the field of commercial operations, but also in sustainable development. He/she will not improve the situation in general in terms of the whole organisation applying popular strategies, but will take targeted measures in the arrears which are, in his/her opinion, at risk.

The dummy variable for industry-related CEO experience showed an opposite effect. Experience has a negative impact on the components of environmental, social and governance efficiency, as well as on the ESG evaluation itself. The longer the CEO works in the same industry, the more close-minded and conservative his/her views become [77]. Such a manager is sure that he/she knows all intricacies and ways of efficient management and is focused more on improvement of operational performance than on social aspects of his/her activity. As a rule, this variable describes the directors who have grown to their position from lower posts. Having come such a long way, CEOs improve mainly the aspects in which they face problems personally but they are afraid and reluctant to experiment with the technological process and the system in general.

The CEO's power variable, specified as a share of ordinary shares' ownership had a negative impact on corporate social efficiency. A more domineering CEO is more likely to place emphasis on the financial and operating efficiency of the company due to self-interest. Consequently, when taking decisions, he/she will be interested in his/her own benefit and pay less attention to customers' and employees' needs, thus producing a negative impact on the social aspect of corporate operations. These obtained results are in complete contradiction to previous studies [17; 83] which asserted that the growth of CEO power entailed an increase of his/her inclination towards the implementation of ESG policies.

Another highly important characteristic of human capital in the considered model was education. The knowledge level had a strong positive influence only on corporate environmental factors. It should also be noted that in comparison to basic education (specialist's degree, bachelor's degree, master's degree) only possessors of science-related degrees exerted influence. No significance was revealed for PhD holders. It is most probable that data is the reason for such a result. Out of 46 CEOs in the sample, only 5 had a PhD. So, the obtained results should not be generalised to all Russian companies due to lack of observations. Probably, in case of expanding the sample and conducting further study of dependence of ESG efficiency on CEO's characteristics a significant influence may be detected. It is important to note that results of foreign studies were indicative of a differently-directed effect, but nevertheless they were significant [66; 84].

Also, the technical education of the CEO may have a significant positive impact. ESG and all its aspects had this effect. The susceptibility of this type of director to cooperation may explain the influence on results pertaining to social factors [7; 64]. This character trait prompts such CEOs to develop internal and external communities, and intensify cooperation with customers and partners. Such an approach improves contractors' loyalty and the efficiency of social practices. Correlation with the environmental aspect and ESG efficiency is explained by the inclination of CEOs with an engineering specialist's degree toward innovation. Technical education provides an opportunity to understand which technology is better for development of some aspect of ESG practice and allows to evaluate its advantages and disadvantages without assistance. As for management factors, it is interesting to note that previous studies did not establish a significant effect for the governance component either in developed or in emerging countries. In Russia the impact on this characteristic feature turned out to be positive. The reason for such influence is the CEO's opportunity to manage the company better because he/she can communicate directly with technical experts [85].

As for control variables, indicators of the leverage and sales growth rate may have a negative impact. Additionally, their influence is notable only for social and management practices. The first dependence may be explained by the fact that in case of an increased debt load, a company is not interested in expenditures for the improvement of workforce diversity and investment in education, culture, and healthcare of the regions where it operates. A negative influence of the sales growth rate on social aspects may be predetermined by the fact that when management controls revenue growth, it may pay less attention to such social interaction aspect as customer relations and customer loyalty improvement. On the basis of successful results, the man-

agement may think that investment in this sphere at this stage is unnecessary and may postpone it till a decrease in growth is observed.

Influence on management practices has approximately the same explanation. The main point of evaluation of the governance component in the S&P methodology is the transparency of available reports. This is a rather expensive process, therefore, when companies have a growing debt load, they may not want to spend large cash flows for solving this problem. The management is more likely to use funds to pay debts and maintain the current operating activity. Revenue growth rate, in its turn, may be a marker for trust of the company customers, i.e. the organisation is transparent enough for the customers and fits their values. Again, at this stage, the management may consider that concerned parties have enough information, and postpone expenses for development of this aspect. As a result, the efficiency of this component decreases.

The negative influence of dummy variables of 2018 and 2019 was unexpected. All statistical sources showed the growth of companies' engagement in ESG, especially in recent years. Besides this, the obtained coefficients are indicative of a deterioration in performance of Russian companies, which is unexpected at first sight. This contradiction is explained by the methodology used by S&P for making estimates of sustainable development efficiency. Their method evaluates the ESG profile of the company, and also includes regional risks in the final rating. The company complies a so-called 'Country Risk Atlas'[9] which takes into consideration laws and regulatory documents regulating ESG issues. As long as this activity is popular, regulation across the world is strengthening - however, in Russia the legal framework is still emerging and developing. For example, the draft law 'On Limitation of Greenhouse Gases Emissions' was approved as late as this year[10]. The international practice is ahead of us in this sphere. In 2018 the European Union presented its sustainable development strategy[11] up to 2030, based on a UN resolution.

It may be postulated that a slowdown of governmental regulation of ESG may put Russia at a competitive disadvantage on the global stage. Since estimates of the country risk of states are comparable, improvement of legislation in one state may enhance its rating due to downgrade of another's rating. Most likely, this was the case in 2018. Due to the resolution, the European Union gained the lead and mitigated the risk factor for itself. Russia lost ground because its legal framework had been left behind, and this impaired the ratings in general. Decrease of the negative effect of the coefficient in 2019 does not support this hypothesis.

Conclusion

In this paper, we have considered the dependence of the quality of ESG measures implemented in Russian companies on the personal characteristics of CEOs within the period of 2017 to 2019. As a result of testing the hypotheses about influence of CEO's personality on practice and its components we have established that a CEO's optimism has a significant positive impact. Additionally, its effect spreads upon both general efficiency and each ESG component.

An optimistic CEO does not focus his/her own or stakeholders' attention on failures, preferring to demonstrate in the reports how the company has overcome vulnerabilities or obstacles, thus increasing the estimate of the quality of practices' implementation and reducing exposure to risks in the minds of concerned parties. The situation is the same when long-term plans and strategies are developed. An optimistic CEO will project onto them his/her positive expectations from the world around and try to make it better with his and his company' activity. Implementation of ESG practices will be an excellent tool for this.

The presence and effect of narcissism showed its significance in our final analysis. Its impact on the social efficiency of a company turned out to be negative. This indicator is, to a great extent, evaluated by analysing existing relations and communities inside and outside the company. The proneness of narcissistic managers to overestimate their contribution into solving collective tasks prevents them from making a cohesive team, thus destroying internal social bonds and resulting in personnel turnover.

The main problem of the research was a small number of variables in the sample, therefore we cannot confirm the significance of influence of the parameters related to CEO's self-confidence. Probably, if we expanded the sample, narcissism would have shown effects not just on the social factors' component but also on E, G components and the ESG indicator in general. In further research, it will be necessary to model variables of personal characteristics on the basis of an expanded base of texts and take into consideration additional estimates of companies by ESG efficiency.

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Appendices

Appendix 1. Description of variables

Variable	Description
Optimism	In order to calculate the CEO's optimism level we used the dictionary Loughran-McDonald Sentiment Word Lists[12] intended for work with economic texts. In order to calculate the optimism level we used the measure offered in the paper by (Fedorova et al., 2019). The optimism level was calculated using the following formula: $Optimism_{i.t} = \frac{\text{Positive words} - \text{Negative words}}{\text{Positive words} + \text{Negative words}}$
Narcissism	It is calculated using the pronouns which characterise the CEO as a narcissist: I, me, my, mine, myself (Chatterjee & Hambrick, 2011). Frequency of these words is compared to the words which do not characterise the CEO as a narcissist: we, us, our, ours, ourselves. The first group is called "I words", the second – "WE words". The narcissism level is defined by the following formula: $Narcissism_{i.t} = \frac{\text{I words}}{\text{I words} + \text{We words}}$
Overconfidence	In order to calculate self-confidence in English texts of CEO's letters we applied the method and lists of words presented in the paper by Malmendier et al. (2011). Then we calculated the words characterising the CEO as a self-confident person ("confident", "confidence", "optimistic", "optimism")
Nonconfidence	Nonconfidence. Evaluation of the variable is based on the paper by Malmendier et al. (2011), which calculated the words characterising reliability of the CEO "not confident", "not optimistic"; "reliable", "cautious", "conservative", "practical", "frugal", "steady")
CEO tenure	The CEO's term in current office is measured in years
Industry experience dummy	It is the variable of existence of previous experience in the industry where 1 means that the CEO had an experience in the industry in which he/she works now, otherwise 0
CEO power	CEO's power is measured by the share of ordinary shares owned by the CEO, i.e. the percentage of the shares in possession of the CEO
Edu level	The level of received education is set as a categorical variable where 1 is the basic education (bachelor's degree, specialist's degree, master's degree), 2 – candidate of sciences degree, 3 – PhD

[12] Loughran-McDonald Sentiment Word Lists. URL: https://sraf.nd.edu/textual-analysis/resources/#LM%20Sentiment%20Word%20Lists

Variable	Description
Tech education	The dummy variable which takes on the value of 1 if CEO has technical education, otherwise 0
Managerial education	The dummy variable indicating management education, i.e. higher-level academic qualification, advanced training in management and MBA. The variable takes on the value of 1 if the CEO has such education, otherwise 0
Size	Company size. It is measured according to the formula: $Size_{i,t} = \ln\left(Total\ Assets\right)_{i,t}$
Leverage	Company's leverage. It is measured by the formula: $Leverage_{i,t} = \frac{\text{Total Debt}_{i,t}}{\text{Total shareholder's equity}_{i,t}}$
Sales growth	Revenue increment for the past year. It is measured according to the following formula: $Sales\_Growth_{i,t} = \frac{Revenue_t - Revenue_{t-1}}{Revenue_{t-1}}$
_Iyear_2018	The dummy variable for a year which takes on the value of 1 for the observations in 2018 and otherwise 0
_Iyear_2019	The dummy variable for a year which takes on the value of 1 for the observations in 2019 and otherwise 0

Appendix 2. Descriptive Statistics for Evaluation of the Influence of CEO Personal Characteristics on ESG and its Components

Variable	Mean value	Standard deviation	Min	Max	Number of observations
ESG score	23.36348	11.06076	0	53.404	89
Environmental score	20.56953	13.84332	0	61.203	89
Social score	23.3545	11.24399	0	46.997	89
Governance Score	26.82646	12.41949	2.0412	64.165	89
Optimism	0.664799	0.229857	0	1	81
Narcissism	0.085096	0.141963	0	0.7	78
Overconfidence	0.506173	0.673117	0	3	81
Nonconfidence	0.333333	0.570088	0	2	81
CEO tenure	7.280702	7.097935	1	36	114
Industry experience dummy	0.72807	0.446918	0	1	114
CEO power	0.06307	0.167232	0	0.75	114
Edu level	1.446429	0.668995	1	3	112
Tech education	0.392857	0.490581	0	1	112
Managerial education	0.625	0.486299	0	1	112
Size	19.42194	2.12533	13.812	22.842	91
Leverage	4.6851	30.7948	−10.70	293.80	91
Sales growth	0.01177	5.818546	−41.86	34.006	88
_Iyear_2018	0.333333	0.473486	0	1	114
_Iyear_2019	0.333333	0.473486	0	1	114

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How CEO Affects ESG and the Financial Performance of Companies

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Abstract

In the past decade the society grew more interested in corporate operations concerning environmental, social, and corporate governance (ESG). This paper is dedicated to study of influence of CEO's personal characteristics on financial performance of companies and interrelation between ESG indicators and corporate financial performance. For this purpose we have conducted a review of scientific literature on this topic, established interrelation between financial indicators and ESG indicators, determined the main characteristics which influence corporate financial indicators. For this purpose we developed a model of CEO's personal characteristics.

The paper studied characteristics of CEOs from Russian companies, compiled a rating of CEOs taking into consideration financial and ESG indicators of companies, considered influence of the CEO's position in this overall rating on financial indicators of a company.

The research sample comprises 81 Russian companies of the real sector which are in the Moscow Exchange index and 123 CEOs. The time interval covered by this research is seven years since 2013 to 2019. Analysis was performed in the statistics package STATA applying panel data analysis as a method. Return on assets, return on equity and the market capitalization indicator were used as dependent variables. We chose disclosure of ESG information by a company, CEO's score in the overall rating and such CEO's characteristics as age, tenure and financial education as explicative variables. Financial leverage and company size were used as control variables. We also added return on assets to some model specifications in order to improve the model quality.

Keywords: CEO, CEO's personal characteristics, disclosure of ESG indicators, CEOs' rating

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Introduction

Nowadays there are a lot of papers dedicated to study of financial indicators and companies' performance. However, researchers as well as other concerned parties become more interested in the factors which have the greatest influence on profitability, reliability and success of companies.

In the corporate hierarchy CEO is one of the main persons capable of influencing management decisions and responsible for such decisions. It is believed that CEO plays a significant part in company's chances for financial success in the near future. Decisions taken by CEOs depend largely on their behaviour and cognitive capacities which in their turn are related to such characteristics as sex, age, education level, relevant experience etc.

In the past decade the society grew more interested in corporate operations concerning environmental, social, and corporate governance (ESG). Disclosure of ESG indicators is a new type of reporting which states in detail information about the impact a company exerts on the environment, its attitude to the employees and its distinctive features of corporate governance. Disclosure of these indicators is of such importance because the company has to do both: satisfy the needs of its shareholders aimed at making more profit and also respect the interests of other stakeholders – customers, employees, investors. If a company accommodates interests of all parties and discloses corresponding ESG information, later on it will be rewarded with larger contribution amounts from investors, a higher consumption from consumers and an increasing productivity from its employees. According to the research conducted by KPMG experts in 2020 80% of top 100 companies largest by revenue in 49 countries disclose their ESG indicators. It is expected that in the near future the number of such companies will grow because, according to many experts disclosure of ESG information results in profitability increase and, further, in enhancement of the company value.

In this paper we use the score assigned to CEO on the basis of the position in the overall rating as one of characteristics. The rating consists of two components: corporate financial indicators and ESG indicators. We compiled our own rating of CEOs in order to assign the score.

During the research we performed econometric analysis of panel data and used the statistics package STATA for it. Data on 81 Russian companies for a seven-year period since 2013 to 2019 was obtained from the Capital IQ and Bloomberg databases, data about 123 CEOs was collected from corporate annual reports and from the Capital IQ database.

Review of Scientific Literature Dedicated to the Relation between CEO's Characteristics, ESG Indicators and Corporate Financial Indicators

The papers dedicated to analysis of influence of CEO's characteristics on financial indicators and corporate indicators related to environment, social responsibility and corporate governance (ESG) may be divided into two big groups. A lot of authors study the cause-and-effect relationship between financial and ESG indicators of companies. Representatives of the second group study CEO's characteristics and personal traits which may have an impact on the extent and quality of disclosure of ESG information of companies, if any, and on financial performance of companies.

Interrelation between ESG Indicators and Financial Indicators of Companies

A large layer of research is dedicated to study of the interrelation between ESG and financial indicators. From the point of view of the stakeholder theory and the legitimacy theory a company should pay attention to values and norms existing in the society where it operates [1]. It is of crucial importance because recognition by the community is used as the factor which may influence corporate stability. According to the stakeholder (interested parties) theory [2] satisfaction of their needs will result in a long-term success of company's products and services and will provide stability of corporate financial indicators. According to this concept, if a company fails to disclose necessary ESG information it is unable to satisfy needs of stakeholders which are not shareholders. In this case the market defines such companies as riskier ones which will result in higher risk premiums and, finally, in reduced financial indicators. And vice versa, companies with higher indicators and a good ESG reputation will be awarded by stakeholders (for example, by investors and consumers) by means of increase in investment and consumption [3]. Otherwise speaking, companies with disclosed ESG indicators will attract customers ready to pay more for the goods and services made particularly by this firm; employees ready to work harder; and investors trusting the company in its operations [4]. The stronger the confidence of stakeholders the more resources the company obtains. Thus, transparency of ESG information will influence directly the corporate financial indicators. Besides, disclosure of information may be used by companies in order to explain the changes in the ESG policy or to improve the company's ill reputation which will further result in increase of financial indicators. Disclosure of ESG indicators is a new type of reporting related to sustainable development which starts from separate reporting on corporate social responsibility (CSR) followed by integrated reporting [5]. ESG is used to assess corporate information on sustainable development in a holistic way. ESG assessment comprises three aspects: environmental, social and governmental. Each aspect has its own indicators for evaluation of corporate sustainability. Due to use of a new way of assessment which comprises three aspects of corporate social responsibility evaluation of ESG may be used by investors as an instrument for a complete evaluation of corporate sustainability indicators [6].

There is no uniform methodology for assigning ESG scores and compiling a rating. Various analytical agencies define themselves the methodology of assigning scores related to environment, social responsibility and corporate govern-

ance, calculate the overall ESG score and compile ratings. In the papers we have considered the authors use in their models ready ESG scores from the Bloomberg and Capital IQ databases.

Such variables as return on assets, return on equity and Tobin's Q are used most frequently as financial indicators and company value indicators. Profitability ratios are the key indicators which characterize companies' profitability and show the extent of efficiency of corporate operations. Market capitalization shows the company's current value at the stock exchange. Some studies show that there is a significant positive correlation between ESG and financial indicators meaning that ESG disclosure results in improvement of financial indicators and raises companies' value due to increase in transparency and accountability. Thus, panel data of British companies included in FTSE 350 listing for 2004–2013 [7] shows that companies with a higher degree of ESG disclosure are of higher value. The authors chose Tobin's Q as an indicator of the company value. They considered not just the aggregate ESG indicator but also environmental and social factors as independent variables. Besides, they performed a sensitivity test by replacing Tobin's Q with return on assets. Consequently, all conducted tests showed that companies with higher ESG indicators have higher financial indicators and higher value.

Empiric study [8] of 775 German companies for 2010–2018 confirms the hypothesis that ESG disclosure of a higher quality brings about higher financial indicators. In this paper we chose ROA as the dependent variable, and the aggregate ESG indicator and three factors of the aggregate indicator as independent variables, also we also conducted regression analysis with fixed variables. As in the previous paper, the authors performed a sensitivity test replacing ROA with ROE and Tobin's Q. The results remained the same – ESG indicators have a significant positive impact.

Results of paper [9] show that there is no interrelation between individual and combined ESG factors and return on equity (ROE) as well as the company value (Tobin's Q). Moreover, taken separately not a single ESG factor influences the cost of capital (weighed average cost of capital (WACC)), however, the overall ESG score exerts a positive and significant influence on the cost of company's capital (WACC).

Paper [10] conducted meta-analysis on the basis of 142 primary studies in order to consider the interrelation between environmental factors and financial indicators. The results show that in the short term (one year) financial indicators and resources may improve environmental performance of the company in line with the resource scarcity hypothesis; however, the effects vanish over the long term (more than a year). And vice versa, improvement in environmental performance has no short-term impact on corporate financial performance but the company benefits greatly in the long term.

In paper [1] using data of 159 Indonesian companies from 2012 to 2016 the authors found out that ESG disclosure has a positive impact on return on equity. The higher the disclosure quality the higher ROE.

There are also papers which show other conclusions. Some empiric studies emphasize that there is an obvious trade-off between financial performance and ESG indicators and companies have to choose the indicator which is more important for them. So, in paper [11] the authors studied 100 leading CEOs in a group of companies from S&P Global 1200 ranged according to the common rating variable. Their hypothesis stated that ESG and financial indicators had a positive significant correlation. In order to verify the hypothesis they calculated the Pearson correlation coefficients which showed a significant negative correlation between these indicators. These results may be explained by the trade-off theory [12] focused on expenditures used to improve ESG information disclosure which has a negative influence on financial performance. The companies which strive to improve ESG disclosure have higher expenditures (for example, for higher salaries). In future such companies will be eliminated by competitors which do not comply with ESG properly and do not have such expenditures [13]. Other authors [3] presume that managers engaged in ESG activities disregard alternative costs related to ESG actions and, consequently, sacrifice the activity which would have been profitable for the company. Over time such ESG activity results in low financial performance.

At the same time some studies [8; 14] fail to reveal a significant interrelation between the level of ESG indicators' disclosure and the company value. On the basis of the stakeholder theory and the majority of empiric studies we put forward the following hypothesis.

Hypothesis 1. Companies which disclose ESG indicators have higher financial performance.

It is expected that companies which disclose ESG indicators will have higher financial performance than the companies which do not disclose such information.

Infrastructure of CEO's Personal Characteristics on Financial Performance and ESG Indicators

A lot of studies are dedicated to CEO's characteristics, in particular, membership in the Board of Directors, education, tenure, age etc. Their authors consider the characteristics which are easier to measure (for example, sex, age, education level, experience). Moreover, there is no subjectivity in measuring of these indicators, therefore they are the most universal characteristics and the ones convenient to analyze their influence on financial performance and ESG indicators.

Until recent times CEO's performance was mainly measured with financial indicators such as Tobin's Q, return on assets, return on equity and similar financial ratios. However, alongside with the increasing significance of ESG indicators measurement of performance by means of financial indicators only is considered to be too limited. While financial performance is aimed at shareholders' welfare ESG takes into consideration not just shareholders' interests but also impact on the environment (for example, climate change, energy and water waste) as well as social

responsibility issues (for example, human rights, gender equality) and management issues (for example, structure and gender composition of directors, top management's remuneration, bribery and corruption).

In particular, many authors study companies' response to the necessity to disclose the indicators which show their activity in the sphere of environment, social responsibility and corporate governance. There is a belief that as long as expenses and benefits from information disclosure are often uncertain decisions on the company's response fall under responsibility of the management [15]. Consequently, these decisions may depend on the manager's personal characteristics [16]. This is precisely why CEO's characteristics play an important role in the extent to which a company is financially sound and profit-making, in quality of disclosure of company's indicators on the environment, social responsibility and corporate governance and whether the company discloses such information at all.

CEO's Tenure

One of the most popular characteristics studied by the modern literature is CEO's tenure. In the majority of cases studies show an inverse dependence between tenure and organizational adjustment [17]. Closer to the end of their tenure CEOs become more committed to their own views on the company, rely short-sightedly on obsolete paradigms and are less prone to adapt to the external environment, for this reason they have lower ESG indicators [18; 19]. Paper [20] showed that only appointed managers were more inclined to experiment and pursued innovative strategies while managers with long tenures resisted strategic changes. Early paper [21] dedicated to this topic found out that all main key actions taken by CEOs occurred in the first two and a half years of time in power.

At the same time many theorists assert that a negative interrelation between tenure and organizational adjustment often manifested itself as the manager's commitment to status quo [22]. Otherwise speaking, tenure is related to firmness and commitment to the established policy and practical activity because over time managers think increasingly that their views are right. Paper [20] describes this CEO's state as "stale in the saddle", i.e. commitment to status quo, risk avoidance, isolation from new information and confidence that their opinions and beliefs are correct. This behaviour is due to increase of CEO's power as tenure lasts [23]. These authors assert that CEO's unofficial power grows over time for several reasons. First, boards of directors may coopt with appointed CEOs; second, CEOs get their subordinates' loyalty; and third, informal power becomes institutionalized. Apart from that, managers with greater unofficial power have an opportunity to hire and promote other managers who share their views and beliefs [24]. At the same time managers with greater power stand up to pressure better when introducing changes because their independence and influence allow to veto the projects which disagree with the established paradigm [20].

There is a range of late empiric studies which confirm theoretical justification of negative dependence between the CEO's tenure and the level of ESG disclosure. The authors of [25] assert that as a result of a long time in office CEOs do not respond to recent developments. Using the data of Chinese government companies in the period of 2008 to 2016 they revealed a negative influence of a long-term tenure on disclosure of CSR information. Paper [26] based on data about American companies in the period of 2002–2008 found out that CEO's tenure influences the probability of disclosure of environmental information by a company. The authors showed that companies managed by new directors disclose voluntarily environmental information more often than other companies, and new directors accept concessions substantially more often and are not so much committed to their own opinions and beliefs.

An empiric research based on a sample of non-financial Chinese companies listed on the Shanghai and Shenzhen stock exchanges in 2009–2015 shows that CEO's tenure has an inverse significant impact on social and environmental indicators [27]. The main reason for such inverse dependence is the CEO's career horizon. They assert that as long as CEOs in the first years in office have a longer expected career horizon than the ones at the late stages of their career they demonstrate their abilities contributing more to ESG practices. Further, in the last years in office CEOs will be remunerated by increased financial indicators of their company. That is why recently appointed CEOs are more motivated to improve ESG indicators than CEOs at the final stages of their career.

The results of this paper are in line with results of another empiric research based on data of 100 leading CEOs in a group of companies from S&P Global 1200 [11]. Analysis shows that CEOs with longer tenures demonstrate worse ESG indicators while their financial performance is higher.

Paper [28] is dedicated to study of influence of tenure on change of the value of transport companies which is defined by Tobin's Q. It makes the conclusions that CEO's tenure has a negative impact on the companies' value because in this case the difference between the theoretical value and the observed (actual) one turned out to be negative. This research covers a large time interval (from 2000 to 2011), however, its drawback is that the sample consists of 53 companies from 17 countries but it does not take into consideration the countries' characteristics and economic environment.

Paper [29] based on a sample of 10,096 observations for a year comprising 1,450 companies in the period from January 1, 2006 to December 31, 2015 discloses the extent to which firmness in information disclosure on behalf of the company management which depends on managers' tenure influences corporate strategies of ESG disclosure. It shows a significant negative interrelation between the manager's tenure and transparency. Companies where managers occupy their positions for a longer time disclose less information demonstrating lesser variability. Such negative relation is confirmed in three ways. First, it is shown that transfer from the 25th to the 75th percentile of the average time in executive positions is related to decrease in the average estimate of ESG information disclosure and

average variability of information disclosure by 9.3 and 20.1%, respectively. Second, a similar change in the percentile of CEO's tenure results in decrease in the ESG estimate by 4.5% and variability of information disclosure – by 14.6%. Third, there is an interruption in information disclosure after change of CEO. The aggregate indicator of ESG information disclosure improves on average by 9.7% in two years after replacement of CEO.

Paper [1] considers CEO's tenure as a variable which moderates interrelation of ESG and financial indicators of a company. The authors revealed that companies with a high-quality disclosure of environmental indicators have higher ROE and, as a consequence, growth of the company value. However, CEO's tenure enfeebles the interrelation of ESG disclosure and ROE.

On the basis of previous studies and new papers [11] we put forward the following hypothesis.

Hypothesis 2. There is a positive relation between CEO's score in the overall rating and company's financial performance.

We expect that the higher the CEO's score in the overall rating which takes into account both financial performance and ESG indicators the higher the company's financial performance. The CEOs' rating for verification of this hypothesis was compiled on the basis of the methodology of Top 100 Best-Performing CEOs in the World described in detail below.

Hypothesis 3. There is a significant positive relation between CEO's tenure and corporate financial performance.

We assume that directors who occupy their position for a long time show higher financial indicators.

CEO's Age

Literature asserts that person's age is of great importance in taking strategically significant decisions [30]. The authors point out that with advancing age a person loses flexibility and risk proneness and, thus, becomes more resistant to necessary changes. At the same time, in their opinion, older directors, as a rule, are more conservative and, consequently, less inclined to risk [31]. Such behavoiur is due to psychological reasons and motives. Older directors lack physical and mental stamina to carry out organizational adjustments, they are less able to study something new. Apart from that, older directors have less incentives for making risky investment, for example, in research and development. The reason is that they will have to face a negative influence of such investment on current profitability because, probably, the company will have profit from investment over the long term [32]. Consequently, young executives, as a rule, challenge the existing state of things and introduce revolutionary changes in company's orientation to solving important issues to a greater extent.

Empiric studies continue to explore CEO's age. Early paper [32] shows that there is a decrease in research and development expenses when CEOs achieve a mature age. In article [33] the authors proved existence of a negative correlation between CEOs' age and corporate investment in the corporate social responsibility policy (CSR). Paper [11] dedicated to study of CEOs characteristics verifies the assumption of a negative interrelation of CEO's age and overall corporate performance which take into account financial indicators weighted 80% and ESG indicators weighted 20%, however, the results turned out to be statistically insignificant.

In spite of numerous theoretical interpretations of why more aged directors show weaker financial and ESG indicators there is a range of papers which use actual data to prove that age is related positively to corporate financial performance. Thus, in paper [28] the authors showed that there was a significant positive relation between CEO's age and company value. On the basis of a frontier model of stochastic analysis they generate the optimal and theoretical company value which a transport company could have if its directors acted exceptionally reasonably and used optimally their productive factors. Then they try to explain a decrease in the company value which is a difference between the optimal and observed company value. Results of their model show that directors' age may cut the deficit and, thus, increase the company value.

Authors of paper [34] also managed to show that managers at a mature age have higher financial performance of their companies. As a theoretical explanation they offer an assumption that directors' age is predominantly related to their experience.

Taking into consideration the fact that papers dedicated to study of CEO's age produce different results but the majority of researchers indicate a positive influence we put forward the following hypothesis.

Hypothesis 4. There is a positive relation between CEO's age and corporate financial performance.

Education and Experience

Another important characteristic feature which influences ESG and financial results of a company is CEO's education. Previous studies have shown that director's education may have a significant impact on behaviour and corporate performance [17].

Paper [35] explains that education may have effect on quality of performing CEO's functions because it influences his/her cognitive capacity, behaviour and social capital. Later on it will have effect on fulfilling of his/her functions and efficiency.

At present there is no agreement of opinion in literature on the issue of what should be considered as the variable characterizing the education level. Empiric research [11] considers an MBA degree and engineering education as such variable. The authors premised on the methodology of the rating of Top 100 Best-Performing CEOs in the World. In their opinion, directors with engineering education usually had significantly higher ESG indicators and, as a consequence, higher overall indicators. An MBA degree is associated with lower financial performance, ESG and overall indicators, however, the results are not statistically significant. Another research shows that CEOs with an MBA degree do not have higher ESG indicators than CEOs without such degree [35]. These results stem from the fact that CEOs with an MBA degree are more aggressive [36].

Thus, paper [36] shows that companies managed by CEOs with an MBA degree spend more on capital expenditures, incur more debts, pay smaller dividends than companies with other CEOs. Such aggressive behaviour is aimed at short-term results therefore CEOs do not bother with ESG information disclosure intended to long-term results [11]. Paper [37] states a similar opinion: MBA programs are focused on short-term results based on innovation instead of long-term results.

However, other authors offer their explanation of such aggressive behaviour. Directors with an MBA degree are more experienced in taking strategic decisions, hence, they have a greater capability to identify and use the opportunities which increase the company value [38]. The authors of paper [39] revealed that chief financial officers with an MBA degree apply more complex evaluation methods than the ones without an MBA degree. Apart from that, the paper shows that American railroad companies with a large number of directors having an MBA degree are more likely to change their strategies in response to deregulation. Therefore, taking into consideration such conclusions one may also presume that directors with an MBA degree are more likely to think of the necessity to disclose environmental, social and governmental indicators of a company as of a strategic opportunity than other directors. Besides, directors with an MBA are more likely to take voluntary information disclosure as an opportunity to enhance the corporate reputation in the eyes of all concerned parties [40]. Empiric research [26] conducted on the basis of data of American companies in the period of 2002 to 2008 confirms the hypothesis that companies managed by CEOs with an MBA degree disclose voluntarily environmental indicators more often than other companies. Building upon this the authors assert that principal officers who have more academic achievement have a more sophisticated understanding of the sphere and exert a greater impact on corporate performance.

Technical and engineering education is studied less in literature. The existing empiric papers point out that CEOs with technical education usually spend more on investment projects related to research and development than other CEOs [31]. Therefore, it is expected that managers with engineering and technical education will spend more money on disclosure of ESG information. Further this will result in higher financial performance. In paper [28] the authors confirmed such assumption. It turned out that companies managed by directors with technical education have a higher company value expressed by Tobin's Q.

Other papers explore economic / financial education or experience in finance. It is expected that high financial skills and a vast experience will have a positive effect on corporate financial performance which is confirmed by [41].

Taking into consideration the fact that the majority of CEOs in Russia have financial or engineering education and a rather small number have an MBA degree the hypothesis about influence of education looks as follows.

Hypothesis 5. There is a significant positive relation between CEO's financial / economic education and corporate financial performance.

We presume that financial or economic education provides CEO with relevant knowledge and abilities which later results in high financial indicators of a company.

Methodology

Sample Description

The paper uses data of Russian companies of the real sector from the Moscow Exchange index for seven years from 2013 to 2019. In view of absence of some data the panel data is unbalanced. The final sample comprises 82 Russian companies providing 527 observations.

Hypothesis 1 is tested on the complete sample of companies, hypotheses 2–5 – on a reduced sample for five years – since 2015 to 2019. Using these hypotheses influence of CEO's characteristics on corporate financial performance is verified. One of the characteristics included in the model is the CEO's score in the overall rating which was compiled for each year since 2015 to 2019.

Description of Variables

ROA, ROE and market capitalization of companies will be used as *dependent variables* because these indicators exactly are the indicators of financial efficiency most commonly used in literature. ROA and ROE are measured as net income divided by total assets and net income divided by equity, respectively. The variable market capitalization represents company value at the stock exchange. Data on these indicators was obtained from Capital IQ Market Intelligence.

In the first model the fictitious variable of ESG Participation is used as an *independent variable*, it equals 1 if the company discloses ESG indicators or 0 – if the company does not disclose ESG indicators. The data whether the company discloses or does not disclose ESG information was also obtained from Capital IQ Market Intelligence.

The following variables are used as the independent variable in the second model: the CEO's score in the rating, age, CEO's tenure and the fictitious variable which indicates that CEO has or does not have financial or economic education.

In this paper we compiled our own CEOs rating for each year since 2015 to 2019 on the basis of the methodology of the Top 100 CEO rating issued annually by Harvard Business Review since 2013 to 2019 and which idea belongs to researchers of the French business school INSEAD [42]. The rating shows which directors of large public companies have the best performance during their time in office. The distinctive feature of the rating is the fact that it takes into account not just corporate financial performance but also ESG indicators.

Then we describe the methodology on the basis of which a CEO is assigned the score and the rating is compiled.

In order to compile the CEOs rating we selected from the initial sample of 81 Russian public companies only the ones with disclosed ESG indicators and which, consequently, were assigned an ESG score. Thus, the final sample consisted of 43 CEOs representing 33 companies from 11 various industries. The number of CEOs in the sample is bigger than the number of companies for obvious reasons: in some companies CEO was replaced during the considered period. It should also be noted that the rating for each year comprises a different number of CEOs because each year the number of companies which disclose ESG indicators grows. Thus, for example, the rating of 2015 comprises 19 CEOs, the rating of 2016 – 20, 2017 – 24, 2018 – 21, and the rating of 2019 – 33 directors. The ratings were compiled for each year since 2015 to 2019. Thus, there are 117 observations.

In order to compile the financial rating the authors of this methodology used three metrics:

- company profitability with adjustment for the country;
- company profitability with adjustment for the industry;
- change of market capitalization.

As long as our sample comprises only Russian companies the overall financial rating was calculated on the basis of two metrics:

- companies' profitability;
- change of market capitalization.

In order to determine the company profitability the total shareholder return was calculated for the whole CEO's tenure. Such metrics as the total shareholder return was used because it is the most convenient indicator for comparison of companies from various industries. Such indicators as sales, profitability and innovation level are also useful but they differ in various industries and this impedes comparison [43].

The total shareholder return (TSR) is evaluated on the basis of growth of share price and dividend yield per share of a company for this period (BCG Value Creators). We used the following formula to calculate this indicator:

TSR = (Share price as at the end of the period – Share price as at the beginning of the period + Dividend yield) / Share price as at the beginning of the period.

The data on share prices and dividend yield was obtained from the Capital IQ database.

The adjustment of the total shareholder return is determined by subtracting the average return in the industry. This is done to exclude any increase in income which was a result of growth of the whole industry but not the result of achievements and personal characteristics of CEO. In order to get the industry adjustment we obtained from Thompson Reuters the industry average of shareholders' total return for each year since 2015 to 2019. It turned out that after the industry adjustment this indicator is negative for the majority of companies. It means that their profitability was lower than in the whole industry and it does not need adjustment. Therefore we decided not make the adjustment for industry.

Then we calculated change of market capitalization of companies for each year. The directors were assessed by both indicators from 1 (the best) to 33 (the worst). The weighted average of both ratings was the overall financial rating.

At the same time managers were evaluated according to the ESG indicator. For this purpose we took ESG indicators and also assessed directors from 1 (the best) to 33 (the worst). The final rating of CEOs from Russian public companies was obtained on the basis of the overall financial rating with the weight of 70% and ESG rating with the weight of 30%. Then. On the basis of the rating CEOs were assigned scores from 1 to 100 depending on the position in the rating. All ratings are presented in Appendix 2.

The data related to the rest of CEO's characteristics: age, tenure and education was collected manually from publicly available sources, namely annual reports of companies and Capital IQ.

Analysis of existing literature showed that the most common *control variables* used for study of the relation between financial and ESG indicators are the company size and financial leverage. In this paper we also use these variables.

The authors of many studies assert that the *company size* influences both financial performance and ESG indicators. It is emphasized that the larger the company size the higher the probability that the company will disclose ESG information and the higher its ESG indicators because large companies have more resources for disclosure of such information [44]. Apart from that, large companies attract more attention of the society and are always in the limelight, therefore disclosure of ESG information is important for them in order to uphold their reputation [1]. As for influence of the company size on financial indicators the authors of paper [45] point out that a large company size results in economy of scale, such companies have a better access to resources and have a great market power, hence, they have better competitive advantages than small companies.

In the studied literature the company size is defined as a natural logarithm of total assets. In this paper the company size is determined in a similar way.

The *leverage* indicator is associated with business risk which may influence future corporate financial performance [9]. Some papers showed that there was a negative relation between this indicator and corporate financial performance because risks influence the decisions taken by the company management [1].

Various coefficients are used in literature to measure the leverage. The most common are the ratio of total net borrowing to total assets or the ratio of total net borrowing to equity. In our paper we use the leverage measured as the ratio of total debt to equity of the company.

Regression analysis of panel data is the method applied in the empiric part of the paper. In order to conduct this analysis we use the statistical package STATA.

The *model* for verification of the first hypothesis appears as follows:

ROA_{it} / ROE_{it} / Market $Capitalization_{it} = \beta_0 + \beta_1 \cdot ESG\_Participation_{it} + \beta_2 \cdot Firm\ size_{it} + \beta_3 \cdot Leverage_{it} + u_{it} + e_{it}$,

where ROA – the natural logarithm of return on assets;

ROE – the natural logarithm of return on equity;

Market Capitalization – the natural logarithm of market capitalization;

ESG_ Participation – the fictitious variable equaling 1 if the company discloses ESG indicators and 0 – if the company does not disclose ESG indicators;

Firm size – the natural logarithm of total assets;

Leverage – the natural logarithm of the ratio of borrowed assets to equity;

u_{it} – unobserved individual effects;

e_{it} – residual disturbance.

After corresponding tests for choosing the functional model we chose the loglinear model because it allows to approximate distribution of residues to normal ones.

The general arrangement of the model for verification of hypotheses 2–4 is as follows:

ROA_{it} / ROE_{it} / Market $Capitalization_{it} = \beta_0 + \beta_1 \cdot Presence\ in\ rating_{it} \cdot CEO\ score_{it} + \beta_2 \cdot CEO\ age_{it} + \beta_3 \cdot CEO\ tenure_{it} + \beta_4 \cdot Financial\ degree_{it} + \beta_5 \cdot Firm\ size_{it} + \beta_6 \cdot Leverage_{it} + u_{it} + e_{it}$,

where Presence in rating – a fictious variable equaling 1 if CEO in included in the rating; 0 – if CEO is not included in the rating;

CEO score – CEO's score in the rating;

CEO age – CEO's age;

CEO tenure – CEO's time in office;

Financial degree – a fictious variable equaling 1 if CEO has financial / economic education; 0 – if CEO does not have financial / economic education.

Empiric Analysis Results. Conclusions and Discussion

Descriptive Statistics

This section presents information on descriptive statistics of dependent, explicative and main control variables used in the paper (Appendix 1).

Table 1. Descriptive statistics

	Number of observations	Mean value	Standard deviation	Minimum	Maximum
Return on assets (ROA)	527	0.056	0.16	–2.46	1.12
Return of equity (ROE)	527	0.159	1.19	–9.27	17.59
Market capitalization, mln RUB	527	298,999.4	638,301.6	52.4	4,765,920
Total assets, mln RUB	527	791,251	1,925,087	592.17	17,300,000
Leverage	527	1.96	5.623	0	73.65

Source: the author's calculations.

As we see from Table 1 ROA and ROE in our sample take on both positive and negative values. Besides, ROE has a wider range of values. Mean values of both indicators, however, are positive and amount to approximately 5.6% for ROA and about 15.9% for ROE.

ROA and ROE are measured as net income divided by total assets and net income divided by equity, respectively. They are important indicators for investors because they show the efficiency with which company uses its assets and resources, the income which they generate for the company. The higher ROA the more efficiently the company manages its assets, i.e. the company generates more income with smaller investment. Unlike ROE ROA takes into consideration not just shareholders' funds but also borrowed assets. Therefore, the more borrowed funds the company attracts the bigger the difference between ROA and ROE. As for ROE the rule "the higher ROE the better" is not always true. In this case one has to define the reasons for high ROE. On the one hand, if ROE is extremely high it may mean that net income is very high in comparison to equity and this may indicative of high corporate performance. On the other hand, high indicators may be due to the fact that in comparison to net income corporate equity is very small because of a high leverage.

As we see from Table 1 mean values of both indicators are positive, consequently, our sample of companies shows high financial performance and in general companies are attractive for investors.

The market capitalization variable also has a wide range of values. It stems from the fact that the sample comprises both small companies and large corporations. In our case it is not a problem for the research, it just shows the variety of companies in the sample. Apart from that, the differences will be mitigated in transfer to the loglinear model.

The leverage variable is defined as the ratio of borrowed funds to equity of the company. The optimal value of this indicator is the range from 1 to 2 (for larger companies this indicator may exceed 2). However, there is a belief that in case

of too high indicators the financial standing of the company becomes unstable because borrowed funds exceed equity greatly and the company loses its independence. A too low ratio may mean that the company fails to use opportunities. As we see from Table 1 the leverage indicator in our sample ranges from 0 to 73. This parameter cannot be negative because it is calculated by dividing total debt by equity and both of them cannot be below zero. The zero value of this indicator may be interpreted as absence of company's debts and risks related to it. At the same time there are companies with borrowed funds significantly exceeding equity, therefore the indicators exceed seriously the commonly-accepted optimal values. It means that there are outliers in the sample which may actually make our model worse and cause distortion of statistical evaluations and parameters. However, as long as these outliers are not a result of errors in measurement and they provide actual information about our sample and are important data we decided to keep these outliers in the sample. As we see the leverage mean value equaling 1.96 is at the level of the optimal value for this indicator.

The value of "total assets" representing the company size also shows a wide spread but this phenomenon is again due to variety of our sample. As long as the spread of this indicator is too large, on the basis of studied literature we decided to take the logarithm of total assets as a proxy for companies' size.

Then Table 2 presents descriptive statistics of the reduced sample on the basis of which we compiled the rating of CEOs and verified hypotheses about influence of CEO's characteristics on financial performance and influence of the CEO's position in the overall rating. Table 2 shows that ROA and ROE take on positive and negative values. At the same time ROE again has a wide range of values. Mean values of both indicators are positive and amount to approximately 6.9% for ROA and about 18.9% for ROE. The maximum and minimum values of the leverage were at the same level, it means that on average the companies' sample does not differ greatly from the previous one.

Table 2. Descriptive statistics of the reduced sample

	Number of observations	Mean value	Standard deviation	Minimum	Maximum
Return on assets (ROA)	397	0.069	0.11	–0.702	0.65
Return on equity (ROE)	397	0.189	1.45	-9.27	17.59
Market capitalization, mln RUB	397	333,486.2	695,531.3	121.55	4,765,920
Total assets, mln RUB	397	894,025.6	2,200,960	3,178.84	17,300,000
CEO score	397	15.5	28.57	0	100
CEO age	397	49.84	8.89	30	71
Tenure	397	6.59	5.96	1	36
Leverage	397	2.35	7.09	0	73.65

Source: the author's calculations.

There are 123 CEOs in the sample which provide 397 observations. Their average age is 50 years old because the sample comprises younger directors of 30 years old and older ones – of 70 years of age. As for tenure the average time is over six years while the spread of this indicator is also wide: from one year to 36 years. The CEO's score, as explained above, was assigned on the basis of the CEO's position in the overall rating which takes into consideration both corporate financial performance and quality of disclosure of ESG information.

Panel Data Analysis

Hypothesis 1. Companies which disclose ESG indicators have higher financial performance.

Verification of this hypothesis implies answering the question: whether disclosure or non-disclosure of ESG information of the company in its reports has an impact on its financial performance. The hypothesis was verified on the complete sample of companies which comprised 527 observations. For this purpose we built three model specifications which differ in dependent variables. We chose a dummy variable as an independent variable which takes on the value of 1 if the company had been assigned an ESG score or the value of 0 – if the company did not disclose ESG information, and consequently, it had not been assigned a ESG score. For the reason that this variable is not a time invariant one it is impossible to use the fixed effects regression model because in this case time invariant regressors

are eliminated. For this reason, we evaluated a pooled regression and a random effect model. In order to choose the most suitable model from the two abovementioned models we applied the Breusch-Pagan test which verified the model for a random individual effect. The test was conducted for all three model specifications and showed that the zero hypothesis which stated absence of individual effects was rejected at a 1% significance level for all model specifications. Thus, in order to verify the first hypothesis we chose the individual random effects model. The model looks as follows:

$$ROA_{it} / ROE_{it} / \text{Market Capitalization}_{it} = \beta_0 + \beta_1 \cdot ESG\_Participation_{it} + \beta_2 \cdot \text{Firm size}_{it} + \beta_3 \cdot Leverage_{it} + u_{it} + e_{it}.$$

Before interpreting the model results it is necessary to verify it for multicollinearity. For this purpose we calculated VIF. If VIF exceeds 10 there may be serious multicollinearity problems [46]. In our case VIF does not exceed 7.66, therefore multicollinearity should not influence our results.

Table 3 shows the results of the model we obtained. See the complete information on them in Appendix 3.

Table 3. Results of models' evaluation

	ROA	ROE	Market_Capitalization
ESG_Participation	0.311**	0.321**	0.748***
Leverage	–0.147***	0.207***	–0.113***
Firm_size	–0.07	–0.062	0.267***
Constant	–2.175***	–1.099*	7.602***
Number of observations	409	416	493

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: the author's calculations.

As we see in Table 3 the variable responsible for company's disclosure or non-disclosure of ESG information (ESG Participation) is significant in all specifications of the model. In the model with ROA and ROE as a dependent variable it is significant at a 5% significance level and in both cases it is above zero. Moreover, influence of this indicator on ROA and ROE is virtually the same (0.311 and 0.321 respectively). According to the model with market capitalization as the dependent variable this variable is significant at a 1% significance level. Its influence on market capitalization of the company is also positive but is more than twice as high as on ROA and ROE (0.748). It is remarkable that the company size variable is significant at a 1% significance level only in the model with market capitalization. The leverage variable is significant at a 1% significance level in all three model specifications, however, the results concerning influence of this variable are controversial. It was found out that there is a negative relation between the leverage and return on assets as well as between the leverage and market capitalization of companies which conforms to the results obtained in other papers. At the same time it was revealed that the relation between the leverage and return on equity is positive.

It follows that companies disclosing ESG indicators have higher financial indicators and higher market capitalization in comparison to those which do not disclose such information. This means that hypothesis 1 is confirmed.

Hypothesis 2. There is a positive relation between CEO's score in the overall rating and company's financial performance.

In order to verify this hypothesis we used a reduced sample of companies in order to define influence of the CEO's position in the rating on corporate financial performance. CEOs' rating was compiled for each year from 2015 to 2019. It is due to the fact that before 2015 there had been a small number of companies disclosing ESG indicators.

In order to verify the hypotheses we built three model specifications which differed in dependent variables (ROA, ROE, market capitalization). For verification we used a pooled regression and an individual random effects model. The fixed effects model was not verified because there was a fictious variable in it which showed whether CEO had / did not have financial education. It is a time invariant variable, therefore use of the fixed effects model is impossible. The Breusch-Pagan test showed, as in the previous case, that the random effects model is the most suitable one for our regression.

All three model specifications, as in the previous case, were verified for multicollinearity. Analysis of VIF showed that there was multicollinearity in the models. In order to eliminate it we decided to remove the control variable representing the company size. After the second verification VIF did not exceed the optimal values, therefore multicollinearity was not a problem any more. We also conducted tests for heteroscedasticity which proved its presence. So, further we built robust regressions.

The final random effects model for verification of hypotheses 2–5 is as follows:

$$ROA_{it} / ROE_{it} / \text{Market Capitalization}_{it} = \beta_0 + \beta_1 \cdot \text{Presence in rating}_{it} \cdot \text{CEO score}_{it} + \beta_2 \cdot \text{CEO age}_{it} + \beta_3 \cdot \text{CEO tenure}_{it} + \beta_4 \cdot \text{Financial degre}_{it} + \beta_5 \cdot Leverage_{it} + u_{it} + e_{it}.$$

The results of all specifications are presented in Table 4. All obtained results are shown in Appendix 4.

Table 4. Results of specifications

	ROA	ROE	Market_Capitalization
Rating Score	0.0005***	0.002	0.0065***
CEO age	–0.001	0.012	0.02767
CEO tenure	0.002	–0.015	0.0403*
Financial degree	–0.009	–0.016	0.3017*
Leverage	–0.002***	–0.035***	–0.002
ROA	–	–	0.934***
Constant	0.109**	–0.264	9.446***
Number of observations	397	397	397

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: the author's calculations.

Further we are going to consider results of each specification and provide a conceptual interpretation of influence of each variable. In view of the fact that the quality of models is low we decided to add return on assets as a dependent variable to the model with market capitalization in order to improve the model quality. In point of fact, the model quality improved a little because the Wald statistic value increased, therefore we decided to keep the return on assets variable as the explanatory variable in the model with market capitalization. In our case this model is the principal one. Let us pass on to results interpretation.

As we see from Table 4 the variable which we determined as multiplication of the fictious variable of CEO's presence in the rating by his/her score in the rating turned out to be significant at a 1% level in the model with market capitalization. Predictably, influence of this indicator is positive – the higher the CEO's score in the rating the higher the company's market capitalization. The coefficient value amounts to 0.007. It means that if the score grows by 1 point market capitalization increases by 0,7%.

Influence of this indicator in the model with return on assets as the dependent variable was verified in two ways – with the time lag and without the time lag. It was expected that the CEO's position in the rating could influence return on assets with some delay. It turned out that in both cases the variable is significant: in the model with the time lag – at a 1% significance level, in the model without the time lag – at a 5% significance level. We decided to keep the model without the time lag as the final one because of its higher quality. Influence of this indicator on return on assets turned out to be positive (0.0005) which is consistent with our hypothesis on the positive relation between the CEO's position in the rating and corporate financial performance. This leads us to the conclusion that when the CEO's score grows by one point return on assets increases by 0.0005.

In the model with return on equity influence of the CEO's position in the rating was verified in a similar way. However, the results showed that in both models – without the tame lag and with the time lag – the variable was not statistically significant.

Thus, hypothesis 2 was confirmed for two model specifications – for the model with market capitalization and the model with return on assets.

Hypothesis 3. There is a significant positive relation between CEO's tenure and corporate financial performance.

This hypothesis is verified on the same model which is used to verify hypothesis 2. See the obtained results in Table 4.

In the principal model – the one with market capitalization – the "CEO's tenure" variable turned out to be significant at a 10% level. Influence of this variable on corporate financial performance is positive which is consistent with the results obtained in some papers. The coefficient preceding the variable is 0.043. It means that when CEO's tenure increases by one year company's market capitalization grows by 4.3%, i.e. the longer the CEO's time in office the higher the company's market capitalization.

In the other two models – with return on assets and return on equity as dependent variables – the CEO's tenure variable turned out to be insignificant.

Thus, the hypothesis on a positive relation between CEO's tenure and corporate financial performance was confirmed for one model specification out of three – the model with market capitalization.

Hypothesis 4. There is a positive relation between CEO's age and corporate financial performance.

This hypothesis was put forward on the basis of results of previous empiric studies and it was expected that CEO's age is related positively with corporate financial performance.

This hypothesis as well as previous ones was verified for three model specifications. However, in all three specifications the variable of CEO's age turned out to be statistically insignificant.

Thus, hypothesis of a positive relation between CEO's age and corporate financial performance was not confirmed.

Hypothesis 5. There is a significant positive relation between CEO's financial / economic education and corporate financial performance.

According to this hypothesis it was expected that directors with financial and economic education had more relevant knowledge and experience for management of the company. Consequently, it was presumed that companies managed by such directors showed higher financial indicators. The variable responsible for presence or lack of financial education was determined as a fictitious variable. See the results in Table 4.

In the principal model – the one with market capitalization – the variable turned out to be significant at a 10% level. The influence coefficient is positive (0.301). It means that if CEO has financial / economic education the company market value is higher by 30%.

The education variable was also verified using the other two model specifications, however, the results turned out to be statistically insignificant.

Thus, the hypothesis on a positive relation between CEO's financial education and corporate financial performance was confirmed just for one model specification.

Conclusions

The analysis performed in this research paper showed that disclosure of ESG information by a company plays an essential role. The stakeholder theory was confirmed – disclosure of ESG information by a company is perceived positively by buyers, investors and company employees which further results in improvement of financial indicators.

Analysis showed that the CEO's position in the rating which takes into consideration financial indicators as well as ESG indicators exerts a positive impact on market capitalization and return on assets. It was found out that CEO's tenure is related positively with market capitalization and return on assets. Probably, it is due to the fact that a longer time in office allows to obtain relevant experience, consequently, CEO is able to provide higher financial performance for the company. Finally, hypothesis 5 based on the assumption of a positive influence of financial education on corporate financial performance was confirmed partially. The results showed that companies managed by a director with financial education have higher market capitalization.

Thus, all hypotheses put forward in this paper were confirmed in full or partially, except for the hypothesis about a positive influence of CEO's age on corporate financial performance. In all models this CEO's characteristic feature produces no significant impact on considered financial indicators.

Conclusive Statement

In this paper we studied characteristics of CEOs from Russian companies and compiled a rating of CEOs taking into consideration financial and ESG indicators of companies, considered influence of CEO's position in this overall rating on corporate financial performance. We performed corresponding tests in order to choose the best model and a test for possible errors. The random individual effects model was considered to be the best one for verification of suggested hypotheses.

The analysis showed that there was a significant positive relation between the fact of company's disclosure of ESG information and financial indicators which were defined as return on assets and return on equity as well as the market capitalization indicator. The next conclusion states that there is a significant positive relation between the CEO's score in the rating and market capitalization indicator of the company as well as between the CEO's score in the rating and return on assets. We also found out that CEO's financial education exerts a positive impact on market capitalization of the company. Moreover, tenure is related positively to return on assets and market capitalization. However, it turned out that CEO's age did not have a significant influence on corporate financial performance.

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Appendices

Appendix 1. Description of variables

Variable	Description	Source
ROA	Return on assets	Capital IQ
ROE	Return on equity	Capital IQ
Market Capitalization	Market capitalization	Bloomberg
ESG Participation	Disclosure of ESG by the company	Capital IQ
Firm size	Natural logarithm of total assets	Capital IQ
Leverage	Natural logarithm of leverage	Capital IQ
CEO age	CEO's age	Companies' annual reports
CEO tenure	Time in office	Companies' annual reports
Financial degree	Presence of CEO's financial education	Companies' annual reports
CEO score	The score assigned to CEO in the overall rating	Author's calculations
Rating	Presence of CEO in the overall rating	Author's calculations

Appendix 2. CEOs' Ratings

Rating of 2015

CEO's full name	*Ranging by no TSR (1 – the best, 19 – the worst)*	*Ranging by market capitalization (1 – the best, 19 – the worst)*	*Financial rating*	*Ranging by ESG (1 – the best, 19 – the worst)*	*Overall rating*	**Score**
Mikhelson Leonid Victorovich	7	6	3	1	1	100.00
Sechin Igor Ivanovich	10	5	5	2	2	94.74
Shekhterman Igor Vladimirovich	1	9	2	10	3	89.47
Tokarev Nikolay Petrovich	2	7	1	15	4	84.21
Guriev Andrey Andreevich	3	10	3	11	5	78.95
Potanin Vladimir Olegovich	18	1	7	3	6	73.68
Bagrin Oleg Vladimirovich	12	4	6	12	7	68.42
Maganov Nail Ulfatovich	11	8	7	13	8	63.16
Shulginov Nikolay Grigorievich	5	15	10	7	9	57.89
Alekperov Vagit Yusufovich	9	12	11	5	10	52.63
Galitsky Sergey Nikolaevich	17	2	7	17	11	47.37
Larin Vadim Alexandrovich	19	3	12	8	12	42.11
Korsik Alexander Leonidovich	4	19	14	4	13	36.84
Gordeev Sergey Eduardovich	6	16	12	19	14	31.58
Dubovskov Andrey Anatolievich	15	13	17	9	15	26.32
Kalugin Sergey Borisovich	8	17	15	14	16	21.05
Zharkov Andrey Vyacheslavovich	13	18	19	6	17	15.79
Bogdanov Vladimir Leonidovich	16	11	16	18	18	10.53
Shamolin Mikhail Valerievich	14	14	17	16	19	5.26

Rating 2016

CEO's full name	*Ranging by TSR (1 – the best, 20 – the worst)*	*Ranging by market capitalization (1 – the best, 20 – the worst)*	*Financial rating*	*Ranging by ESG (1 – the best, 20 – the worst)*	*Overall rating*	*Score*
Potanin Vladimir Olegovich	9	3	4	3	1	100
Ivanov Sergey Sergeevich	5	7	4	6	2	95
Bagrin Oleg Vladimirovich	3	1	1	15	3	90
Larin Vadim Alexandrovich	2	2	1	18	4	85
Kovalchuk Boris Yurievich	1	8	3	14	5	80
Mikhelson Leonid Victorovich	12	6	8	5	6	75
Sechin Igor Ivanovich	15	4	10	2	7	70
Alekperov Vagit Yusufovich	8	5	6	13	8	65

CEO's full name	*Ranging by TSR (1 – the best, 20 – the worst)*	*Ranging by market capitalization (1 – the best, 20 – the worst)*	*Financial rating*	*Ranging by ESG (1 – the best, 20 – the worst)*	*Overall rating*	*Score*
Shulginov Nikolay Grigorievich	6	12	8	9	9	60
Shamolin Mikhail Valerievich	7	14	12	4	10	55
Maganov Nail Ulfatovich	4	10	7	17	11	50
Shishkin Andrey Nikolaevich	11	9	11	8	12	45
Dubovskov Andrey Anatolievich	10	13	13	7	13	40
Galitsky Sergey Nikolaevich	16	20	18	1	14	35
Shekhterman Igor Vladimirovich	13	11	14	11	15	30
Tokarev Nikolay Petrovich	14	16	15	16	16	25
Kalugin Sergey Borisovich	18	17	17	12	17	20
Guriev Andrey Andreevich	19	18	19	10	18	15
Gordeev Sergey Eduardovich	17	15	16	20	19	10
Bogdanov Vladimir Leonidovich	20	19	20	19	20	5

Rating 2017

CEO's full name	*Ranging by TSR (1 – the best, 24 – the worst)*	*Ranging by market capitalization (1 – the best, 24 – the worst)*	*Financial rating*	*Ranging by ESG (1 – the best, 24 – the worst)*	*Overall rating*	*Score*
Bagrin Oleg Vladimirovich	2	1	1	8	1	100
Dubovskov Andrey Anatolievich	10	6	6	4	2	95.83
Shekhterman Igor Vladimirovich	7	4	3	15	3	91.67
Maganov Nail Ulfatovich	1	3	2	21	4	87.50
Saveliev Vitaly Gennadievich	17	8	10	6	5	83.33
Shilyaev Pavel Vladimirovich	9	2	3	23	6	79.17
Gordeev Sergey Eduardovich	6	5	3	24	7	75.00
Potanin Vladimir Olegovich	4	22	12	5	8	70.83
Alekperov Vagit Yusufovich	3	15	7	17	9	66.67
Galitsky Sergey Nikolaevich	5	24	13	3	9	62.50
Kovalchuk Boris Yurievich	15	10	10	10	9	58.33
Guriev Andrey Grigorievich	14	7	9	14	12	54.17
Bogdanov Vladimir Leonidovich	11	9	8	22	13	50.00
Shulginov Nikolay Grigorievich	21	11	18	1	14	45.83
Ivanov Sergey Sergeevich	13	17	14	13	15	41.67
Shevelev Alexander Anatolievich	8	23	15	12	16	37.50
Grachev Pavel Sergeevich	12	19	15	16	17	33.33

CEO's full name	*Ranging by TSR (1 – the best, 24 – the worst)*	*Ranging by market capitalization (1 – the best, 24 – the worst)*	*Financial rating*	*Ranging by ESG (1 – the best, 24 – the worst)*	*Overall rating*	*Score*
Sechin Igor Ivanovich	18	21	22	2	18	29.17
Mikhelson Leonid Victorovich	16	20	20	7	19	25.00
Oseevsky Mikhail Eduardovich	19	12	15	19	20	20.83
Tokarev Nikolay Petrovich	20	14	19	18	21	16.67
Shamolin Mikhail Valerievich	24	16	23	9	22	12.50
Shishkin Andrey Nikolaevich	22	18	23	11	23	8.33
Dyunning Yan Gezinyus	23	13	20	20	24	4.17

Rating 2018

CEO's full name	*Ranging by TSR (1 – the best, 24 – the worst)*	*Ranging by market capitalization (1 – the best, 24 – the worst)*	*Financial rating*	*Ranging by ESG (1 – the best, 24 – the worst)*	*Overall rating*	*Score*
Sechin Igor Ivanovich	2	5	2	3	1	100.00
Potanin Vladimir Olegovich	4	1	1	6	2	95.45
Mikhelson Leonid Victorovich	1	6	2	4	3	90.91
Shevelev Alexander Anatolievich	7	4	4	1	4	86.36
Grachev Pavel Sergeevich	3	10	5	12	5	81.82
Fedorishin Grigory Vitalievich	12	2	6	10	6	77.27
Ivanov Sergey Sergeevich	5	9	6	17	7	72.73
Kovalchuk Boris Yurievich	8	11	11	8	8	68.18
Guriev Andrey Grigorievich	6	12	9	14	9	63.64
Shilyaev Pavel Vladimirovich	13	3	8	18	10	59.09
Alekperov Vagit Yusufovich	16	7	13	7	11	54.55
Maganov Nail Ulfatovich	10	8	9	19	12	50.00
Tokarev Nikolay Petrovich	9	13	12	15	13	45.45
Shamolin Mikhail Valerievich	19	14	16	13	14	40.91
Shekhterman Igor Vladimirovich	15	19	17	11	15	36.36
Shulginov Nikolay Grigorievich	20	18	21	2	16	31.82
Naumova Olga Valerievna	11	21	15	16	17	27.27
Kornya Alexey Valerievich	18	19	20	5	18	22.73
Saveliev Vitaly Gennadievich	21	15	19	9	19	18.18
Shishkin Andrey Nikolaevich	14	16	14	21	20	13.64
Bogdanov Vladimir Leonidovich	17	17	17	20	21	9.09

Rating 2019

CEO's full name	*Ranging by TSR (1 – the best, 24 – the worst)*	*Ranging by market capitalization (1 – the best, 24 – the worst)*	*Financial rating*	*Ranging by ESG (1 – the best, 24 – the worst)*	*Overall rating*	*Score*
Grachev Pavel Sergeevich	4	5	3	1	1	100
Potanin Vladimir Olegovich	1	1	1	7	2	96.97
Alekperov Vagit Yusufovich	5	3	2	10	3	93.94
Kovalchuk Boris Yurievich	9	8	5	5	4	90.91
Sechin Igor Ivanovich	14	6	7	3	5	87.88
Dubovskov Andrey Anatolievich	2	13	4	15	6	84.85
Shulginov Nikolay Grigorievich	8	16	9	6	7	81.82
Shevelev Alexander Anatolievich	25	2	12	2	8	78.79
Kornya Alexey Valerievich	16	7	8	13	9	75.76
Shekhterman Igor Vladimirovich	15	10	10	11	10	72.73
Livinsky Pavel Anatolievich	10	9	6	25	11	69.70
Oseevsky Mikhail Eduardovich	12	19	16	4	12	66.67
Murov Andrey Evgenievich	11	14	10	19	13	63.64
Mikhelson Leonid Victorovich	27	4	16	9	14	60.61
Kunitsky Vladimir Yakovlevich	6	23	13	20	15	57.58
Bogdanov Vladimir Leonidovich	3	26	13	27	16	54.55
Uzhakhov Bilan Abdurakhimovich	18	11	13	30	17	51.52
Gordeev Sergey Eduardovich	19	18	19	21	18	48.48
Molchanov Andrey Yurievich	22	17	21	17	19	45.45
Shirokov Maxim Gennadievich	17	20	19	26	20	42.42
Tinga Herman Franciscus Johannes	7	28	18	29	21	39.39
Maganov Nail Ulfatovich	30	12	22	23	22	36.36
Tokarev Nikolay Petrovich	28	15	25	16	23	33.33
Saveliev Vitaly Gennadievich	26	24	27	12	24	30.30
Fedorishin Grigory Vitalievich	24	32	29	8	25	27.27
Guriev Andrey Grigorievich	23	29	28	14	26	24.24
Butko Alexander Alexandrovich	20	22	22	31	27	21.21
Tatriev Hasan Kureyshevich	21	21	22	33	28	18.18
Shilyaev Pavel Vladimirovich	13	33	26	24	29	15.15
Shpakov Valery Vasilievich	30	27	30	22	30	12.12
Ivanov Sergey Sergeevich	29	30	32	18	31	9.09
Dyunning Yan Gezinyus	33	25	31	28	32	6.06
Stepanov Sergey Stanislavovich	32	31	33	32	33	3.03

Appendix 3. Verification of Hypothesis 1

Breusch-Pagan Tests

```
Breusch and Pagan Lagrangian multiplier test for random effects

        ROA[comp_num,t] = Xb + u[comp_num] + e[comp_num,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+------------------------------
                     ROA |    .9789072       .9893974
                       e |    .5971977       .7727857
                       u |     .403695         .63537

        Test:   Var(u) = 0
                                 chibar2(01) =     95.87
                              Prob > chibar2 =    0.0000

Breusch and Pagan Lagrangian multiplier test for random effects

        ROE[comp_num,t] = Xb + u[comp_num] + e[comp_num,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+------------------------------
                     ROE |   1.295854       1.138356
                       e |   .7067986       .8407131
                       u |   .4740859        .688539

        Test:   Var(u) = 0
                                 chibar2(01) =    133.78
                              Prob > chibar2 =    0.0000

Breusch and Pagan Lagrangian multiplier test for random effects

        MarketCap[comp_num,t] = Xb + u[comp_num] + e[comp_num,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+------------------------------
               MarketCap |   3.887848       1.971763
                       e |   .3610678       .6008892
                       u |   1.296717       1.138735

        Test:   Var(u) = 0
                                 chibar2(01) =    661.49
                              Prob > chibar2 =    0.0000
```

Final models, verification of hypothesis 1

```
. xtreg ln_roa ESGParticipation leverage Firmsize, re

Random-effects GLS regression                   Number of obs     =       409
Group variable: comp_num                        Number of groups  =        79

R-sq:                                           Obs per group:
     within  = 0.0504                                         min =         1
     between = 0.0268                                         avg =       5.2
     overall = 0.0468                                         max =         7

                                                Wald chi2(3)      =     18.65
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =    0.0003
```

ln_roa	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ESGParticipation	.3110875	.1415742	2.20	0.028	.0336072	.5885678
leverage	-.147255	.0403851	-3.65	0.000	-.2264083	-.0681017
Firmsize	-.0701075	.0473647	-1.48	0.139	-.1629405	.0227256
_cons	-2.175238	.5739017	-3.79	0.000	-3.300065	-1.050412
sigma_u	.63536998					
sigma_e	.77278565					
rho	.40333497	(fraction of variance due to u_i)				

```
. vif,uncentered
```

Variable	VIF	1/VIF
Firmsize	1.79	0.558105
ESGPartici~n	1.61	0.619284
leverage	1.17	0.853408
Mean VIF	1.53	

```
. xtreg ln_roe ESGParticipation leverage Firmsize, re

Random-effects GLS regression                   Number of obs     =       416
Group variable: comp_num                        Number of groups  =        79

R-sq:                                           Obs per group:
     within  = 0.0293                                         min =         1
     between = 0.2066                                         avg =       5.3
     overall = 0.1248                                         max =         7

                                                Wald chi2(3)      =     27.40
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =    0.0000
```

ln_roe	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ESGParticipation	.3205559	.1532227	2.09	0.036	.0202449	.620867
leverage	.206764	.043493	4.75	0.000	.1215193	.2920086
Firmsize	-.0623482	.0505245	-1.23	0.217	-.1613744	.0366779
_cons	-1.09942	.6104463	-1.80	0.072	-2.295873	.0970324
sigma_u	.68853895					
sigma_e	.84071315					
rho	.40146678	(fraction of variance due to u_i)				

```
. vif,uncentered
```

Variable	VIF	1/VIF
Firmsize	1.78	0.560687
ESGPartici~n	1.61	0.619914
leverage	1.16	0.859483
Mean VIF	1.52	

```
. xtreg ln_marketcap ESGParticipation leverage Firmsize, re

Random-effects GLS regression                   Number of obs     =       493
Group variable: comp_num                        Number of groups  =        81

R-sq:                                           Obs per group:
     within  = 0.0857                                         min =         1
     between = 0.5423                                         avg =       6.1
     overall = 0.5122                                         max =         7

                                                Wald chi2(3)      =    100.72
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =    0.0000
```

ln_marketcap	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ESGParticipation	.7478316	.1203564	6.21	0.000	.5119373	.9837258
leverage	-.1125673	.035652	-3.16	0.002	-.182444	-.0426906
Firmsize	.2673199	.0470086	5.69	0.000	.1751848	.3594551
_cons	7.602183	.5850072	13.00	0.000	6.45559	8.748776
sigma_u	1.1387348					
sigma_e	.60088919					
rho	.78219862	(fraction of variance due to u_i)				

```
. vif,uncentered
```

Variable	VIF	1/VIF
Firmsize	1.58	0.633631
ESGPartici~n	1.53	0.652629
leverage	1.07	0.936278
Mean VIF	1.39	

Appendix 4. Verification of Hypotheses 2–5

Final Models

```
. xtreg ln_market_cap Rating_Score CEOAge CEOTenure Financial_degree Leverage, robust re

Random-effects GLS regression                   Number of obs     =       397
Group variable: ceo_num                         Number of groups  =       123

R-sq:                                           Obs per group:
     within  = 0.1143                                         min =         1
     between = 0.1640                                         avg =       3.2
     overall = 0.1933                                         max =         5

                                                Wald chi2(5)      =     31.46
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =    0.0000

                                (Std. Err. adjusted for 123 clusters in ceo_num)
```

ln_market_cap	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
Rating_Score	.0066379	.0019189	3.46	0.001	.002877	.0103987
CEOAge	.0267991	.0173808	1.54	0.123	-.0072666	.0608648
CEOTenure	.0438301	.0229905	1.91	0.057	-.0012304	.0888906
Financial_degree	.2956488	.1734034	1.70	0.088	-.0442156	.6355132
Leverage	-.0034457	.0026441	-1.30	0.193	-.008628	.0017367
_cons	9.531607	.8132472	11.72	0.000	7.937672	11.12554
sigma_u	1.347762					
sigma_e	.39406268					
rho	.9212448	(fraction of variance due to u_i)				

Model with ROA added as the dependent variable, verification of hypotheses 2–5

```
. xtreg ln_market_cap Rating_Score CEOAge CEOTenure Financial_degree Leverage ROA ,robust re

Random-effects GLS regression                   Number of obs     =       397
Group variable: ceo_num                         Number of groups  =       123

R-sq:                                           Obs per group:
     within  = 0.1427                                         min =         1
     between = 0.2008                                         avg =       3.2
     overall = 0.2271                                         max =         5

                                                Wald chi2(6)      =     59.23
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =    0.0000

                                (Std. Err. adjusted for 123 clusters in ceo_num)
```

ln_market_cap	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
Rating_Score	.006529	.001902	3.43	0.001	.0028011	.0102569
CEOAge	.0276793	.0172913	1.60	0.109	-.006211	.0615696
CEOTenure	.0403632	.022709	1.78	0.076	-.0041456	.0848719
Financial_degree	.3017572	.1734121	1.74	0.082	-.0381244	.6416387
Leverage	-.0024317	.002113	-1.15	0.250	-.0065731	.0017097
ROA	.9344388	.2379108	3.93	0.000	.4681422	1.400735
_cons	9.445502	.8108338	11.65	0.000	7.856297	11.03471
sigma_u	1.331282					
sigma_e	.38850301					
rho	.92152093	(fraction of variance due to u_i)				

```
. vif, uncentered
```

Variable	VIF	1/VIF
CEOAge	3.13	0.319290
CEOTenure	2.44	0.410007
Financial_~e	1.53	0.653720
Rating_Score	1.42	0.706428
ROA	1.41	0.711367
Leverage	1.12	0.889647
Mean VIF	1.84	

```
. xtreg ROA Rating_Score CEOAge CEOTenure Financial_degree Leverage, robust re

Random-effects GLS regression                   Number of obs     =       397
Group variable: ceo_num                         Number of groups  =       123

R-sq:                                           Obs per group:
     within  = 0.0039                                         min =         1
     between = 0.1294                                         avg =       3.2
     overall = 0.0616                                         max =         5

                                                Wald chi2(5)      =     26.62
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =    0.0001

                                (Std. Err. adjusted for 123 clusters in ceo_num)
```

ROA	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
Rating_Score	.0005679	.0001819	3.12	0.002	.0002115	.0009244
CEOAge	-.0010988	.0008812	-1.25	0.212	-.0028259	.0006283
CEOTenure	.0017667	.0011203	1.58	0.115	-.000429	.0039624
Financial_degree	-.0093719	.0147448	-0.64	0.525	-.0382712	.0195274
Leverage	-.0018644	.0005804	-3.21	0.001	-.0030019	-.0007269
_cons	.1090462	.0443907	2.46	0.014	.022042	.1960504
sigma_u	.06994794					
sigma_e	.09171727					
rho	.36774132	(fraction of variance due to u_i)				

Model with time lag for the CEO's score, verification of hypotheses 2–5

```
. xtreg ROA 1.Rating_Score CEOAge CEOTenure Financial_degree Leverage, robust re

Random-effects GLS regression                   Number of obs      =       272
Group variable: ceo_num                         Number of groups   =        94

R-sq:                                           Obs per group:
     within  = 0.0008                                         min =         1
     between = 0.1107                                         avg =       2.9
     overall = 0.0516                                         max =         4

                                                Wald chi2(5)       =     12.24
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0317

                                  (Std. Err. adjusted for 94 clusters in ceo_num)
------------------------------------------------------------------------------
             |               Robust
         ROA |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
Rating_Score |
         L1. |   .0006031   .0002814     2.14   0.032     .0000517    .0011545
             |
      CEOAge |  -.0003008   .0010765    -0.28   0.780    -.0024107    .0018092
   CEOTenure |   -.000846   .0011425    -0.74   0.459    -.0030852    .0013932
Financial_~e |   .0099896   .0171552     0.58   0.560    -.0236341    .0436132
    Leverage |   -.000764   .0008127    -0.94   0.347    -.0023568    .0008289
       _cons |    .088302   .0557158     1.58   0.113    -.0208989    .1975029
-------------+----------------------------------------------------------------
     sigma_u |  .07823996
     sigma_e |  .07686043
         rho |  .50889367   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. vif, uncentered

    Variable |      VIF       1/VIF
-------------+----------------------
      CEOAge |     2.91    0.343744
   CEOTenure |     2.43    0.410902
Financial_~e |     1.53    0.653720
Rating_Score |     1.37    0.729571
    Leverage |     1.11    0.903225
-------------+----------------------
    Mean VIF |     1.87

. xtreg ROE Rating_Score CEOAge CEOTenure Financial_degree Leverage, re

Random-effects GLS regression                   Number of obs      =       397
Group variable: ceo_num                         Number of groups   =       123

R-sq:                                           Obs per group:
     within  = 0.0043                                         min =         1
     between = 0.1713                                         avg =       3.2
     overall = 0.0403                                         max =         5

                                                Wald chi2(5)       =     16.41
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0058

------------------------------------------------------------------------------
         ROE |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
Rating_Score |   .0023427   .0025967     0.90   0.367    -.0027467    .0074321
      CEOAge |   .0120749   .0086133     1.40   0.161    -.0048069    .0289567
   CEOTenure |  -.0147617   .0126734    -1.16   0.244    -.0396011    .0100777
Financial_degree |  -.0155583   .1602168    -0.10   0.923    -.3295774    .2984608
    Leverage |  -.0347521   .0102415    -3.39   0.001    -.0548251   -.0146792
       _cons |  -.2640545   .4315222    -0.61   0.541    -1.109822    .5817135
-------------+----------------------------------------------------------------
     sigma_u |          0
     sigma_e |   1.399166
         rho |          0   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Model with time lag for CEO's score, verification of hypotheses 2–5

```
. xtreg ROE l.Rating_Score CEOAge CEOTenure Financial_degree Leverage, re

Random-effects GLS regression                   Number of obs     =       272
Group variable: ceo_num                         Number of groups  =        94

R-sq:                                           Obs per group:
     within  = 0.0319                                         min =         1
     between = 0.0555                                         avg =       2.9
     overall = 0.0245                                         max =         4

                                                Wald chi2(5)      =      3.79
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =    0.5807
```

ROE	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Rating_Score						
L1.	.0016711	.0039822	0.42	0.675	-.0061338	.009476
CEOAge	.0177648	.013387	1.33	0.185	-.0084733	.0440029
CEOTenure	-.0243816	.019516	-1.25	0.212	-.0626321	.013869
Financial_degree	.0149237	.2452288	0.06	0.951	-.465716	.4955634
Leverage	-.0122254	.0149708	-0.82	0.414	-.0415676	.0171168
_cons	-.477964	.6764805	-0.71	0.480	-1.803841	.8479134
sigma_u	.52713353					
sigma_e	1.4351902					
rho	.11886761	(fraction of variance due to u_i)				

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Relationship between Board Characteristics, ESG and Corporate Performance: A Systematic Review

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Abstract

In recent years researchers have been paying significant attention to Environmental, Social, Governance (ESG) principles as a crucial factor in company performance. This paper aims to summarize the trends and findings in academic literature devoted to the board of directors as a determinant of ESG performance and non-financial disclosure quality. This paper also summarizes the key findings for a board's moderating effects on the impact of ESG on corporate financial performance. The results of qualitative analysis of more than 70 empirical papers demonstrate that board independence is the most widely considered parameter, interpreted as a positive factor for strengthening a board's monitoring function according to agency theory. There is no consensus on board size: larger boards include directors who represent the interests of a wider range of stakeholders (stakeholder theory), however, the increase in board size leads to a complication of decision-making and controlling processes. Researchers mostly agree that an augmentation of women' and foreigners' representation among directors positively affects ESG performance and disclosure quality, although the lack of critical mass may dilute this effect. As for CEO's role in the board, while some researchers argue that CEO duality enhances agency conflict, deterring corporate transition to ESG, other authors claim that a CEO's organizational power may enhance the ESG transition due to a faster implementation of board decisions. One of the crucial determinants for this effect is the board members' diversified professional expertise, including specialized education and experience, for the effective monitoring of managers' performance. Finally, there is a growing interest in the role of board sustainability committees, which accumulate the required professional expertise for developing environmental and social strategies (resource-based theory). By examining the key board characteristics' effect on corporate ESG performance and disclosure quality, this paper contributes to corporate governance literature, expanding the field for further research. Moreover, the paper highlights several understudied issues for further research.

Keywords: corporate governance, board of directors, agency theory, resource-based theory, stakeholder theory, critical mass theory, ESG

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In recent years the study of implementation of ESG (Environmental, Social, Governance) practices in the board of directors' agenda has become very common in academic and business circles [1]. Researchers attribute it to the growing concern with the negative anthropogenic impact on the environment and climate change [2], increasing consumer and employee awareness of environmental and social responsibility issues [3], rising regulatory pressure on companies in terms of all three elements of ESG practices [4]. This attracts more attention to corporate ESG practices and reports of the main interested stakeholder parties that include consumers, employees, suppliers, investors, communities and government authorities in the regions of operation. As a result, an increase of ESG's importance for the formation of market value and companies' investment attractiveness is observed [5]. Consequently, in the years to come, models that forecast company value with regard to ESG factors need to be and are already being created by researchers [6].

An essential component of such evaluation models should be the quality of corporate governance (G factor). This paper is a systematic review of the most relevant studies dedicated to the influence of the board of directors' characteristics on the efficiency of implementation of ESG principles and practices in the corporate sector that aims to reveal the principal trends, systemize the key results and define the lines of further research. This subject of research has been chosen because the board of directors determines the corporate development strategy [7] and is meant to control the management's actions aimed at the implementation of this strategy, including prevention (mitigation) of agency conflict [8–10]. Besides, in the existing papers researchers are mainly focused on the individual characteristics of the boards of directors and consider them together on rare occasions.

This research has been carried out aiming to define the key trends in academic literature, which studies the influence of the board of directors' characteristics on performance and ESG disclosure indicators. The paper systemizes and presents the results of over 70 empirical studies published in the last five years and conducted based on an analysis of samples comprising companies from developed and emerging markets: a total of over 247,000 observations from 1990 to 2019. The review also interprets the conclusions of empirical papers based on corporate governance theories: agency theory, stakeholder theory, resource-based theory, critical mass theory. We also reveal the topics that are of interest for further research. So, the review is of value from both a theoretical and an applied viewpoint. We expect that this paper will enhance the knowledge of corporate governance, which is of special relevance a rapid adaptation to new conditions and challenges is required, and will define the lines of further research.

Methodology of Review Preparation

In the last few years, the issue of influence of the board of directors' characteristics on implementation and efficiency of ESG practices has been considered thoroughly in academic literature. For the purpose of this research, we sought and selected papers using the Scopus citation database and followed the steps described below:

- search for the papers published from 2017 to 2022 with the following words and word combinations in their titles, abstracts and keyword lists: Board of Directors, Corporate Governance, ESG, ESG Performance, ESG Disclosure, Corporate Social Performance, Corporate Social Responsibility;
- filtering of papers published in academic journals in 2017–2022;
- using filters according to relevance of the knowledge area to which the paper pertains and adding the following knowledge areas according to the Scopus classification: Business, Management and Accounting; Economics, Econometrics and Finance; Social Sciences;
- choosing papers with five or more citations.

The interim sample consisted of over 420 papers in Scopus journals. We subsequently selected the papers from the interim sample in the following way:

- qualitative analysis of papers' abstracts;
- consideration of journal quality: first and second quartile papers.

Thus, 60 empirical papers were selected. They consider the influence of one or several parameters of the board of directors on ESG indicators, efficiency in corporate social responsibility (CSR) and environment protection, as well as quality of ESG/sustainable development/CSR reports. The sample also comprises 11 papers on impact of the board of directors on a company's financial and innovative efficiency against the ESG background. The final sample consisted of 71 papers; see the division of the papers by their topic and studied markets in Table 1.

Table 1. Division of papers by their topic and samples

Country	ESG performance	Quality of ESG disclosure	Corporate performance with regard to ESG	Overall quality of disclosure	Total number of observations
International samples					
Companies from power generation, oil and gas, logistics, agricultural-industrial and other industries	9	2	2	1	103,895
Developed countries					
USA	6	1	3	1	68,836
Italy	3		1	1	1,973
Great Britain	3	1	1	2	16,414
Spain		3	1	1	3,485
European Union (companies from several EU countries)	2		1	1	7,308
France	2				1,754
Republic of Korea	1				1,450
Australia		1			345
Emerging countries					
India	1	1	1		21,076
Persian Gulf countries	1				504
Malaysia	2	2			2,464
Iraque				1	168
Pakistan		1	1		3,450
Latin America (Brazil, Mexico, Chile, Argentina, Colombia)	2				1,406
China	1	1			11,444
Turkey				1	615
Thailand		1			600
Bangladesh		1			1,005

ESG performance is evaluated using the following:

- special ratings, including Bloomberg ESG Disclosure Score, Sustainalytics, MSCI, Thomson Reuters Eikon (ASSET4, Thomson Reuters ESG Score), Dow Jones Sustainability Index;
- indicators of CO_2 emissions and implementation of ecological innovations;
- CSR indices compiled by paper authors.

Quality of ESG reports is defined using the following:

- analysis of reports on compliance with GRI standards;
- analysis of integrated reports on meeting IIRC standards;
- other indices defining reports' quality compiled by paper authors;
- third-party certification of reports by the Big Four companies.

A company's performance indicators with regard to ESG factors in the considered papers include the following:

- financial indicators and market value indicators, including ROA, Tobin's Q, changes and stock price volatility, etc.;
- a company's level of financial risks;
- return on investment in R&D.

We singled out the papers that consider the influence of the board of directors and its committees on the quality of

financial and non-financial reports (except for ESG ones) in general, including:

- third-party certification of reports by the Big Four companies;
- fact of report revocation;
- disclosure of non-financial reports in accordance with international standards (i.e., related to intellectual capital).

As long as the authors of published papers assess the influence of the board of directors on ESG from the point of view of various parameters, we will present these papers grouped together on the basis of the parameters considered most frequently:

- size and independence of the board of directors;
- diversity of the board of directors, including representation of women and foreigners on the board;
- expertise (including education and experience) of the board's members;
- tenure of the board's members;
- CEO role in the board of directors;
- board of directors' committees: characteristics of the sustainable development committee are provided in the review individually as those of a special-purpose committee.

Quantitative analysis of the influence determined from the papers (positive or negative) on dependent variables is performed for each characteristic feature, including:

- ESG ratings;
- other indicators of ESG performance;
- indicators of ESG report quality;
- performance indicators against the ESG background;
- indicators of report quality in general.

Parameters of the Board of Directors and ESG

Board Size and Independence

The majority of studies include the parametres of board size and independence models. Generally, a large number of independent directors is considered as a positive factor for the implementation of ESG practices [11]. Using over 800 USA companies as an example, authors [12] demonstrate the positive influence of an increase in the share of independent directors on corporate social performance explaining it by enhancement of the monitoring function of the board of directors. Similar results were obtained in [13], which studied a sample of 54 Italian public companies over the period of 2011–2014. After conducting an analysis of an international sample of 540 companies from Forbes Global 2000, which represent various non-financial industries, the authors of [14] confirm the positive role of independent directors because they provide an opportunity to obtain a more impartial assessment of the management's activity. The authors of these papers consider the influence of independent directors from the viewpoint of strengthening the monitoring of management's activity, or, otherwise speaking, from the viewpoint of the *agency conflict theory* and the ability of independent directors to mitigate it or reduce agency costs [8; 9]. Besides, a positive influence of independent directors on the implementation of ESG practices and disclosure is explained from the perspective of *stakeholder theory* and greater confidence of external stakeholders in such directors [15; 16]. Independent directors strive to improve their professional reputation [9; 17] and they are to a greater extent committed to a long-term performance of companies achieved through ESG, among other things [18]. Finally, independent directors have more opportunities to prevent managers' manipulations with sustainable development reports [19].

There are other points of view concerning the underlying reasons for the positive influence of board independence the efficiency of ESG practice implementation. After studying the sample of 688 Persian Gulf countries, the authors of [20] found a confirmation of the positive influence of independence of the board of directors on ESG disclosure explaining this effect by the expertise of external directors. These conclusions are consistent with the results of other papers, where the composition of the board of directors is examined from the viewpoint of the *resource-based theory,* and where independent directors are perceived as an external source of knowledge, experience and relations [7]. Some authors also emphasize the value of a "fresh perspective" of independent directors for the company and its strategy [21; 22].

It is important to note that some papers impugn the exceptionally positive role played by independent directors in the efficiency of implementation of ESG practices. Thus, after studying a sample of 38 companies from Malaysia, the authors of [23] indicate the absence of a statistically significant influence of the share of independent directors on the ESG rating by Thomson Reuters Eikon. Paper [24] also reveals that the influence of the share of independent directors on the level of corporate social responsibility (CSR) and value generation in companies that use CSR practices is insignificant. This may stem from the fact that some independent directors may lack the necessary "specific" knowledge and experience to monitor management's actions.

As for the impact of the board size on the efficiency of implementation of ESG practices, researchers' opinions differ to a much greater extent for all that this parameter is added to the majority of models. On the one hand, the expansion of a board of directors allows to improve its monitoring opportunities [19; 25], attract more directors with different education and experience [26; 27], represent the opinions of a greater number of stakeholders [28]. All these factors enhance corporate sustainability and responsibility. On the other hand, having too many directors complicates the decision-making process [29] and com-

munication inside the board of directors, as we mentioned above. Consequently, some researchers consider the possibility of non-linear influence of the size of the board of directors on corporate performance [30], assuming that up to a certain point the expansion of the board improves the quality of adopted decisions and control of their implementation. Meanwhile, after the "breakpoint" is achieved, this expansion, on the contrary, complicates corporate governance, impeding quick decision-making and implementation of innovations.

Conclusions of empirical papers in regard to the effects of increase in the size and independence of the board of directors in the banking sector are summarized in Table 2.

Table 2. Empirical results: size and independence of the board of directors

	Significant positive effect	Significant negative effect	Significant positive effect	Significant negative effect
	Board Size		Board Independence	
Bloomberg ESG Disclosure Score	5	1	9	
DJSI Index			1	
MSCI ESG Rating			2	
Sustainalytics				1
Thomson Reuters ESG Score	1	4	6	1
Thomson Reuters ASSET4			1	
Other indicators of ESG performance	2	1	4	1
Quality of ESG disclosure	7	2	8	3
Corporate performance with regard to ESG	5	2	5	3
Overall quality of disclosure	3	2	2	2

Thus, although the majority of researchers indicate a positive influence of the independence of the board of directors on implementation of ESG practices, it is not clear whether this factor is always positive. It appears necessary to consider the possibility of non-linear influence of both size and independence level of the board of directors on ESG practices.

Board Diversity

The next part of the research is dedicated to the influence of diversity of the board of directors on its ability to efficiently implement ESG practices in corporate strategy. Papers related to the diversity of expertise (special knowledge, skills, experience) are described in a separate section. In this section we will examine the studies focused on the role of female directors in the efficiency and disclosure of ESG, as well as the impact of female directors on ESG performance and disclosure, as well as the role of national diversity of the board of directors.

The majority of researchers think that women's presence on boards of directors is a positive factor of implementation of corporate environmental and social responsibility practices [24; 31; 32]. Paper [33] analyzes a sample of Chinese industrial companies, which demonstrated a positive influence of admitting women to boards of directors on corporate environmental and social responsibility indicators; moreover, this effect is stronger in the sectors that are subject to greater environmental impact risks (metallurgy, mineral extraction, power generation etc.). The results are confirmed by paper [34], which used a sample of 1,390 companies from 21 European Union countries. Relying on *stakeholder* and *resource-based* theories, research authors assert that female directors tend to act as a catalyst in achieving an effective balance between corporate financial objectives and social responsibility, confirming the conclusions of a number of previous studies [20; 35; 36]. Some researchers show that the presence of female directors can enhance the positive effect of other board of directors' ESG-related characteristics. For instance, paper [37] demonstrates that an increase in the share of female directors enhances the positive effect of external relations that company directors have on ESG indicators. Besides, some papers associate women's membership in boards of directors with a decrease of financial risks due to the improvement of ESG practice efficiency [38].

On the other hand, there are studies in academic literature, whose results indicate that the influence of female directors on ESG may be insignificant or negative. For example, paper [13] is one of such studies. The research authors revealed a significant negative effect of the share of women

on the board of directors on the ESG disclosure indicator as per the Bloomberg ESG Disclosure Score. They believe that this is due to the fact that the expertise of directors is more important for ESG disclosure than "demographic" characteristics. Also, the researchers who have described the insignificant influence of the share of women on boards of directors on ESG efficiency and disclosure explain it from the viewpoint of the *critical mass theory*, which asserts that the nature of group interactions depends on the group size. This theory implies that when a minority group achieves a certain threshold, the so-called critical mass, qualitative changes in interactions within the group begin to take place [39]. Research [40] offers an interpretation from the perspective of this theory, which studies ESG disclosure in 35 Italian companies from FTSE-MIB index, according to which significant positive changes in ESG reports are characteristic of the companies with three or more women on the board of directors. Notably, the authors revealed a positive influence of female directors on CSR indicators (Social) and corporate governance (Government), with an insignificant influence on environmental indicators (Environmental). In general, these conclusions are consistent with the ones of some other papers [41; 42].

In studies of a range of emerging countries, the believe that the negative effect of influence of the share of women on the board of directors is due to the special features of cultural and public life. In research [43] of Indian companies, the authors emphasize a small representation and role of women in social relations in this country, which entails a negative influence of female directors on ESG disclosure. Similar results were obtained, for example, for companies from Pakistan [44]. Results of [28] are also of interest. They concern 176 companies from Brazil, Mexico, Columbia and Chile: the authors note the insignificance of female directors' influence on ESG in these countries in comparison to men, and attribute it to the cultural pattern of Latin America, where men are more prone to share collectivism and social responsibility values than in North America and Western Europe. A study [45] of boards of directors in BRIC countries (Brazil, Russia, India, China) and their effect on the relationship between CSR and corporate financial performance also emphasizes the importance of the cultural pattern. The research indicates that under the conditions of hierarchical and individualistic culture of the members of the board of directors, a positive effect of CSR practices on financial indicators is nullified, while a great collectivism, tendency to compromise solutions and openness of directors, on the contrary, enhance the positive effects of CSR.

Diversity of a board of directors from the perspective of the native country (*national diversity*) as an ESG factor is also studied in academic literature. Research [12] uses the example of a sample of USA companies and emphasizes a positive influence of national diversity of the board of directors on the extent of corporate social responsibility. This effect may be due to the fact that such companies accommodate the interests of a wider range of stakeholders (*stakeholder theory*). The authors of [46] agree with this interpretation of "internationalization" effect of the board of directors on ESG efficiency (concerning Environmental). Based on analysis of 120 public companies from France, research [47] confirms a positive influence of foreign directors on the efficiency of environment protection and on relations with local communities. In terms of the *resource-based theory*, it is due to a new vision, ideas, knowledge, experience and social relations brought by foreign directors. This is consistent with the results of [48]. For instance, foreign directors often have a better knowledge of current environment protection requirements in different countries and of opportunities to increase corporate environmental responsibility. A large share of foreigners on the board of directors provides cultural diversity and, consequently, mitigation of a possible negative effect of various preconceptions and prejudices of all members of the board. Although in general the papers that confirm a positive influence of foreign directors on ESG prevail in academic literature, some researchers call this effect into question. The authors of [49] studied the influence of the board of directors' characteristics on the attestation of sustainable development reports in Chinese public companies, and revealed a negative influence of an increased share of foreign directors on such attestation.

Conclusions of empirical papers on the effects of diversity of the board of directors' composition are summarized in Table 3.

Table 3. Empirical results: diversity of composition of the board of directors

	Significant positive effect	Significant negative effect	Significant positive effect	Significant negative effect
	Board diversity: female directors		Board diversity: foreign directors	
Bloomberg ESG Disclosure Score	7	3	1	
MSCI ESG Rating	1		2	
Sustainalytics	1		1	
Thomson Reuters ESG Score	6	1	1	

	Significant positive effect	Significant negative effect	Significant positive effect	Significant negative effect
Thomson Reuters ASSET4	1			
Other indicators of ESG efficiency	3	2	1	
Quality of ESG reports	8	1		3
Company's efficiency in regard to ESG	2		2	
General report quality	2	2		

In general, the conducted analysis is indicative more of a positive influence of the board of directors' diversity on implementation of ESG practices and improvement of disclosure quality. Nevertheless, researchers and business practitioners have to take into consideration potentially constraining factors of the possible effects of directors' diversity, including representation of a certain group, the country's culture pattern and possible complication of the decision-making process.

Board Expertise

Among the existing studies dedicated to the influence of the board of directors on ESG, a significant number of papers is focused on board members' expertise. In the existing studies, the notion of expertise is interpreted rather broadly, including education [29; 50], work experience in some industry [51] or specific positions [52–54]. In general, the expertise of the board members is considered from the point of view of their human (knowledge, skills) and social (relations, professional reputation) capital in terms of the *resource-based theory,* according to which the corporate strategy and its feasibility depend on available resources, including human resources.

In the existing academic literature, the directors' experience is widely considered an efficiency factor of implementation of ESG practices and reports. Research [53] of a sample of over 150 public Spanish companies is an example of such a paper. The authors studied the directors elected out of "external" candidates (rather than from among employees) and define three types of expertise in their paper: business experts (directors experienced as top managers, including top managers currently working as such in other companies), specialists (directors with long-term experience in a certain narrow niche, including finance, law, technology and engineering, or those with specific experience in a corresponding industry) and opinion leaders (politicians, heads of non-commercial organizations, other public persons). Each type of director represents its own type of expertise: business experts embody management expertise, specialists denote focused expertise in a certain professional area, opinion leaders largely stand for relations and reputation, as well as expertise in communication with external stakeholders. At the same time, the results of the paper demonstrate that only the specialist director type improves quality of disclosure in terms of corporate and social responsibility; moreover, this influence is more profound in case of strong CEO power. An increase in the share of directors who are business experts and opinion leaders lowers the level and quality of CSR disclosure. These findings are interesting because of the evidence from both resource-based and agency theories' perspectives. On the one hand, the importance of directors' experience for the CSR disclosure has been confirmed; on the other hand, the paper demonstrates that "external" directors with necessary expertise not only mitigate negative effects of the chief executive officer's "power" (CEO power that will be described in detail below), but also help to use it in order to generate corporate value by complying with the sustainable development principles.

Interestingly, these conclusions are consistent with the findings of the studies dedicated to influence of expertise on the general corporate value generation strategy. For example, research [51] on a sample of companies from the S&P 1500 confirms that companies operating in more complex and knowledge-intensive industries elect directors with special industry-related expertise, while "autocratic" CEOs try to impede the election of such directors, who are more capable of monitoring management's actions. The authors believe that the positive effect of directors with industry-related expertise is due to specialized knowledge, as well as a vision and understanding of the environment in the industry and social relations with industry participants. At the same time, research [52], examining 83 Spanish companies, indicates that independent directors with political experience also can improve the quality of CSR disclosure (according to Global Reporting Initiative – GRI) due to better understanding of the importance of compliance with sustainable development practices for external stakeholders, understanding of mechanisms of communication with external stakeholders concerning CSR issues, society's greater attention to politicians and, consequently, public pressure on companies.

A positive effect of "specialized" experience is confirmed for both environmental efficiency and corporate responsibility indicators. Thus, paper [54] studies the influence of experience and social relations of independent directors on greenhouse gas emissions in British companies from FTSE 350. The authors confirm that the presence, number and a longer tenure of directors with experience in subdivisions and organizations specializing in anthropogenic (including industrial) impact on the environment results in decreased

greenhouse gas emissions. At the same time, the authors do not confirm a significant effect of directors' "technical" expertise in a broader sense. Relations between such directors in different companies also entails reduction in greenhouse gas emissions in the observed companies due to greater capabilities of such directors in knowledge and experience exchange. Paper [55] demonstrates empirical results that confirm the positive influence of "specialized" experience on sustainable development and corresponding disclosure in a company by means of analyzing the specialized expertise of boards of directors and quality of sustainable development reports (according to GRI) of Malaysian companies. The authors also manage to verify the positive effect of additional sustainable development trainings for directors.

Some authors consider the size of the board of directors to be an indicator of directors' expertise diversity [27]. In general, researchers positively assess the influence of expertise diversity on ESG efficiency and quality of information disclosure, explaining it by the understanding of ESG's importance for value creation [56] and a tendency to implement innovations in corporate operations [57]. However, at the same time they note a risk of occurring and/or escalation of conflicts within the board of directors, which impede and slow down decision-making processes [29; 57].

Some researchers add the parameter of the board members' education to their models. For instance, researchers of [12; 45] confirm a positive influence of directors' education diversity on CSR indicators due to an understanding of interests of a wide range of stakeholders. These conclusions are in line with the results of other papers [58; 59]. Paper [60], dedicated to the influence of board characteristics on CSR disclosure in Malaysian public companies, emphasizes the importance of board diversification in terms of educational levels: directors with a relatively lower educational level (bachelors, masters) may have more practical skills, while directors with a higher educational level (PhD, DSc) have a wider range of theoretical knowledge and more advanced skills of information synthesis and analysis. The directors' educational level and academic major define their role in corporate governance and, consequently, their influence on adopted decisions. Thus, the abovementioned research of companies of S&P 1500 confirms an enhanced role of the board of directors depending on the educational level (bachelor's degree, master's degree, MBA). Besides, it was revealed that in most cases directors with a degree and experience in the legal or financial spheres, as well as the ones experienced in consulting play more significant roles on the board of directors: such directors become board (or committees') chairs more often, defining corporate strategy.

Conclusions of empirical papers on the effects of diversity of education and experience of the board members are summarized in Table 4.

Table 4. Empirical results: diversity of expertise of board members

	Significant positive effect	Significant negative effect	Significant positive effect	Significant negative effect
	Education: level		Education: major	
Bloomberg ESG Disclosure Score	2			
MSCI ESG Rating	2			
Other indicators of ESG performance	1	1		1
Quality of ESG disclosure	2		2	
Corporate performance with regard to ESG	1	1	1	1
Overall quality of disclosure	1			
	Sustainable development / CSR experience		Experience in finance, law, industrial sciences	
MSCI ESG Rating	1		1	
Thomson Reuters ESG Score	1		1	
Other indicators of ESG performance	1			
Quality of ESG disclosure	2	1	3	
Corporate performance with regard to ESG			2	
Overall quality of disclosure			1	

	Significant positive effect	Significant negative effect	Significant positive effect	Significant negative effect
	Industry-specific experience		General management and political experience	
MSCI ESG Rating	1			
Thomson Reuters ESG Score	1		1	
Quality of ESG reports	1		2	1
Corporate performance with regard to ESG	1			

The above review revealed significant discrepancies in existing papers. While the majority of researchers confirm the positive role of diversity of directors' expertise, the effects of each type of expertise on ESG remain unclear.

Board Tenure

In academic literature, some researchers consider board members' tenure parameter, similar to CEO tenure widely used in literature. Fewer studies are dedicated to this issue in terms of ESG comparing to the above-described characteristics, however, some authors add this parameter in their models. Thus, the authors of [61], who have studied influence of board diversity on CSR efficiency in the US companies, confirm a positive influence of tenure diversity (expressed as existence of groups of directors with different tenures) on the CSR level, which is mainly due to a decrease in the number of components of concern (CSR concerns). A positive effect of diversity of board members' tenure periods was revealed for CSR disclosure as well in the above-mentioned paper [60]. Conclusions on a positive influence of diversity in directors' tenures on CSR are confirmed for an international sample of 42 countries [62] as well. Besides, on the one hand, so far as the tenure period increases, directors promote corporate sustainable development to a greater extent, on the other hand, it is a non-linear relationship, i.e., it is only true to a certain point. A negative effect of the board tenure on CSR disclosure quality after a certain value (after 10 years as a director) is confirmed empirically in paper [63], which used textual analysis of annual reports made by Australian companies.

A positive effect of diversity in board members' tenures may be due to the fact that companies with directors who have different tenures have a wider range of expertise, and for this reason are more efficient in monitoring [64]. Apart from that, speaking of "new" directors, researchers emphasize their "fresh perspective" in addition to new expertise [22]. At the same time, on average a director needs a longer tenure to get into the swim of things, for example, in comparison to a CEO, because on average they can spare less time on working the company; meanwhile, it is pointed out that when they perform a director's functions, on the one hand, they obtain the needed experience and knowledge about the company, and on the other hand, they get involved in social relations inside the company, which limits their ability to perform independent monitoring. This factor confirms the significance of a well-balanced structure of the board of directors from the power perspective.

CEO's Role on Board

A significant block of studies considers the influence of CEO power and, in particular, CEO's membership in the board of directors on the efficiency of ESG practices and quality of reports. The so-called CEO duality, otherwise speaking, CEO's simultaneous functioning as the board chairperson, is considered extensively in academic literature [20; 65]. A significant number of researchers characterize CEO duality as a negative factor for implementation of ESG practices and information disclosure. This effect is explained from the viewpoint of agency theory, according to which top-managers, including CEO, are more concerned with short-term performance indicators [66] because CEO's remuneration depends on them, so they do not try to accommodate the interests of a wide range of stakeholders [28] or to disclose additional ESG information [14]. CEO duality and CEO power mostly deter board's ability to monitor top-managers' actions efficiently.

Other indicators of CEO power considered in scientific literature are CEO ownership [10; 51], CEO tenure [67], CEO remuneration comparing to remuneration of other top-managers [68], in comparison to board members[69]. The majority of researchers generally consider CEO power a negative factor for efficiency and ESG disclosure. Moreover, research [70] conducted on a sample of 155 public companies from Bangladesh shows that CEO power can "dilute" the positive effects of the board of directors' parameters. These conclusions are similar to the ones regarding [65] European companies, which state that CEO's chairmanship of the board of directors is a negative factor that diminishes the positive effect of CSR on corporate financial performance.

It is important to note that academic literature offers evidence of the positive influence of CEO power on ESG. Research [43] of a sample of 386 Indian public companies points out the positive role of CEO power in ESG disclosure, which may be due to the fact that "autocratic" CEOs have an opportunity to carry into effect the decisions of the board of directors on the implementation of ESG practices more actively. The authors of research [26] on S&P 500 companies using the Bloomberg ESG Disclosure Score came to similar conclusions. Above-mentioned research [53] on Spanish public companies demonstrated that CEO

power in combination with the directors' required expertise may promote the implementation of CSR disclosure practices, while CEO power itself was a negative factor. A study [68] of a sample of German public companies reveals that CEO power enhances positive effect of better ESG performance on corporate return on assets (ROA), when there are a separation of executive and monitoring corporate governance functions (two-tier system), and a well-developed institutional environment focused on promoting corporate social responsibility. These findings are typically confirmed by result of other academic papers that indicate that the board of directors can mitigate the negative effect of excessive CEO power, first of all, due to increased independence and diversity of expertise [71]. Using a sample of British companies from FTSE 350, the authors of [72] indicate that stakeholders assess CEO power positively in case of high-quality ESG disclosure. The authors explain this effect from the viewpoint of the *agency theory*: in their opinion, quality of ESG disclosure improves internal governance and monitoring practices within the company; at the same time, the CEO power level as such is a negative factor for corporate value generation.

Conclusions of empirical papers on effects of director tenure diversity and CEO's role on the board of directors are summarized in Table 5.

Table 5. Empirical results: tenure diversity and CEO's role in the board of directors

	Significant positive effect	Significant negative effect	Significant positive effect	Significant negative effect
	Board Tenure		CEO Duality	
Bloomberg ESG Disclosure Score		1	4	3
DJSI Index				1
MSCI ESG Rating	1		2	
Sustainalytics				1
Thomson Reuters ESG Score			1	4
Thomson Reuters ASSET4				1
Other indicators of ESG performance		1		2
Quality of ESG disclosure	2	1		6
Corporate performance with regard to ESG	2	1	5	2
Overall quality of disclosure				2

Thus, in spite of the prevalent viewpoint in academic literature, which corroborates the negative influence of CEO's participation and their significant role on the board of directors on ESG, there is evidence that such participation may be favourable in case of a large number of independent directors and directors with necessary expertise. It is necessary to conduct further studies of CEO's influence in implementation of ESG practices that take into consideration the parameters of the board of directors' independence and expertise.

Board Committees

A range of studies examine the characteristics of special-purpose committees of boards of directors and their influence on the implementation of ESG practices in corporate operations. Existence and parameters of a special-purpose committee for sustainable development (or corporate social responsibility) are considered most often [73]. Thus, using a sample of European companies added to STOXX EUROPE 600 from [74] as an example, the authors reveal a positive influence of existence of a special-purpose committee on the CSR level. It consisted in adding the company to Dow Jones Sustainability Index Europe (DJSI Europe). Besides, the authors indicate a strengthening of influence of the CSR committee on high performance in this field in case of an increase in the share of independent directors and the directors with CSR-related experience. These conclusions are partially consistent with the results [75] obtained for an international sample of agricultural and industrial companies. The authors confirmed a positive effect of the existence of a sustainable development committee for the evaluation (rating) of a company's environmental responsibility; at the same time, the influence on implementation of ecological innovations was insignificant. The positive influence of the existence of the sustainable development committee on ESG indicators is confirmed by a study of an international sample of 540 companies from Forbes Global 2000 [14], logistics companies [24], hotel and tourism companies [76], and 400 power generating companies using the ESG rating of Thomson Reuters Eikon [77].

Table 6. Empirical results: committees of the board of directors

	Significant positive effect	Significant negative effect	Significant positive effect	Significant negative effect
	Board Sustainability committee		Board Audit committee	
Bloomberg ESG Disclosure Score	3			
DJSI Index	2			
Thomson Reuters ESG Score	5			
Other indicators of ESG performance	3			
Quality of ESG disclosure	4		2	1
Overall quality of disclosure			4	

Research [13] explains the positive influence of the existence of a sustainable development committee on the ESG rating of Italian companies by the fact that committee members have the necessary specialized expertise. A study [46] of a sample of 1,870 companies from 25 countries also confirms the positive influence of the existence of a sustainable development committee on quality of ESG disclosure: this effect strengthens along with an increase in the share of women on the board of directors and in the dependence of CEO's remuneration on ESG indicators. In two studies of an international sample of 130 companies that compile integrated reports in accordance with IIRC[1] recommendations, the authors indicate that the existence of a CSR committee improves the quality of both non-financial[2] [78] and integrated reports [79].

From among the papers dedicated to the influence of sustainable development committees on corporate sustainable development indicators, we should single out research [80]. It was conducted on an international sample of 177 companies in the real sector. The authors carried out a complex analysis of sustainable development committees and found out that in accordance with the *agency theory*, the share of independent directors and CEO's non-membership in the committee have a positive impact on the indicator of external assessment of a company's sustainability based on the Dow Jones Sustainability World Index. They also revealed positive effects of female directors' membership in the committee. At the same time, the influence of the size of the sustainable development committee turned out to be negative. The authors point out that in Europe, where the external institutional environment facilitates sustainable development to a greater extent, the influence of a special-purpose committee on the level of corporate social responsibility is significantly smaller.

Apart from the SD committees, some researchers study the influence of audit committees on the level of corporate sustainability and social responsibility, first of all, in relation to the quality of ESG disclosure. Paper [81] is of interest. It considers the influence of characteristics of an audit committee on the quality of sustainable development reports of British public companies measured through external certification of reports by the Big Four companies. Considering the characteristics of the audit committee from the viewpoint of the *resource-based theory*, the authors confirmed the positive influence of an increase in the share of independent directors and share of directors with financial expertise on the quality of sustainable development reports. Interestingly, although the influence of the share of directors with financial expertise is significant in the audit committee, the impact of this parameter for the board of directors in general turned out to be insignificant. The authors also indicate a positive influence of active functioning of the board of directors in general and the audit committee, which implied the number of meetings per year, on the quality of the sustainable development report. Results obtained by the authors are consistent with the conclusions of [9], which state that the audit committee accumulates directors with the necessary expertise, i.e., revealing manipulations with reports and other types of financial fraud, thus enhancing the importance of this committee's independence. Another research study [82] conducted on a sample of Spanish public companies indicates that the engagement of audit committee members outside of the company degrades the quality of ESG reports, reducing its monitoring opportunities, which is an indirect confirmation of conclusions of the previous paper and other studies, i.e., research [58] that analyzes a sample of 120 Turkish public companies. The authors also point out the positive effect of assigning female directors, who are prone to pay more attention to issues of impact on the environment and corporate social responsibility, to the committee [28]. This conclusion is also made by the authors of research [83] that analyzes [83] Iranian companies. They assert that the presence of female directors on the audit committee mitigates

[1] International Integrated Reporting Council.

[2] In this study the authors analyzed quality of disclosure concerning intellectual capital on the basis of their own methodology comprising 14 indicators of disclosure concerning various components.

the risk of report revocation; this effect is strengthened if female directors on the audit committee have financial expertise or are independent. A series of studies point out that the positive influence of independent directors on quality of ESG reports is stronger if they are members of the audit committee because in this case there is a greater opportunity to prevent manipulations with reports and opportunistic actions of top management in general [19].

Conclusions of empirical papers on the effects of the sustainable development and audit committees of the board of directors are summarized in Table 6.

The existing papers generally confirm the positive effects of the sustainable development committee on implementation of ESG practices. Apart from that, some authors point out the significance of parameters of the audit committee for ESG disclosure. Nevertheless, it should be noted that the majority of researchers only add the variable of presence of the sustainable development committee within the board of directors to their models. They consider its characteristics, for example, the membership of executive and independent directors, their work experience, diversity, etc., less frequently. A "qualitative" analysis of characteristics of audit committees is performed on a much more frequent basis, but at present the influence of a range of parameters (directors with both professional and financial expertise, membership of foreign directors, characteristics of the committee chairman) on the implementation of ESG practices and improvement of disclosure quality has not been studied. Finally, the existing literature barely considers the parameters of strategy committees, as well as HR and remuneration committees as factors of implementation of ESG practices. It seems that academic research should be geared towards a more detailed study of characteristics of the board of directors' committees.

Conclusion

In this paper we have reviewed the most relevant papers dedicated to the influence of characteristics of boards of directors on ESG that have been published in the last seven years. We consider principal board characteristics (size, independence, diversity, expertise, directors' tenure, CEO role, committees) and key theories (agency, stakeholder, resource-based, critical mass theory),. Many researchers consider board independence as facilitating factor for ESG implementation in corporate operations by means of enhancing the opportunities to monitor top-management's actions and offering a "fresh perspective" on the company, although this factor may also lessen the positive effects due to an insufficient involvement of external directors in corporate or industry specifics.

Board diversity is also generally considered as a positive factor for ESG: larger share of female directors enhances the level of corporate responsibility, while foreign directors may offer new knowledge and competences. Some researchers point out that it is necessary to maintain diversity among directors in terms of tenure in order to combine the experience of "old" directors (not just industry-specific, but also the company-specific experience) with broader perspectives and the new knowledge offered by "new" directors. At the same time, according to the critical mass theory, insufficient representation of these groups on the board of directors may become a deterrent for these parameters. Researchers also point out the importance of board diversity in terms of education (in both the level and the academic major) and professional experience; besides, some papers emphasize the importance of "specialized" (or "functional") competences, including law, finance, technical skills, etc.

Conclusions of the existing studies regarding a CEO's role on the board of directors seem most ambiguous: CEO power deters board capability to monitor top-management's actions efficiently; CEOs also often focus on high short-term indicators at the expense of the measures that create long-term company value, including ESG. At the same time, some researchers point out the potential positive effects of CEO's membership in the board of directors by means of enhancing the opportunities to speed up the implementation of development strategies. Finally, some papers consider the influence of the existence and characteristics of the sustainable development committee on the implementation of ESG principles and while there is a general consensus on the issue of the positive influence of existence of specialized committee, researchers' conclusions on the influence of its parameters are more dubious.

Our review allowed to obtain the results that may be used by researchers as well as business practitioners, especially in the ongoing period of significant changes in approaches to and parameters of corporate governance in Russian companies due to the social and economic challenges and political instability, which intensified in 2022. The research may be continued as an econometric study of the influence of characteristics of boards of directors and their committees on the efficiency of implementation of ESG practices in Russian companies and value creation with regard to these practices.

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Why Do We Need to Examine Leadership Concepts and Styles in Finance? Literature Overview

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Abstract

In the contemporary world, leadership concepts are associated with managerial literature. As a rule, scholars define a leader as a person with a certain set of positive characteristics that enable them to lead people and contribute to the successful development of a company. However, the concept of financial efficiency has to be factored into the effective development of a company. At the same time, personal characteristics of top managers, such as overconfidence, narcissism, excessive risk-taking, usually have a negative connotation in financial literature.

This review includes a study of the development of various leadership concepts in management-related literature. The leader's main personal characteristics are highlighted according to the literature. It also explores the relationship between the concepts of a leader and a manager. The literature devoted to the relationship between the concept of a transformational leader and company performance has also been studied.

The key conclusion of this literature review is that certain personal characteristics of top managers can have a positive effect on a company's performance if they are considered from the point of view of transformational leadership. This confirms the need for a deeper study of the relationship between managers' personal characteristics and a company's financial efficiency, especially in the context of sustainable development and the concept of transformational leadership.

Keywords: leadership, leadership concepts, leadership styles, transformational leadership, management, managers' personal characteristics, company performance

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Introduction

Today, the concept of a successful top manager is becoming one of the key and most hotly debated areas of research. Scholars examine an extensive list of managers' characteristics, including different personality traits, such as age, gender, education, and tenure, as well as behavioral traits, such as overconfidence, narcissism, risk-taking, and so on. Depending on the perspective of the reviewer, the presumed impact of these traits on decision-making and performance may be completely different.

Management-related literature often refers to the topic of leadership. Considering a specific top manager – not as a successful manager but as a leader who determines the vector of a company's development – we find that a completely different list of personal characteristics comes to the fore. However, the issue of leadership is still extremely debatable. Who is a leader in the modern context? How can we identify them? What qualities should they possess in order to contribute to the successful operation of a company in such a complex and unstable world? And an especially important question is: how could these leadership concepts be applicable in the field of financial research?

The most complicated issue is that the significance of certain characteristics under specific conditions cannot be extrapolated to other circumstances. Various other factors, such as cultural characteristics, a company's organizational structure, corporate culture, the scope of company activities, and so on, need to be considered. However, at the same time, it is worth noting that the portrait of a leader of the future, capable of sharing their ambitions with subordinates through inspiration and motivation, is already very similar to the concept of a transformational leader. This concept is especially relevant today, when the idea of corporate transformation for the sake of sustainable development comes to the forefront. It is also important to examine whether the company's activity depends on a particular type of leader, and if it does, how this dependence can be measured using the existing financial metrics.

However, in order to define the leader of the future, it is necessary to trace the history of development of the leadership concept in financial literature. It is important to move on from the analysis of various theories to understanding and identifying a leader with a particular style. It is also significant to clarify how a manager differs from a leader and what features become especially relevant for the emergence of a new type of CEO.

The paper examines the evolution of the theory and leadership styles that prevail in academic literature on management. The relationship between the transformational leader and firm performance, which, in turn, is especially relevant for research in the field of finance, is also considered.

Leadership Theories

Trait Theory

The debate on whether leadership involves a certain set of qualities and characteristics acquired within a professional lifetime has always been relevant. A number of researchers do agree that despite the lack of explicit scientific justification, the theory of the great man can be considered relevant to this day [1]. The position of the leader changes, being transformed from that of a hero to that of a "savior" CEO with innovative views, capable of fully influencing the development and vision of the company [2]. Researchers believe that a true leader possesses a certain set of traits that can help identify and clearly distinguish them from a non-leader. Scholars have examined a variety of such traits. Conventionally they could be divided into those that are inherited, such as height, weight, facial features, sense of humor, intelligence and self-confidence, and those that one acquires directly through life experience, such as scholarship, knowledge, and work experience [3]. However, this conceptual approach has been criticized because similar traits can be found in leaders and their followers. At the same time, some studies find a correlation between traits and leadership [4].

The trait theory was pushed forward after the development of the Five-Factor Model of Personality (FFM) and the establishment of its relationship to leadership [5]. This model is one of the most widely used tools that allow to reflect on and explore the characteristics of the human personality [6; 7]. It includes:

- Extraversion.
- Agreeableness.
- Conscientiousness.
- Neuroticism (opposite of Emotional Stability).
- Openness to Experience (Intellect).

These characteristics may or may not be inherent in an individual to varying degrees, and are measurable. At the same time, they do not influence each other and are not interrelated. Thus, McAdams [8] states that this model can be applied to the study of personality issues, but agrees that it is not an exhaustive description of human personality. In his review of this model, Bass [9] reveals how each trait can be characteristic of a leader, which allows FFM to be used to develop the trait theory. To corroborate this view, Judge et al. [4] found a strong correlation between FFM traits and leadership criteria. This means that characteristics such as leader emergence or leadership effectiveness can be studied using FFM.

Contingency Theory (Situational)

The main criticism of the trait theory refers to the manifestation of many personal characteristics at a specific time in a specific place. For this reason, the situational leadership theory has spread, claiming that a leader's characteristics depend on a number of different circumstances. Moreover, at times when certain skills may be needed, others may be irrelevant. Of course, this can be countered with the argument that a true leader must have a complex set of necessary skills that will make them a leader in any situation, and that the ability to adapt directly to current circumstances is also one of the key leadership qualities. However, one of the main assumptions of this theory is the significant relationship between the leader and the subordinates.

It states that leadership qualities and the leader themselves do not develop individually, but in tandem with their subordinates. Moreover, adaptability is not a special trait of a leader, but merely the ability to switch between different traits depending on external factors. Thus, the success of a leader largely depends on their ability to build the right mechanisms for interacting with their team [10].

Style and Behavior Theory

The researchers specifically aimed to identify the ways in which a leader's behavior directly affects company performance and satisfaction of the subordinates. The scholars attempt to investigate the leader's interaction with their subordinates, especially the decision-making process [11]. Yukl identifies three main types of leader behavior: *task-oriented* behavior aims to improve the existing problem-solving efficiency; *change-oriented* behavior helps to overcome the difficulties that emerge in new adaptive conditions; *relations-oriented* behavior is aimed specifically at strengthening the connection between the leader and the team [12].

A key feature in the development of behavioral leadership theories was the view of leadership skills as a set of acquired qualities that an individual can potentially develop, rather than inherent traits. This means that almost any manager can potentially become a successful leader. The key task set by the researchers was to identify these characteristics. However, the main difficulty lies in the fact that different circumstances require different characteristics. Moreover, it is also important to consider the leader's well-being. For example, a change-oriented or relations-oriented leader may be more unstable in terms of personal satisfaction than a task-oriented leader [13].

Servant Leadership Theory

In the early 1970s, a new theory was put forward, and the concept of a servant leader was formed. This is an empathetic leader who is focused on the problems, anxieties and experiences of their subordinates. The main task of such a leader is to help their subordinates gain independence, new knowledge, and inner satisfaction [14; 15]. However, it is worth noting that scientists today are questioning the servant leadership theory. There is not even a generally accepted definition of a leader of this type. Also, this theory requires a clear understanding of the research context. Another factor is the extensive list of metrics used to explain this type of leadership. However, the important thing is that this type of leadership can be one of the most effective if the main aim is to improve the conditions and satisfaction of subordinates, [16].

Transactional theory

The transactional theory of leadership is also based on the interaction between the leader and their subordinates. Here, the leader acts as an overseer and controller of the subordinates' activities, and the effectiveness of interaction is precisely achieved through the mechanism of incentives and checks [9; 17–18], which is why this theory is also called the *management theory*. Here, the leader achieves maximum efficiency through a clear understanding of the current task, as well as through a clear formulation of this task to subordinates. The leader must also monitor and control the activities of their subordinates. The main goal of leadership is to achieve the goals of the organization. At the same time, it is also necessary to concentrate on the balance between employee satisfaction and productivity, but, once again, this is achieved mainly through rewards and punishments [19; 20]. It is also worth noting that the transactional theory of leadership has formed the basis of managerial practices for effective management [21], and that it is one of the most popular approaches in modern research [19].

Transformational leadership theory

The most relevant and popular theory today is the theory of transformational leadership. Its foundations were laid by Burns [22] and developed in the work of Bass [9], and it also considers the relationship between the leader and the followers. However, in its case, the cornerstone of these relations is the leader's ability to motivate their subordinates with their personal qualities. A leader's charisma enables them to inspire their followers, thereby increasing the latter's motivation to achieve goals. Leaders are endowed with certain qualities, such as charisma, optimism, confidence, and extraversion. Moreover, the leader must have their own vision of the company's future, and be able to share this vision with their subordinates [17; 23–25]. Here, an important component is the formation of a sense of unity among subordinates and work for the benefit of a future ambitious goal, rather than the understanding of the need to complete the current task in exchange for a reward. The theory of transformational leadership is now by far the most widely discussed [26; 27], with a large number of created metrics and consideration of various factors. But the interaction mechanisms and the very transformation of subordinates still need to be confirmed and explained [28].

Leadership styles

Multifactor Leadership Theory and main leadership styles

However, having dealt with the key theories from an ideological perspective, the researchers faced the key issue of developing the metrics required to identify a particular type of leader and subsequently explore the impact of a particular leader on various company characteristics, such as performance, employee satisfaction, innovative activities, etc. Moreover, outdated theories did not offer clarity in regard to leader identification; they also basically described the relationship between the leader and the team in a rather abstract way. Furthermore, the main emphasis was placed on the study of leadership in organizations where everything came down to evaluating the effectiveness of the subordinates' performance [29]. At the same time, certain motivation-related factors, other than monetary rewards or promotions, were not examined. Exploring other mech-

anisms of interaction between a leader and subordinates, [30] formed the concept of a transformational leader, and later developed the *Multifactor Leadership Theory* (MLT), which includes three main leader types: transactional, transformational and laissez-faire. According to this theory, almost every manager or director could be identified as a leader of a certain or an adjacent type [31; 32].

The Multifactor Leadership Questionnaire (MLQ) proposed by Bass & Avolio [33] became an instrument that allowed to identify the type of leader and has gained great popularity among scientists due to its theoretical validity, as well as applicability for empirical research. Hargis et al. [34] identified the three main factors of MLQ acceptability:

- Ability to identify the three main types of leader behavior: transformational, transactional, and non-leadership (or laissez-faire).
- Despite criticism [35], the model finds support in the scientific community [17; 36–38].
- This model also studies the skills that can be acquired through learning; moreover, these skills can have a significant effect on the activities of a group or enterprise [39].

MLQ is a survey form that respondents fill out, answering questions related to their leader (typically their supervisor).

Transformational Leadership style

As previously described, the early transformational type of leader is directly associated with the ability to motivate and inspire subordinates to perform more ambitious tasks. In other words, we can say that the transformational leader is focused on the organization's long-term prospects, they are ready to explain the importance of the decisions made to achieve the needed result by their own example [20]. Most scientists are inclined to believe that there are four main patterns, which together form a transformational leader [40–42]:

a) Charisma or Idealised Influence has to do with creating a kind of a role model leader for the subordinates, whom they are willing to follow unconditionally. Even at times of major transformations within the company, subordinates trust their leader and are willing to share their vision [40; 43]. This trait is often compared to charisma [44]. However, charisma is more of an abstract concept, and, depending on the field of knowledge, it can take on completely different meanings.

b) Inspirational motivation is also related to employee motivation, but in contrast to individual motivation (increasing personal well-being or receiving praise), here motivation appears through a sense of belonging to something greater, namely to the company [40]. Moreover, we also believe that in this case employee motivation transcends personal barriers and achieves a set of higher goals. This is accomplished through motivational or public speeches, where the leader demonstrates confidence or optimism regarding common goals and ideals. In this context, confidence and optimism may not act as behavioral biases that lead to negative consequences, but rather, confidence in their decisions increases the employees' desire to overcome themselves and achieve previously unattainable goals through engagement and enthusiasm [45].

c) Intellectual Stimulation refers to the leader's ability to encourage subordinates to perform certain tasks. It can be additional non-material motivation, i.e., the leader may be able to offer a new vision of a seemingly unsolvable problem. Also, the important point here is that the leader should hear and understand their subordinates properly in order to individually leverage each of them [40; 43].

d) Individualized Consideration also expands the notion of an individualized approach to each of the subjects. In order to competently achieve the set goals, the leader must clearly analyze the weaknesses and strengths of each subordinate. An individual approach to motivation is also required. The leader must be able to sense when and in what form encouragement is necessary. All of these things together help subordinates to feel valued and to achieve their goals [40].

In his article, Hay [40] also summarized the main identifying characteristics of a transformational leader:

Characteristics of transformational leaders:

- clear sense of purpose, expressed simply (e.g. metaphors, anecdotes);
- considerate of employees' personal needs;
- value driven (e.g. have core values and congruent behavior);
- listens to all viewpoints to develop spirit of cooperation;
- strong role model;
- life-long learners;
- high expectations;
- identify themselves as change agents;
- persistent;
- enthusiastic;
- self-knowing;
- able to attract and inspire others;
- perpetual desire for learning;
- strategic;
- love work;
- effective communicator;
- emotionally mature;
- courageous;
- risk-taking;
- risk-sharing;
- visionary;
- unwilling to believe in failure;
- sense of public need;
- mentoring.

- able to deal with complexity,
- uncertainty and ambiguity;*Source*: [40].

Transactional Leadership style

Yet another approach to leadership is the transactional, or managerial, leadership style. As described above, a transactional leader uses a system of rewards and punishments as a formal force to achieve optimal control over their subordinates [17]. According to the Bass [30], a leader of this type can be described by the following four basic characteristics:

1) *Contingent Reward:* Offers an exchange of rewards for effort, promises rewards for good performance, recognizes accomplishments.
2) Manage*ment by Exception (active):* Watches and searches for deviations from rules and standards, takes corrective action.
3) *Management by Exception (passive):* Intervenes only if standards are not met.
4) *Laissez-Faire*: Abdicates responsibilities, avoids making decisions.

Successful Manager versus Leader

It is also important to understand whether there is a difference between a successful manager and a successful leader. In leadership studies, the role of the CEO or a member of the top management is usually investigated. The logical question here is – what if the manager is not a leader at all? This is where the laissez-faire type of leader comes into play. It is a manager who does not take on any responsibility and is unable to motivate their followers in any way, so they do not intervene in the processes, only acting as an observer [46; 47].

However, despite the fact that this type of leadership is recognized as destructive for both the company and for subordinates [48; 49], it is still possible to find positive effects from a leader of this type under different circumstances. It all depends on the context and different behavioral patterns of such a manager [50].

Of course, we can distinguish between various types of leaders, such as transactional and transformational leaders. However, in this context the transactional leader will be the portrait of a successful manager. However, semantically, the words manager and leader have different meanings. Moreover, there is empirical research that proves that people can distinguish between a manager and a leader [51].

The concepts of a leader and a manager certainly overlap, but they also have notable differences [52]. Management functions can potentially provide leadership; leadership activities can contribute to managing. Nevertheless, some managers do not lead, and some leaders do not manage [53]. Algahtani [54] in his paper claimed that leaders can create new opportunities or visions, while managers should apply them within the company.

Moreover, thanks to empirical experiments, we can see that the qualities characteristic of a successful manager may not be characteristic of leadership [51; 54]. Therefore, this question should be approached very carefully. Of course, this is especially relevant when examining behavioral biases. Researchers should be honest about the context in which they might investigate overconfidence, overoptimism, or inadequate risk-taking. Depending on the context, we can see that these biases tend to have a negative effect, although narcissism or overconfidence can have a positive effect on certain aspects of company performance [55], and overoptimism could also be positively correlated with firms' innovative activities [56]. However, this characteristic could have a negative effect in other cases, such as mergers or acquisitions [57; 58].

In other words, the context itself and the purpose of the study are important. For example, [59] precisely analyzed how a narcissist differs from a transformational leader. The study led the authors to conclude that these two concepts often overlap. Of course, in accordance with previous studies, a transformational leader should take responsibility for making a decision and should be confident in their actions. However, the key question becomes how to understand when this self-confidence is "healthy," and when it becomes "unhealthy" for the organization. In other words, it is very difficult to distinguish between a successful transformational leader and a complete narcissist with unreasonable confidence and inadequate risk-taking.

According to the authors, the most important thing is to be able to clearly recognize a narcissist, for whom the company is only one tool used to achieve selfish personal goals, as well as identify a transformational leader who considers themselves a tool used by the company to achieve common and noble goals.

Transformational leadership and company performance

Of course, transformational leadership is one of the most relevant topics in management-related literature. There is an entire list of articles that set out to study transformational leadership and business innovation, however, from the point of view of financial literature, the most relevant question is probably how transformational leadership is aligned with company performance.

Before starting to consider this problem, it is crucial to understand precisely what is meant by the term 'company performance.' It is a rather complex concept, but in the context of transformational leadership, the company's operational and financial performance are usually examined.

However, in the majority of cases researchers do not study the direct effect of transformational leadership on company activities. As a rule, intermediate influence is taken into consideration. For example, we can assume that transformational leadership has a positive effect on a company's innovative activity, on the efficiency of subordinates' work or on the knowledge sharing process. These variables, in turn, will have a significant effect on company performance.

First, it is worth starting with the company's innovative activity. One of the key points is the contribution of the transformational leader to the process of spreading knowl-

edge within the company. Also based on such characteristics as individual stimulation, the leader can motivate each employee to engage in intellectual and creative work [60; 61]. This leads to an increase in the company's innovation activity [62], which, in turn, has a positive effect on company performance [63–65]. Also, a study of a sample of 606 small and medium-sized enterprises from Thailand demonstrated that the positive effect of a company's innovative activities achieved thanks to transformational leadership also positively affects a company's financial activities [66]. In general, reliability of results is also greatly influenced by company size, i.e., in large corporations, the role of a single leader may be blurred. For this reason, the results for small and medium-sized enterprises confirm the effect of the transformational leader on company performance with greater reliability [67].

The next step is to consider the impact of a transformational leader on their subordinates. Thus, by motivating and inspiring their colleagues, the leader increases their efficiency, helps to achieve an understanding of corporate culture, and promotes compliance with high organizational standards [68]. In this manner, transformational leadership affects operational efficiency, thereby increasing the company's efficiency [69]. Moreover, transformational leadership increases employee competitiveness, which also has a positive effect on firm performance [70]. Transformational leadership also has a positive impact on the effectiveness of a team of top managers, but it is important to consider the fact that they must have a common leadership style, otherwise the effect may be the opposite [71]. Through the mechanism of sharing common values and a vision of the future, the transformational leader also aligns themselves with the improvement of the company's ethical culture, which also leads to enhanced performance [72].

Conclusion

An analysis of the concept of leadership allows us to conclude that these theories can be considered beyond the framework of managerial or psychological research, i.e., in the context of corporate finance research. The connection between the transformational leader and company performance is already apparent. Moreover, one of the most important points is that this relationship is usually positive, while various behavioral characteristics may be viewed in a negative context. Scholars should aim to precisely identify various traits of a leader to understand the effect they have on different factors. As previously noted, it is extremely difficult to distinguish between an iconic transformational leader and a narcissist. Furthermore, the relationship between the leader and the team is also of paramount importance. In this regard, the concept of transformational leadership is highly relevant and in demand in the current literature. Perhaps, by separating out conditional patterns, it will be possible to develop managers' much-needed soft skills required for harmonious and sustainable development, in addition to hard skills. Of course, it is extremely important to distinguish between fields of study as well, for example, in medicine or educational institutions, the mentor's role may be much more important, while the leader's characteristics may also vary.

However, the very concept of a transformational leader cannot be ignored in the contemporary world. It becomes especially relevant in the new paradigm of sustainable development when a company needs qualitative changes. Here the visionary leader will be able to influence a company's long-term development, which in turn will be reflected in the value of the company. In this connection, research in the field of finance can also analyze leadership concepts, finding answers by considering the issue of company performance from a new viewpoint. Moreover, leadership research can have an impact on the human capital issue. Having closely studied the specific characteristics of a transformational leader that coincide with a positive result, it will be possible to develop new skills in the top management team. For now, we are considering the problem in the context of the qualities that are best avoided. But if we could see the qualities that can and should be developed in ourselves, would it give us a greater chance to answer the question of what the CEO of the future is like?

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