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CEO Personal Traits and Company Performance: Evidence from Russia

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Abstract

This research investigates the impact of CEO positive traits, particularly transformational leadership and vision, on firm performance. Despite substantial literature acknowledging the significance of leadership traits on organizational outcomes, there remains a gap in understanding the explicit role of a CEO's vision and how it influences firm performance. Our study aims to address this gap, focusing on the empirical linkage between the CEO's vision and a firm's return on assets (ROA). To find the empirical evidence 35 companies were selected. The CEO's letters to shareholders from annual reports were investigated using the LIWC-22 program to estimate the CEO's positive characteristics. The findings reveal a significant positive relationship between the CEO's vision and firm performance, suggesting that organizations led by visionary CEOs tend to perform better. These results carry practical implications, emphasizing the importance of fostering visionary leadership qualities within CEOs to drive organizational success. The study contributes to the extant literature on transformational leadership, offering a nuanced understanding of the role of vision and laying the groundwork for future research in this area.

Keywords: CEO, transformational leadership, positive traits, financial performance, CEO's vision, CEO's positive emotions

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Introduction

In today's dynamic and competitive business environment, effective leadership plays a crucial role in determining the success of an organization. The Chief Executive Officer (CEO) is often seen as the driving force behind the company's strategic direction and overall performance in keeping with the upper echelon theory [1].

However, CEOs have a large number of different personal and psychological characteristics. Many modern studies refer mainly to negative characteristics, such as overconfidence [2–3], narcissism [4], and excessive optimism [5]. At the same time, a CEO with these characteristics can influence the company's activities both positively and negatively. The popularity of these theories lies in their contribution to understanding the role of human irrationality in decision-making. Moreover, papers studying negative traits answer the question of what a CEO shouldn't be like. However, this raises the counterquestion, "but what should a CEO be like?" And, in order to answer, we must focus not only on negative characteristics but also on positive ones. Of course, the word "confidence" inspires people. Everyone wants to see a leader who is certain about the company's future and his own decisions and has no doubts in his subordinates. But what separates confidence from "overconfidence"? There is no single answer to this question. Everything depends on different factors, starting from the personal characteristics of the top manager themselves, such as age, education, gender and so on, and ending with the nature of the company, such as the country where it conducts its main operations, the current market conditions, the size of the company and its organizational structure.

However, there are some generally accepted views about the positive characteristics of CEOs. One of the most important is the concept of transformational leadership [6]. The primary aim of our study is to explore the relationship between positive CEO traits and firm performance, with a focus on understanding how these individual characteristics can influence organizational success.

Drawing on the existing literature on CEO positive characteristics and transformational leadership, we will identify and examine such CEO positive traits as vision, focus on present achievements and overall emotional tone and their impact on different performance indicators, including return on assets (ROA), net profit margin (NPM), and return on invested capital (ROIC).

The findings of our study offer valuable insights for both academics and practitioners interested in leadership development and corporate strategy. By identifying positive CEO traits that are most closely associated with firm performance, our research contributes to the ongoing discourse on effective leadership and provides guidance for organizations seeking to recruit and nurture high-performing CEOs. Furthermore, we highlight the importance of considering the broader organizational context in understanding the role of CEO traits in shaping firm performance, shedding light on the complex interplay between individual characteristics and organizational factors.

In short, our paper advances the understanding of the relationship between positive CEO traits and firm outcomes, offering novel perspectives on the role of individual leadership characteristics in driving organizational success. Through a rigorous examination of the relevant literature and the empirical analysis of data, we contribute to the study of leadership, management, and organizational behavior by providing evidence-based insights into the qualities that characterize effective CEOs and the ways in which these traits can influence firm performance.

Literature Review

Understanding the traits and characteristics of effective CEOs is crucial for the success of organizations. These traits and characteristics can be grouped into four main categories: personality traits related to the Big Five Model [7–8], leadership styles [9–11], cognitive abilities [12–13] and emotional intelligence [14–15]. The following sections provide a brief overview of each category.

Personality Traits

Personality traits can significantly influence a CEO's behavior, decision-making, and leadership style. The popular Big Five Personality Traits Model or Five Factor Model assesses an individual's personality by examining their conscientiousness, extraversion, openness to experience, agreeableness, and emotional stability [16–17].

Conscientiousness refers to an individual's degree of organization, responsibility, dependability, and self-discipline. CEOs who score high in this indicator are more likely to set clear goals, establish plans, and consistently work toward achieving those objectives [18]. Highly conscientious CEOs may also foster a culture of accountability, responsibility, and attention to detail within the organization, contributing to its improved performance [19–20].

Extraversion is characterized by an individual's sociability, assertiveness, and energy level. Extraverted CEOs tend to be more outgoing, persuasive, and comfortable in social situations, which can be advantageous in building relationships, motivating employees, and engaging with stakeholders [20–22]. However, extremely extraverted CEOs may also be prone to overconfidence [23] or overlook valuable input from introverted team members, leading to potential challenges in decision-making processes.

Another important characteristic is openness to experience, which includes an individual's curiosity, imagination, and receptiveness to new ideas and experiences. CEOs with high levels of openness are more likely to embrace innovation, encourage creative problem-solving, and adapt to changing business environments, helping to enhance the company's performance [7; 16; 24].

Agreeableness as a personal characteristic refers to an individual's heartiness, cooperativeness, and likability. Executive directors who score high in this indicator tend to be more skilled at building rapport, resolving conflicts, and fostering collaboration within the organization [25–27].

Emotional stability, which is often opposed to neuroticism, encompasses the individual's ability to show endurance, overcome stress, and remain emotionally balanced. Such CEOs are better equipped to handle high-pressure situations, make rational decisions, and exert a calming effect on their teams during periods of uncertainty [17; 28–29]. However, it is also worth noting that such CEOs tend to focus on formal rules, which can lead to excessive bureaucratization [24].

The personality traits of CEOs are a valuable concept which can have a substantial impact on company effectiveness. A detailed understanding of these traits and their potential advantages and disadvantages can help organizations recruit and nurture the most suitable candidates for CEO positions. Furthermore, the awareness of one's own personality traits can help CEOs to capitalize on their own strengths and address potential weaknesses, ultimately enhancing their overall effectiveness [17; 30–31].

Leadership Styles

Probably one of the most important tools for the study of the positive characteristics of top managers is leadership theories. The main advantage of these theories is that they show that a successful CEO must be not just a person with a set of professional skills and abilities but a real leader with the necessary skills to successfully head a company even in times of crisis. Leadership styles refer to the distinctive approaches used by CEOs to guide, influence, and motivate their employees and foster the company's activities [32–33]. Different leadership styles can have varying impacts on organizational performance, depending on factors such as organizational culture and business sector and workforce characteristics [34]. This subsection provides a brief description of leadership styles and their potential implications for CEO effectiveness.

Transformational leadership is one of the most popular leadership concepts today. It is characterized by the CEO's ability to inspire and motivate employees to exceed their own expectations, fostering a shared vision and promoting personal and professional growth [6]. Transformational leaders encourage innovation, challenge the status quo, and empower employees to take on responsibility. Studies have shown that transformational leadership is positively associated with organizational performance, employee satisfaction, and innovation [27; 35–37]. As transformational leadership is one of the main subjects of this paper, a separate section will be devoted to its detailed study.

Another leadership style is transactional leadership, which refers to the CEO's focus on establishing clear expectations, setting performance goals, and issuing rewards or penalties for employee performance [6; 39–40]. This leadership style emphasizes efficiency, consistency, and, unlike transformational leadership, maintaining the status quo. While transactional leadership can be effective in certain situations, it may not foster innovation or adaptability as well as being less effective in highly dynamic or uncertain environments [41].

The popular concept of servant leadership characterizes a style that prioritizes the needs, growth, and well-being of employees: its primary goal is to help others reach their full potential. This leadership approach was first described by R.K. Greenleaf in his 1970 essay "he Servant as Leader". Servant leaders are characterized by empathy, humility, stewardship, and commitment to the personal and professional growth of personnel [42]. Studies show that servant leadership can lead to higher levels of employee engagement, satisfaction, and performance [43–44]. Furthermore, such leadership can inspire employees to engage in extra-role behaviors that benefit the organization, known as organizational citizenship behaviors (OCB) [45]. The servant leader also emphasizes the importance of customer service and meeting customers' needs. This customer-centric approach can lead to higher customer satisfaction and loyalty [46].

The next style is autocratic leadership, also known as authoritarian leadership, which is characterized by the leader making decisions unilaterally, with little or no input from subordinates. Autocratic leaders often maintain strict control over their teams, closely monitoring work processes and providing explicit instructions on how tasks should be executed [47]. In certain situations, autocratic leadership can contribute positively to company performance. For example, when an organization is facing a crisis, requires rapid decision-making, or operates in a highly regulated sector, an autocratic leader may be able to make swift decisions and implement changes efficiently, ultimately benefiting the firm's performance [48]. On the other hand, such strict adherence to rules can lower employee morale and motivation, as subordinates may feel undervalued and disempowered by their lack of input in decision-making processes [49]. Additionally, subordinates may be hesitant to voice new ideas or challenge the status quo due to the leader's dominant and controlling nature. This lack of creativity and innovation can limit the organization's ability to adapt to changing market conditions or capitalize on new opportunities [50]. Lower levels of motivation can result in reduced productivity, commitment, and job satisfaction [51]. Autocratic leaders often make decisions quickly and decisively but may struggle to have employees adapt to new information. While this style can be effective in crisis situations, it can lead to reduced employee morale, innovation, and adaptability in the long term [52].

Last but not least, participative or democratic leadership is a leadership style characterized by the active involvement of employees in the decision-making process. Participative leaders encourage open communication, collaboration, and shared responsibility, valuing and considering the input and ideas of team members. Such leaders foster a sense of ownership, involvement, and commitment among employees, which can lead to higher levels of job satisfaction and engagement [53]. Employees who are heard and valued are more likely to be motivated, productive, and committed to the organization, allowing participative leaders to access a wider range of perspectives, ideas, and knowledge that lead to better-informed and more effective decisions [54]. An environment that encourages creativity and innovation facilitates open communication, trust, and psy-

chological safety, exerting a significant and positive impact on employee performance [54–56].

Leadership styles differ in their effect on CEO effectiveness and organizational performance. Understanding these leadership styles and their implications can help organizations recruit and nurture the most appropriate CEOs for their specific context. Additionally, such an understanding can enable CEOs to adapt their leadership approach to the changing needs of the organization, ensuring continued growth and success.

Cognitive Abilities

Good cognitive abilities allow CEOs to deal with a significant amount of complex intellectual tasks on a daily basis. In general, cognitive abilities are a rather broad concept studied by academic psychologists. In particular, this concept has proven quite relevant for understanding the effectiveness of performing tasks [57–58].

One type of cognitive ability is problem-solving skills. Effective problem-solving skills contribute to better decision-making processes, as they enable individuals to analyze situations systematically, evaluate alternatives, and select the most appropriate course of action [59–60]. Problem-solving skills are also closely related to creativity and innovation. Creativity is also singled out by many researchers as one of the criteria of cognitive abilities [61]. By fostering a culture that encourages employees to identify and solve problems using novel approaches, organizations can enhance innovation capacity [62–63], which can lead to the development of new products, services, or processes that can give a market advantage [64]. CEOs who promote creativity within their organizations can inspire employees to think differently or explore new approaches, potentially leading to breakthroughs in products, services, and processes. Studies have found that creativity is positively linked to employee performance and adaptability [65–66]. It is also significant that the ability to solve problems also contributes to building resiliency in the organization. By developing the ability to adapt to changing circumstances and address new challenges, organizations can become more resilient to market disruptions [67].

Strategic thinking is another important cognitive ability. It refers to a CEO's capacity to analyze complex situations, identify patterns and trends, and develop long-term plans to achieve organizational goals [68–69]. CEOs with strong strategic thinking skills can anticipate future challenges, capitalize on opportunities, and steer the organization towards success [70–71]. Successful strategic thinking is closely connected with decision-making capabilities involving the ability to gather and analyze information, evaluate options, and select the most appropriate course of action [72]. Of course, strategic thinking is similar to the ability to solve problems, but the nuance is that the CEO can take responsibility for his decisions and is prepared for their consequences. Effective decision-making is crucial for CEOs, as their choices can have significant implications for company performance and reputation [72–74].

Another major component of cognitive abilities is cognitive complexity. It may be defined as the individual's ability to process and interpret information from multiple perspectives, recognize patterns, and understand the nuances and subtleties of a situation [75]. CEOs with high cognitive complexity can appreciate the nuances and interconnectedness of the different aspects of their organizations, enabling them to adapt and respond to complex challenges [76]. Recent studies have shown that this phenomenon needs to be extremely carefully investigated, since its effect on company efficiency can be ambiguous. For instance, in a dynamic and unstable market, CEO cognitive complexity could be an unfavorable factor for company performance [77].

Emotional Intelligence

Among the positive characteristics of the executive manager, the concept of emotional intelligence proposed by D. Goleman holds a special place. Undoubtedly, this theory has become extremely popular in the non-scientific field, which is often the case with revolutionary ideas. D. Kahneman and R. Thaler realized that decisions in the economy are made not by idealized subjects expressed by mathematical formulas but by living people with their irrational weaknesses and strengths. The same applies to the process of optimizing company activities. There are hundreds of different theories and practices related to various aspects of company performance – from the optimization of capital structure to complex derivative financial instruments. The concept of human capital has become increasingly popular, and many managerial theories answer the question of how to properly measure and optimize it. The main point is that employees should be considered not just as individuals with certain skills and competencies but also as people with their own emotions and experiences. This is where the concept of emotional intelligence originates.

Emotional intelligence (EI) is the set of skills that enable individuals to recognize, understand, and manage their own emotions and the emotions of others [15]. With regard to CEOs, EI includes self-awareness, self-regulation, motivation, empathy, and social skills.

Self-awareness is the ability to recognize and understand one's own emotions, strengths, weaknesses, and personal values [15]. CEOs with high self-awareness can make better decisions by acknowledging their biases and limitations and seeking external input when necessary [78–79].

Self-regulation, also known as emotional self-control, refers to the individual's ability to manage their emotions, impulses, and stress effectively [15]. Self-regulation allows managers to maintain composure under pressure, make rational decisions, and respond adaptively to setbacks [80–81].

In the context of emotional intelligence, a crucial role is played by motivation, which refers to the intrinsic drive to achieve goals, pursue personal growth, and maintain a positive attitude [15]. Motivated CEOs can inspire and energize their teams, set ambitious targets, and persevere in the face of challenges [82–83].

Empathy is the ability to understand and share others' feelings, fostering supportive and trusting relationships [15]. CEOs with high empathy can better understand the needs and perspectives of their employees, stakeholders, and customers, leading to more effective decision-making and conflict resolution [84]. Additionally, people with high emotional intelligence are characterized by good social skills, including the ability to interact effectively with others and deal with complex social situations [15]. CEOs with strong social skills can communicate persuasively and collaborate effectively, contributing to a positive work environment and ensuring successful negotiations [85–86].

Transformational Leadership

Four Dimensions of Transformational Leadership

Our analysis of the main positive characteristics of CEOs showed that many of the same positive traits and qualities appear in different leadership styles. However, they all imply that an outstanding CEO is not just a successful manager with good professional skills but also a real leader. There are cases when an excellent student with extensive knowledge quickly ascends the career ladder yet stumbles at a certain point. In contrast, an unremarkable person may become the head of a large corporation and successfully steer it through times of crisis [87]. So, it is clear that a real leader must have special qualities. And, among all the leadership concepts, the most popular paradigm today is transformational leadership, which unites most of the positive traits of the other styles.

Transformational leadership instills inspiration and galvanizes followers to exceed their inherent potential [6; 35]. Describing the concept of transformational leadership, B.M. Bass (1985) identified four main components: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration. These components will be considered in detail below.

Idealized influence (charisma) is a fundamental dimension of transformational leadership. In general, the concept of charisma is quite abstract, and the question is still open whether it is an innate or acquired quality [88]. In fact, the answer largely depends on its definition, and, in this section, we will follow Bass's approach (1985). According to him, charisma is a leader's ability to serve as a role model for their followers [35]. Such an individual fosters an atmosphere of trust, respect, and admiration among their subordinates [6].

Transformational leaders who possess idealized influence demonstrate unwavering conviction in core values and ethical principles, which promotes high moral standards and authentic leadership [89]. They are also known for their strong commitment to their organization's mission and vision, which further reinforces their credibility and trustworthiness [90].

Idealized influence is also marked by the leader's ability to inspire a sense of belonging and loyalty among their followers, cultivating a collective identity that transcends individual interests [91–92]. This shared identity not only fosters unity within the team but also promotes a heightened sense of purpose and meaning [93–94].

Moreover, charismatic leaders with idealized influence are adept at communicating their vision and values in a manner that resonates with their followers, sparking enthusiasm and motivation [95]. This enhances employee identification with the leader, resulting in greater commitment and willingness to exert extra effort in pursuit of the organization's objectives [96]. By embodying and communicating their values and vision, charismatic leaders inspire their subordinates to commit wholeheartedly to the shared mission, ultimately producing exceptional performance and success.

Another dimension of transformational leadership is inspirational motivation that refers to the leader's ability to inspire and motivate followers by articulating a compelling vision and setting high expectations for the team [35].

Inspirational managers craft a clear and appealing vision of the future, which serves as a guiding light for their organization's strategic direction [97–99]. This vision aligns with the values and aspirations of employees, resonating with them and engendering a shared sense of purpose [90].

In addition, strong inspirational motivation is proficient at setting ambitious and achievable goals that challenge and stretch the capabilities of subordinates [100]. By consistently raising the bar and fostering a sense of urgency, such leaders inspire a drive for continuous improvement and excellence among employees [99].

Furthermore, leaders who excel at inspirational motivation are skilled at celebrating the team's successes, recognizing individual contributions, and fostering a culture of appreciation and gratitude [101]. This positive reinforcement not only boosts their followers' performance but also nurtures a strong sense of belonging within the organization [35].

The next pivotal dimension of transformational leadership is intellectual stimulation that emphasizes the leader's ability to encourage creativity, critical thinking, and innovation among employees [35]. Leaders of such type cultivate a culture of continuous learning and development in their organization [90], creating an atmosphere where subordinates feel empowered to question assumptions, explore novel ideas, and seek alternative solutions to problems [102].

Furthermore, employees are encouraged to engage in reflective practices, share insights, and learn from experiences, which coincides with the concept of a learning organization [103]. This approach not only expands employee knowledge and skills but also enhances their adaptability and resilience to change [99]. Unlike autocratic and transactional leadership styles, transformational leadership recognizes that the status quo is not always the most effective approach; thus, it is open to adopting and experimenting with new paradigms and methodologies [35]. This mindset fosters innovation and drives organizational performance, particularly in dynamic and competitive environments

[104]. Most importantly, healthy disputes are encouraged, creating opportunities for collaboration and co-creation and empowering followers to contribute meaningfully to the organization's strategic direction [105].

Leaders who provide intellectual stimulation emphasize the importance of learning from failures and treating setbacks as opportunities for growth and improvement [106]. By fostering a psychologically safe environment where followers feel comfortable taking risks and openly discussing challenges, transformational leaders enable their teams to learn from their mistakes and keep evolving [107].

A final key dimension of transformational leadership is the leader's ability to attend to the unique needs, strengths, and aspirations of each employee that call for individualized consideration [35].

By supporting personal and professional growth, recognizing and valuing the individual contributions and potential of subordinates, and showing a genuine interest in understanding their distinct talents, motivations, and concerns, the leader gains true respect [90; 108]. Individualized consideration also involves providing personalized coaching, mentoring, and feedback to followers, helping them to identify and overcome their difficulties and develop their competencies [99; 109]. This approach not only enhances employee engagement and job satisfaction but also promotes a sense of proprietorship and responsibility for job outcomes [35; 110].

In addition, transformational leaders with a highly individualized approach create opportunities for followers to pursue their professional goals and aspirations [90]. They actively encourage and support their subordinates in seeking advancement, expanding their skills, and achieving their career objectives, fostering a culture of continuous learning and growth within the organization [35], which also coincides with the concept of a learning organization.

Transformational leadership is often considered as the quintessence of the positive characteristics of a CEO because it emphasizes visionary thinking, inspiration, and the ability to drive positive change within an organization. This leadership style has been widely recognized for its potential to enhance organizational performance, employee satisfaction, and overall success.

Transformational Leadership and Firm Performance

In the previous subsection, we discussed in detail how transformational leadership can raise the effectiveness of a company. Let us now consider empirical studies that confirm the positive effects of such leadership. Most of them show that transformational leadership positively impacts different aspects of organizational performance, such as financial results, employee engagement, job satisfaction, innovation, and overall productivity [27; 35; 41; 111–112], which also coincides with the results of meta-analysis [36].

D.A. Waldman, G.G. Ramirez, R.J. House, and P. Puranam [113] investigated the relationship between transformational leadership and organizational performance in a sample of 27 multinational corporations. They found that firms led by transformational CEOs demonstrated higher levels of financial performance compared to those with less transformational leaders. Additionally, these companies exhibited increased levels of strategic flexibility and adaptability, which are essential in today's rapidly changing business environment.

A meta-analysis conducted by T.A. Judge and R.F. Piccolo [41] examined the effects of transformational leadership on various organizational outcomes, including employee satisfaction, motivation, and job performance. The authors' findings revealed that transformational leadership had strong positive effects on all of these outcomes, indicating the potential for these leaders to drive organizational success through their influence on employees.

L. Gumusluoglu and A. Ilsev [102] conducted a study on the impact of transformational leadership on innovation in organizations. Their results showed that transformational leadership positively influences both the innovative behavior of employees and the overall innovation performance of organizations. The authors explained this impact by the fact that encouraging creativity and open communication creates a climate of innovation.

A study by G. Wang et al. [36] focused on the relationship between transformational leadership and team performance. It demonstrated that teams led by transformational leaders displayed higher levels of performance, commitment, and satisfaction compared to teams led by non-transformational leaders. These findings suggest that the positive effects of transformational leadership extend beyond the individual level, influencing team dynamics and performance.

The main conclusion is that by adopting such a leadership style, CEOs can significantly improve the success of their organizations.

Additional Components of Transformational Leadership

The key difficulty in the study of leadership is identifying the type of leadership of a particular person. The theory of transformational leadership offers us four main dimensions (idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration) that are easy to measure and quantify using primary data like questionnaires but extremely complicated with the help of secondary data. In this connection, some researchers use other indicators that, according to empirical studies, can be interpreted as proxies of transformational leadership. Such indicators include vision, the ability to consider present achievements, and the emotionality of the CEO [114]. Using the appropriate linguistic tools, these indicators can be measured objectively. We will discuss the methodology of data collection in detail later, focusing in this section on the description of these characteristics in the context of the theory of transformational leadership.

Vision is a crucial aspect of transformational leadership, especially within the dimension of idealized influence. A leader's vision sets the direction and provides a clear, compelling picture of the future to motivate and engage team

members [35]. A clear vision helps employees understand the organization's purpose and strategic direction [115–116]. This understanding allows them to align their personal goals and efforts with the organization's objectives, leading to higher motivation and commitment [97].

Furthermore, transformational leaders use their vision to create a sense of purpose and passion that inspires team members to push their limits and achieve exceptional results [35]. A strong vision encourages employees to think creatively and explore new ideas to achieve set goals [31]. This innovative mindset drives continuous improvement and growth, making the organization more adaptive and resilient [99]. Additionally, shared vision fosters a sense of unity and collaboration among team members, as they work collectively to achieve common targets [103]. This sense of unity strengthens the organizational culture, promotes teamwork, and enhances overall performance [117]. All these conclusions confirm that vision is an integral feature of transformational leadership, and CEOs who possess it could also be considered as leaders of this type. Thus, our first hypothesis is

H1: The vision of the CEO positively relates to the firm's performance. Transformational leadership is often associated with a forward perspective, emphasizing the development of a compelling vision and long-term goals. However, focusing on present achievements is also important, as it enables leaders to balance their visionary approach with the practical demands of the organization's current performance. This is one of the most difficult aspects for a CEO, who must achieve a rational trade-off between present and future. As a result, focusing on present achievements provides transformational leaders with an opportunity to demonstrate their ability to translate the organization's vision into actionable steps. By emphasizing the importance of current accomplishments, leaders can highlight the tangible progress being made toward the organization's strategic objectives [35]. This enables employees to better understand the connection between their daily work and the overall vision, leading to higher levels of personal motivation [118].

Moreover, celebrating present achievements allows transformational leaders to foster a positive work environment and strengthen the organizational culture. Recognizing and rewarding employees for their contributions reinforces values and behaviors that drive success, leading to a stronger sense of unity and shared purpose within the organization [90].

Additionally, focusing on present achievements helps transformational leaders maintain their credibility and effectiveness. By demonstrating their ability to manage the organization's day-to-day operations and deliver results, transformational leaders can build trust and confidence in their leadership among employees and stakeholders. This trust is essential for leaders to inspire and motivate followers to embrace change and strive for higher levels of performance [97]. This leads to our second hypothesis:

H2: The CEO's ability to consider present achievements positively relates to the firm's performance. The last hypothesis is related to the emotional aspects of transformational leadership. As we mentioned earlier, transformational leaders often possess high levels of emotional intelligence (EI), which enables them to manage their own emotions and understand the emotions of others effectively [15]. High EI allows leaders to build strong relationships with their followers, fostering trust and commitment to the organizational vision. That is why the concepts of transformational leadership and EI are closely related [119–122].

The emotions of one person can spread to the whole group – in other words, emotions tend to be contagious [123]. Transformational leaders can leverage this phenomenon to inspire and motivate their followers. By expressing positive emotions such as enthusiasm, optimism, and passion, leaders can create an emotional climate that encourages employees to feel and exhibit similar emotions [124]. Such emotional contagiousness can enhance employee engagement, motivation, and overall job satisfaction [125]. Additionally, transformational leaders provide emotional support [50] to their followers, which is critical to fostering a positive work environment and promoting employee well-being. By demonstrating empathy, compassion, and understanding, transformational leaders can help employees cope with stress, reduce burnout, and maintain a healthy work-life balance [126]. Such emotional support is essential for the long-term success and sustainability of the organization. As emotions can significantly influence decision-making processes [127], transformational leaders need to be aware of the impact their emotions have on their judgment and decision-making abilities. By perceiving and regulating their own emotions, leaders can make more effective decisions and avoid potential biases arising from emotional reactions [128]. Thus, the positive emotions broadcast by the CEO demonstrate a significant effect on the productivity of the team, which in turn affects the company's performance. This leads to our third hypothesis:

H3: The CEO's positive emotionality positively relates to the firm's performance.

Methodology

Methods of Gathering Leadership Data

Existing methods for gathering transformational leadership data include a diverse range of approaches, encompassing both qualitative and quantitative techniques. The most common and widely used approach is questionnaires, which may be divided into self-report questionnaires and peer and subordinate evaluations. Self-report questionnaires typically consist of Likert-type scales, where respondents rate their agreement with various statements related to transformational leadership behaviors. Peer and subordinate evaluations collect assessments of a leader's transformational behaviors from their colleagues, subordinates, or other individuals within the organization. This method provides a more objective perspective on the leader's behaviors and can help mitigate potential biases associated with self-report instruments.

The most popular and widespread questionnaire is the Multifactor Leadership Questionnaire (MLQ) developed by B.M. Bass and B.J. Avolio in 1995 [129]. The MLQ measures various aspects of leadership style, including transformational, transactional, and laissez-faire leadership behaviors. The questionnaire is based on Bass and Avolio's Full Range Leadership Model, which posits that effective leadership encompasses a full range of behaviors, with transformational leadership representing the most effective style. This tool has both advantages and disadvantages. The most important advantage is that MLQ has been extensively validated by numerous studies, demonstrating its reliability and construct validity in various contexts and cultures [130–131]. This robust validation makes the MLQ a reliable instrument for assessing transformational leadership. The MLQ is applicable across diverse organizational settings and industries, allowing for the examination of transformational leadership in a variety of contexts [39; 132]). Furthermore, it can be completed by the CEOs themselves (self-assessment) or by their subordinates, peers, or other stakeholders (rater-assessment), offering a multifaceted view of leadership behaviors and reducing potential biases associated with self-report measures [133].

Its disadvantages include a potential social desirability bias. As with many self-report questionnaires, the MLQ may be susceptible to this problem, as respondents can overstate their transformational leadership behaviors in order to present themselves more favorably [134]. Although the MLQ provides a comprehensive assessment of leadership styles, it may not capture every aspect of transformational leadership or account for context-specific factors that could influence leadership effectiveness [135]. Additionally, the MLQ measures leadership behaviors at a specific point in time, potentially failing to account for the dynamic nature of leadership or changes in behaviors over time [136].

Overall, the MLQ has been widely recognized as a valuable instrument for assessing transformational leadership, although researchers should be aware of its limitations and consider supplementing the questionnaire with other methodologies to obtain a more comprehensive understanding of leadership behaviors and their impact on company performance.

Other approaches to assessing CEO leadership characteristics include behavioral observation, qualitative interviews, and content analysis of written and spoken communication. Of course, methods that work with primary data have a high level of reliability and efficiency. There is a large variety of statistical methods for their verification, notably Cronbach's alpha [137–138]. However, the biggest difficulty lies in collecting such data. This process is time-consuming and resource-intensive. Moreover, when researching big companies, it is practically impossible to get access to CEOs. Given this, methods that allow processing secondary data come to the fore. Particularly widespread are different variations of text analysis, including content analysis, dictionary-based approaches, machine learning and natural language processing (NLP), computer-aided text analysis (CATA) and linguistic inquiry and word count (LIWC).

Content analysis is a qualitative research method that involves systematically coding and interpreting textual data to identify themes, patterns, and meanings relevant to a particular research question [139]. Dictionary-based approaches involve the creation of predefined word lists or dictionaries that represent specific leadership concepts or behaviors. These dictionaries can then be used to analyze texts to determine the presence and frequency of transformational leadership indicators [140]. Machine learning and NLP techniques can be used to analyze large volumes of textual data and identify patterns or features indicative of transformational leadership. Supervised or unsupervised learning algorithms, such as topic modeling, sentiment analysis or classification, can be employed to process and analyze CEO communications [141]. CATA involves the use of software programs to automate the process of coding and analyzing text data. Programs like NVivo, Atlas.ti, or MAXQDA can be used for systematically identifying, coding, and analyzing textual data related to leadership [142].

However, all of these methods are complicated to verify. They also require the development of necessary dictionaries and meaningful words. Moreover, linguistic context and features play a huge role, and so compiling a dictionary in your own language creates additional difficulties. For example, most of the literature on transformational leadership is written in English. The works of Bass and MLQ are often taken as a basis. A researcher can select words that characterize certain leadership qualities, but the process of choosing such words [37] and creating dictionaries is fraught with biases. When creating such a dictionary in Russian, for example, a translation bias appears [143], which requires further verification efforts.

For all these reasons, the most effective and applicable instrument is Linguistic Inquiry and Word Count (LIWC). LIWC is grounded in the notion that the language people use reflects their underlying psychological processes, including thoughts, emotions, and social relationships. Transformational leadership is closely linked to these psychological constructs, as it involves inspiring and motivating followers, stimulating their intellectual growth, and fostering strong interpersonal connections. By analyzing the linguistic patterns in a CEO's communication, LIWC can provide valuable insights into their transformational leadership qualities.

LIWC offers a wide range of linguistic categories that can be analyzed, including affective, cognitive, and social processes, as well as linguistic dimensions like pronoun usage, verb tense, and word complexity [144]. This comprehensive approach allows researchers to detect different aspects of transformational leadership, such as inspirational motivation, idealized influence, individualized consideration, and intellectual stimulation [145]. Moreover, this tool allows them to use different sets of characteristics to design their own metrics to calculate a transformational leadership score [114]. LIWC also provides a quantitative, objective measure of language use, making it less susceptible to researcher bias than other methods like content analysis. By converting qualitative textual data into numerical values, LIWC enables researchers to apply robust statistical analy-

sis and draw more reliable conclusions. As a computerized text analysis tool, LIWC ensures a high level of consistency and reliability in coding and categorizing linguistic features. This consistency reduces the likelihood of human error and subjectivity and facilitates the comparison of results across different studies and research contexts [146]. LIWC has been extensively used and validated in different research domains, including social psychology, organizational behavior, and political science [147]. Its broad application and demonstrated validity enhance the generalizability of findings derived from LIWC-based analysis, making it a suitable tool for studying transformational leadership across diverse settings and populations [148].

Secondary Data Sources

Before proceeding to the quantitative measurement of the transformational leadership of top managers based on text analysis, we should determine the most relevant and stable source of information. Many studies analyze CEO interviews or news reports. However, while interviews and news articles can offer valuable insights into CEO leadership style and company performance, they may not be the perfect source of information for several reasons.

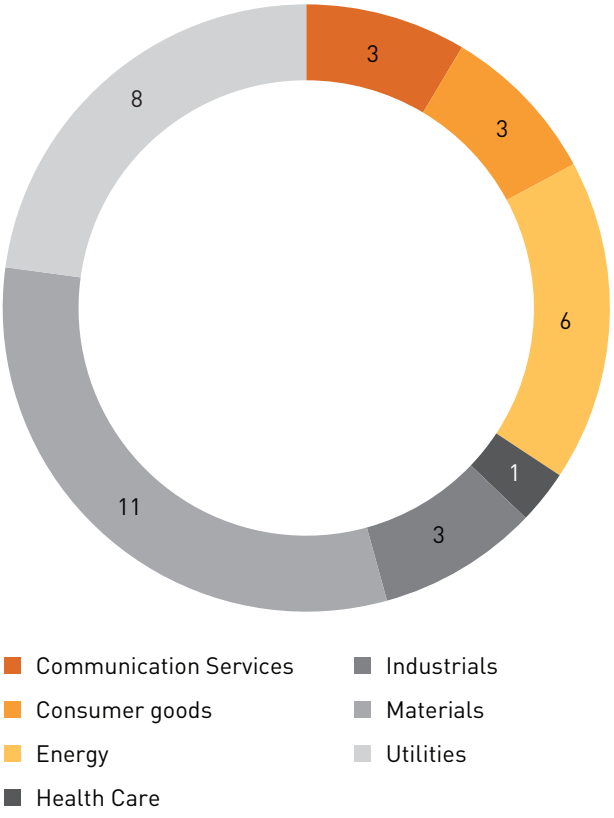
Interviews and news articles are typically sporadic rather than appearing at regular intervals. This inconsistency in timing can make it difficult to conduct a longitudinal analysis or compare the CEO's statements over time. Additionally, the topics discussed in interviews and news articles can vary widely, making it challenging to conduct meaningful comparisons across different sources. When researching interviews, it is extremely important to understand the context [149]: for example, an important feature of transformational leadership is the creation of common values shared by the leaders and his subordinates. The term "common" has a special meaning here. To detect it, the researcher can see how often the CEO uses the pronoun "We" when talking about future goals. Moreover, it is also worth considering how often the CEO uses the pronoun "I" to detect potential narcissism. Context plays a pivotal role here: if the interviewer asks personal questions about family or personal interests or hobbies, then the respondent is quite likely to use the pronoun "I" more often without referring to themselves in the plural, which will already bias the estimation.

Interviews and news articles may also be subject to other biases, such as the interviewer's or journalist's personal opinions, editorial policies, or the influence of external factors like public relations efforts and media sensationalism [150]. These biases can potentially distort the information, making it less reliable for research purposes. Given these concerns, it is preferable to rely on more consistent and objective sources of information to study transformational leadership and company performance. One such source is CEO letters to shareholders in annual reports.

First of all, CEO letters are authentic. They are typically written by the CEO themselves or under their close supervision, genuinely representing the leader's thoughts, perspectives, and intentions. This direct insight into the CEO's mindset provides a unique reflection of their leadership style and priorities. Additionally, annual reports are published regularly, usually on a yearly basis. This consistency in timing and format allows researchers to make comparisons across multiple years, sectors, and companies, providing a robust and standardized data source for longitudinal analysis. CEO letters in annual reports are public documents, which means they are readily accessible to researchers and other stakeholders. This transparency ensures a level of accountability and openness that can contribute to the reliability of the information contained within the letters. Also, public companies are required by law to disclose accurate and complete information in their annual reports, including the CEO's letter. This requirement increases the credibility of the information provided in these documents and reduces the likelihood of intentional misrepresentation or manipulation. CEO letters in annual reports are an important tool for companies to communicate with various stakeholders, including shareholders, employees, and customers. As a result, these letters often provide a comprehensive overview of the company's performance, strategy, and vision, making them a rich source of information for text analysis [151–152]. The language, tone, and content of a CEO's letter can provide valuable insights into their transformational leadership capabilities. These elements can be used to calculate a leadership score for each CEO, which can then be correlated with company performance to establish potential relationships between leadership style and organizational outcomes.

Data Description

Figure 1. Makeup of sectors (Global Industry Classification Standard)



Source: author's calculations.

Considering these advantages of CEO letters to shareholders in annual reports, we selected them as the corpus for content analysis. We chose a sample of 35 Russian companies. The main criteria for including a company in the dataset was the publication of an annual report in English and a CEO letter to shareholders in its report. In addition, this letter had to be signed by the CEO for verification. Another important criterion was the length of the letter, which could not exceed 100 words to avoid calculational inaccuracies.

The selected companies represented different sectors from the Global Industry Classification Standard (GICS): Industrials, Materials, Consumer Goods, Energy, Health Care, Communication Services, and Utilities (Figure 1). Such diversity was chosen to avoid sector bias. The company list is presented in Appendix 1.

The CEOs in the selected companies were all male. The youngest CEO was 38 years old, and the oldest was 72. 43% of the CEOs were younger than 50, 31% were between 51 and 60, and 26% were older than 60.

Description of Variables

Linguistic variables

To obtain linguistic variables, the CEO letters were placed in text files compatible with the LIWC-2022 format. The mean length of the letters was 1,286 words (SD = 115.8). The shortest letter included 499 words, and the longest one 3,874 words. All the letters were robust for further analysis.

To construct linguistic variables, we used Scheuerlein's methodology [114].

VISION: Measures the visionary qualities of a CEO expressed as a sum of four LIWC-22 categories:

$$\text{Vision} = \text{PosEmo} + \text{First person plural}(\text{WE}) + \\ + \text{Achieve} + \text{Reward}.$$

1) Positive tone is measured through the LIWC-22 category "positive emotions" (PosEmo) (words such as *love, nice, sweet*, etc.).
2) Collective (group) goals are measured through the LIWC-22 category "first person plural" (words such as *we, us, our*, etc.).
3) Achievements are measured through the LIWC-22 category "achieve" (words such as *win, success, better*, etc.).
4) Rewards are measured through the LIWC-22 category "reward" (words such as *take, prize, benefit,* etc.).

PRESENT ACHIEVEMENTS (PA): Measures the CEO's focus on present achievements expressed as a sum of two LIWC-22 categories:

$$\text{Present Achievements}(\text{PA}) = \text{Focus present} + \text{Achieve}.$$

1) Present focus is measured through the LIWC-22 category "focus present" (words such as *today, is, now,* etc.).
2) Achievements are measured through the LIWC2015 category "achieve" (words such as *win, success, better,* etc.).

EMOTIONALITY RELATIVE (EMO_R): Measures the CEO's expression of positive and negative emotions using two LIWC-22 categories:

1) Positive Emotions are measured through the LIWC2015 category "positive emotions" (PosEmo) (words such as *love, nice, sweet*, etc.).
2) Negative Emotions are measured through the LIWC2015 category "negative emotions" (NegEmo) (words such as *hurt, ugly, nasty,* etc.).
3) To assess emotions more accurately, we used the emotionality scale of Pennebaker et al. [144]:

$$\text{Emotionality relative}(\text{EMO\_R}) = \frac{\text{PosEmo}}{(\text{PosEmo} + \text{NegEmo})}.$$

Financial performance

In our analysis, we used three indicators of company performance.

The first indicator was Return on Assets (ROA), which is a comprehensive measure of company performance, as it takes both income and assets into account, providing a complete understanding of the company's ability to generate profits from its assets [153]. Additionally, ROA provides insights into the effectiveness of company management: high ROA indicates sound decision making in investments, resource allocation, and operations [154].

$$\text{ROA} = \frac{\text{Net income}}{\text{Total assets}}.$$

The second indicator was Net Profit Margin (NPM). Profitability indicators are widely used to measure company performance as they consider the company profit itself [37; 153].

$$\text{NPM} = \frac{\text{Net income}}{\text{Total revenue}}.$$

The third indicator was Return on Invested Capital (ROIC). Even though this indicator is not often employed in research on transformational leadership, it is frequently used for studying CEO personal characteristics and firm performance [155–156]. The benefit of ROIC is its ability to assess the company's capacity of effective capital allocation (Figure 2).

$$\text{ROIC} = \frac{\text{NOPAT}}{\text{Invetsed capital}}.$$

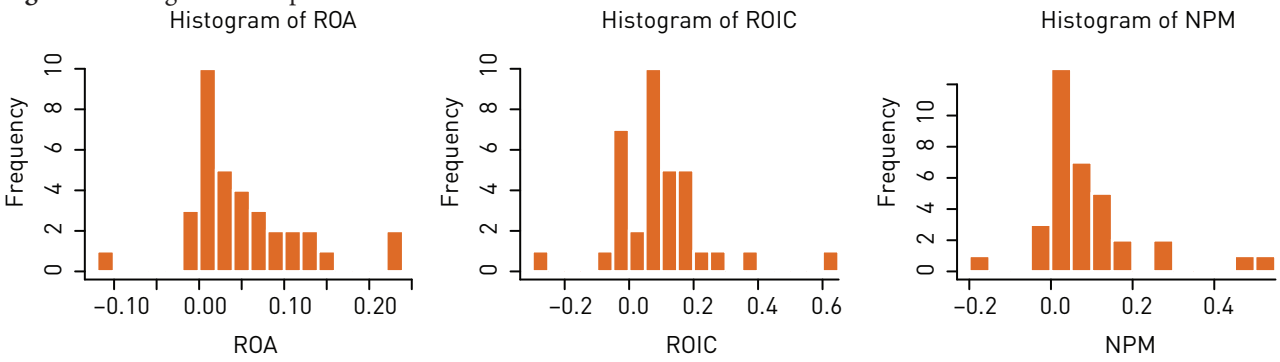
Control variables

CEO control variables. The age of the CEO (CEO_AGE) is a key control variable in top manager research. By controlling for age, researchers can account for the potential effects of experience on the CEO's strategic decisions and management practices [1], risk-taking behavior, time horizon and strategic focus [157].

The second control variable is CEO tenure (CEO_TENURE). As CEOs remain longer in their positions, they become more familiar with company operations and culture, as well as industry dynamics. Additionally, CEOs with different tenures can have quite distinct power

and influence over their subordinates [158]. Even more importantly, the length of the CEO's tenure can impact succession planning and leadership development within the organization [159]. Longer-tenured CEOs usually have more time to choose and mentor successors, while shorter-tenured CEOs may face challenges in identifying and nurturing future leaders [160]. *Firm control variables.* Since the firms in our sample differ significantly in size, the natural logarithm of total assets (LN_TA) was used to control for the size effects of companies.

Figure 2. Histograms of dependent variables

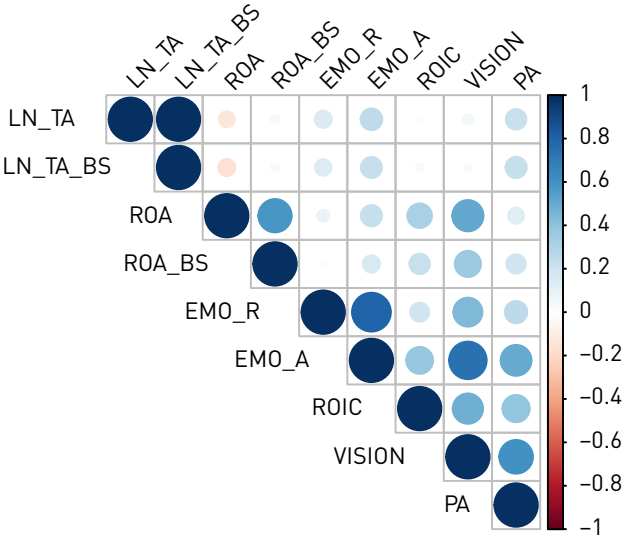


Source: author's calculations.

Correlation Analysis

Our correlation analysis shows that VISION and EMO_R have a strong positive correlation of 0.76, which implies that transformational leadership (as measured by vision) is closely related to emotional intelligence, which stems from the employed methodology. However, as these characteristics have a high level of correlation, the empirical model will have to be carefully examined for multicollinearity (Figure 3).

Figure 3. Correlation matrix



Source: author's calculations.

There is a moderate positive correlation (0.41) between ROIC and present achievements (PA). This suggests that these variables are moderately related, although the relationship is not as strong as in the previous case.

CEO_AGE has a negative correlation with most of the other variables, indicating that, as the CEO's age increases, these variables tend to decrease. The strongest negative correlation is with VISION (–0.31), suggesting that older CEOs might be less likely to exhibit a clear vision among their transformational leadership traits.

CEO_TENURE has a positive correlation with LN_TA (0.26) and a slightly stronger positive correlation with CEO_AGE (0.40), indicating that longer-tenured CEOs are more likely to be older and lead larger companies.

Empirical Estimation

Model

To test the hypotheses, we performed a hierarchical regression analysis for each dependent variable. During the first step, linear models with intercept coefficients only were tested. During the second step, the control variables were added:

$$ROA = \beta_0 + \beta_1 LN\_AS + \beta_2\ CEO\_AGE + \\ + \beta_3 CEO\_TENURE + \varepsilon$$

$$NPM = \beta_0 + \beta_1 LN\_AS + \beta_2\ CEO\_AGE + \\ + \beta_3 CEO\_TENURE + \varepsilon$$

$$ROIC = \beta_0 + \beta_1 LN\_AS + \beta_2\ CEO\_AGE + \\ + \beta_3 CEO\_TENURE + \varepsilon.$$

And, during the last step, the models with all linguistic variables were analyzed:

$$ROA = \beta_0 + \beta_1 LN\_AS + \beta_2\ CEO\_AGE + \\ \beta_3 CEO\_TENURE + VISION + PA + EMO\_R + \varepsilon$$

$$NPM = \beta_0 + \beta_1 LN\_AS + \beta_2\ CEO\_AGE + \\ + \beta_3 CEO\_TENURE + VISION + PA + EMO\_R + \varepsilon$$

$$ROIC = \beta_0 + \beta_1 LN\_AS + \beta_2\ CEO\_AGE + \\ + \beta_3 CEO\_TENURE + VISION + PA + EMO_R + \varepsilon.$$

To select the most suitable model, ANOVA analysis was performed (Table 1). The results show that adding the linguistic variables to our model has a statistically significant impact on every indicator.

Table 1. ANOVA results

	ROA	NPM	ROIC
	Pr(>F)	Pr(>F)	Pr(>F)
Model 1			
Model 2	0.396837	0.34542	0.45310
Model 3	0.008197 ***	0.01887 **	0.05948*
*** p < 0.01; ** 0.01< p < 0.05); * 0.05 < p < 0.1.			

Source: author's calculations.

The next step was to investigate the selected models (Table 2).

Table 2. Linear regressions results

	ROA	NPM	ROIC
Intercept	0.018	0.042	–0.099
LN_TA	–0.002	0.001	–0.004
CEO_AGE	0.001	–0.002	–0.001
CEO_TENURE	0.001	0.005	0.001
VISION	0.019***	0.037***	0.018
PA	–0.01	–0.021	0.016
EMO_R	–0.02	–0.049	–0.002
R-squared	0.3834	0.3517	0.2829
Adjusted R squared	0.2513	0.2127	0.1292
F-statistic:	2.902	2.531	1.841
p-value:	0.02503**	0.04384**	0.1272
*** p < 0.01); ** 0.01 < p < 0.05); * 0.05 < p < 0.1.			

Source: author's calculations.

The analyzed models show that the CEO's vision is a significant variable that affects company financial efficiency expressed in ROA and NPV. However, before proceeding to further analysis and the interpretation of results, it is necessary to check the robustness of the models.

Robustness Check

The models were checked for possible multicollinearity since some of the regressors have high correlation scores. To this end, the variance inflation factors (VIF) were calculated (Table 3).

Table 3. VIF calculation

	ROA/NPM/ROIC VIF
LN_TA	1.27
CEO_AGE	1.47
CEO_TENURE	1.38
VISION	3.03
PA	1.62
EMO_R	2.90

Source: author's calculations.

The analysis showed that there is no multicollinearity in the models since all the VIFs are less than 10.

To investigate potential heteroscedasticity, which could also lead to the bias estimation, the Breusch – Pagan test and the White test were performed (Table 4).

Table 4. Heteroscedasticity tests

	ROA		NPM		ROIC	
	Statistic	p-value	Statistic	p-value	Statistic	p-value
Breusch-Pagan test	5.86	0.43	13.19	0.04	1.50	0.95
White test	11.6	0.478	18.2	0.11	3.32	0.99

Source: author's calculations.

For the model with ROA as the dependent variable, BP = = 5.86 and White = 11.6. Thus, the p-value is not significant in either case (being > 0), and we cannot reject the null hypothesis. Hence the residuals are homoscedastic, and the model is robust. As for the model with NPV as the dependent variable, the presence of heteroscedasticity is shown by the Breusch – Pagan test (BP = 13.9 and p-value = 0.04) but not by the White test (White = 11.6 and p-value = 0.11). As the results are ambiguous, we cannot confirm the homoscedasticity of this model. The results with ROIC as an estimator also show robustness without the heteroscedasticity of the residuals. However, this model is insignificant.

The results are robust only in the model that investigates the effect of CEO vision on ROA, focusing on present achievements and the CEO's emotional scale with control variables. The presence of only one significant variable may raise doubts about the relevance of the model. However, in studies that investigate different metrics of transformational leadership, especially on the basis of text analysis, only one or two variables are usually significant [37].

Results and Discussion

Our results provide empirical evidence that the CEO's vision is positively related to the Return on Assets (ROA) of a company, confirming the first hypothesis. The second and third hypotheses remained unconfirmed.

This finding aligns with the broader literature on transformational leadership and organizational performance. Several studies have emphasized the significance of the CEO's vision in shaping strategic direction, motivating employees, and fostering an innovative and adaptive organizational culture [35; 41].

The positive relationship between CEO vision and ROA supports the notion that transformational leadership, specifically the ability to articulate a compelling and inspiring vision, can translate into tangible financial outcomes for the company [36]. A CEO with a clear vision can set the stage for long-term growth and success by pooling resources and organizational efforts for the achievement of strategic objectives [161]. Moreover, CEOs who have a clear vision and can communicate it competently have a positive impact on TMT performance [162].

Furthermore, CEOs who demonstrate strong visionary leadership are more likely to foster a positive work environment, which, in turn, enhances employee performance, satisfaction, and commitment [20; 163]. This may contribute to improved operational efficiency, resulting in higher ROA.

In summary, the positive relationship between the CEO's vision and ROA highlights the importance of transformational leadership for enhancing firm performance. Organizations should prioritize the recruitment of visionary leaders to drive strategic direction, motivate employees, and promote long-term success. Future research could explore the specific mechanisms through which vision impacts performance, while examining the role of other transformational leadership dimensions and contextual factors in shaping organizational outcomes.

Limitations and Suggestions for Future Research

While our study provides valuable insights into the relationship between CEO vision and company performance, it is important to acknowledge its limitations, which may affect the interpretation and generalizability of the results. First, we investigated only cross-sectional data. Future studies could analyze longitudinal data, too. However, this method is fraught with great difficulties in collecting and evaluating data.

Second, our study relied on secondary data. Even though the methodology of collecting such data is justified and relevant, it would be possible to use both primary and secondary data for a more accurate assessment of transformational leadership in further studies.

Third, we confined ourselves to Russian companies. Future studies can have broader international scope. They could also examine in greater detail the four individual directions of the theory of transformational leadership, as well as incorporating complementary indicators into models for finding new dependencies.

Acknowledging these limitations can help guide future research efforts to expand upon existing knowledge and provide a more robust understanding of the relationship between CEO transformational leadership traits and company performance.

Conclusion

Our findings clearly show that the positive characteristics of a CEO, particularly those pertaining to transformational leadership, play an instrumental role in driving firm performance. We have substantiated the major role of CEOs within their organizations and clarified the ways in which personal attributes and leadership styles can shape company performance and strategic direction.

Studying the positive characteristics of top management in detail, we demonstrated that the positive traits of CEOs can be examined from different points of view and classified in multiple ways. For example, the positive attributes of a CEO can be categorized into personal traits, leadership qualities, cognitive abilities, and emotional intelligence. These categories are inherently interconnected, contributing to a complex network of traits that define a successful CEO. By isolating and examining individual categories and then recombining them, researchers can construct a comprehensive portrait of the effective leader. Naturally, it is hardly possible to investigate all these facets within a single empirical study. Still, by decomposing specific characteristics – as exemplified by the focus on vision in this work – researchers can delve deeper into the different dimensions. This approach leads to the construction of a robust theoretical foundation that could be instrumental for future advancements in both theoretical understanding and practical applications in this field of study.

Among all the positive CEO traits examined in our study, transformational leadership emerged as a key factor of organizational success. This leadership style, characterized by the ability to inspire and motivate, engage in intellectual stimulation, provide individualized consideration, and demonstrate idealized influence, has been linked with enhanced organizational outcomes. Our research underscored the pivotal role of the CEO's vision, a cornerstone of transformational leadership, in fostering firm performance.

The empirical evidence cited in this study supports a positive correlation between CEO vision and company performance, as measured by return on assets (ROA). This finding elucidates the notable impact of visionary leadership on firm performance, resonating with the theoretical underpinnings of transformational leadership theory and corroborating extant literature in the field.

These findings contribute to the scholarly discourse on leadership and organizational performance by highlighting the role of positive CEO traits, specifically transformational leadership and visionary thinking, in shaping company success. Furthermore, it provides practical insights for organizations by emphasizing the value of cultivating transformational leadership qualities among CEOs. This could be achieved via leadership training and development programs that would emphasize visionary leadership skills, including the ability to articulate a compelling vision and inspire and engage employees, especially in difficult market conditions.

At the same time, the role of CEO traits in determining firm performance is multifaceted and influenced by a range of other internal and external factors. This should be explored in future research by investigating the interplay of individual leadership characteristics, organizational context, and firm performance in greater depth.

In conclusion, our study underscores the influence of positive CEO traits, particularly transformational leadership and visionary thinking, on firm performance. It advocates nurturing these leadership qualities in CEOs to allow them to steer firms towards sustained success in an increasingly complex and turbulent business environment.

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Appendix

Table 1. Company list

Ticker	Company name	Отрасль GIGS
AFLT	Aeroflot	Industrials
AGRO	Rusagro	Materials
AKRN	Akron	Materials
ALRS	Alrosa	Materials
BELU	Beluga	Consumer goods
CHMF	Severstal	Materials
DSKY	Detmir	Consumer goods
EVRAZ	Evraz	Materials
FIVE	X5	Consumer goods
GAZP	Gazprom	Energy
GLTR	Globaltrans	Industrials
GMKN	Nornikel	Materials
KAZT	Kuibishevazot	Materials
KMAZ	Kamaz	Industrials
KUBE	RossetiKuban	Utilities
LKOH	Lukoil	Energy
MDMG	Matidetya	Health Care
MFON	Megafon	Communication Services
MRKP	RossetiCentr	Utilities
MRKV	Rosseti_Volga	Utilities
MRKY	Rosseti_Yg	Utilities
MSNG	Mosenergo	Utilities
MSRS	Moscow United Electric Grid Company	Utilities
MTSS	MTS	Communication Services
NVTK	Novatec	Energy
PHOR	Fosagro	Materials
PLZL	Polus	Materials
POLY	Polymetal	Materials
ROSN	Rosneft	Energy
RSTI	Rosseti	Utilities
RTKM	Rostelecom	Communication Services
TATN	Tatneft	Energy
TRMK	TMK	Energy
UPRO	Unipro	Utilities
URKA	Uralkali	Materials

Table 2. Word count statistics for CEO letters

	Word count
Mean	1286.143
Standard Error	115.802
Median	1007
Standard Deviation	685.0937
Sample Variance	469353.4
Range	3375
Minimum	499
Maximum	3874
Count	35

Source: author's calculations.

Table 3. Statistics of dependent variables

	ROA	ROIC	NPM
Mean	0.051558	0.100171	0.090077
Standard Error	0.011379	0.023747	0.022281
Median	0.03442	0.088363	0.052414
Standard Deviation	0.067321	0.14049	0.131814
Sample Variance	0.004532	0.019737	0.017375
Kurtosis	2.079061	6.336895	4.684522
Range	0.35419	0.901414	0.715254
Minimum	-0.11574	-0.26636	-0.1735
Maximum	0.238452	0.635052	0.541753
Count	35	35	35

Source: author's calculations.

Table 4. Descriptive statistics of each component and cumulative linguistic variables

	WE	achieve	Reward	focuspre-sent	posemo	negemo
Mean	2.418	3.656571	1.306	3.420286	3.199429	0.633714
Standard Error	0.334583	0.165413	0.082101	0.167407	0.150987	0.053916
Median	1.96	3.51	1.24	3.26	3.06	0.58
Standard Deviation	1.97942	0.978597	0.485715	0.990394	0.893252	0.31897
Sample Variance	3.918105	0.957653	0.235919	0.980879	0.7979	0.101742
Range	7.35	3.48	1.83	3.78	3.35	1.15
Minimum	0	2.09	0.65	1.93	1.57	0.2
Maximum	7.35	5.57	2.48	5.71	4.92	1.35
Count	35	35	35	35	35	35

	VISION	PA	EMO_R
Mean	10.58	7.076857	0.828634
Standard Error	0.516085	0.265361	0.015972
Median	10.52	7.43	0.857143
Standard Deviation	3.053198	1.569897	0.094491
Sample Variance	9.322018	2.464575	0.008929
Kurtosis	–0.91284	–0.62785	0.924683
Range	10.99	6.2	0.413112
Minimum	4.86	4.07	0.545139
Maximum	15.85	10.27	0.95825
Count	35	35	35

Source: author's calculations.

Table 5. Statistics of control variables

	AGE	CEO_TENURE	LN_AS
Mean	52.62857	8.514286	2.418
Standard Error	1.52022	1.143025	0.334583
Median	52	6	1.96
Standard Deviation	8.993742	6.762228	1.97942
Sample Variance	80.88739	45.72773	3.918105
Kurtosis	–0.84222	0.826542	–0.55214
Range	34	27	7.35
Minimum	38	1	0
Maximum	72	28	7.35
Count	35	35	35

Source: author's calculations.

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Determinants of Mergers and Acquisitions in Emerging Asian Countries: Effects of Confucianism and Technological Development

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Abstract

Asian emerging markets exemplify the contemporary trend of glocalization (globalization-localization). Countries in this region have strong cultural bonds shaped by the influence of Confucianism, which has given rise to a distinctive approach to conducting business, including the realm of mergers and acquisitions. The homogeneity of cultural values fosters trust among parties even in cross-border transactions, impacting the assessment of transaction premiums. Simultaneously, within this region, a cluster of Asian Tiger countries distinguishes itself by leading in technological advancements, particularly in the realm of digitalization. The escalating competitiveness of technologically advanced companies further influences estimates of transaction premiums.

This paper endeavors to delve into the theoretical aspects of these issues and substantiate, through empirical evidence, the cultural impact of Confucianism and technological progress on mergers and acquisitions (M&A). Our research is grounded in a database encompassing 2677 cross-border deals compiled from January 1, 2002, to January 1, 2021, for 10 burgeoning Asian markets. This study marks the first exploration of M&A deal value and firm valuation during transactions utilizing a glocal region as a case study. Our primary findings substantiate the notion that cultural affinities exert a substantial influence on M&A deal values, with a propensity for lower values among culturally similar countries. Congruent cultural values build trust among stakeholders and safeguard from additional risks. These results give policymakers and business entities an opportunity to adjust their decisions and refine their comprehension of factors that shape the economy.

Keywords: mergers and acquisitions, acquisition premium, Asian emerging markets, Asian Tigers, Confucianism, technological development, cultural identity

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Introduction

Over the past few decades, our world has witnessed a significant surge in globalization. International trade, MNCs, and foreign investments have exerted a profound influence on economic growth. Today, globalization has become commonplace in the context of business operations. However, within the broader spectrum of globalization, regionalization tendencies are on the rise. Regional influences and interconnections between neighboring countries make them cluster. As a result, regional dynamics can be just as strong as global ones, leading to the formation of "glocal" entities characterized by robust economic, cultural, and political ties.

Many companies are expanding their operations beyond local borders, moving goods, services, and capital across the globe. Cross-border mergers and acquisitions (M&A) have garnered significant attention in academic research, with numerous studies exploring this phenomenon across different groups of countries. Simultaneously, it may be interesting to study M&A deals executed by firms within the same region to see whether a homogeneous business environment impacts the processes and outcomes of these transactions.

Among these regional groups of countries, the emerging nations of the Asian region stand out prominently. M&A transactions involving Asian countries have gained increasing prominence in recent years. According to a McKinsey report, M&A activity in Asia experienced substantial growth in 2021, with the number of deals surpassing 2020 figures by more than 20%. The average deal size in Asia has also been on the rise, with the value of such transactions in 2021 approximately 40% higher than in 2019[1]. This surge in M&A activity reflects the growing significance of Asian countries in the global economy, currently accounting for 39% of the world's GDP[2].

Despite significant geopolitical and financial challenges, M&A activity in the Asia-Pacific (APAC) region remained robust in the first half of 2022, boasting 648 deals with a total value of US$403 billion. The notable growth in deal volumes and values, along with an increasing focus on the APAC region, indicates that APAC companies are leveraging M&A to transform their businesses. China, with M&A deals totaling $144 billion, led the way in the Asia Pacific region during H1 2022, solidifying its position as the most active M&A country in the region. Consequently, M&A transactions involving Asian countries have become pivotal for companies seeking growth and global expansion opportunities[3].

Furthermore, the region has shown impressive growth rates, with numerous Asian countries experiencing substantial economic expansion[4]. Additionally, Asian countries are at the forefront of innovation, with many developing Asian economies nearing or reaching the global innovation frontier[5].

Countries within this region form cultural clusters, giving rise to a glocal cultural entity. The cultures within these clusters exhibit common features and formats, influenced by the countries that constitute them. Confucianism, a historical underpinning in these regions, has emerged as a potent developmental force. It significantly shapes relationship dynamics and communication processes and fosters a sense of paradoxical equilibrium. However, Confucianism has been noted to potentially stifle creativity in various forms. A "Confucian firm" is characterized by collectivism, paternalism, affectionism, harmony, and the importance of relationships. Concurrently, Sinosphere business ethics exhibit a blend of traditional values and Western ideas.

Among the emerging Asian markets, certain countries stand out as leaders in technological development and digitalization. As a country advances in technological prowess, it becomes increasingly appealing to foreign investors. Simultaneously, domestic firms contemplate expansion to fulfill their growth ambitions. To analyze the regional characteristics of M&A deals, it is imperative to consider technological development and digitalization.

This paper undertakes a thorough examination of the theoretical aspects related to these topics while substantiating the cultural impact on M&A deals through empirical evidence. Additionally, we delve into ethical paradigms, encompassing both interpersonal and business ethics.

The primary objective of this study is to explore the cultural impact of Confucianism on M&A deals, ethical issues, and the state of digitalization within the Asian region. The practical application of this research lies in policy recommendations. Understanding how specific factors influence the evaluation of companies assumes critical importance in the business landscape. The posing of this question is novel within the relatively homogeneous business environment in the large region of emerging Asian markets. While the influence of digitalization on technological development is a common theme in M&A literature, the effect of Confucianism on M&A deals remains underdeveloped. Thus, this study seeks to scrutinize its impact on M&A value and M&A premiums, which are integral components of a company's overall value. The study is designed to uncover potential theoretical gaps, aligning with the initial objectives of this research.

Cultural identity remains a multifaceted variable even within culturally proximate regions, where subtle distinctions persist. However, in regions where cultural similar-

[1] M&A Asia | McKinsey.

[2] Asia GDP 2021 – StatisticsTimes.com.

[3] M&A Asia | EY.

[4] GDP Annual Growth Rate – Countries – List | Asia (tradingeconomics.com).

[5] Asian Development Outlook (ADO) 2020: What Drives Innovation in Asia? | Asian Development Bank (adb.org).

ities abound, influences like Confucianism can exert a profound unifying impact, shaping not only overall outcomes but also the specific decision-making processes at the transaction level. In other words, individuals involved in these deals often unconsciously adhere to culturally ingrained patterns. The presence of shared values fosters trust among stakeholders and shields company shareholders from additional risks.

This paper has the following structure. We commence with a comprehensive literature analysis, elucidating the theoretical underpinnings of M&A determinants, with a particular emphasis on cultural identity and technological development within emerging Asian markets. This analysis provides the foundation for constructing an analytical framework and formulating hypotheses. Subsequently, we present and discuss the variables of our empirical model at both country and firm levels. Our examination of the Asian M&A landscape, based on a dataset comprising 2,677 cross-border deals collected between January 1, 2002, and January 1, 2021, enables us to investigate how cultural, institutional, and economic factors, as well as digitalization and innovation indicators at the country and firm levels, are linked to total deal value – a proxy for measuring the true market value of a company – and the acquisition premium, which is associated with unlocking hidden value, managerial motivations, and more. By testing the formulated hypotheses, we shed light on the roles played by Confucianism and the technological leadership of Asian Tigers in assessing the value of companies acquired within the analyzed region. In doing so, we contribute to a deeper understanding of M&A determinants and the intricate relationships between companies in different countries. In the final two sections, we present our findings and their limitations and provide implications for future research.

Background Theory and Hypotheses Development

Cultural Aspects of M&A Deals

M&A deals typically involve M&A premiums, representing the difference between the price paid for the target company in a merger or acquisition and the target's assessed market value. It signifies the excess amount over the fair value of all identifiable assets paid by the acquiring company [1]. While there is no concrete evidence of financial synergy motives for overpayment in M&A deals [2], factors such as unlocking hidden value and managerial motives, among others, often contribute to the inclusion of premiums in the deal value.

The impact of cultural disparities between the countries involved in an M&A transaction on these premiums has been a topic of discussion in the literature. Historical and societal contexts shape people's ways of living, communicating, and conducting business. These factors invariably influence M&A deals, as individuals who collectively form a cultural base govern these companies, work within them and, last but not least, engage in negotiations during M&A transactions. However, the relationship between cultural factors and M&A premiums is nuanced. The dependence between cultural differences and target premiums is asymmetrical, with a higher level of familiarity between deal participants often leading to a discount [3]. In essence, collectivist shareholders tend to seek lower premiums [4]. In M&A activities, collectivist shareholders are inclined to demand lower premiums compared to individualist shareholders. They are motivated by the success of the group in negotiations and are more likely to consider the welfare of other stakeholders. Thus, collectivist shareholders are more likely to prioritize the goals of the target firm and may even compromise their interests to safeguard the overall interests of the target firm. Their behavior is also driven by the avoidance of confrontation and the preservation of harmony in negotiations. Additionally, collectivist negotiators are more inclined to employ a group decision-making model rather than an individual one, aligning with the interests of most stakeholders and safeguarding their concerns. These reasons are closely aligned with the theoretical tenets of Confucianism, which will be discussed further below. Therefore, it is posited that cultural similarities have a moderating effect on M&A deal values. All Confucianist countries should exhibit a similar pattern to China, given their shared cultural heritage. At the same time, other cultural factors can introduce conflicts of interest at various stages of M&A deals.

Confucianism and Its Effect on Business Operations

The East Asian cultural sphere, known as the Sinosphere, encompasses Greater China, Japan, Korea, and Vietnam. Historically, trade connections and the dominant position of Imperial China in the region fostered interactions among Sinospherical countries, which came to be linked by strong ideological and cultural roots, including Confucianism, Buddhism, and Taoism.

However, under the influence of globalization, the Sinosphere has witnessed a shift toward cultural regionalization. Borders between countries are fading as global flows of goods and services strengthen. Even consumer behavior is evolving towards a more "glocal" orientation, transcending national boundaries. The distinctive feature of the Sinosphere is that these processes are primarily intraregional, even though the region's borders remain fluid. As with any region, historical context and societal factors have deeply influenced the way people live, communicate, and conduct business. All these elements inevitably exert their influence on M&A deals, as the people who form the cultural foundation govern these companies, work within them, and participate in the negotiation process during M&A transactions.

Confucianism fosters cooperative relationships among individuals, emphasizing consideration for others and group harmony. However, it simultaneously hampers innovation and individual initiative [5]. Confucian social relationships are underpinned by specific guidelines, including:

1) The Golden Mean: Seeking balance and finding mutually satisfactory solutions in conflicts.

2) Generosity and Virtuousness: Treating others with kindness and justice to enhance overall welfare.
3) Harmony: Avoiding confrontation as the preferred solution.
4) Tolerance, Propriety, and Deference – the basic principles of social norms and moral standards.
5) Submission to Authority – a key to understanding power relationships.
6) Discretion for Self-preservation: Avoiding unnecessary involvement in others' affairs.
7) Pleasing Superiors: Demonstrating respect, obedience, and devotion to show loyalty.

Previous research suggests that, among Asian countries, these dominant principles exert varying degrees of influence on the communication process. In terms of factors affecting firm value, Confucianism has been found to impact creativity and innovation negatively [6]. It conflicts with creativity due to factors such as unquestioning obedience, authoritarian relationships, emphasis on humility and conformity, and more. Regardless of the creativity techniques employed or individual creativity levels, Confucianism tends to stifle creativity [7]. Innovation faces hurdles at all stages, from personal relationships to corporate social responsibility and business activities. Notably, Confucianism is significantly associated with lower levels of innovation activity. Moreover, state-controlled firms are a lot more affected by the Confucianist mentality [8].

Recent research also substantiates the impact of Confucianism on company performance. Confucianism legitimizes profit-seeking behavior in companies, thereby enhancing firm performance. Additionally, Confucianism can effectively improve the efficiency of supervision mechanisms while diminishing the marginal contribution of incentive mechanisms to financial performance [9].

ICT Development Under the Influence of Confucianism

Researchers have linked information and communication technologies (ICT) with firm performance through various mechanisms, including increased productivity [10; 11], enhanced efficiency [12], and overall performance [13]. ICT generally adds value by delivering cost savings, revenue enhancement, and new growth opportunities [14]. Previous studies have shown that both high and low levels of industry digitalization have implications for the innovation process following an M&A deal, with the effect being more pronounced in "low" digitalization companies due to the enforcement of technological conditions [15]. Technology enables a clearer assessment of deals, and its implementation enhances the transparency of post-deal performance, suggesting that deal premiums should decrease under the influence of technological development in Confucian countries.

Our analysis primarily focuses on countries in the Asia-Pacific region that meet the criteria of Emerging Market Economies (EME), including China, India, Indonesia, Korea, Malaysia, the Philippines, Taiwan, and Thailand. Additionally, the sample includes the Four Asian Tigers, which occupy a unique position in the region. Furthermore, Malaysia, Thailand, the Philippines, and Indonesia, often referred to as the "Tiger Cub Economies," have experienced steady growth, albeit at a slower pace than the Four Asian Tigers since the 1950s [16]. These countries exhibit distinctive developmental characteristics, characterized by a high level of digitalization coupled with steady economic growth[6]. The synergy between digitalization and cultural dominance in these countries in recent years may contribute to higher company valuations.

Given the multifaceted influence of Confucianism and the dynamic context of regional development characterized by significant innovative growth with a digital component, this study investigates the impact of Confucianism and digitalization on M&A premiums as a component of company value. In light of the literature discussed, the following hypotheses are formulated:

H1: Firms connected by a Confucian background tend to reduce M&A deal premiums due to a more equitable evaluation of businesses under the influence of Confucian virtues.

H2: Successful implementation of modern technologies decreases M&A premiums and leads to more accurate evaluations.

H3: Acquirers evaluate target companies from "Tiger" countries more favorably.

Methodology

Continuing from previous studies, the dependent variable in this work is Total Deal Value, serving as a proxy for measuring the true value (or market value) of the company. It includes acquisition premiums connected to factors like unlocking hidden value and managerial motives [2; 17].

Firm-level Factors

To account for the heterogeneity of firms involved in M&A transactions and the characteristics of specific deals, several firm-level variables are included in the model, as shown in Table 1.

[6] Digital development | Worldbank.

Table 1. Firm-level Factors

Variable	Description	Measure	Source
Deal year	The year when the deal was announced	–	S&P Capital IQ
Target Age [18]	The difference between the foundation year of the target company and the year of the deal	–	Calculations based on S&P Capital IQ
Percent Sought [19]	The percentage acquired during the deal or the proportion of the target shares that the acquirer intends to buy	%	S&P Capital IQ
Target Net Income (log) [18; 20–25]	Target/Issuer net income at announcement, historical rate. Logarithmic values are used in econometric analysis	USD$ million	S&P Capital IQ
Target Total Equity (log)	Target/Issuer total common equity at announcement, historical rate. Logarithmic values are used in econometric analysis	USD$ million	S&P Capital IQ
SIC codes [26; 27]	Dummy variable for evaluating the industrial belonging of deal participants. If the companies belong to the same group by two digits of the SIC code, they marked by 1, and 0 otherwise	Dummy	Calculations based on S&P Capital IQ

Country-level Factors

1. Network Readiness Index (NRI): Introduced in 2002, the NRI provides a forward-looking and holistic perspective on the application of ICT within national economies. The NRI is frequently cited by leaders from the public and private sectors and has been used by numerous countries to design ICT strategies [28]. It measures the progress of digitalization within countries and can serve as a metric to assess the impact on M&A deals. While various variables within NRI influence deals differently, the compound NRI may offer insights, despite the limitations suggested by Silva et al. [29].

2. Cultural Distance: To measure cultural differences between countries, Hofstede's cultural dimensions are employed [18; 30–33]. Cultural components are calculated based on the Compound Culture Index (CCI) methodology developed by Hamid Yeganeh [34]. Given that Hofstede's dimensions now include six, Debasish Roy's modification of the Hofstede Global Cultural Dimension Index (HCGCDI), based on the analysis of Hofstede's dimensions for 64 countries, is used to compute the CCI [35].

3. Geographic Distance: Similar studies have considered the distance between countries and its impact on trade and investments [31; 36].

4. Market Capitalization Component: This component is determined as the ratio of a country's market capitalization to its GDP. Used in previous research [37; 38] to measure market-seeking motives, it provides insights into the size and liquidity of the financial market, affecting a company's ability to attract financial capital and facilitating investment. Market-seeking motives, a component of the Eclectic Paradigm (OLI framework), are relevant here [39]. According to this framework, all transactions are evaluated to determine whether they are more beneficial than in-house investments [40]. It has been shown that market-seeking motives and similar factors affect foreign direct investments (FDI) in the Asian region [41]. Although this effect depends on the specification of the model, the authors conclude that it is generally positive and significant.

5. Economic Distance: This index measures the economic status difference between two countries [18]. It accounts for factors such as GDP per capita, the GDP deflator, and export and import as a percentage of GDP. The product of these components serves as a measure of economic status, while the differences between countries provide information about their economic distance. Economic distance can help to take decisions about high-risk deals [30].

6. Economic Freedom Index: Economic freedom is a significant factor in attracting FDI. It is associated with strong institutions, the rule of law, property protection, justice, and effective police [42]. Incorporating various factors used in earlier studies, the economic freedom index has been positively linked to profit margins and firm value [18; 43–45].

7. Corruption Perception Index: High levels of corruption can deter deals by increasing the opacity of local bureaucracy and raising the cost of doing business [46–48]. However, the negative impact of corruption diminishes in popular countries for FDI, which is known as the "helping-hand effect" [31].

Confucian Deals

Given our focus on analyzing the influence of Confucianism, it is important to identify the countries that are influenced by Confucian values. Based on the Inglehart-Welzel world cultural map, Confucian countries include China, Taiwan, Hong Kong, South Korea, as well as Singapore due to the strong influence of Chinese ideology there [49]. These countries are expected to be influenced by a broad syndrome of distinctive value orientations linked to socioeconomic development [50]. To measure the impact of Confucianism, two dummy variables are included: "Confucianism Deal," which accounts for deals exclusively between Confucian countries, and "Confucianism All," which observes the overall effect of deals involving at least one company labeled as Confucian (Table 2).

Table 2. Other Variables

Variable	Description	Measure	Source
GDP Growth [51; 52]	Annual percentage growth rate of GDP at market prices based on constant local currency	%	GlobalData
Real Interest Rate	Lending interest rate adjusted for inflation as measured by the GDP deflator	%	GlobalData
Patents	Sum of patents by residents and non-residents	–	WorldBank
Tigers	Dummy variable for target companies to see whether they belong to the Tiger country list	Dummy	–

Model Justification

A random effects model is employed as the econometric instrument. An explicit hierarchical model, as described in [53], could be likened to a state-space representation in which the observations within a system are individually modeled. In random effects, each level is conceptualized as a random variable stemming from an underlying process or distribution [54].

In a random effects model, explanatory variables are assumed to have fixed relationships with the response variable in all observations, although these effects may vary from one observation to another. Standard errors can be significant for fixed effects, while random effects allow the estimation of effects for time-independent variables. Random effects models can be estimated using generalized least squares methods [55; 56].

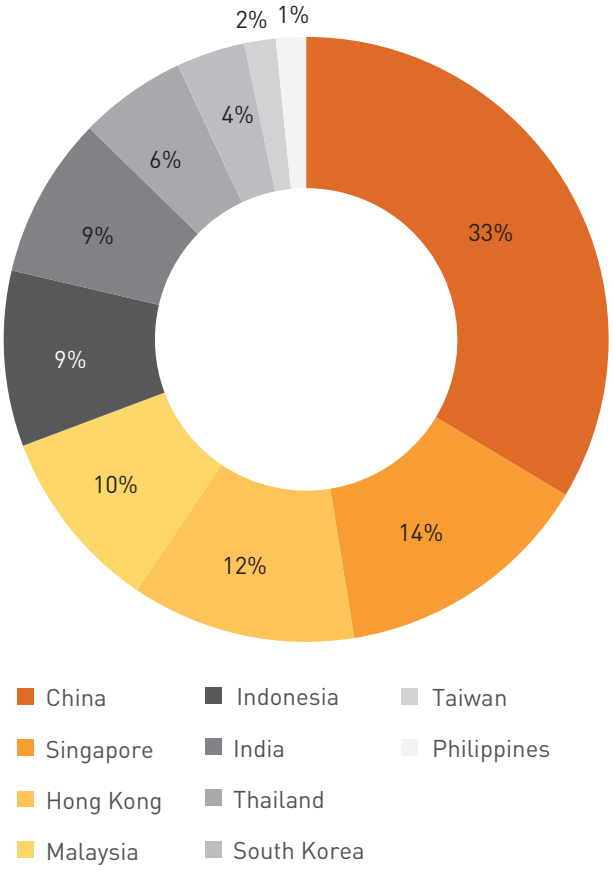
Modelling Results

Dataset Description

The dataset encompasses all closed cross-border M&A deals between the sample countries from January 1, 2002, to January 1, 2021. Notably, approximately one-third of the sample deals originate from China, and another third from the four first-wave Asian Tigers (Figure 1).

In terms of industries, the companies involved in the deals span various sectors. The most prevalent vectors for M&A operations are Industrials, Consumer Discretionary, and IT, although deals from all major industries are included, as illustrated in Figure 2.

Figure 1. Deals Structured by Country



During this period, a total of 2,677 deals were completed, with a mean deal value of $165 million. On average, acquirers acquired a 55% stake in the target companies. Additional descriptive statistics are provided in Table 3.

Figure 2. Industry Breakdown

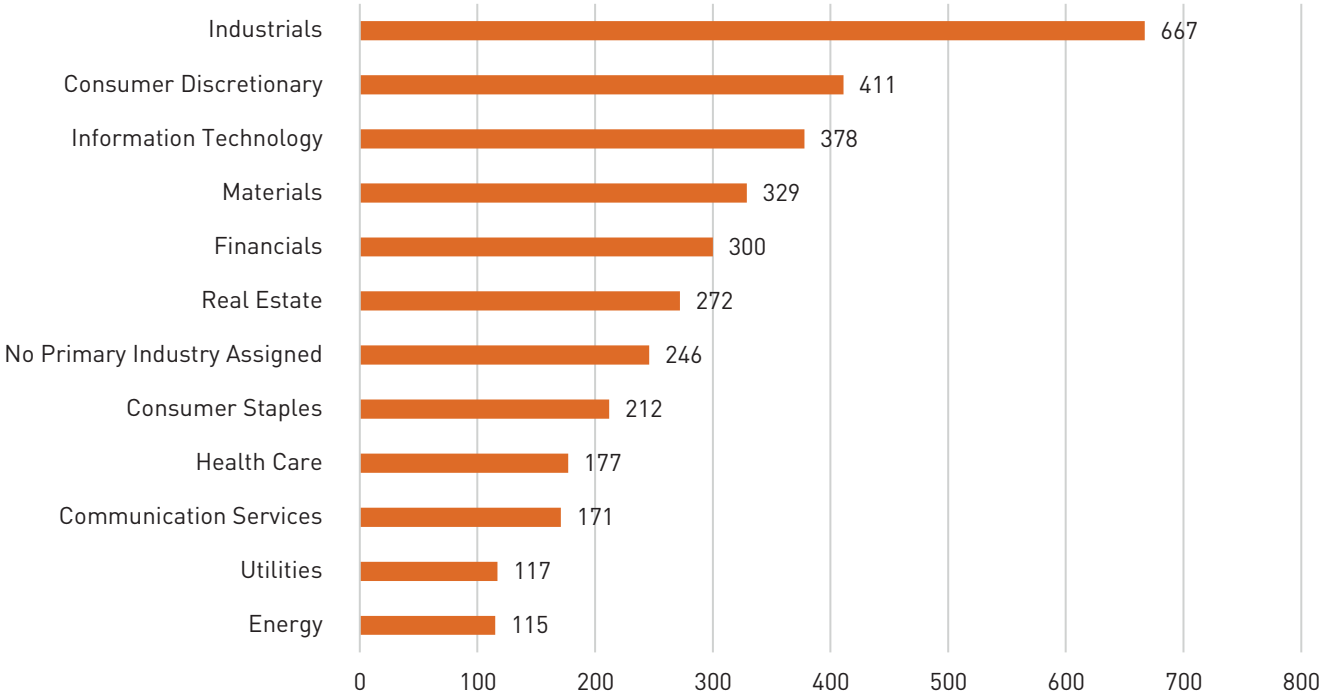


Table 3. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Micro indicators					
Total Deal Value	2,677	165.14	1152.52	.001	35110.44
% Sough	2,640	55.06	35.42	.002	100
Target Net Income (log)	1,171	1.49	2.48	-6.91	10.15
Target Total Equity (log)	1,157	3.35	2.64	-5.81	11.71
Target Age	2,677	13.22	21.04	0	444
Size	817	5.21	2.38	.01	14.43
Indexes					
CPI	2,677	50.46	21.22	19	94
EFI	2,677	65.99	14.76	51	90.2
NRI	2,677	62.22	11.33	32.6	86.23
Market capitalization component	2,677	65781.53	130885.5	141.35	652587.4
Cultural Distance	2,677	.18	.13	0	.5
Geographic Distance	2,677	1.87	1.47	0	5.27
Economic distance	2,677	4.25	2.26	0	6.43
Macro indicators					
Patent	2,677	251302.2	412920.4	1873	1542002
GDP Growth	2,677	6.37	3.04	.12	14.53
Real Interest Rate	2,677	3.40	2.15	.03	12.32

Table 4. Correlation Matrix (Part)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Size	1	1.00															
Confucianism	2	0.04	1.00														
Confucianism_all	3	-0.04	0.40	1.00													
GDP Growth	4	-0.02	0.21	0.11	1.00												
CPI	5	-0.01	0.13	0.24	-0.33	1.00											
EFI	6	0.00	0.01	0.15	-0.50	0.94	1.00										
Patent	7	0.04	0.49	0.19	0.23	-0.32	-0.45	1.00									
NRI	8	-0.05	0.10	0.21	-0.28	0.57	0.58	-0.15	1.00								
Cultural Distance	9	-0.01	0.30	0.37	0.22	-0.12	-0.19	0.23	0.03	1.00							
Geographic Distance	10	0.01	0.16	0.24	0.18	-0.13	-0.17	0.11	-0.13	0.60	1.00						
Direct Connections	11	-0.01	0.04	0.00	0.02	-0.10	-0.10	0.13	-0.07	-0.22	-0.71	1.00					
Market capitalization component	12	0.04	0.22	0.15	-0.34	0.67	0.74	-0.27	0.46	-0.12	-0.05	-0.11	1.00				
Tigers	13	0.01	0.21	0.21	-0.40	0.92	0.91	-0.35	0.56	-0.07	-0.08	-0.16	0.70	1.00			
Total Deal Value(log)	14	0.66	0.13	-0.02	-0.01	0.03	0.01	0.09	0.00	0.00	-0.01	0.00	0.05	0.05	1.00		
Target Net Income (log)	15	0.83	-0.03	-0.05	-0.10	-0.01	0.01	-0.02	-0.05	-0.05	0.01	-0.05	0.01	0.01	0.58	1.00	
Target Total Equity (log)	16	0.92	-0.01	-0.06	-0.08	-0.04	-0.02	0.02	-0.06	-0.03	0.03	-0.07	-0.05	-0.01	0.72	0.81	1.00

Correlation Analysis on M&A Deal Determinants

Table 4 shows a substantial positive correlation between Size (and the natural logarithm of assets) and the natural logarithms of deal value, equity value, and net income. This correlation is logical, as investors first pay for the assets of the target company in an M&A deal. The deal value cannot be less than the cost of the company's assets, as this would contradict the fundamental theory of the firm. The theory of the firm, rooted in neoclassical economics, posits that firms operate to maximize profits [57]. To this end, they ascertain the price and demand of products on the market and optimize resource allocation. Investments, in this context, represent resource allocation, and the result of any deal should ideally be profit maximization. Business assets hold value for a company because they are used to produce goods, fund operations, and drive growth. However, the final deal value is also influenced by other factors, including different evaluations from the perspectives of buyers and sellers, as well as hidden incentives to pay more (deal premiums). Given this correlation, the final model includes the logarithmic values of net income and equity.

As previously mentioned, a strong correlation was observed between the Corruption Perception Index (CPI) and the Economic Freedom Index (EFI). Further analysis revealed that this high correlation stemmed from the use of the Corruption Perception Index as a data source for calculating the Economic Freedom Index. Consequently, the Economic Freedom Index was included in the model, while the Corruption Perception Index was omitted. The preference was given to the Economic Freedom Index due to its broader description of the business environment at the country level, which can be crucial in analyzing M&A determinants.

Additionally, the Market Capitalization component, measured in accordance with GDP, displayed a high correlation with the CPI and EFI indexes. Since the linkage was similar, it was hypothesized that countries with high market capitalization tended to have higher ratings in these indexes.

Empirical Findings of Econometric Analysis

Table 5. Econometric modeling results

Variables	All	Equity based	both based	Percent out
Target Net Income (log)	0.2*** (0.04)		0.2*** (0.04)	0.15*** (0.03)
Target Total Equity (log)	0.69*** (0.05)	0.86*** (0.05)	0.69*** (0.05)	0.59*** (0.05)
Confucianism	–0.28*** (0.09)	–0.3*** (0.09)	–0.26*** (0.09)	0.29*** (0.05)
Confucianism_all	0.12 (0.17)	0.04 (0.18)	0.07 (0.18)	–0.12 (0.23)
Log_NRI	–0.17 (0.21)	–0.07 (0.27)	–0.09 (0.21)	
NRI				–0.001 (0.003)
Percent sought	0.03*** (0.003)	0.03*** (0.003)	0.03*** (0.003)	
Tigers	0.66*** (0.09)	0.57*** (0.16)	0.52*** (0.12)	
SIC similarity	0.13 (0.08)	0.08 (0.06)	0.14 (0.09)	0.28** (0.14)
Year	0.01 (0.01)	0.003 (0.006)	0.01 (0.009)	–0.02* (0.01)
Target Age	–0.003 (0.002)	–0.001 (0.003)	–0.003 (0.002)	–0.01** (0.002)
Patent	3.09e-07** (1.45e-07)	2.64e-07** (1.14e-07)	2.23e-07** (1.02e-07)	2.49e-07*** (6.77e-08)
Economic Distance	–0.03* (0.01)	–0.05* (0.01)	–0.03* (0.01)	–0.05* (0.01)
Market Capitalization Component	2.74e-07 (2.46e-07)	1.04e-06* (1.74e-07)	4.31e-07* (2.39e-07)	1.29e-06* (3.62e-07)
EFI	0.003 (0.01)	–0.02** (0.008)	–0.01 (0.008)	0.005* (0.003)
Geographic Distance	0.01 (0.02)	0.05* (0.02)	0.03** (0.01)	0.02 (0.05)
Cultural Distance	0.14 (0.33)	0.24 (0.36)	0.15 (0.31)	–0.16 (0.53)
Direct Connections		0.16 (0.12)	0.07 (0.11)	
Constant	–23.86 (26.32)	–5.43 (13.53)	–22.82 (19.70)	40.60* (23.15)
Observations	960	1,145	960	972

Variables	All	Equity based	both based	Percent out
No. of country	10	10	10	10
Within	0.6547	0.6657	0.6534	0.4717
Between	0.9031	0.8898	0.9357	0.8600
Overall	0.6591	0.6691	0.6581	0.4786

The initial model included all variables believed to impact firm value. However, certain variables were found to be insignificant and were subsequently excluded. Specifically, GDP growth and Real Interest Rate (RIR) were excluded due to their redundancy with other variables, particularly the Economic Freedom Index (EFI). Additionally, the Corruption Perception Index (CPI) was excluded due to its integration into the EFI.

The main variables in the model displayed significance. A robustness check was conducted on the data in the "all" variables model. The results of the Variance Inflation Factor (VIF) test indicated no multicollinearity in the data, except for CPI and EFI, which reinforced the decision to exclude CPI. Heteroscedasticity was detected using the Breusch-Pagan test, and to address this issue, errors were clustered by countries. Clustering errors by countries is justified by the similarities in socioeconomic background among observations within clusters, potentially increasing the statistical power of the model. Furthermore, statistical significance tends to increase with both an increasing number of clusters and an increasing number of subjects per cluster [58].

As expected, firm performance variables significantly increased company value. Among the country-level factors, the number of patents displayed a significant positive impact on deal value. This aligns with theoretical expectations, as a higher number of patents is indicative of a more technologically advanced country.

However, the Network Readiness Index (NRI) did not yield significant results, leading to the rejection of Hypothesis 2. It is worth noting that NRI measures only the overall impact and may be too broad to yield significant results. Therefore, further study is recommended, with a focus on breaking the NRI down into its subcomponents.

Regarding cultural distance measured with Hofstede's cultural dimensions and accounting for differences in culture among countries within the same region, no significant impact was observed. This lack of significance can be attributed to the cultural similarities among the interconnected countries in the region, resulting in a small and insignificant cultural distance. This partially supports Hypothesis 1 theoretically.

In direct support of Hypothesis 1, deals involving a Confucian background showed a negative and significant influence on transaction value, confirming the hypothesis's premise that Confucianism affects deal premiums. Additionally, deals in Tiger countries were significantly more highly valued. This suggests that companies operating in highly developed environments with access to advanced technologies tend to receive higher valuations. Geographic position and industrial structure, including high-tech manufacturing and finance, likely contribute to these results, supporting Hypothesis 3.

The "percent out" model, which omits the "acquired by buyer" amount, assumes full acquisition. While signs of variables may change in this model, they remain significant. (We connect this with the significance of the constant factor.) This underscores the robustness of the findings.

Hypothesis 2 was not confirmed, indicating that further exploration of the digitalization aspect is warranted.

Discussion and Practical Implications

The findings of this analysis have important implications for policymakers and businesses involved in cross-border M&A deals.

The study's confirmation of Hypothesis 1, which suggests that firms connected by Confucianism tend to reduce M&A deal premiums and evaluate businesses more fairly under the influence of virtues, highlights the importance of considering cultural factors in M&A processes. Policymakers can use this insight to develop policies that promote cross-border M&A deals by culturally similar companies, encouraging fairer deals and improving negotiation processes.

Hypothesis 3, which indicates that acquirers tend to evaluate target companies from "Tiger" countries higher, suggests that these markets are attractive for investments. Although the backwards effect is not investigated in this study, it is clear that investments from these countries are also highly attractive. Understanding these aspects in summary with other effects will be undoubtedly beneficial for all stakeholders.

Policymakers and regulators can also use the information about the evaluation process and price formation to prevent overpayments in M&A deals and decrease the risk of destructive takeovers [34; 59–62]. Cultural similarities such as Confucianism guarantees that all parties follow a similar action template. A clear shared vision helps to lower risks, decreasing both the deal price and the deal premium.

Conclusions

This paper offers a comprehensive exploration of the factors influencing M&A deals. Its distinctive feature is the analysis of the impact of a common cultural background of

the companies participating in the deal, with a specific focus on the phenomenon of Confucianism. As per existing literature, business operations are linked to cultural attributes. The impact of culture on business operations becomes particularly evident in specific geographic regions, such as the Sinosphere. Within this region, countries form cultural clusters, essentially creating a glocal cultural entity. Cultures within these clusters share common characteristics, which evolve with each generation. In modern history, phenomena like the Korean wave or Hallyu have exerted significant influence on the Sinosphere, whose business ethics can be described as a blend of traditional values and Western ideals.

The cultural impact on deals is asymmetrical, leading to discounts, among other effects. Personal inclinations influenced by culture, particularly in collectivist countries, can decrease the value of premiums. Cultural similarities between parties involved in deals tend to reduce the overall value of M&A transactions.

The advancement of information and communication technology (ICT) has led to reduced costs, increased productivity, and new growth opportunities. Higher technological development facilitates innovation processes post-deal. However, the mere development of technology does not guarantee its effective utilization. Empirical findings support our assumption, yet further in-depth exploration of these topics could yield significant results.

This research addresses three key theoretical questions. Firstly, it investigates the influence of Confucianism on M&A deal value and premiums. M&A deal value and premiums tend to decrease when the parties share a similar cultural background, which helps to mitigate risks associated with cultural differences. Shared visions on fundamental issues often ensure positive prospects for new business entities. Secondly, due to the regional specificity, questions about the adoption of technology (or digitalization) in the Asian region have emerged. Technology enables a more transparent assessment of deals and post-deal performance, which should theoretically lead to a decrease in deal premiums. However, empirical studies do not support this hypothesis, potentially due to the generality of independent variables, suggesting the need to measure the network readiness index on different scales by dividing it into pillars. Thirdly, apart from the Confucian impact, we explore whether specific countries have a unique impact on deals. Irrespective of their size, certain countries can influence the culture of the Sinosphere, such as South Korea. These countries, often referred to as "Tigers," share a Confucian background, which, combined with recent cultural dominance, could elevate the valuation of companies from these nations. Companies from Tiger countries tend to receive high evaluations, possibly due to factors such as economic structure, technological advancement, or geographical considerations.

The findings of this research provide new insights allowing policymakers and companies to tailor their decisions or update their understanding of the factors influencing the economy. Cultural identity is a complex variable, and distinctions exist even in culturally proximate regions. When the cultures of the participating countries are similar, elements like Confucianism can further deepen cultural connections and impact decisions both overall and at the deal level. Similar values foster trust between parties and safeguard the interests of company shareholders by mitigating additional risks.

Our study contributes to the existing literature by examining the combined effects of digitalization and culture on deal premiums. Unlike previous studies measured culture broadly by assessing cultural similarities or differences between deal parties or used cultural dimensions as proxies for cultural differences [4], we place particular emphasis on the specific role of a shared cultural background rooted in Confucianism. Moreover, in contrast to some studies that explored the influence of Confucianism on innovation outcomes [6] or the negative association between Confucianism and creativity [7], this research directly investigates how Confucianism affects deal premiums in the context of digitalization.

It is important to note that this study has certain limitations that warrant further investigation. The reduced sample size is due to constraints related to data availability. Additionally, the metric used to measure digitalization may lack precision, and further refinement could lead to a more accurate representation of the phenomenon. Future studies can overcome these limitations by expanding data sources and developing a more nuanced measure of digitalization, thereby enhancing the validity, generalizability, and potential insights of the findings.

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Appendix A

Correlation matrix

Table A.1. Correlation matrix of main determinants

	T_Value	Percent	SIC	Size	Year	T_age	A_age	Conf	Conf_all	RGDPG	RIR	CPI	EFI	Patent	NRI	Cult_D	Geo_D	Dir_Con	Econ_D	Mcap_c~p	Tigers	country	logV	lNRI	L_T_Net	L_T_Eq~y
T_Value	1.00																									
Percent	0.05	1.00																								
SIC	0.02	0.07	1.00																							
Size	0.36	-0.20	0.09	1.00																						
Year	0.01	-0.02	0.02	-0.05	1.00																					
T_age	0.10	-0.16	-0.04	0.24	-0.12	1.00																				
A_age	0.05	-0.11	-0.07	0.23	-0.13	0.17	1.00																			
Conf	0.04	0.10	0.08	0.04	0.04	-0.11	-0.20	1.00																		
Conf_all	-0.01	-0.01	0.02	-0.04	0.05	-0.08	-0.18	0.40	1.00																	
RGDPG	-0.03	0.02	0.07	-0.02	-0.39	-0.09	-0.04	0.21	0.11	1.00																
RIR	0.01	-0.02	0.00	0.05	0.08	0.04	0.04	-0.20	-0.07	-0.16	1.00															
CPI	0.03	0.09	-0.09	-0.01	0.08	0.03	0.05	0.13	0.24	-0.33	0.07	1.00														
EFI	0.03	0.06	-0.10	0.00	0.14	0.06	0.07	0.01	0.15	-0.50	0.05	0.94	1.00													
Patent	0.01	0.06	0.11	0.04	0.31	-0.16	-0.16	0.49	0.19	0.23	-0.14	-0.32	-0.45	1.00												
NRI	0.02	0.03	-0.05	-0.05	0.10	0.01	0.00	0.10	0.21	-0.28	-0.11	0.57	0.58	-0.15	1.00											
Cult_D	-0.01	-0.03	0.04	-0.01	-0.04	-0.08	-0.07	0.30	0.37	0.22	-0.10	-0.12	-0.19	0.23	0.03	1.00										
Geo_D	0.00	-0.02	0.02	0.01	-0.03	-0.08	-0.09	0.16	0.24	0.18	-0.01	-0.13	-0.17	0.11	-0.13	0.60	1.00									
Dir_Con	-0.01	0.03	0.04	-0.01	0.00	0.02	-0.02	0.04	0.00	0.02	-0.04	-0.10	-0.10	0.13	-0.07	-0.22	-0.71	1.00								
Econ_D	-0.02	-0.04	0.05	0.01	-0.04	-0.06	-0.21	0.21	0.44	0.14	-0.04	-0.19	-0.21	0.12	-0.09	0.28	0.23	-0.01	1.00							
Mcap_comp	0.04	0.09	-0.06	0.04	0.12	-0.02	-0.01	0.22	0.15	-0.34	-0.05	0.67	0.74	-0.27	0.46	-0.12	-0.05	-0.11	-0.16	1.00						
Tigers	0.04	0.07	-0.09	0.01	0.05	0.05	0.04	0.21	0.21	-0.40	0.02	0.92	0.91	-0.35	0.56	-0.07	-0.08	-0.16	-0.21	0.70	1.00					
country	-0.02	-0.07	-0.08	-0.07	0.06	0.12	0.14	-0.45	-0.18	-0.49	0.01	0.32	0.44	-0.52	0.19	-0.21	-0.21	0.01	-0.14	-0.07	0.36	1.00				
logV	0.28	0.08	-0.01	0.66	0.07	0.22	0.11	0.13	-0.02	-0.01	0.00	0.03	0.01	0.09	0.00	0.00	-0.01	0.00	-0.13	0.05	0.05	-0.07	1.00			
lNRI	0.02	0.03	-0.05	-0.05	0.12	0.00	0.00	0.12	0.21	-0.27	-0.09	0.55	0.55	-0.11	0.99	0.03	-0.12	-0.06	-0.08	0.44	0.52	0.17	0.00	1.00		
L_T_Net	0.30	-0.28	-0.01	0.83	0.00	0.23	0.17	-0.03	-0.05	-0.10	0.07	-0.01	0.01	-0.02	-0.05	-0.05	0.01	-0.05	-0.06	0.01	0.01	0.04	0.58	-0.06	1.00	
L_T_Equity	0.29	-0.33	-0.03	0.92	0.01	0.29	0.23	-0.01	-0.06	-0.08	0.02	-0.04	-0.02	0.02	-0.06	-0.03	0.03	-0.07	-0.08	-0.05	-0.01	0.06	0.72	-0.07	0.81	1.00

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Executive Human Capital: Adaptive Efficiency of Russian IT Companies to Structural Crises

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Abstract

Starting from March 2022 Russian companies are facing a structural crisis while IT industry was the most affected. The paper investigates the impact of qualities of top management's human capital (HC) in the domestic IT companies on the effectiveness of their adaptation to this crisis. The novelty of the paper is underpinned by (1) the rare investigation of the topic at times of crises; and (2) coverage of the entire top management team. The results showed that HC of top managers moderately and positively impacted the effectiveness of firms to adapt to the crisis. No difference in strength of impact of CEO HC and HC of the rest of the team was discovered. Such qualities of HC as (1) young age; (2) taking office before the crisis; (3) experience in international companies; (4) experience in IT industry; and (5) openness to stakeholders the most supported the adaptation to crisis.

Keywords: human capital, cancel culture, structural crisis, adaptation, information technology industry

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Introduction

The influence of top management's human capital on corporate performance is studied extensively in academic literature, but is rarely considered from the viewpoint of different levels of stability of the economic environment. At the same time, the authors of the upper echelons theory believe that during crises top managers' personal traits become even more significant than in economically prosperous periods because they influence managers' decisions, which must be made quickly in the times of crisis [1]. Thus, the purpose of this research is to evaluate the influence of top management's human capital on the efficiency of adaptation of Russian IT companies to the structural crisis and the 2022 cancel culture.

In 2023, during the structural crisis and the cancel culture period in Russia, it is particularly significant to study the issue of influence of top management's personal qualities on the efficiency of companies' adaptation to the rapidly changing conditions.

To achieve our purpose, we have to accomplish the following objectives:

1) Analyze academic and practical literature dedicated to human capital and strategies of companies' adaptation to the structural crisis of 2022.
2) Define the characteristics and indicators of an efficient strategy of Russian IT companies' adaptation to cancel culture.
3) Develop an index of efficiency of Russian IT companies' adaptation to cancel culture and a calculation methodology.
4) Develop a human capital index and a calculation methodology.
5) Evaluate the efficiency of Russian IT companies' adaptation to cancel culture and their human capital using the developed indices.
6) Perform correlation analysis for the developed indices.
7) Draw conclusions and provide recommendations for their practical application.

The objective of the research is the human capital of Russian IT companies' top management, the subject of the research is the influence of human capital on the efficiency of companies' adaptation to the crisis of 2022. A sample of Russian IT companies was compiled on the basis of the information technology index of the Moscow Stock Exchange – MOEX IT. It is a case study.

We test the following hypotheses.

H1. Companies with better-quality human capital adapt more efficiently to cancel culture.

H2. CEO human capital has a positive impact on the efficiency of companies' adaptation to cancel culture.

H3. Top management's human capital (without the CEO) has a positive impact on the efficiency of companies' adaptation to cancel culture.

H4. CEO human capital produces a more powerful influence on the efficiency of companies' adaptation to cancel culture than the human capital of the rest of top management.

H5. Companies with a more heterogeneous top management team in terms of human capital demonstrate better efficiency in adaptation to cancel culture.

The scientific novelty of the paper is in the development of original indices of efficiency of companies' adaptation to cancel culture and human capital (exemplified by information technology companies) and in the combination of conclusions about the influence of human capital and its heterogeneity on corporate performance in the times of crisis in order to create the most complete model of an efficient top management team. The obtained results may be used by internal and external stakeholders of companies, educational institutions and researchers.

How Top Management's Human Capital Assists in Adaptation to Structural Crises. Literature Review

Human Capital and Corporate Performance

According to the OECD, human capital (hereinafter – HC) is "the knowledge, skills, competencies and other attributes embodied in individuals that allow them to contribute to their personal and social and economic well-being" [2]. HC of an organization has the characteristics of an intangible asset: it has no physical form, but contributes to the creation of company value.

In resource-light industries (e.g., IT), human capital is the main competitive advantage of companies, since it suffers from copying, transfer and replication less than other resources [3]. The whole HC is of significance for company development, however, the management team headed by the CEO makes the key contribution in profit generation. In 1984 D. Hambrick and P. Mason presented the upper echelons theory, which stated that the human capital of each manager influenced his decisions and thus produced an indirect impact on corporate performance. It is important that in the authors' opinion this dependence is most pronounced in an unstable economic environment [1]. In the most recent papers, V. Nazarkina and other researchers studied the way in which personal traits of a CEO influenced value creation in one of the largest emerging capital markets in Russia. The sample comprised the information on 111 Russian public companies and 235 CEOs over eight years (2013 to 2020). In order to evaluate corporate efficiency, the authors used economic value added (EVA). They found empirical evidence that CEO human capital had impact on value creation measured as the first-order difference with the annual adjusted EVA across the industry [4]. In their turn, E. Karnoukhova and A. Stepanova studied the influence of a CEO's personal qualities in such innovative industries as pharmaceuticals, biotechnology

and life sciences, software, services and manufacturing equipment. They used a generalized least squares model for the sample of 12,565 observations from 2004 to 2015. The obtained results showed that education, tenure and duality play a key role in explaining the company value [5].

In the present paper we suggested the following hypotheses on the basis of literature study.

*H*1. Companies with better human capital adapt more efficiently to cancel culture.

*H*2. CEO human capital has a positive impact on the efficiency of companies' adaptation to cancel culture.

*H*3. Top management's human capital (without the CEO) has a positive impact on efficiency of companies' adaptation to cancel culture.

*H*4. CEO human capital produces a more powerful influence on efficiency of companies' adaptation to cancel culture than human capital of the rest of top management.

*H*5. Companies with a more heterogeneous top management team in terms of human capital show a better efficiency in adaptation to cancel culture.

Literature analysis allows to define several gaps in research dedicated to the influence of various characteristics of top management's HC on corporate performance. They are 1) no studies on this topic under the circumstances of permanent structural crises; 2) a small number of studies for Russia and samples not divided by industry; 3) ambiguity of conclusions due to a large spread of influencing and dependent variables used in the studies; 4) insufficient number of studies on evaluation of influence of personal traits of the whole top management team. Also, team heterogeneity is only considered in literature by separate factors (e.g., by age, sex, education). In the present paper we will evaluate of the heterogeneity level of the HC management team as a whole.

Structural crisis, Cancel Culture and Company's Adaptation to It

The phenomenon of "cancel culture" is not new, and it occurs in various historical periods [6], however, the term "cancel culture" has been in active use in the late 2010s – early 2020s due to social media development. Cancel culture is a social way of holding a person(s) and (or) brand(s) liable for unethical acts by means of a boycott of such person(s) and/or brand(s).

The 2022 structural crisis in Russia is often called cancel culture. Sanctions against Russian companies and banks, Russia's disconnection from the SWIFT payment system, geopolitical divides caused the exodus of many foreign companies from Russia and termination of cooperation agreements with Russian firms. In particular, non-cooperation with Russian companies is a distinctive feature of cancel culture.

The second distinctive feature of cancel culture is the fact that it immediately followed the crisis of 2020, overlapping the unsolved problems. By 2022 Russian business had not fully recovered from the crisis caused by COVID-19 and the limitations related to it.

On the basis of the studied literature, in order to evaluate the efficiency of adaptation to cancel culture we determined two main strategies used by companies in down times: reduction and investment [7]. The reduction strategy implies the reduction of operating costs and non-core assets. The investment strategy involves the investment in improvement of existing products or development of new ones in order to enter new markets. A.V. Stepanyan concludes that the most effective solution is a combination of both abovementioned strategies or a "dual strategy", as it is called by the author [7].

Therefore, in this paper we will define the combination of the retention and investment strategy by companies as the most efficient strategy of adaptation to cancel culture. The main objective of this strategy may be described as "Retain everything you can retain and urgently create something new – markets, products, relations". This approach implies that companies will develop new business niches, expand or replace the product range, search for new suppliers and consumers, change supply chains drastically.

The main drawback of literature dedicated to the cancel culture crisis is the absence of methodology for evaluating the efficiency of companies' adaptation to it. It is due to the following factors: 1) absence of statistical and econometric research caused by a lack of information and a short time period since the beginning of the crisis; and 2) results of academic research of previous crises may not be extrapolated to the current crisis because of its unique nature.

In the present paper we will offer our own methodology for the evaluation of companies' adaptation to the crisis of 2022 and the methodology of evaluation of top management's human capital with regard to the above-mentioned gaps in academic literature.

IT Industry and Cancel Culture

The present paper considers the influence of cancel culture on information technology companies because this industry was most noticeably exposed to the influence of the changed macroeconomic environment. It is important to understand that, on the one hand, the crisis of 2022 had a negative impact on the industry and, on the other, it brought about new opportunities for companies. This allows IT companies to preserve both the retention and investment strategies in order to continue operations and develop their products.

One of the central industry problems is the difficulty in purchase of the necessary foreign equipment and software because foreign suppliers have left the Russian market. Cooperation with foreign suppliers that have remained in the market is complicated by the disconnection of Russia from the SWIFT bank payment system. Industry experts also point out the staff shortage.

The opportunities of the Russian IT industry are underpinned by the government support of IT specialists and IT industry, as well as the decline in competition due to foreign companies exiting the market. Thus, the industry has

received an impetus for development: companies may copy foreign products as well as create their own know-how taking into consideration the needs of the Russian market.

A sample of Russian IT companies for this research was compiled on the basis of the information technology index of the Moscow Stock Exchange (MOEX IT), which comprises seven companies: Yandex N. V., Ozon Holdings Plc., VK Company Ltd., HeadHunter Group Plc., Cian Plc., Positive Technologies Pjsc., Softline Holding Plc. We also added Selectel Ltd. to the sample. The point to note is that although all companies belong to the IT sector, they serve different economy sectors and their product range differs significantly.

Methodology

Methodology of Calculation of the Index of Efficiency of Companies' Adaptation to Cancel Culture

As noted above, in order to function successfully companies need to employ both the retention and investment strategies. Thus, the index comprises the indicators that reflect the efficiency of each strategy.

Revenue was chosen as the indicator that reflects the company's ability to maintain the level of business activity. The EBITDA margin was chosen as the indicator that reflects how companies managed to reduce operating costs in order to stay profitable/prevent operating at a loss. Staff retention level will be used as the indicator of companies' ability to preserve the key resource.

In an unstable economic environment, it is important for companies to avoid cash flow gaps and find the most efficient ways of using their funds. In this paper, absolute liquidity ratio is used as the indicator of efficient funds application, and receivables and payables turnover – as the indicator of efficient negotiations with contractors. The above indicators pertain to the evaluation of efficiency of *the retention strategy*.

Now we come over to the evaluation of the investment strategy. Many recent papers suggest that under cancel culture circumstances it is necessary to adapt the product to the current market conditions and try to enter new markets. Therefore, the first criterion of the investment strategy efficiency is the dynamics of capital investments made by companies.

Instability of the economic environment and floating credit rates during 2022 made short-term loan-based funding less attractive. Therefore, for companies in general the investment coverage ratio became important. It shows which share of assets companies can finance using sustainable sources of funding.

The third criterion is the actual fact of new product launches. Apart from changes in the product line, experts assert that it is necessary to rebuild the organization structure and business processes. This also entails cost optimization and allows to shift the focus to the most promising business development trends. Thus, the efficiency index comprised the criterion of "change in the company structure".

In spite of a reduction in the investment and broker operations in 2022, in this paper the share price dynamics is one of components of the investment strategy efficiency indicator. See the description and evaluation scale of each indicator in Table 1.

Table 1. Components of the index of efficiency of companies' adaptation to cancel culture

Criterion	Evaluation scale
Retention strategy	
1. Revenue dynamics	0 – company's revenue decreased; 1 – company's revenue grew, the growth rate is less than the industry performance indicator; 2 – company's revenue grew, the growth rate exceeds the industry performance indicator
2. Dynamics of the EBITDA margin	0 – the EBITDA margin is negative and decreased in 9 months of 2022; 1 – the EBITDA margin is positive but decreased in 9 months of 2022 or is negative but increased in 9 months of 2022; 2 – the EBITDA margin is positive and increased in 9 months of 2022
3. Staff retention level	0 – staff reduction; 1 – no news of staff reduction or increase; 2 – staff increase
4. Dynamics of the absolute liquidity ratio	0 – the ratio is above average, the ratio increased; 1 – the ratio is below average, the ratio increased; 2 – the ratio is below average, the ratio decreased

Criterion	Evaluation scale
5. Dynamics of receivables and payables turnover (hereinafter – receivables and payables turnover)	0 – receivables turnover increases, payables turnover decreases; 1 – receivables turnover increases, payables turnover increases or receivables turnover decreases, payables turnover decreases; 2 – receivables turnover decreases, payables turnover is unchanged/increases
Maximum score	10
Investment strategy	
1. Existence of capital investment in 2022	0 – the company froze capital investments in 2022; 1 – the company made capital investments in 2022 or the company did NOT make capital investments in 2022 but announced planned investments for 2023–2025; 2 – the company made capital investments in 2022 and announced planned investments for 2023–2025
2. Dynamics of the investment coverage ratio	If the industry-wide indicator decreases: 0 – the ratio has decreased more than the industry-wide indicator; 1 – the ratio has decreased less than the industry-wide indicator; 2 – the ratio has increased. If the industry-wide indicator increases: 0 – the ratio has decreased; 1 – the ratio has increased less than the industry-wide indicator; 2 – the ratio has increased more than the industry-wide indicator
3. Launch of new products	0 – the company has not launched new products; 1 – the company has announced new products, but has not launched them yet; 2 – the company has launched new products
4. Changes in the company structure	0 – the company structure has not changed; 1 – the company announced structural changes, but the changes have not been implemented yet; 2 – the company structure changed
5. Dynamics of share prices	0 – company share prices decreased more than the industry-wide indicator; 1 – company share prices decreased less than the industry-wide indicator; 2 – company share prices grew in 2022 as compared to 2021
Maximum score	10
Maximum score of the index	20

Source: Compiled by the author.

Methodology of Calculation of the Human Capital Index and Heterogeneity Level of the Top Management Team

Based on the dual strategy of companies' adaptation to the crisis, the top management team studied in the present paper comprises seven persons (the official names of positions in companies may be different):

- Chief executive officer – the main decision maker;
- Chief commercial officer – solves the problems of reconstruction of sales channels when relations with foreign contractors have been severed;
- Chief financial officer – manages cash flows and takes measures to ensure corporate financial stability in an uncertain macroeconomic environment;
- Chief technology officer – is responsible for replacing critical IT infrastructure when Russian companies' licenses for use of foreign services, software are withdrawn and equipment maintenance is suspended;
- Chief HR officer – implements measures for staff retention and prevention of brain drain, moral support and motivation of employees in the circumstances of increasing stress level during crisis;

- Chief legal officer – manages redomiciliation (if needed) and structural changes (including executing transactions of mergers and acquisitions);
- Chief marketing officer – responsible for the correct use of market niches vacated by foreign companies and market launch of new products.

When in this paper we chose the qualities to be added to the human capital index, we took into consideration characteristics potentially useful in the implementation of the dual strategy of adaptation to cancel culture.

1. Age. In the times of crisis, a manager has to be ready to make nonstandard decisions and respond to situations as quickly as possible. Previous studies note that young CEOs are more prone to make changes in the company and in general adapt more quickly to the external environment than aged managers [8–10].

2. Tenure period. In a down economy, this quality may be of special importance if we consider it on terms of the number of tenure months because in unstable times staff turnover increases. It takes new employees from several months to half a year to integrate fully in corporate operations.

3. Technical (STEM) education. The research that studied changes in shareholders' preferences when selecting CEOs after the crisis of 2008 determined that CEOs with a STEM (Science, Technology, Engineering, Mathematics) education were more sought-after after the crisis than CEOs with humanities, business or arts education [10]. The same trend is observed in 2022: an increasing number of vacancies in the market requires a degree in mathematics, which may be related to an increased need in a rational and systematic approach to problem solution [11].

4. Financial education. The authors often find out that a CEO's financial education raises the company's risk level, increases the number of investments, and drives company growth [8; 12; 13].

5. Education level. The authors of the upper echelons theory assumed that there was a positive relationship between the managers' education level and innovations in a company [1]. Subsequently, the positive dependence between the education level and risk proneness was often revealed from empirical data. The reason for this is that the degrees obtained after the bachelor's/specialist's degree expand managers' cognitive capacities and horizons, making them more flexible and inclined to unconventional solutions [9; 12].

6. Experience in foreign companies. Managers who have previously been employed by international companies have specific skills and knowledge of business practices abroad, so they are of special value during a structural crisis.

7. Experience of company management in the times of crisis. While compiling the index, we also took into consideration the indicator of management experience during other crises because such experience may help to evaluate the situation quicker under current conditions. This criterion has not been previously considered by the authors in empirical studies.

8. Relevant experience. It should be noted separately that managers' experience in the information technology industry is of importance because an employee familiar with specifics of the sector has more relevant knowledge and connections. This reduces the likelihood of incorrect decisions caused by lack of understanding of the industry specifics.

9. Openness. The level of the upper echelon managers' openness is a quality necessary in unstable times. The managers have to be in the spotlight for the external world and employees in order to give moral support, define the current situation, new objectives and projects, the corporate development strategy for investors and employees.

10. Political connections. Top managers' political connections may be a useful characteristic in the times of crisis because it allows to solve issues quicker, handle problems related to licensing and patenting (which is of special importance in the IT industry)

Description of the logic of score assignment for the calculation of the HC index is presented in Table 2.

Table 2. Components of the top management's human capital index

Criterion	Evaluation scale
1. Age	0 – older age (60+); 1 – middle age (45–59); 2 – young age (18–44)
2. Tenure	0 – holds his position less than three months; 1 – holds his position for 3–9 months; 2 – holds his position more than 9 months (employed before the special military operation)
3. Technical (STEM) education	0 – no STEM education; 1 – the main STEM education; 2 –STEM education in addition to the main STEM education

Criterion	Evaluation scale
4. Financial degree	0 – no financial degree; 1 – main degree is finance-related; 2 – financial education in addition to another degree
5. Education level	0 – specialist's/bachelor's degree; 1 – master's degree; 2 – postgraduate study – doctoral degree (PhD)
6. Experience in foreign companies	0 – no experience in foreign companies; 1 – experience in foreign companies; 2 – experience in a foreign IT company
7. Management experience in the times of crisis	0 – did not occupy management positions during the previous crisis (crises); 1 – occupied management positions during the previous crisis in other companies; 2 – occupied management positions during the previous crisis in his company
8. Relevant experience	0 – no experience in the IT industry before the current position; 1 – relevant experience occupying other positions in the IT industry (including positions in the same company); 2 – relevant experience in a management position similar to the current position
9. Openness	0 – the manager has not been mentioned in mass media since February 2022; 1 – the manager has not been mentioned in mass media since February 2022 separately from the company or is mentioned in lists; 2 – since February 2022, the manager promotes company interests in mass media
10. Political connections	0 – no connections; 1 – one connection channel; 2 – more than one connection channels
The total maximum score	20

Source: Compiled by the author.

The data on personal qualities was collected for each top manager of companies in the sample using public sources where information was up-to-date as of 30 September 2022.

On the basis of the collected information on each criterion, the managers were assigned a score from 0 to 2, where 2 is the maximum usefulness for company's adaptation to the crisis of 2022, 0 – the minimal usefulness. If personnel changes took place in 2022, the HC of both managers weighted by the number of days of tenure was taken into consideration. Based on the obtained data, the human capital index of each IT company was calculated according to the following formula (compiled by the authors):

$$\text{Index ЧКа} = \sum_{i=1}^{n} \text{Ki}, \quad (1)$$

Where Index HKa – the human capital index of company a;

n – number of personal traits for summing up;

K*i* – evaluation of human capital of company a by personal quality *i* (sum of the management team).

HC heterogeneity of the top management team is calculated using Blau's index, which is indicative of the diversity level. The values of Blau's index range from 0 to 1, where 0 means that the team is completely homogeneous, 1 – completely heterogenous.

$$Bi = 1 - \sum_{i=1}^{k} Pi^2, \quad (2)$$

Where B*i* – Blau's index indicates the team diversity level;

k – number of categories to which managers belong to;

P*i* – the share of managers in the category *i*.

In this paper, the existence/absence of a relationship between indices will be defined by means of the Spearman's rank correlation.

Research results

The results of evaluation of efficiency of Russian IT companies' adaptation to cancel culture are presented in Table 3.

Table 3. Evaluation of efficiency of IT companies' adaptation to cancel culture

No.	Company	Retention stage	Investment stage	Efficiency index
1	Positive Technologies Group	8	7	15
2	Selectel	7	8	15
3	Ozon Holding PLC	7	7	14
4	VK Group	6	8	14
5	Yandex PLC	7	6	13
6	Softline	4	7	11
7	Headhunter PLC	6	3	9
8	Cian PLC	4	3	7
The maximum value for the company		10	10	20

Source: Compiled by the authors.

Table 4. Correlation between personal qualities of top management and efficiency of IT companies' adaptation to cancel culture

No.	Quality	Corr Spearman		
		CEO	Management	The whole team
1	Age	0.67	0.10	0.61
2	Tenure	0.37	0.12	0.47
3	Technical (STEM) education	–0.37	0.25	0.15
4	Financial education	–0.33	–0.31	–0.57
5	Education level	–0.54	–0.63	–0.78
6	Experience in foreign companies	0.21	0.49	0.41
7	Management experience in the times of crisis	–0.25	–0.82	–0.76
8	Relevant experience	–0.28	0.30	0.30
9	Openness	0.46	0.42	0.41
10	Political connections	0.29	–0.17	0.10

In order to calculate the human capital index of companies and ensure correct further results we verified the trend of influence of each chosen quality from the HC index on the index of efficiency of companies' adaptation to cancel culture. Table 4 shows coefficients of correlation of managers' qualities and the index of efficiency of IT companies' adaptation to cancel culture.

Top managers' age (an average relationship), tenure period, experience in foreign companies, openness and relevant experience (a moderate relationship) have the most powerful impact on adaptation efficiency. Such qualities as technical education and political connections have a weak positive relationship with the level of adaptation to the crisis.

We revealed a negative relationship between the index of efficiency of companies' adaptation to the crisis and some qualities. Thus, the financial education of the management team produces a negative average impact on adaptation

efficiency. This may be due to the fact that people with a financial education may be overconfident in their estimation of the company status and correctness of market analysis [12]. Under the constantly changing conditions of cancel culture this may result in incorrect decisions and an excessive risk increase. It is also important that the crisis of 2022 is a structural one and non-financial reasons are at its root. As a consequence, financial management skills are less useful for top managers than, for example, relevant experience, connections, ability to represent the company's interests before external stakeholders.

A higher education level of the top management team has a negative impact on the way in which an IT company copes with a crisis. This may be due to the length of the period spent to obtain an education. It should also be noted that an academic education focuses more on theoretical concepts or consideration of cases from companies' past experience. Under cancel culture conditions, standard or well-tried decisions may be ineffective because of drastic changes in the macroeconomic environment.

Company management experience of the whole management team during previous crises has also a negative influence on the results of adaptation to cancel culture. This fact may be explained by the intention of the top managers experienced in company management during crisis to apply the methods that have been effective in the past, and the fact that they make decisions on the basis of their previous experience, ignoring the specifics of the current situation. Such well-tried decisions may be less risky, but are also less efficient. The absence of such experience may help to take more unconventional decisions.

The following also has a negative influence on successful adaptation to crises:

- CEO's technical education, which indicates that this type of education is not optimal for an IT company CEO;
- CEO's relevant experience in the industry – the previous experience in the industry probably makes a person make more familiar, well-tried decisions that sometimes are not in line with the current economic environment;
- Top management's (except the CEO's) political connections – functional managers' connections may result in shifting the management's responsibility on to external persons, thus causing a lack of effort in solving the existing problems.

The qualities for which a negative dependence was revealed in all three manager samples (financial education, education level, company management experience in the times of crisis) were excluded from the HC index. Table 5 presents the results of the evaluation of companies by the adjusted human capital index (7 qualities) and Blau's index (heterogeneity).

Table 5. Results of evaluation of corporate human capital

No.	Company	Human capital ratio			
		The whole team	CEO	Management	Heterogeneity
1	Ozon Holding PLC	0.684	0.509	0.720	0.6410
2	Positive Technologies Group	0.673	0.786	0.645	0.6408
3	Headhunter PLC	0.561	0.571	0.560	0.6584
4	Yandex PLC	0.523	0.482	0.530	0.6657
5	VK Group	0.513	0.643	0.488	0.6661
6	Softline	0.509	0.591	0.494	0.6621
7	Selectel	0.500	0.500	0.500	0.6448
8	Cian PLC	0.454	0.422	0.461	0.6660
The maximum value for the company		1	1	1	1

Source: Compiled by the authors.

Table 6. Correlation between the index of adaptation efficiency to cancel culture and HC indices

No.	Indices	Corr Spearman	Relationship strength
1	Team HC index	0.33	Moderate positive
2	CEO HC index	0.43	Moderate positive
3	Management HC index	0.42	Moderate positive
4	HC general heterogeneity	–0.55	Average negative

Ozon Holding and Positive Technologies have the highest human capital level, while Cian showed the worst results in this sample. VK, Cian and Yandex have the most heterogeneous management teams in terms of HC, while companies with the highest HC indicators (Ozon Holding and Positive Technologies) have the most homogeneous teams. Team heterogeneity levels of all IT companies are very close (range from 0.64–0.67), and above average. This may be due to the fact that all organizations belong to the same high-tech industry, which requires a diverse range of intellectual capital, hence, HC diversity is highly valued [8].

Analysis of the interrelation between the index of adaptation to cancel culture and the adjusted human capital index is presented in Table 6.

On the basis of the obtained results, we may conclude that the first three hypotheses are confirmed. There is a moderate positive relationship between the index of efficiency of adaptation to cancel culture, the team's human capital index, CEO HC and management HC. This means that companies with higher HC show better performance for 9 months of 2022 and cope with external threats and use opportunities more efficiently. The conclusion is consistent with the core upper echelons theory by D. Hambrick and P. Mason [1].

The fourth hypothesis of a stronger influence of CEO human capital on the efficiency of adaptation in comparison to the rest of top management is not confirmed. CEO and top management human capital exert almost the same impact on the results of IT companies' adaptation to the crisis of 2022 (Corr = 0.43 and 0.42 respectively). This allows to assert that top management's HC was excluded by many authors from consideration in their studies for no good reason.

At the same time, it should be noted that for some qualities a different relationship strength is observed (Table 4): in six cases out of ten CEO's qualities produce a stronger influence on the adaptation efficiency index. This may be related to the CEO's key role in decision-making, as well as to the fact that data concerning top management may be diluted because calculations are made on the basis of data on six employees. It is interesting that the exceptions are the education level and the whole set of industry-specific experience (experience in foreign companies, management experience in the times of crisis and relevant experience) of functional top managers. They are of high importance for corporate performance in comparison to the same qualities of a CEO.

The hypothesis that companies with the most heterogeneous teams adapt to crises most efficiently was not confirmed either. Analysis showed (Table 6) that in a cancel culture environment companies with more homogeneous total human capital on the team were more efficient (correlation –0.55 with HC heterogeneity). Thus, in spite of the assumption made by the upper echelons theory authors, i.e., that heterogeneous teams are more efficient in times of crisis, cancel culture dictates the rules. Probably, when decisions need to be made quickly, top management's HC homogeneity becomes more useful, which helps managers to understand each other better and come to an agreement quickly. At the same time, the general level of HC heterogeneity for all IT companies is rather high anyway.

Let us also consider the influence of the heterogeneity level by individual qualities of the top management team on the efficiency of company's adaptation to cancel culture (Table 7). For a more successful adaptation to cancel culture the top management team should be homogeneous enough in terms of age and tenure, because a moderate negative correlation was revealed for these indicators.

Table 7. Correlation of the index of the efficiency of adaptation to cancel culture with team heterogeneity by individual qualities

No.	Quality	Corr Spearman
1	Age	–0.37
2	Tenure	–0.48
3	Technical (STEM) education	0.14
4	Financial education	–0.23
5	Education level	–0.17
6	Experience in foreign companies	0.11
7	Management experience in the times of crisis	0.67
8	Relative experience	0.44
9	Openness	–0.18
10	Political connections	0.18

At the same time, heterogeneity of top management is useful during a crisis for such qualities as management experience in the times of crisis and relative experience, where an average and moderate correlation was revealed. After all, the diversity of past experience expands the base of knowledge and skills available for use.

Besides, a weak positive correlation was discovered. It means that a company that is more heterogeneous in terms of STEM education, experience in foreign companies and political connections will cope with a crisis more efficiently. Also, a weak negative correlation with team heterogeneity was revealed (a homogenous team copes with a crisis better) in terms of education level, openness and financial education.

To sum up, we would like to emphasize that the majority of the relationships revealed in this research are of moderate or average power. This may be due to the fact that in this research we study the short-term influence of companies' HC on adaptation efficiency (9 months of 2022). In the long-term, stronger relations may be observed. Additional studies are required to determine it.

Besides, this research, even though it only takes the information technology industry into account, does not consid-

er the fact that IT companies are closely related to other industries that they serve. Therefore, companies from the sample are subjected to cancel culture to different extents, which may have an effect on the obtained results.

It is important to note that the described model of efficient HC is characteristic of Russian IT companies in the times of crisis. In order to extrapolate these conclusions to other samples and the external economic environment, it is necessary to perform additional studies.

Conclusion

The purpose of this research was the evaluation of the influence of top management's human capital on the efficiency of adaptation of Russian IT companies to structural crises and the cancel culture of 2022. The results showed that managers' human capital has a moderate and positive impact on the effectiveness of adaptation of Russian IT companies to cancel culture. The moderate nature of these relationships may be due to a short research period and the influence of industries that IT companies serve.

The hypothesis of a stronger influence of CEO HC in comparison with the HC of the rest of the top management team was not confirmed, hence, it is reasonable to pay attention to the overall HC of corporate top management instead of personal qualities of CEOs.

The following personal qualities of the top management team are the most useful in the times of crisis: young age, assuming office before the crisis, top management's experience in foreign companies, relative experience, high level of openness of the top management to external stakeholders. At the same time, the qualities that exert a negative impact on efficiency of companies' adaptation to cancel culture were revealed: top management's advanced academic degrees, financial education and management experience during previous crises.

Besides, the hypothesis of importance of high heterogeneity of team HC in the times of crisis was rejected. It is generally better to have a more homogenous team for quick decision making in the constantly changing circumstances. However, it is desirable that the characteristics of the CEO and the rest of top management differed by the criteria of technical education (preferable for top management), previous experience in the IT industry (it is preferable for top management) and political connections (it is preferable for the CEO). It is also good when foreign companies in which managers have acquired experience are from different industries.

The results obtained in this paper may be used by external and internal company stakeholders for a more accurate forecasting of corporate performance in times of crisis, and the creation of a more efficient personnel development strategy and anti-crisis strategy with regard to HC specifics; by educational institutions to develop training programs; by scientists as the base for additional research (including the study of the influence of top management's HC on the efficiency of companies' adaptation to cancel culture in the long term).

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Financial Contagion of Russian Companies During the COVID-19 Pandemic

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Abstract

The article examines the financial contagion of Russian companies during the pandemic COVID-19. Financial contagion refers to the strengthening of interconnections between segments of the financial market during a crisis, when turbulence from one market is transferred to others, and the relationship between parameters goes beyond normal market interactions. The study involved shares of 27 companies in the energy, financial, telecommunications, consumer and raw materials sectors of the Russian economy. As exogenous variables supposedly influencing the market values of these companies, we tested the rouble exchange rate against the US dollar, the spot price of Urals oil and the yield on annual government bonds (proxies for the cost of borrowings). Identification of the potential contagion period was based of the sliding coefficient of variation of these variables. The construction of VARX models convincingly proved the increasing influence of the exchange rate and the bond yield rate on the fundamental (market) return of Russian companies in the short term (during the acute phase of the pandemic) and the delayed impact of oil prices on it, which manifested itself during the chronic crisis. Contagion testing was also carried out on the basis of a change (growth) in the coefficient of determination in the acute phase of the pandemic as compared to the pre-crisis and post-crisis periods. For a more accurate assessment of the contribution of each variable to contagion, we used the method of source decomposition of the coefficient of determination with a correction for heteroscedasticity. This made it possible to identify the companies most vulnerable to financial contagion during the pandemic, and the sources of their contagion, as well as the market segments that showed the greatest resilience. The study can be useful for managers in maintaining their companies' market value, for investors in effective portfolio diversification, and for public authorities when pursuing a policy of financial stabilization in a crisis. The limitations of the study are related to the imperfections of the VARX models method, as well as to the specifics of the pandemic crisis, the conclusions from which can only be partially applied to other types of crises.

Keywords: Russian companies, market return, financial contagion, COVID-19 pandemic, exchange rate, oil price, yield of government bonds, VARX model

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Introduction

Researchers all over the world pay increasingly more attention to the financial contagion and systemic risk concept which implies that a shock in one country, industry or economic sector may be transmitted to other countries, industries and economic sectors.

The strengthening interrelation between financial markets, the global market integration and the growing role of financial intermediaries induce rapid spillover effects which may spread any minor shock throughout the economy. Capital flows, trade and commercial relationships, competitive devaluation are the main reasons for spreading the spillover effects of an economic shock among countries and markets [1–3]. Investors' behavior, their sentiment, fears and concerns have a special impact on the spillover of shocks among markets [4]. Financial contagion between different sectors of the economy is caused by a strong bond between stock market indices and exchange rate fluctuations, oil price yield, energy demand, industrial production and functioning of commodity markets [5; 6].

The COVID-19 pandemic once again pointed out financial fragility and vulnerability of the economy to exceptional risks such as "black swan" events. The state policy measures taken to keep the infection at bay, for example, isolation, suspension of industrial and commercial activities, mobility restrictions caused a serious economic shock both in supply and demand which has far-reaching consequences in various industries. The COVID-19 pandemic had a significant, extensive influence on the world stock markets affecting the return on stock assets and their volatility [7].

Before the pandemic the markets had already shown a high co-integration accompanied by spillover of external shocks of mixed nature. However, the pandemic due to the specific nature of its external causes and response methods made adjustments in the financial contagion processes. Study of the interrelation between financial assets in new circumstances will allow investors to adjust their portfolio diversification and risk hedging strategies while regulatory bodies will be able to develop sound macroprudential measures to combat the effects of financial contagion.

Development and use of adequate mathematical and econometric tools for analysis of markets' interrelatedness play a particularly important role because they enable a comprehensive assessment of the direction and scope of systemic risk propagation. The present research addresses these issues.

Review of Studies Dedicated to the Problem under Investigation

There are two main notions in the financial contagion concept. "*Spillover*" (overflow, side effect) describes financial contagiousness as a situation when assets' price volatility in one market spreads to another market. "*Co-movement*" refers to a significant increase in joint dynamics of markets after an exogenous shock which cannot be attributed to fundamental economic factors [8].

Paper [9] describes three contagion channels through which a financial shock spreads to financial markets: *the information, liquidity and financial channel*. Information channel contagion is caused by transfer of information about the asset price. In this case the shock in one market is a signal to investors resulting in immediate price effects in other markets. Market shocks spillover is more significant in the early stage of a crisis due to global uncertainty, panic and investors' herding mentality. Liquidity channel contagion occurs due to a decrease in borrowers' creditworthiness and an overall liquidity deficit in all financial markets and this affects prices and returns on assets. Financial channel contagion is related to shocks in the stock returns in a crisis-ridden market. They may be an indicator of future returns on other assets and influence the market participants' readiness to assume risks.

Paper [10] defines four possible channels of contagion: *the macroeconomic, political, trade and financial one*. The macroeconomic and political channels are attributed to the markets' identical response to interrelated macroeconomic changes (for example, an increase in debt burden) and economic policy changes (for example, change in the key rate of the Central Bank). The trade channel is related to mutual influence of markets/countries through supply of resources, goods, and services while the financial channel – to capital flow between them. Paper [11] also defined four financial contagion channels: the information channel, liquidity channel, flight-to-quality channel (switching to less risky assets), risk premium channel.

In order to measure the dependence between stock markets linear correlations are often used. However, their results are unreliable because they are static and do not cover the constantly developing dynamic relationships between markets. To eliminate these drawbacks researchers apply copula methods [3; 12; 13]; the generalized autoregressive conditional heteroskedasticity models (GARCH) [14; 15]; vector autoregression models (VAR) [16; 17]; vector error correction models (VECM) [18; 19]; DCC-GARCH models [20] and others.

Construction of VAR models of various specifications are a rather widespread approach for detecting contagion effects [11]. VAR models have the following advantages: simplicity and flexibility in modeling the market relationships; taking into account control variables and influence of previous returns of the tested variables [13]; ability to assess the contribution of each variable into the variance of the modeled variable by means of its decomposition [21]. At the same time VAR models have several drawbacks: they are sensitive to selection of variables and time periods; it may also be difficult to choose the optimal lags for different variance in them; they do not take into consideration possible cross connections between endogenous and exogenous variables generating the endogeneity problem [13].

A special area of modern research is study of interrelations between markets and financial contagiousness during the COVID-19 pandemic. Thus, in paper [22] the authors reach the conclusion that there is the financial contagion

effect between the markets of the emerging countries intensified in case of especially strong interrelation between them. The authors of another paper [23] make the conclusion that during the COVID-19 pandemic there was a relationship between the S&P 500 index and industry-related indices which manifested itself most of all in the periods of elevated uncertainty. Paper [24] analyzed spreading of financial contagion from the USA stock market to stock markets of emerging countries through global factors such as inflation, interest rates, exchange rate and political uncertainty.

The present paper makes a contribution to the topic of financial contagion. For the first time we study contagion of the fundamental (market) return on stocks of Russian companies during the pandemic from three financial markets: the currency, oil and debt market. The novelty of this research also consists in use of VARX models and methods of decomposition of the coefficient of determination with a correction for heteroscedasticity.

Data

Ordinary shares of 27 companies were used to test contagion[1]:

1) *energy sector*: PJSC Gazprom (GAZP); PJSC Lukoil (LKOH); PJSC Novatek (NVTK); PJSC Oil Company Rosneft (ROSN); PJSC Surgutneftegas (SNGS); PJSC Tatneft (TATN); PJSC RusHydro (HYDR); PJSC Inter RAO UES (IRAO);
2) *financial sector*: AFK Sistema PJSFC (AFKS); PJSC Credit Bank of Moscow (CBOM); PJSC Sberbank of Russia (SBER); PJSC Moscow Exchange (MOEX); PJSC VTB Bank (VTBR);
3) *telecommunications sector*: PJSC Mobile TeleSystems (MTSS); PJSC Rostelecom (RTKM); Yandex N.V. LLC (YNDX);
4) *consumer sector*: PJSC Aeroflot (AFLT); PJSC Magnit (MGNT);
5) *raw material sectors*: PJSC Severstal (CHMF); PJSC MMC Norilsk Nickel (GMKN); PJSC Magnitogorsk Iron & Steel Works (MAGN); PJSC ALROSA (ALRS); PJSC NMLK (Novolipetsk Steel Company) (NLMK); PJSC PhosAgro (PHOR); PJSC Polyus / Polyus Gold (PLZL); JSC Polymetal (POLY); PJSC United Company Rusal (RUAL).

We used for analysis data on the average daily prices of these stocks (RUB) at the MOEX.

The following variables are taken as exogenous variables which presumably influence the stock price:

1) spot price of Urals oil, US dollar[2];
2) Russian roubles to US dollar exchange rate, RUB/US dollar[3];
3) annual yield of Russian government bonds, %[4].

Government bonds yield is considered as a proxy variable of the capital cost. Besides, high-frequency data necessary for analysis is available for government bonds.

Research Hypothesis

The research hypothesis suggests that the relationship between the studied variables should manifest itself or strengthen only at the time of economic shocks.

If the stock price index of a certain company traditionally correlates with the oil price, the dollar exchange rate and the yield of government bonds, and the relationship is not strengthened significantly after a shock their joint movement will be indicative of strong real connections rather than financial contagion. However, if in the periods of rapid changes in economic conditions, fluctuations in exogenous variables are accompanied by an intensification of their relationship with the prices and yield of the studied financial assets, contagion may be diagnosed. Besides, effects of financial contagion may be manifested both in the acute phase of the crisis (in the short-term period when uncertainty grows which entails chaotic movements and influences overall market volatility) and in the chronic crisis period (when relative prices of assets change).

Methodology

In the present research the periods of heightened market turbulence (acute crisis) and relative market lull were differentiated by means of constructing the sliding coefficients of variation for three exogenous variables. The acute crisis period was determined on the basis of consistent exceedance by the coefficient of variation of its mean value throughout the entire considered period. The periods adjacent to it from the left and right and equal in duration were identified as the pre-crisis and post-crisis period.

The sliding coefficient of variation CV_X of variable X was calculated by steps for each point in time on the basis of 10 values of the indicator up to the specified date, the indicator value on such date and 10 values of the indicator after the corresponding date. 21 values were chosen because this is the average number of trading sessions per month.

$$CV_X = \frac{\sigma_X}{\mu_X}, \qquad (1)$$

where σ_X – standard deviation of indicator X within the considered period; μ_X – its mean value.

In order to have a better visualization of the coefficients of variation we normalized them by means of adjusting to the linear scale (0; 1):

[1] URL: https://m.ru.investing.com/indices/rtsi-components

[2] URL: https://www.profinance.ru/chart/urals/max/?s=Urals_med&hist=true&p=VXJhbHNfbWVkIzIjMTAjOTcwIzU1MCM3IzMjMg==

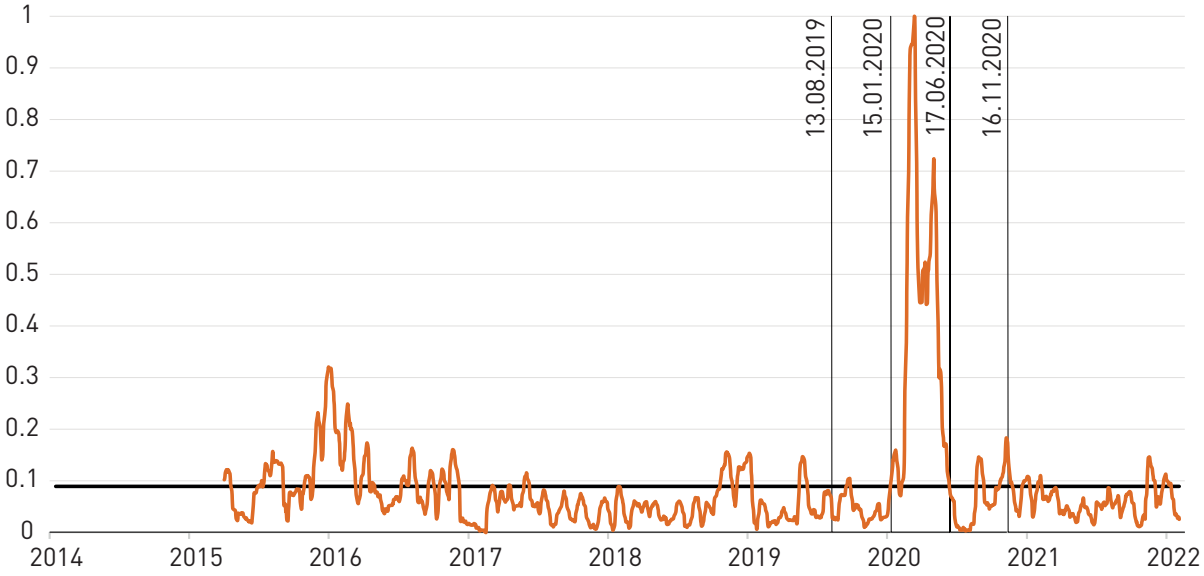
[3] URL: https://ru.investing.com/currencies/usd-rub

[4] URL: https://ru.investing.com/rates-bonds/russia-1-year-bond-yield-historical-data

$$ICV_X = \frac{CV_X - \min CV_X}{\max \mathrm{CV}_X - \min CV_x}. \quad (2)$$

Figure 1 presents dynamically the results of calculation of the sliding coefficient of variation of the logarithm of Urals oil prices. The black line shows its mean value within the considered period.

Figure 1. Sliding normalized coefficient of variation of the logarithm of the Urals oil price



On the basis of Figure 1 we determined the period of heightened volatility of the Urals oil price: 15 January 2020 – 17 June 2020 (totally 105 observations for 5 months) which corresponds to the acute phase of the pandemic. Consequently, we defined the pre-crisis period (13 August 2019 – 14 January 2020) and the post-crisis period (18 June 2020 – 16 November 2020) which also comprise 105 observations before and after the acute phase of the pandemic.

The pre-crisis, crisis and post-crisis periods, similar in length, were shown graphically for two other exogenous variables (Figures 2 and 3).

Figure 2. Sliding normalized coefficient of variation of the logarithm of the US dollar exchange rate against the Russian rouble

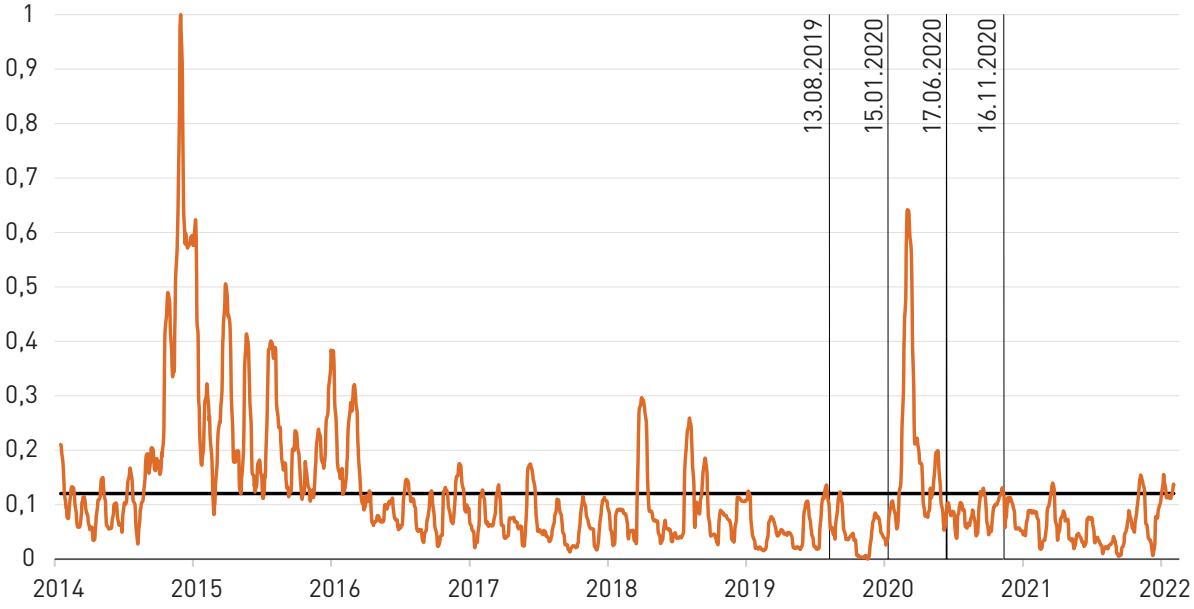
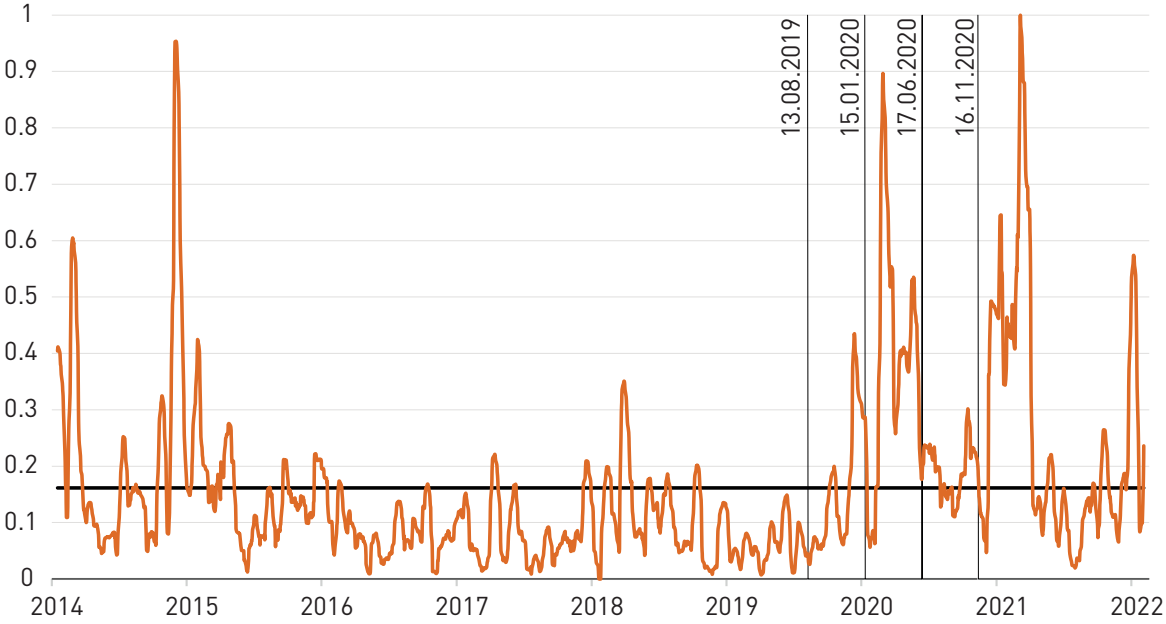


Figure 3. Sliding normalized coefficient of variation of the logarithm of yield on annual government bonds



To test contagion we applied the vector autoregression model with exogenous variables (VARX) which is an extension of the standard VAR model:

$$Y_t = c + \sum_{i=1}^{p} a_i Y_{t-i} + \sum_{j=1}^{k} b_j X_{t-j} + \varepsilon_t, \quad (3)$$

where Y_t – vector $p \cdot 1$ exogenous variables at the time point t;

c – constant;

X_t – vector $k \cdot 1$ exogenous variables at the time point t;

a_i – matrix $p \cdot p$ of coefficients of exogenous variables with a lag up to order p;

b_j – matrix $p \cdot k$ of coefficients of exogenous variables with a lag up to order k;

ε_t – vector of model residuals at the time point t.

The maximum value of lag p of the model was determined using the Akaike, Schwarz and Hannan-Quinn generalized information criteria. In the majority of models the criteria indicated a lag value of 2. Apart from that, we excluded the constant in the constructed models because its estimates were close to zero and were statistically insignificant.

Stationarity in time series of data was achieved by using the first differences of logarithmic variables (approximate values of assets' fundamental return) in the models. It was confirmed by means of the augmented Dickey-Fuller test.

The following tests were used to diagnose the quality of the models: 1) the Portmanteau test for the residual autocorrelation; 2) the autoregressive conditional heteroscedasticity test (ARCH) – a test for presence of nonpermanent variance in the residuals of regression analysis; 3) the Doornik-Hansen test (DH test $\chi 2$) – a comprehensive statistical test to verify normality of distribution, homoscedasticity and absence of residuals' autocorrelation; 4) the F-test – to verify whether the previous values of variables included in the VAR model have any predictive power for the current value of these variables (whether the subset of lags of the model makes a joint significant contribution to explanation of dependent variables' variance).

Financial contagion of stock assets from exogenous variables is confirmed in two ways: 1) if during the acute crisis period the explanatory variable coefficient exceeds in modulus its value in both pre-crisis and post-crisis period; 2) if during this period the share of the dependent variable variance explained by exogenous factors increases.

As mentioned in the theoretical part, an advantage of the VARX model is decomposability of the variance (Var) and, subsequently, the coefficient of determination (R^2). This allows to identify the contribution of each exogenous variable X_j into the variance of return on asset in each tested period:

$$\mathrm{Var}\left(X_j / Y\right) = \frac{b_j^2 \mathrm{Var}\left(X_j\right) + b_j \sum_{k=1, k \neq j}^{K} \mathrm{CoVar}\left(X_j; b_k X_k\right)}{\mathrm{Var}\left(Y\right)}. \quad (4)$$

The first term of the numerator estimates the variable's own contribution to the variance of Y and the second term – the cross impact of the tested variable with other exogenous variables. The sum of contributions of all exogenous variables defines the part of the coefficient of determination which is explained only by exogenous variables[5].

It is comparison of $\sum_{j=1}^{K} \mathrm{Var}\left(\frac{X_j}{Y}\right)$ for pre-crisis, crisis

[5] It should be noted that this approach does not take into consideration possible interrelations between exogenous and endogenous variables but in the well-specified model devoid of endogeneity such interrelations should be minimized.

and post-crisis periods which enables us to make conclusions about the presence or absence of contagion.

However, paper [25] raised the important problem which consists in the fact that during the crisis increase in the variance of exogenous variables creates the heteroscedasticity problem (one of the results is overestimation of correlation coefficients). In order to solve the problem of nonconstancy of variance of the model explanatory parameters, the abovementioned paper offered a way of adjusting the correlation coefficient of the crisis period using the parameter δ^*. This parameter is indicative of the increment in the variance of variables – which are potential contagion sources during the crisis period (*cr*), as compared to their variance during non-crisis periods (*no_cr*):

$$\delta_j^* = \frac{\mathrm{Var}\left(X_{j\_cr}\right)}{\mathrm{Var}\left(X_{j\_no\_cr}\right)} - 1, \quad (5)$$

According to [25] and taking into consideration decomposability of the coefficient of determination we may use the calculated δ_j^* coefficients to adjust the contribution to the coefficient of determination of each exogenous variable separately:

$$\mathrm{Var}\left(X_j / Y\right)^* = \frac{\mathrm{Var}\left(X_j / Y\right)}{1 + \delta_j^* \cdot \left(1 - \mathrm{Var}\left(X_j / Y\right)\right)}, \quad (6)$$

Research Results and Their Discussion

Table 1 shows change of logarithms of stock prices and exogenous parameters of the model as well as their coefficients of variation in the three tested time intervals.

Table 1. Some Descriptive Statistics of Model Variables

X	*Pre-crisis period, BC*		Crisis period, C		Post-crisis period, PC	
	$\overline{\ln X_t - \ln X_{t-1}}$	$\mathrm{CV_x}$	$\overline{\ln X_t - \ln X_{t-1}}$	$\mathrm{CV_x}$	$\overline{\ln X_t - \ln X_{t-1}}$	CV_x
Exogenous variables						
USD	−0.060	0.516	−0.392	1.869	0.084	0.893
URALS	0.075	1.065	−0.277	11.171	0.046	1.250
BONDS	−0.196	4.553	0.121	7.846	−0.002	1.895
Energy sector						
GAZP	0.078	0.976	−0.190	2.165	−0.053	1.261
LKOH	0.194	0.811	−0.153	1.695	−0.076	0.981
NVTK	−0.011	0.393	−0.234	1.590	0.148	0.619
ROSN	0.159	0.761	−0.303	3.066	0.141	0.660
SNGS	0.671	5.844	−0.344	4.822	−0.036	1.320
TATN	0.090	0.652	0.174	2.801	−0.097	1.842
HYDR	0.214	1.114	−0.154	2.626	−0.072	0.676
IRAO	0.307	1.240	0.121	1.619	0.045	0.852
Financial sector						
AFKS	0.267	4.542	−0.063	5.431	0.579	4.888
CBOM	−0.019	1.129	0.008	2.520	0.039	1.454
MOEX	0.176	1.419	−0.208	2.142	0.162	1.635
SBER	0.146	0.807	−0.246	2.458	0.167	0.980
VTBR	0.145	4.355	0.121	11.821	0.018	3.983

X	*Pre-crisis period, BC*		Crisis period, C		Post-crisis period, PC	
	$\overline{\ln X_t - \ln X_{t-1}}$	CV_X	$\overline{\ln X_t - \ln X_{t-1}}$	CV_X	$\overline{\ln X_t - \ln X_{t-1}}$	CV_X
Telecommunications sector						
MTSS	0.192	1.334	−0.003	1.145	−0.008	0.476
RTKM	0.016	0.354	0.127	2.025	0.143	0.997
YNDX	0.103	1.207	0.121	0.835	0.413	1.459
Consumer sector						
AFLT	-0.017	0.560	0.159	4.664	−0.193	3.307
MGNT	-0.061	0.575	0.121	1.341	0.222	0.687
Raw materials sector						
CHMF	−0.002	0.633	−0.036	0.822	0.236	1.026
GMKN	0.272	0.874	−0.113	0.740	0.073	0.392
MAGN	0.095	1.385	−0.326	2.420	0.085	1.095
ALRS	0.172	1.410	−0.065	3.360	0.287	1.686
NLMK	0.022	1.160	0.083	1.702	0.371	2.039
PHOR	−0.009	0.316	0.356	0.963	0.127	0.501
PLZL	0.040	0.433	0.250	1.975	0.382	1.424
POLY	0.143	0.646	−0.190	2.204	0.274	1.613
RUAL	0.190	1.491	0.121	4.673	0.217	2.511

Note. The indicator $\overline{\ln X_t - \ln X_{t-1}}$ is an average (intersession) market return on asset; CV_X – coefficient of variation of the asset price. For better visualization both indicators were multiplied by 100 and presented in %.

Analysis of data from table 1 shows that when the acute phase of the crisis began the stock prices of the studied companies came down. An especially significant drop occurred in the energy sector where 6 out of 8 studied companies lost on average 0.14% during one session in comparison to the positive daily growth of 0.21% in the pre-crisis period. During the crisis period the financial sector (3 out of 5 companies) showed an average daily drop of 0.08% as compared to a growth of 0.14% in the previous period. The raw materials sector turned out to be more resilient to the crisis: the average daily intersession returns of 5 out of 9 companies decreased to 0.01% in comparison to 0.10% in the base period but positive. The consumer and telecommunications sectors, on the contrary, showed growth in the stock return during the acute phase of the pandemic which may be due to development of remote work and consumer fever in anticipation of and in the first months of lockdown.

In the post-crisis period the situation stabilized: all sectors except for the energy sector showed better price dynamics as compared to the pre-crisis period. The stocks of AFK Sistema (AFKS) demonstrated the highest growth. On average they gained 0.58% daily, Yandex (YNDX) – 0.41% which is probably due to the growth of e-commerce, ride-tech and delivery services. The raw materials sector showed the best stock returns in the post-crisis period. The average daily growth was 0.23%. On the contrary, Aeroflot (AFLT) stocks demonstrated a decline of -0.19% which had probably been caused by lockdowns and mobility restrictions related to the COVID-19 pandemic.

The coefficients of variation represented in table 1 indicate that in the acute phase of the pandemic volatility increased not just in the explanatory variables but also in stock prices of the majority of companies except for Surgutneftegas (SNGS), Mobile TeleSystems (MTSS), Yandex (YNDX) and Norilsk Nickel (GMKN). The biggest growth in volatility was observed in Urals oil prices (CV increased by 10.1 p.p.) and VTB stocks (CV increased by 7.5 p.p.)

In transition to the post-crisis period the coefficients of variation returned to pre-crisis values with slight changes (±1 p.p.) except for yield of government bonds (their rel-

ative variation decreased by 2.7 p.p.) and Surgutneftegas (SNGS) stock prices (their CV decreased by 4.5 p.p.). Volatility of Aeroflot (AFLT) stock prices, on the contrary, increased by 2.8 p.p. in the post-crisis period in comparison to the pre-crisis period.

As long as according to our hypothesis the contagion effect manifests itself in change of influence of the studied variables during different crisis periods we built VARX models for all three periods (formula 3). For convenience of visualization and presentation of the obtained results in the three periods Table 2 was made (the models are presented in more detail in Appendices 1–3). It demonstrates significance and signs of the variables' coefficients (+) (–), significance of the model in general (R^2) and results of tests for absence of autocorrelation and heteroscedasticity as well as for normality of residuals distribution.

Now we are going to consider the results of VARX models in more detail.

In the *pre-crisis period* (BC) some companies of the energy and raw materials sectors showed a positive relation between current and previous periods' returns which is indicative of an onward growth of stock prices (bullish trend). For Rostelecom (RTKM) a negative relation of returns was observed which may suggest that a correction in the value of previously overvalued stocks took place. The F-test results for lags confirm significance of the lagged variable of the 1st and 2nd order for Rostelecom (RTKM) and Severstal (CHMF).

In the *crisis period* (C) dependences are mainly changed into the opposite ones. Change in the coefficient sign of lagged variables for Lukoil (LKOH) is indicative of an oncoming recession while change in the direction of influence of lagged variables for Rostelecom (RTKM), on the contrary, implies that the telecommunications company has gained advantages during the COVID-19 crisis. The F-test results confirm significance of lagged variables for these companies in the crisis period. Apart from that, according to the F-test results in the crisis period negative coefficients of lagged variables of return of the 1st and 2nd order are also statistically significant for SBER, CBOM, MAGN, NLMK.

In the *post-crisis period* (PC) the negative influence of previous return on the current return was preserved for the Credit Bank of Moscow (CBOM), SNGS and manifested itself for RTKM. LKOH, TATN, SBER, NVTK, ALRS showed an opposite trend which is indicative of a correction in stock prices. The F-test results for the above companies are statistically significant.

Now we are going to consider significance and direction of influence of exogenous variables on stock return of companies.

The *dollar exchange rate* (*USD*) shows a statistically significant negative influence on returns of almost all studied companies in the crisis period. At the same time, for some companies the negative influence of the USD variable on change of the stock price persists even after the crisis is over. As long as shares are denominated in the domestic currency, the correlation, of their fundamental return with the dollar/rouble exchange rate seems rather logical. A significant drop in the rouble exchange rate during the crisis reduces interest to assets in the domestic currency. Heightened currency volatility creates uncertainty which also influences investor behavior. As a result, stocks become highly sensitive to the USD exchange rate.

As we see in Table 3, *Urals oil price* has a significant impact on stock returns mainly in the post-crisis period (PC), to be more precise, after passing the acute phase of the crisis. When the real sector companies restore the pre-crisis outputs, the demand for energy resources boosts raising the prices of the energy sector companies. In the post-crisis period there is also a positive relation between oil prices and prices of assets of the majority of companies from the raw materials sector and some companies from the financial sector (CBOM, MOEX, SBER, VTBR) as well as the telecommunications sector (MTSS and RTKM).

Yield on government bonds (BONDS), similar to the oil price during the crisis, has a significant negative impact on almost all studied companies except for the raw materials companies. This is due to a rise in the cost of borrowing which most of all affects the companies attracting borrowed capital for financing. Unlike the dollar exchange rate, after transition to the post-crisis period (PC) the influence of the BONDS variable becomes statistically insignificant almost for all observed models.

In general, the coefficients of the USD and BONDS variables are indicative of change of the state of the stock market during the crisis which may imply that there exists the financial contagion effect while the coefficients of the Urals variable are indicative more of a delayed impact after the acute phase of the pandemic has passed.

A low coefficient of determination (R^2<0.3) for all companies in the pre-crisis period is succeeded by a significant increase during the acute phase of the pandemic (R^2>0.3) and then declines again below the established threshold in the post-crisis period. During the acute crisis the coefficient of determination is significant for all energy companies, the majority of financial companies (except for the Moscow Exchange's shares which are the most diversified securitized asset), telecommunications companies MTSS and AFLT, 4 out of 9 companies from the raw materials sector (GMKN, ALRS, NLMK, RUAL). These companies may be suspected of financial contagion.

The results of tests (*Portmanteu test, ARCH test, (DH) test* χ^2) indicate that for the majority of models the assumptions of normality, homoscedasticity and absence of autocorrelation are true. In general, this is indicative of correctness of the chosen models specifications. Absence of normality of residuals distribution in some studied models (according to *(DH) test* χ^2) suggests that the model fails to explain the whole variation of data and/or contains systematic errors. This may imply presence of outliers or a non-linear relationship between the dependent variable and its predictors, and this may reduce its predictive capability. However, this does not reduce significance of these variables for explaining stock market returns.

Table 2. Summary Visualization of Coefficient Estimates and Tests of VARX Models

Y_{tLn_ln-1}	Y_{t-1}			Y_{t-2}			X_{1t} (USD)			X_{2t} (URALS)			X_{3t} (BONDS)			R^2	Portmant. test		ARCH test LM Lag 1			ARCH test LM Lag 2			(DH) test χ^2			F-test Lags			F-test Vars	
	BC	C	PC	BC	C	PC	BC	C	PC	BC	C	PC	BC	C	PC	BC	C	PC	BC	C	PC	BC	C	PC	BC	C	PC	BC	C	PC	BC	C	PC
Energy sector																																	
GAZP								(–)	(–)	(+)		(+)		(–)			✓		✓	✓	✓		✓	✓	✓	✓	✓						✓	
LKOH	(+)	(–)	(+)		(–)	(+)		(–)		(+)		(+)		(–)			✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	
NVTK						(+)		(–)				(+)					✓		✓	✓	✓	✓	✓	✓	✓	✓	✓							✓
ROSN								(–)		(+)		(+)		(–)			✓		✓	✓	✓	✓	✓	✓		✓				✓				
SNGS	(+)		(–)					(–)	(–)			(+)		(–)			✓		✓	✓	✓		✓	✓		✓	✓		✓	✓	✓			
TATN			(+)					(–)	(–)	(+)		(+)		(–)			✓		✓	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓		
HYDR	(+)							(–)	(–)			(+)		(–)			✓		✓	✓	✓		✓	✓		✓	✓		✓		✓			
IRAO							(–)	(–)				(+)		(–)			✓		✓	✓	✓	✓	✓		✓	✓			✓				✓	
Financial sector																																	
AFKS								(–)						(–)			✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓					
CBOM		(–)	(–)			(–)		(–)				(+)		(–)	(–)		✓			✓			✓	✓		✓	✓		✓			✓	✓	
MOEX				(+)				(–)				(+)							✓	✓	✓	✓	✓	✓	✓	✓	✓			✓				
SBER			(+)		(–)			(–)	(–)			(+)		(–)			✓		✓	✓	✓	✓		✓	✓		✓	✓			✓		✓	
VTBR								(–)	(–)			(+)		(–)			✓		✓	✓	✓	✓	✓	✓	✓	✓	✓							
Telecommunications sector																																	
MTSS								(–)				(+)	(–)	(–)			✓		✓	✓	✓	✓		✓	✓		✓	✓						
RTKM	(–)	(+)		(–)		(–)		(–)				(+)	(+)						✓	✓	✓	✓	✓	✓	✓		✓			✓	✓		✓	
YNDX								(–)						(–)					✓	✓	✓	✓	✓	✓	✓	✓	✓		✓					
Consumer sector																																	
AFLT		(+)						(–)	(–)								✓		✓	✓	✓	✓		✓	✓		✓	✓	✓			✓		
MGNT														(–)					✓	✓	✓	✓	✓	✓	✓		✓	✓		✓				
Raw materials sector																																	
CHMF	(+)			(–)	(–)			(–)											✓	✓	✓	✓	✓	✓	✓	✓	✓			✓			✓	
GMKN		(+)		(+)				(–)	(–)								✓		✓		✓	✓	✓	✓	✓	✓	✓		✓					
MAGN					(–)			(–)		(+)	(–)								✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
ALRS	(+)					(+)		(–)	(–)			(+)			(–)		✓		✓	✓	✓	✓	✓		✓	✓		✓	✓		✓			✓
NLMK					(-)			(–)	(+)			(+)					✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓			
PHOR	(+)					(+)			(+)	(–)		(+)							✓	✓	✓	✓		✓	✓		✓	✓						
PLZL												(+)			(–)				✓	✓	✓	✓	✓		✓		✓	✓						
POLY						(+)									(–)				✓	✓	✓	✓	✓	✓	✓	✓	✓							
RUAL		(+)		(+)				(–)				(+)					✓		✓		✓	✓	✓	✓	✓	✓	✓		✓					

Notes. Estimates of standard errors (adjusted for heteroscedasticity), version HC1:
(+) positive value of the significant variable coefficient ($P \le 0.05$);
(–) negative value of the significant variable coefficient ($P \le 0.05$);
R^2 (✓) coefficient of determination ≥ 0.3;
Portmanteau test (✓) – no autocorrelation;
ARCH test LM Lag 1 (✓) – homoscedasticity of the 1st order lag;
ARCH test LM Lag 2 (✓) – homoscedasticity of the 2nd order lag;
(DH) test χ^2 (✓) – distribution of residuals corresponds to normal;
F-*test* Lags (✓) – subset of lags has a statistically significant impact;
F-*test* Vars (✓) – subset of variables has a statistically significant impact.

F-test Vars is indicative of significance (✓) of influence of the subset of variables. Many models fail to pass this test. This may mean that significance in them pertains only to individual variables rather than the whole subset or that these companies have not been infected. At the same time, the number of statistically significant models is much larger particularly in the crisis period. This also supports the *hypothesis* that influence of the examined variables manifests itself or intensifies only during economic shocks, and this implies presence of the financial contagion effect in some of the studied companies.

Following the methodological part of the paper, in order to enhance correctness of the conclusions on change of the influence of exogenous variables on stock returns we calculated the contribution of these variables to the variance of the explained variable using formula (4). In other words, we distinguished the part of the coefficient of determination which may be attributed to influence of exactly the exogenous variables. Subsequently we corrected it for heteroscedasticity using formulas (5) and (6). The results are presented in Table 3. The cells which confirm contagion are yellow.

Table 3. Contribution of the variance of exogenous variables to the variance of stock returns of Russian companies in three periods: diagnosing financial contagion, %

	USD			Urals			BONDS			Sum*			Sum-corr.*	
	BC	C	PC	BC	C	PC	BC	C	PC	BC	C	PC	C/BC	C/PC
GAZP	0.73	25.83	6.29	4.34	–0.75	10.66	0.72	19.83	0.22	5.80	44.91	17.17	11.76	30.30
LKOH	0.67	27.63	1.56	8.14	6.71	26.03	0.23	28.91	–0.17	9.04	63.26	27.41	17.41	40.52
NVTK	1.25	31.34	–0.19	2.25	4.72	16.39	0.39	–1.03	–0.14	3.89	35.03	16.06	4.90	15.45
ROSN	0.56	25.73	4.24	21.06	0.82	27.02	0.55	31.74	–0.20	22.16	58.29	31.07	18.01	41.50
SNGS	0.02	23.80	11.60	0.00	–1.99	13.31	0.05	18.13	0.37	0.07	39.94	25.28	10.48	27.47
TATN	–0.08	29.56	7.01	7.91	1.80	15.93	2.28	26.02	–0.11	10.11	57.38	22.83	15.77	38.47
HYDR	0.00	12.82	3.64	0.06	1.22	6.44	0.86	28.01	0.06	0.91	42.05	10.13	13.92	31.22
IRAO	6.51	25.40	1.92	–0.11	–1.71	5.51	0.98	25.01	–0.06	7.38	48.70	7.37	14.11	34.75
AFKS	0.07	18.38	0.37	0.33	3.15	0.18	1.10	17.16	0.02	1.50	38.69	0.57	9.63	24.15
CBOM	2.11	24.29	0.35	–0.04	4.53	3.37	0.02	17.62	1.64	2.09	46.44	5.35	10.97	27.91
MOEX	4.30	16.45	3.79	1.90	–1.45	6.95	0.01	4.46	1.54	6.21	19.46	12.28	3.64	11.32
SBER	2.38	37.02	8.63	1.58	2.29	17.67	1.27	13.89	0.08	5.24	53.20	26.38	11.77	32.14
VTBR	3.29	30.59	10.16	3.41	0.49	4.03	0.01	23.26	0.06	6.71	54.34	14.25	14.46	36.41
MTSS	1.69	16.34	-0.05	1.83	–2.14	7.71	3.56	29.69	–0.03	7.08	43.90	7.63	15.03	34.23
RTKM	0.35	14.34	0.17	0.35	–0.17	3.27	15.53	3.68	0.44	16.23	17.85	3.88	3.15	9.70
YNDX	0.55	13.77	0.27	0.93	–0.42	1.02	0.41	6.36	0.44	1.88	19.71	1.72	4.06	11.76
AFLT	–0.12	36.33	5.57	5.72	3.46	6.31	0.35	7.62	0.01	5.96	47.41	11.89	9.13	26.16
MGNT	0.90	5.99	0.31	0.11	1.04	1.54	0.42	18.75	0.42	1.43	25.78	2.26	8.42	19.44
CHMF	0.36	14.60	0.13	0.01	–0.19	1.42	0.58	2.48	0.08	0.95	16.89	1.63	2.74	8.76
GMKN	0.94	32.86	5.61	0.27	–1.12	3.84	0.49	4.03	1.35	1.71	35.77	10.80	6.50	20.28
MAGN	–0.06	26.37	0.00	2.58	–1.90	2.57	0.01	2.50	0.29	2.53	26.97	2.86	4.54	14.93
ALRS	0.06	33.23	8.50	0.10	–0.79	3.68	0.18	1.99	3.97	0.35	34.43	16.16	5.86	18.75
NLMK	0.70	19.69	3.33	0.47	0.93	1.74	0.85	7.43	0.05	2.02	28.05	5.12	5.51	15.85
PHOR	8.99	0.41	5.57	1.79	4.47	1.65	0.01	1.60	1.28	10.78	6.48	8.51	1.06	2.00
PLZL	0.80	0.05	0.86	0.02	0.15	3.59	1.72	0.66	3.00	2.54	0.86	7.45	0.26	0.61
POLY	10.41	0.12	0.10	0.00	0.56	0.49	1.12	3.38	4.91	11.53	4.06	5.50	1.30	3.07
RUAL	1.47	26.91	0.86	0.71	–0.84	8.01	0.17	8.87	0.25	2.36	34.94	9.12	7.19	20.99

Notes. * Sum – the combined contribution of the three exogenous variables to the coefficient of determination. ** Sum-corr. is the contribution corrected for heteroscedasticity (growth of the variance of the exogenous variables).

The obtained results confirm the increasing impact on the fundamental stock return of the majority of Russian companies in the acute phase of the pandemic exerted by the exchange rate of the dollar and borrowing costs, and subsequently – by oil prices. Apart from that, for the majority of companies in the crisis period the joint impact of the three studied exogenous variables increased. This is indicative of financial contagion spilling over from the oil market, currency and debt markets to the stock market. The heteroscedasticity-adjusted explained variation, on the whole, confirmed these conclusions.

The performed analysis showed that some companies in the energy sector (IRAO, HYDR, TATN, SNGS, LKOH, GAZP[6]), financial sector (AFKS, VTBR, CBOM, SBER) and consumer sector (MGNT, AFLT) responded to crisis manifestations to a greater degree. Telecommunications companies (except for MTSS) and the raw materials companies were affected less by the crisis contagion. The exception is the diamond-mining company ALRS and metallurgical plants NLMK and RUAL, which were exposed to contagion, but significantly lower than companies in other sectors.

At the same time there is a series of companies which returns turned out to be the most resilient one to crisis manifestations. First of all, they are Polyus (PLZL) and Polymetal (POLY) engaged in manufacture of noble metals and PhosAgro (PHOR) – a fertilizer producing company. And this is no coincidence because gold and silver are a good portfolio hedging instrument, and many researchers consider them as "safe havens" for investment. Change in their returns is often out of accord with general market trends. PhosAgro is a supplier of mineral fertilizers for agriculture which depends on natural conditions to a greater extent and is less related to global crises. The stocks of the Moscow Exchange (MOEX) also showed a high crisis resilience which may be due to their serious diversification. All these assets may be used for short-term portfolio adjustment during crises in order to reduce the total investment risks.

Conclusion

Financial contagion manifests itself as an increased reaction of some markets to shocks emerging in other markets. It takes the form of strengthened interconnections between them during the crisis. Scientists distinguish liquidity, information, financial, macroeconomic, political and other channels of financial contagion.

We have studied influence of the oil, currency and debt markets on market return of stocks of 27 Russian companies during the pandemic. In order to define the acute crisis period we calculated the sliding coefficient of variation. To test contagion we constructed VARX models for the crisis period as well as the pre-crisis and post-crisis periods equal in length. Contagion was tested on the basis of change and significance of estimates of the exogenous variables' coefficients as well as their contribution to the coefficient of determination adjusted for heteroscedasticity.

The research showed that the dollar/rouble exchange rate and the borrowing costs had the greatest impact on returns of Russian companies during the pandemic acute phase while the oil price – during the chronic crisis. Energy, financial and consumer sector companies turned out to be the most exposed ones to financial contagion during the pandemic shock. As long as an elevated turbulence of the assets' prices may cause loss of control, such companies need special measures to strengthen their resilience in the periods of external shocks.

Telecommunications and base materials companies (with some exception) showed the highest resilience to the pandemic shock. Besides, the greatest resilience was demonstrated by stocks of the noble metals and fertilizer manufacturing companies. This substantiates to recommend them as reliable tools of investment portfolio diversification during crisis.

Understanding of the factors which facilitate spillover of market shocks may assist regulatory bodies in taking efficient measures to implement the policy of financial regulation and maintenance of long-term financial stability, developing timely fiscal and monetary measures intended to combat the effects of financial contagion in the time of exposure to external shocks.

Limitations of the performed research are related to some drawbacks of VAR models and analysis of the sole pandemic shock of 2020 which had specific reasons and mechanisms. In future the research may be developed as improvement of the methodology and study of financial contagion of Russian companies exposed to shocks of another nature, in particular, those related to sanctions. These issues may be solved in future.

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[6] Henceforward the companies are ranked in decreasing order of the contagion scale

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Appendix 1

VARX Model for the Pre-Crisis Period (13 August 2019 – 14 January 2020), N = 105

Y_{tLn_ln-1}	Y_{t-1}	Y_{t-2}	X_{1t} (USD)	X_{2t} (URALS)	X_{3t} (BONDS)	R^2	Portmanteau test	ARCH test LM Lag 1	ARCH test LM Lag 2	(DH) test χ^2	AIC	BIC	F test Lags	F test Variables
Energy sector														
GAZP	0.038 (0.119)	0.133 (0.120)	−0.156 (0.250)	**0.110*** (0.040)	−0.069 (0.052)	0.074	**20.311**	4.324*	**5.103**	8.22**	−-6.034	−5.906	1.002	1.809
LKOH	**0.207**** (0.082)	−0.027 (0.101)	0.431 (0.390)	**0.200***** (0.074)	−0.050 (0.089)	0.117	**17.961**	**0.162**	**0.197**	**2.76**	−5.779	−5.651	2.368	0.077
NVTK	−0.057 (0.098)	−0.104 (0.122)	−0.260 (0.449)	0.080 (0.080)	0.053 (0.114)	0.049	**17.716**	**0.568**	**2.226**	**4.36**	−5.879	5.751	0.605	0.976
ROSN	0.090 (0.114)	−0.091 (0.108)	−0.081 (0.257)	**0.234***** (0.059)	0.052 (0.066)	0.209	**13.541**	**3.252**	**4.015**	14.43***	−6.296	−6.168	0.930	0.977
SNGS	**0.379**** (0.176)	−0.115 (0.110)	−0.091 (0.654)	−0.007 (0.146)	−0.045 (0.164)	0.129	**8.598**	17.328***	18.332***	18.53***	−4.163	−4.036	**6.914****	1.288
TATN	0.075 (0.087)	0.022 (0.091)	0.033 (0.287)	**0.171***** (0.061)	0.131 (0.089)	0.106	**27.413**	**0.014**	**0.402**	9.31**	−5.902	−5.774	0.361	0.050
HYDR	**0.580***** (0.312)	0.021 (0.175)	−0.014 (0.244)	−0.019 (0.041)	0.100 (0.087)	0.158	**16.479**	10.950***	11.377**	78.99***	−5.521	−5.393	**8.764*****	0.019
IRAO	0.125 (0.125)	−0.068 (0.098)	**−1.150*** (0.636)	−0.017 (0.127)	0.139 (0.156)	0.085	**16.822**	**1.044**	**1.044**	6.75*	−4.956	−4.828	0.822	0.427
Financial sector														
AFKS	0.101 (0.091)	0.148 (0.109)	−0.128 (0.322)	−0.046 (0.074)	−0.113 (0.076)	0.056	**17.463**	**0.570**	**1.022**	6.44*	−5.465	−5.337	1.937	2.331
CBOM	−0.031 (0.163)	−0.187 (0.137)	**−0.278*** (0.149)	−0.013 (0.027)	0.009 (0.044)	0.055	40.683*	4.853*	**5.441**	40.74***	−6.691	−6.563	1.789	3.522
MOEX	−0.074 (0.107)	**0.156*** (0.090)	−0.461 (0.289)	0.057 (0.058)	−0.006 (0.080)	0.078	**26.076**	**0.015**	**0.097**	10.09**	−6.158	−6.030	1.640	2.520
SBER	−0.020 (0.088)	−0.053 (0.095)	−0.292 (0.268)	0.048 (0.044)	−0.074 (0.069)	0.052	**18.516**	**0.912**	**1.634**	**1.39**	−6.469	−6.341	0.158	0.277
VTBR	0.001 (0.117)	0.059 (0.097)	−0.494 (0.358)	0.107 (0.080)	−0.010 (0.072)	0.066	**20.218**	**0.118**	**0.256**	44.24***	−5.680	−5.552	0.179	0.357
Telecommunications sector														
MTSS	−0.048 (0.101)	0.060 (0.117)	−0.243 (0.267)	0.056 (0.045)	**−0.127*** (0.069)	0.077	**14.514**	**0.085**	**2.915**	**2.33**	−6.334	−6.206	0.297	0.359
RTKM	**−0.257**** (0.107)	**−0.244***** (0.065)	0.160 (0.235)	0.033 (0.032)	**0.295***** (0.139)	0.266	**19.868**	**0.059**	**0.178**	62.25***	−6.377	−6.249	**6.572****	**7.357****
YNDX	−0.074 (0.091)	−0.031 (0.036)	0.358 (0.389)	−0.109 (0.115)	0.116 (0.107)	0.026	**21.296**	**0.0001**	**0.051**	73.52***	−4.366	−4.238	0.303	0.096
Consumer sector														
AFLT	−0.014 (0.092)	0.050 (0.081)	−0.060 (0.253)	−0.119 (0.092)	−0.040 (0.070)	0.061	**19.33**	**0.283**	**2.778**	**0.76**	−6.227	−6.099	0.129	0.236
MGNT	0.129 (0.113)	−0.037 (0.102)	0.238 (0.233)	0.026 (0.041)	−0.047 (0.081)	0.032	**26.44**	**2.194**	**2.213**	**1.25**	−6.228	−6.100	0.843	0.125

Y_{tLn_ln-1}	Y_{t-1}	Y_{t-2}	X_{1t} (USD)	X_{2t} (URALS)	X_{3t} (BONDS)	R^2	Portmanteau test	ARCH test LM Lag 1	ARCH test LM Lag 2	(DH) test χ^2	AIC	BIC	F test Lags	F test Variables
Raw materials sector														
CHMF	**0.298***** (0.090)	**−0.173*** (0.089)	0.164 (0.268)	0.013 (0.063)	−0.060 (0.055)	0.105	**27.74**	**0.412**	**4.421**	**0.11**	−6.113	−5.986	**4.907****	2.848
GMKN	0.104 (0.099)	**0.198**** (0.099)	−0.270 (0.350)	0.026 (0.055)	−0.064 (0.077)	0.073	**28.965**	**0.038**	**0.104**	**5.03**	−5.717	−5.589	2.761	3.709
MAGN	0.049 (0.097)	−0.086 (0.105)	0.055 (0.301)	**0.109*** (0.055)	−0.010 (0.080)	0.038	**33.146**	**0.047**	**0.115**	**0.23**	−5.624	−5.496	0.481	0.738
ALRS	**0.189*** (0.102)	−0.044 (0.105)	−0.069 (0.294)	0.019 (0.073)	0.042 (0.091)	0.038	**26.119**	**0.010**	**0.018**	**0.02**	−5.639	−5.511	1.740	0.187
NLMK	0.106 (0.106)	−0.155 (0.988)	0.293 (0.296)	0.054 (0.048)	−0.087 (0.097)	0.056	**34.171**	**1.002**	**1.116**	**0.24**	−5.739	−5.611	1.568	2.268
PHOR	**0.189*** (0.112)	−0.063 (0.074)	**0.583***** (0.166)	0.072 (0.044)	0.003 (0.043)	0.139	**16.230**	**1.977**	**3.637**	**1.46**	−6.888	−6.760	2.000	0.424
PLZL	−0.037 (0.092)	−0.074 (0.993)	0.295 (0.364)	-0.003 (0.097)	−0.134 (0.100)	0.030	**13.117**	**0.392**	**0.405**	**0.43**	−5.509	−5.381	0.324	0.547
POLY	0.103 (0.103)	-0.058 (0.919_	**1.078***** (0.402)	0.001 (0.057)	−0.111 (0.078)	0.111	**22.236**	**0.099**	**0.124**	6.03*	−5.603	−5.475	0.703	0.377
RUAL	0.015 (0.110)	**0.163*** (0.093)	-0.313 (0.277)	0.042 (0.044)	−0.036 (0.094)	0.056	**22.440**	**1.176**	**1.486**	**3.98**	−5.878	−5.750	1.324	2.614

Note. * P ≤ 0.05 ** P ≤ 0.01 *** P ≤ 0.001
Robust estimates of standard errors are indicated in parentheses (heteroscedasticity-adjusted), version HC1.

Appendix 2

VARX Model for the Crisis Period (15 January 2020 – 17 June 2020), N = 105

Y_{tLn_ln-1}	Y_{t-1}	Y_{t-2}	X_{1t} (USD)	X_{2t} (URALS)	X_{3t} (BONDS)	R^2	Portmanteau test	ARCH test LM Lag 1	ARCH test LM Lag 2	(DH) test χ^2	AIC	BIC	F test Lags	F test Variables
Energy sector														
GAZP	0.019 (0.090)	-0.138 (0.089)	**-0.734***** (0.275)	−0.008 (0.314)	**−0.336***** (0.093)	0.425	**25.682**	**1.146**	**1.260**	8.56*	−5.151	−5.023	1.537	**3.043***
LKOH	**-0.245**** (0.101)	**-0.232***** (0.088)	**-1.185***** (0.262)	0.077 (0.068)	**−0.688***** (0.165)	0.591	**28.832**	**0.106**	**1.376**	**3.91**	−4.419	−4.291	**10.245*****	**11.271*****
NVTK	-0.050 (0.147)	-0.062 (0.111)	**-1.379***** (0.213)	0.065 (0.043)	0.056 (0.210)	0.355	**20.791**	**0.743**	**4.305**	25.45***	−4.205	−4.077	0.443	0.581
ROSN	0.076 (0.095)	-0.069 (0.101)	**-1.132***** (0.283)	0.011 (0.050)	**−0.735***** (0.138)	0.586	**26.873**	**2.245**	5.796*	7.84*	−4.473	−4.345	0.921	1.008
SNGS	0.042 (0.102)	-0.032 (0.081)	**-1.126***** (0.284)	−0.040 (0.044)	**−0.510***** (0.154)	0.398	**29.885**	**0.004**	**0.032**	**5.86**	−4.217	−4.089	0.180	0.154
TATN	-0.010 (0.105)	-0.094 (0.096)	**-1.454***** (0.298)	0.028 (0.064)	**−0.738***** (0.211)	0.543	**18.997**	**1.776**	**3.665**	11.55**	−4.073	−3.945	0.888	1.716
HYDR	0.056 (0.092)	0.007 (0.110)	**-0.607*** (0.319)	0.017 (0.029)	**−0.604***** (0.122)	0.452	**20.054**	**0.114**	**0.447**	**5.11**	−4.574	−4.446	0.271	0.008
IRAO	0.022 (0.076)	-0.159 (0.099)	**-0.918***** (0.168)	−0.024 (0.031)	**−0.502***** (0.123)	0.493	**30.755**	**0.232**	**0.303**	**3.27**	−4.790	−4.662	2.405	**4.768***

Y_{tLn_ln-1}	Y_{t-1}	Y_{t-2}	X_{1t} (USD)	X_{2t} (URALS)	X_{3t} (BONDS)	R^2	Portmanteau test	ARCH test LM Lag 1	ARCH test LM Lag 2	(DH) test χ^2	AIC	BIC	F test Lags	F test Variables
Financial sector														
AFKS	0.046 (0.087)	-0.046 (0.108)	**-0.810***** (0.279)	0.039 (0.035)	**−0.431***** (0.132)	0.386	**29.873**	**0.646**	**0.647**	**5.27**	−4.419	−4.291	0.269	0.314
CBOM	**-0.179*** (0.106)	-0.111 (0.105)	**-0.477***** (0.109)	0.025 (0.022)	**−0.210**** (0.083)	0.446	**32.673**	5.985*	5.985**	**4.78**	−5.911	−5.783	**3.196***	2.027
MOEX	0.080 (0.109)	-0.163 (0.099)	**-0.687***** (0.167)	−0.049 (0.037)	−0.148 (0.111)	0.218	**34.827**	**0.017**	**0.269**	30.58***	−4.834	−4.706	1.813	3.179
SBER	-0.109 (0.112)	**-0.209*** (0.110)	**-1.184***** (0.225)	0.024 (0.034)	**−0.318***** (0.104)	0.528	**26.771**	12.203***	12.232**	7.26**	−4.820	−4.692	**5.221*****	**8.757*****
VTBR	0.030 (0.061)	0.101 (0.110)	**-0.952***** (0.167)	0.005 (0.030)	**−0.433***** (0.129)	0.595	**21.929**	**0.027**	**0.035**	37.09***	−5.132	−5.004	1.323	2.242
Telecommunication sector														
MTSS	-0.105 (0.111)	0.045 (0.101)	**-0.476***** (0.100)	−0.024 (0.026)	**−0.403***** (0.071)	0.461	**26.741**	10.505**	14.196***	16.56***	−5.481	−5.353	1.191	0.348
RTKM	**0.259**** (0.118)	-0.107 (0.181)	**-0.560**** (0.220)	−0.003 (0.035)	−0.113 (0.157)	0.248	**22.700**	**0.194**	12.519**	53.50***	−5.030	−4.902	**4.095***	1.392
YNDX	-0.055 (0.104)	-0.074 (0.101)	**-0.609***** (0.211)	−0.007 (0.034)	**−0.192**** (0.095)	0.199	**31.074**	**1.404**	**1.415**	**3.99**	−4.487	−4.359	0.445	0.609
Consumer sector														
AFLT	**0.197**** (0.092)	-0.143 (0.126)	**-1.387***** (0.176)	0.043 (0.031)	−0.236 (0.170)	0.504	**25.663**	5.070**	11.074**	**3.5295**	−4.487	−−4.359	**4.065****	3.358
MGNT	-0.055 (0.113)	0.046 (0.178)	-0.374 (0.279)	0.017 (0.048)	**−0.490***** (0.148)	0.278	**27.455**	**3.185**	20.643***	13.98***	−4.370	-4.242	0.330	0.280
Raw materials sector														
CHMF	-0.040 (0.082)	**-0.209**** (0.076)	**-0.534***** (0.151)	−0.003 (0.026)	−0.078 (0.139)	0.212	**2.,484**	**0.343**	**0.353**	21.47***	−5.110	−4.982	2.748	**5.380****
GMKN	**0.150*** (0.085)	-0.020 (0.058)	**-1.315***** (0.227)	−0.020 (0.031)	−0.149 (0.120)	0.355	41.618**	**0.003**	**0.265**	46.96***	−4.375	−4.247	1.632	0.056
MAGN	0.022 (0.095)	**-0.172**** (0.081)	**-0.962***** (0.156)	**−0.056**** (0.027)	−0.092 (0.141)	0.285	**31.190**	**0.256**	**0.343**	**3.41**	−4.784	−4.656	1.961	3.885
ALRS	-0.076 (0.117)	-0.062 (0.104)	**-1.216***** (0.212)	−0.013 (0.030)	−0.075 (0.144)	0.342	**27.806**	**1.283**	**3.175**	**5.60**	−4.535	−4.407	0.645	0.528
NLMK	0.070 (0.126)	**-0.220**** (0.085)	**-0.695***** (0.165)	0.011 (0.026)	−0.188 (0.143)	0.300	**32.315**	**2.753**	**2.810**	**2.95**	−4.871	−4.743	**3.213***	**6.196***
PHOR	0.011 (0.124)	-0.140 (0.128)	0.064 (0.139)	**−0.053*** (0.027)	−0.125 (0.115)	0.089	**16.155**	4.819*	9.329**	11.46**	−5.493	−5.365	1.033	2.065
PLZL	0.067 (0.120)	0.140 (0.145)	0.083 (0.265)	−0.022 (0.054)	−0.124 (0.165)	0.037	**31.412**	**0.896**	6.955*	22.06***	−4.110	−3.982	1.206	1.788
POLY	0.025 (0.071)	0.170 (0.130)	0.169 (0.234)	−0.050 (0.058)	−0.297 (0.210)	0.071	**23.258**	**0.324**	**0.632**	32.28***	−3.985	−3.857	1.439	2.795
RUAL	**0.167*** (0.094)	-0.005 (0.097)	**-1.218***** (0.197)	−0.015 (0.032)	−0.298 (0.219)	0.369	35.729*	**0.822**	**4.483**	40.08***	−4.239	−4.111	2.058	0.003

Note. * P ≤ 0.05 ** P ≤ 0.01 *** P ≤ 0.001

Robust estimates of standard errors are indicated in parentheses (heteroscedasticity-adjusted), version HC1

Appendix 3

VARX Model for the Post-Crisis Period (18 June 2020 – 16 November 2020), N = 105

Y_{tLn_ln-1}	Y_{t-1}	Y_{t-2}	X_{1t} (USD)	X_{2t} (URALS)	X_{3t} (BONDS)	R^2	Portmanteau test	ARCH test LM Lag 1	ARCH test LM Lag 2	(DH) test χ^2	AIC	BIC	F test Lags	F test Variables
Energy sector														
GAZP	0.019 (0.091)	0.055 (0.117)	**-0.360**** (0.135)	**0.219***** (0.077)	-0.058 (0.057)	0.188	**18.031**	**0.007**	**0.138**	31.61***	−5.656	−5.528	0.177	0.312
LKOH	**0.126**** (0.062)	**0.117*** (0.068)	-0.144 (0.142)	**0.421***** (0.088)	-0.013 (0.075)	0.347	**18.786**	**0.232**	**0.456**	27.09***	−5.548	−5.420	2.561	1.928
NVTK	-0.026 (0.106)	**0.211***** (0.080)	0.036 (0.233)	**0.352***** (0.127)	-0.064 (0.081)	0.211	**18.437**	**0.049**	**0.368**	15.99***	−5.329	−5.202	2.516	**4.999***
ROSN	0.112 (0.110)	0.035 (0.073)	-0.248 (0.176)	**0.355***** (0.073)	-0.015 (0.054)	0.340	**27.444**	**2.173**	**3.070**	**2.79**	−5.855	−5.727	1.017	0.164
SNGS	**-0.169*** (0.099)	0.044 (0.099)	**-0.532**** (0.203)	**0.251***** (0.076)	-0.071 (0.071)	0.286	**30.466**	**0.101**	**3.050**	**3.27**	−5.695	−5.567	2.002	0.217
TATN	**0.173*** (0.101)	0.107 (0.091)	**-0.484***** (0.178)	**0.343***** (0.112)	-0.015 (0.085)	0.309	**32.019**	**1.817**	**2.367**	**5.57**	−5.293	−5.165	**3.487***	1.488
HYDR	-0.124 (0.121)	0.117 (0.090)	**-0.286*** (0.149)	**0.170**** (0.072)	0.007 (0.082)	0.158	**33.913**	**3.504**	**4.285**	9.87**	−5.538	−5.410	1.894	1.473
IRAO	0.069 (0.069)	0.041 (0.109)	-0.221 (0.074)	**0.185**** (0.074)	-0.019 (0.799)	0.081	**17.527**	6.490*	6.549*	27.87***	−5.206	−5.079	0.365	0.180
Financial sector														
AFKS	0.138 (0.138)	-0.002 (0.108)	-0.140 (0.249)	0.034 (0.131)	0.012 (0.096)	0.025	**17.924**	**0.811**	**0.867**	8.30*	−4.691	−4.563	0.931	0.0003
CBOM	**-0.394*** (0.202)	-0.116 (0.108)	-0.055 (0.095)	**0.126*** (0.051)	**-0.091*** (0.053)	0.298	52.791***	**0.007**	**0.028**	11.88**	−6.492	−6.364	**15.425*****	2.670
MOEX	0.118 (0.090)	-0.058 (0.109)	-0.288 (0.195)	**0.195**** (0.092)	-0.108 (0.072)	0.131	**20.897**	**0.515**	**0.516**	**0.24**	−5.449	−5.321	0.882	0.366
SBER	**0.157*** (0.089)	-0.010 (0.093)	**-0.475***** (0.162)	**0.324***** (0.101)	-0.070 (0.067)	0.277	**15.499**	**0.069**	**0.290**	25.55***	−5.497	−5.369	1.616	0.015
VTBR	0.082 (0.086)	-0.062 (0.126)	**-0.567***** (0.163)	**0.132**** (0.059)	-0.030 (0.061)	0.148	**16.160**	**0.050**	**0.862**	25.72***	−5.395	−5.267	0.537	0.421
Telecommunications sector														
MTSS	0.065 (0.097)	-0.045 (0.111)	0.093 (0.116)	**0.140***** (0.036)	-0.002 (0.040)	0.079	**26.493**	**0.011**	**0.060**	25.78***	−6.302	−6.174	0.307	0.208
RTKM	-0.053 (0.122)	**-0.127*** (0.075)	-0.032 (0.134)	**0.098*** (0.051)	0.026 (0.049)	0.053	**27.956**	**3.247**	**4.912**	21.66***	−5.997	−5.869	1.029	1.758
YNDX	0.006 (0.091)	0.005 (0.112)	0.176 (0.299)	0.111 (0.126)	0.053 (0.083)	0.017	**19.964**	**0.478**	**0.913**	11.14**	−4.630	−4.502	0.003	0.002
Consumer sector														
AFLT	0.047 (0.112)	0.124 (0.109)	**-0.500**** (0.229)	0.223 (0.151)	0.002 (0.125)	0.148	**24.250**	**1.213**	**3.241**	12.62**	−4.952	−4.824	1.032	1.737

Y_{tLn_ln-1}	Y_{t-1}	Y_{t-2}	X_{1t} (USD)	X_{2t} (URALS)	X_{3t} (BONDS)	R^2	Portmanteau test	ARCH test LM Lag 1	ARCH test LM Lag 2	(DH) test χ^2	AIC	BIC	F test Lags	F test Variables
MGNT	-0.004 (0.101)	-0.069 (0.092)	-0.082 (0.196)	0.090 (0.068)	0.040 (0.063)	0.029	**17.725**	**0.041**	**0.095**	**1.53**	−5.298	−5.170	0.264	0.526
Raw materials sector														
CHMF	0.037 (0.088)	0.047 (0.107)	0.080 (0.158)	0.071 (0.056)	0.009 (0.052)	0.020	**28.929**	**0.212**	**0.250**	7.34*	−5.880	−5.752	0.178	0.214
GMKN	0.098 (0.098)	-0.079 (0.085)	**-0.357**** (0.163)	0.128 (0.085)	-0.088 (0.071)	0.120	**22.294**	**0.365**	**0.962**	**0.82**	−5.598	−5.470	0.7890	0.675
MAGN	-0.013 (0.090)	0.081 (0.103)	-0.001 (0.177)	0.125 (0.087)	-0.053 (0.071)	0.034	**17.954**	**1.574**	**1.585**	**4.56**	−5.407	−5.279	0.328	0.637
ALRS	-0.047 (0.117)	**0.283***** (0.078)	**-0.532**** (0.213)	**0.150*** (0.082)	**-0.167**** (0.070)	0.249	**11.513**	7.377**	10.660**	**4.27**	−5.383	−5.255	**4.768***	**8.763****
NLMK	0.016 (0.104)	0.128 (0.099)	**0.329**** (0.144)	**0.107*** (0.060)	0.005 (0.065)	0.064	**28.314**	**0.001**	**0.053**	8.58*	−5.613	−5.485	0.829	1.628
PHOR	−0.058 (0.097)	0.028 (0.090)	**0.352***** (0.128)	**0.106**** (0.053)	−0.073 (0.064)	0.097	**9.9795**	**0.328**	**0.655**	11.55**	−6.123	−5.995	0.228	0.080
PLZL	0.102 (0.150)	0.065 (0.103)	0.401 (0.297)	**0.282**** (0.130)	**−0.226*** (0.122)	0.092	**21.285**	3.967*	**4.634**	23.32***	−4.514	−4.386	0.858	0.439
POLY	−0.001 (0.114)	0.117 (0.091)	0.172 (0.297)	0.135 (0.145)	**−0.256**** (0.107)	0.075	**10.423**	**0.280**	**0.391**	8.97**	−4.526	−4.398	0.670	1.338
RUAL	0.031 (0.096)	−0.140 (0.101)	−0.104 (0.203)	**0.209***** (0.077)	−0.062 (0.077)	0.097	**17.5877**	**0.130**	**0.607**	**0.28**	−5.464	−5.336	1.032	1.976

Note. * P ≤ 0.05 ** P ≤ 0.01 *** P ≤ 0.001

Robust estimates of standard errors are indicated in parentheses (heteroscedasticity-adjusted), version HC1.

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Stock Market Reaction to Dividend Announcements: Evidence from the Russian Market

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Abstract

The inquiry into the influence of dividend declarations on the stock values of corporations has been extensively investigated across various countries. The results of these studies have been varied, and there is limited information available on this topic specifically for the Russian market. This paper aims to demonstrate the impact of dividend announcements on the yield of Russian companies' shares. The study utilizes comprehensive data from MOEX for the period of 2008–2021, which encompasses both economic growth and recessionary periods. The results of the study indicate that the effect of decreasing, maintaining and increasing the amount of dividends corresponds to the signal theory. There are differences between industries: there are fairly stable and mature companies on the market that are not subject to significant changes (Electric Power, Oil and Gas industries); shares of companies in the Transport industry and a number of other industries behave more distinctively. In comparison with other studies, this paper analyzes the effect of increasing and decreasing dividends on stock returns using not only event analysis, but also regression analysis. This work adds results to the few available on the Russian market.The main limitations include the small number of variables in the construction of regression models and the limited period of the study. The work is carried out only for the Russian market. The obtained findings can be taken into account by company managers in order to make optimal decisions regarding the dividend policy and enhancing their dividend policies.

Keywords: signaling theory, dividend announcement, abnormal return, event study

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Introduction

The investigation of how capital markets perceive a company's choices regarding the allocation of free cash flow between investments and shareholder dividend payments is a significant research area in the fields of corporate finance and governance. The critical role of dividend decisions in managing a business and maintaining high levels of future dividend payments was first highlighted by J. Lintner in his 1956 paper [1]. The payment of dividends by a company is an important strategic decision, because investors and, consequently, the market may react differently to it, which will undoubtedly affect the stock price. Others also studied the issue, for instance M.H. Miller and F. Modigliani [2], who discovered the conditions under which the share price does not change based on decisions regarding dividends.

This paper aims to demonstrate the impact of dividend announcements on the yield of Russian companies' shares. To provide clarity on the purpose and expected outcomes of this research, it is crucial to formulate a clear research question that addresses the considered topic: How do the dividend changes affect stock market returns of Russian companies? In addition to understanding the general vector of influence, the difference between the degree and direction of influence in a crisis and more stable years for the country's economy is studied. With the aim of achieving the research objective, this study utilizes data on Russian companies from various industries. Notably, previous studies have only been conducted during stable economic periods or crisis years, without any comparative analysis of market reactions during different economic conditions. Thus, this study endeavors to determine whether the effect remains consistent during periods of recession. Therefore, a period that includes both economic deterioration and growth stages was chosen for the study (2008–2021). According to the data on GDP, inflation and unemployment rate, the time period under consideration was divided into two groups: the group of growth and stable years, and crisis years. The first included 2010–2012, 2016–2019, 2021, and the second – 2008–2009, 2013–2015, 2020. Moreover, the authors aimed to prove risk aversion among Russian investors. Since there are studies showing that people's attitude to gains is less pronounced than people's attitude to losses [3], it is fair to assume that the investors' market reaction would be stronger when dividend payouts are announced. Stock prices will depend on this reaction.

As already mentioned, the active study of the impact of news about dividend payments, as well as actual dividend payments on the value of company shares begin in mid-20th century, however, research mostly concerns developed markets, for example, the United States [4]. In regard to the Russian market, a limited number of studies have been conducted, including those by I. Berezinets et al. [5], E. Rogova and G. Berdnikova [6], and T. Teplova [7]. That is, the study of the developing countries' markets, in particular, Russia, is not heeded sufficient attention. Secondly, the authors get different results or make ambiguous conclusions. For instance, in the study of developed markets, M. Karim [8] failed to confirm the market's reaction to dividend announcements. In contrast, other research such as D.-H. Chen et al. [9] and Sh. Taneem and A. Yuce [10] have validated the signal theory, demonstrating that the market responds positively to information about an increase in dividend payments, and negatively – to information about a decrease in payments. There are also those who find the confirmation of a partial effect [11; 12].

This suggests that this topic is worth attention and research, and its consideration may lead to unexpected and interesting conclusions. In addition, the above-mentioned studies of the Russian market do not cover the recent events that have brought uncertainty to the market situation, namely, the COVID-19 pandemic. A study of this period would allow to understand the shifts in investor behavior in the period between crises. The objective of this study is to enhance our understanding of the effects of dividend announcements on the emerging Russian market. To achieve this, the most up-to-date companies' data is used, the impact of the COVID-19 pandemic is taken into account, and the results in different economic conditions are compared. The research aims to provide a new perspective on the correlation between changes in dividends and stock prices in the Russian context. In addition, this study uses not only event analysis, but also regression, taking into account the panel data, which was not obtained in sufficient quantity for research on the Russian market, to understand the attitude of Russian investors to risk in relation to dividends. This work intends to demonstrate that Russian investors have an aversion to risk, which is represented by the share values.

The work is divided into two main parts. The first section is a literature review, which touches on both the theoretical foundations and practical considerations that form the basis of this work, help to select specific data and methodology, and then allow compare the results. The second part is empirical, in which the assumptions about the connection between dividend changes and the returns of companies' shares on the Russian market are tested in practice using event study methodology. This section provides a detailed description of the data, methodology, models used, and results. Next, the limitations and discussions of the results and the conclusion are presented.

Empirical research on market reaction to changes in dividends

In the consideration of the empirical research conducted on dividend payments' correlation with stock prices, it is important to highlight the pioneering work of J. Lintner [1]. He gathered and analyzed data from obtained from the management of 28 companies, investigating the determinants of dividend policy and their impact on firm value. The results showed a significant relationship between these two variables, which was later confirmed by M.J. Gordon [13]. His research demonstrated that dividend payments have a positive effect on share price and can mitigate the risk of price fluctuations.

The results of more recent empirical studies on the impact of the announcement of dividends on the share price

are heterogeneous. Some studies have found a positive effect on the stock price [14; 15]. This result is explained by the theory of preference for dividends or the Bird-in-the-Hand theory, which consists in preferring current consumption to promises of future income; that is, investors consider dividends to be a safer income than the expectation of the company's future growth and future large returns. Others have concluded that there is a negative influence [16; 17]. The authors attributed this result to the absence of long-term growth (signal effect) and tax effect. In addition, the conclusion that dividend payments did not significantly affect the dynamics of stock prices was not uncommon [18–20]. According to researchers, dividends are a reflection of the company's past financial results, and not an expectation of future growth or deterioration. Some authors claimed that the stock prices increase before dividend announcements regardless of the amount of dividends, but when the dividends have already been paid, the stock prices should decrease (Table 1) [11; 15].

Table 1. Summary of Research Results on the Impact of Changes in the Amount of Dividends on the Share Price

Authors	Effect	Comments
Kato, Loewenstein [14]; Baker et al. [15]	Positive effect	This outcome can be explained by the theory of preference for dividends, or commonly known as the Bird-in-the-Hand theory. According to this principle, investors perceive dividends as a more secure source of income compared to the anticipation of the company's future growth and potential high returns
Rane [16]; Uddin, Chowdhury [17]	Negative effect	The authors attributed this result to the absence of long-term growth (signal effect) and tax effect
Adesola, Okwong [18]; Ling et al. [19]	No effect	According to researchers, dividends are a reflection of the company's past financial results, and not an expectation of future growth or deterioration
Grullon et al. [4]; Mahmood et al. [21]; Ham et al. [22]	Effect according to signals	For developed countries, when companies increase dividend payments, there is generally a moderate increase in stock prices, and if there is a reduction, then, accordingly, stock prices fall. The same is true for developing countries
Hu and Ahmed [23]; Taneem and Yuce [10]; Ali [24]	Partial effect according to signals	In developing countries, the compliance of the results of the signal theory can only be related to positive news (about the growth of dividends)
Attig et al. [25]	Significant impact of uncertainty on dividend payments	The companies' dividend policies are adjusted depending on the economic situation
Prakash and Lokesh [26] Ali [24]; Mazur et al. [27]	Greater effect during crisis years	The market response to the dividend announcement during the COVID-19 pandemic is more positive than in previous years. The difference in the reaction during the crisis period depends on the company's industry

Empirical research on the reaction of the Russian market to changes in dividends

Empirical research has been conducted on the reaction of the Russian market to changes in dividends. It is essential to note the findings and works in this area that are specifically related to the Russian market, as this study is about Russian companies.

T. Teplova [7] in her research tested the market reaction to announcements of dividend payments on shares of Russian companies that were traded on the RTS, New York and London exchanges in 1999–2006. The result of data analysis showed that both the Russian and foreign markets reacted negatively to good news (about the increase in dividend payments). This conclusion was partially confirmed in the study by E. Rogova and G. Berdnikov [6], which was already conducted on more modern data (2009–2013). During the period under review, the increase in dividends entailed a negative abnormal return. At the same time, a positive reaction to the announcement was discovered for bad news (about the reduction of dividend payments). The authors also noted that the negative reaction was observed in such industries as oil and gas, metallurgy, mining, and it was most significant in the chemical industry.

In addition, it is worth noting the work of I. Berezinets et al. [28], which focused on the post-crisis period (2010–

2012). The market reaction to good news was consistent with the works discussed above, however, with bad news, the market acted in accordance with the signal theory. The authors concluded that the reaction to bad news was more significant than to good news. They noted that there was a dissemination of insider information, as the market reacted a few days before the announcement of dividends. I. Berezinets et al. [5] explained the negative reaction to the news about the increase in dividends by the specifics of the period under review, since these were post-crisis years with rapid economic growth. H.R. Turaev [29] conducted a similar study, but the period under review was 2010–2014. He obtained similar results for the dividend increase and dividend decrease groups. In addition, he considered the group that included companies with unchanged dividends compared to previous year. The author concluded that there is no significant market reaction for such observations, and the research confirms the signal theory (Table 2).

Table 2. Summary of Research Results on the Impact of Changes in the Amount of Dividends on the Share Price for the Russian Companies

Authors	Effect	Comments
Rogova and Berdnikov [6]; Teplova [7]	The reverse effect of the signal theory	An increase in dividends is a signal of a decrease in the company's investment opportunities, which leads to a decrease in value
Berezinets et al. [5]; Berezinetset al. [28]	Partial effect according to signals	The reaction is negative to both types of events (increase and decrease in dividends), but it is more significant to "bad" news. There was the impact of the dissemination of insider information due to the reaction before the event
Turaev [29]		Negative market reaction to both dividends' growth and reduction, lack of reaction to unchanged dividends

Research design and results

Hypotheses

The study examines the market reaction used to calculate the indicator of abnormal return on companies' shares. The literature review showed that although the results of researchers vary, but the majority of works related to this subject reach conclusions in full or partial accordance with the signal theory [10; 12; 21; 23; 27; 29]. In accordance with the signal theory for dividends, the higher dividends can be considered a positive signal for the market, the lower dividends imply a negative market reaction, and if the dividend amount is the same as expected market should not react. Therefore, in accordance with the signal theory and with works such as H.R. Turaev [29], Sh. Taneem and A. Yuce [10], in which similar hypotheses were put forward, the three basic assumptions are developed:

H1: An announcement of increased dividends on average causes a positive market reaction and an announcement of reduced dividend payments on average causes a negative market reaction.

H2: An announcement of unchanged dividend payments on average does not significantly influence the market.

Some research highlights the influence of dividends on the market, both in a general sense and when taking into account the specific industries in which companies operate. Notably, a study conducted by E. Rogova and G. Berdnikov [6] revealed that dividends in the Fuel and Energy and Metallurgy sectors do not have a substantial impact on stock quotes, in contrast to other industry sectors. This information allows to draw the following hypothesis:

H3: Different industries react unevenly to the announcement of a change in dividend amount.

Several studies were conducted that focused on the economic state of the country during the reviewed period. In addition, some works considered the COVID-19 pandemic. According to the results obtained by J.F. Abreu and M.A. Gulamhussen [30] and N. Attig et al. [25], the market reaction and the dividend policy of companies can vary depending on the state of the economy. N. Prakash and Y. Lokesh (2021) [26] demonstrated a stronger reaction to positive changes in dividends and a stronger reaction to negative changes in the dividend amount. In this regard, the statements presented below concerning crisis periods and growth periods in general and specifically for the COVID-19 pandemic period are composed:

H4: In years of crisis, in particular, the years of the COVID-19 pandemic, the influence of both positive and negative news is stronger than at other times.

Y. Yang et al. [3] note that people are generally more sensitive to loss than to gain. In their research, they estimated the ratio of losses to people's reactions to gains and found that the subjective impact of losses is about twice as great as that of gains. Based on the above, the following hypothesis has been formulated:

H5: The negative effect of the announcement of lower dividend payments on the share price is stronger than the positive effect of announcement of higher dividend payments.

The methodology and data found and analyzed to verify the assumptions made are described below.

Methodology

The basic or fundamental work for this research is the study of R. Ball and P. Brown [31], which uses the announcement of the financial results of companies as an event, and the capitalization as the object of influence, that is, we can

say that the performance indicators have an impact on the market price of companies. Different events can act as events, such as news related to financial statements, changes in management, mergers and acquisitions, and so on. However, dividend announcements are also often of interest, have been studied quite often [8; 32] and are also discussed in this paper. If we consider the works of interest in terms of the essence of the methodology, we can mention the study of A.C. MacKinlay [33], which offers a five-step algorithm and is the standard for such studies, so this study also relies on it. Data analysis by event study involves several steps, which will be described below.

Division of events into groups. To apply the method of event study, the data are pre-divided into three groups of events: "bad", "neutral" and "good". Due to the presence of major changes in the amount of dividends, an increase or decrease of less than 5% does not seem significant. The results are checked at different classification thresholds. Therefore, in accordance with the approach used in the work of C. Andres et al. [34], events are classified into three categories depending on the indicator of the surprise of the dividend payment with a threshold of 5%. This option enlarges the group of "neutral" events and allows it to be used in the analysis. "Bad" events refer to news that results in a 5% or greater reduction in dividend payments compared to initial projections. Conversely, "good" events denote the news of a growth in dividends by 5% or more compared to initial projections. The group of "neutral" events includes those news that had no effect on the size of dividends compared to the expectations, or the change is within 5% downward or upward.

The distribution into groups occurs depending on how the amount of dividends has changed relative to what was expected. In this paper, a naive model is used, which assumes that the amount of expected dividends is equal to the amount of last year dividends, that is,

$$Expected\ dividends_{naive,t} = Dividends_{t-1}, \#(1)$$

where t is the year under consideration, and t–1 is the year preceding the year t.

Definition of the event and selection of the event and estimation window. The event that potentially affects the change in the companies' stock returns in this paper is the annual announcement of Russian companies to pay dividends between 2008 and 2021. The dividend announcement refers to the day of the board of directors meeting. This is the day when the information about the number of dividends and the date when the dividend payment may occur is provided to the market for the first time. It is on this day that market participants find out what dividends they can receive, whether dividends have decreased compared to last year, remained the same or increased. They form their attitude to such news, and their subsequent behavior may be reflected in changes in the companies' stock prices. This day is important for companies because it can affect their value.

The event window is a time window for observing stock prices. The selection of the event window duration is contingent upon the extent of the event's impact, namely whether it is a protracted or brief influencing factor. Dividend payout announcements can be categorized as a group of events with a potentially short-term impact. A time window of 3 [34] to 21 days [7] is typically used for such an event. In this paper, an event window of 11 days is used, as in E. Rogova and G. Berdnikova [6] and I. Berezinets et al. [28], since it can be considered optimal to capture the impact of the event and not lead to unnecessary noise unrelated to the event. Thus, the event announcement occurs at zero time period ($t_0 = 0$), and t_1 and t_2 (event window bounds) are –5 and 5, respectively.

The estimation window is a time window for estimating model parameters that does not overlap with the event window. A review of studies on the topic in question showed that a window of 100 to 300 days is chosen as the window of estimation.

Calculation of actual and normal returns. The following formula is used to estimate actual stock returns ($R_{i,t}$):

$$R_{i,t} = \ln\left(\frac{P_{i,t}}{P_{i,t-1}}\right), \#(2)$$

where $P_{i,t}$ – share price of company i on day t of the event window; $P_{i,t-1}$ – the share price of company i on day t–1 of the event window. The daily quotes of the companies' shares, namely the daily closing prices, are used to estimate the yield.

The term "normal return" refers to the expected return that a company's shares would generate in the absence of any extraordinary events. To estimate this normal return, the market model is typically utilized, which assumes a linear correlation between the return of the market and the yield on the share of the organization. The following equation represents the market model:

$$E\left(R_{i,t}\right) = \alpha_i + \beta_i \bullet R_{m,t} + \varepsilon_{i,t}, \#(3)$$

where $E(R_{i,t})$ – the expected return on the stock of company i on day t; α_i – intercept for company i; β_i – slope coefficient for company i; $R_{m,t}$ – market index return on day t; $\varepsilon_{i,t}$ – a random error value. The coefficients α_i and β_i are estimated using the method of least squares (OLS). The Moscow Stock Exchange Index for the corresponding period is used as a market index. The returns for it are calculated in the same way as for the shares of companies.

The calculation of abnormal return (AR) for each day within the event window. AR is determined by subtracting the expected return from the actual one over the period of the event window, which can be computed using the following formula:

$$AR_{i,t} = R_{i,t} - E\left(R_{i,t}\right) = R_{i,t} - \alpha_i - \beta_i \bullet R_{m,t}, \#(4)$$

where $AR_{i,t}$ – the abnormal return of company i on day t; $R_{i,t}$ – the actual profitability of company i on day t; $E(R_{i,t})$ – the normal (expected) return of company i on day t.

Calculation of cumulative abnormal return (*CAR*), average abnormal return (*AAR*) and average cumulative abnormal return (*CAAR*). In order to avoid accounting for random

changes in returns, abnormal returns are accumulated in the interval included in the event window and averaged over the entire sample of events. The cumulative abnormal return is calculated using the formula:

$$CAR_i(t_1,t_2) = \sum_{t=t1}^{t_2} AR_{i,t}, \#(5)$$

where $CAR_i(t_1,t_2)$ – the accumulated abnormal return during the event window period; $AR_{i,t}$ – the abnormal return of company i on day t; t_1 – the lower boundary of the event window (–5); t_2 – upper boundary of the event window (5). If a positive value is obtained, we can conclude that the event in question creates firm value, i.e., there is a positive effect.

This study uses not one event, but a group of N homogeneous events. In this case, the abnormal return is averaged over the entire sample. The average abnormal return (AAR) for day t is found as follows:

$$AAR_t = \frac{1}{N} \bullet \sum_{t=1}^{N} AR_{i,t}. \#(6)$$

In addition, the values for each event are aggregated, that is, the average cumulative excess return ($CAAR$) is calculated as the sum of the average excess returns on the days of the event window:

$$CAAR(t_1,t_2) = \sum_{t=t1}^{t_2} AAR_t. \#(7)$$

The significance of the announcement of dividends on the market can be better understood by analyzing the indicators of average abnormal return and cumulative average abnormal return. Therefore, it is imperative to determine whether these indicators are statistically significant. For this purpose, the paper uses a cross-test, which has also been applied in such works as, for example, H.R. Turaev [29], C. Andres et al. [34]. When conducting this t-test, t-statistics are calculated to check the following hypotheses:

H0: $AAR(t_1;t_2) = 0$ or announcements of dividend payments do not result in abnormal returns.

H1: $AAR(t_1;t_2) \neq 0$ or announcements of dividend payments result in abnormal returns.

The following formula is used to calculate t-statistics:

$$t_{AAR_t} = \sqrt{N} \frac{AAR_t}{\sigma_{AARt}}, \#(8),$$ where N – number of events;

AAR_t – average abnormal return; $\sigma^2_{AAR_t}$ – the standard deviation for the average abnormal return, which is calculated as follows:

$$\sigma^2_{AAR_t} = \frac{1}{N-1} \sum_{i=1}^{N} (AR_{i,t} - AAR_t)^2. \#(9)$$

For $CAAR$, statistics are calculated in a similar way, that is, for testing H0: $CAAR = 0$ t_{CAAR_t} is obtained as follows:

$$t_{CAAR_t} = \sqrt{N} \frac{CAAR_t}{\sigma_{CAARt}}, \#(10)$$

where $^2_{CAAR_t}$ – estimated variation for the cumulative average abnormal return on the sample:

$$\sigma^2_{CAAR_t} = \frac{1}{N-1} \sum_{i=1}^{N} (CAR_{i,t} - CAAR_t)^2. \#(11)$$

Testing the risk aversion of investors in the Russian market. In our paper we also want to test the hypothesis concerning investors' risk aversion. We hypothesize that the announcement of a dividend increase leads to a certain percentage increase in stock prices (x). At the same time, the announcement of a dividend cut leads to a larger percentage decrease in stock prices (y) because of investors' risk aversion. Thus, if a company announces a positive dividend surprise, the company's stock price rises by x%. If the dividend surprise is negative, then the company's share price decreases not by x%, but by y%. In this case $y > x$.

This assumption stems from the fact that investors are inherently risk-averse. It is logical to assume that risk-averse investors would react actively to the news of a negative dividend surprise, which would lead to a significant decline in stock prices.

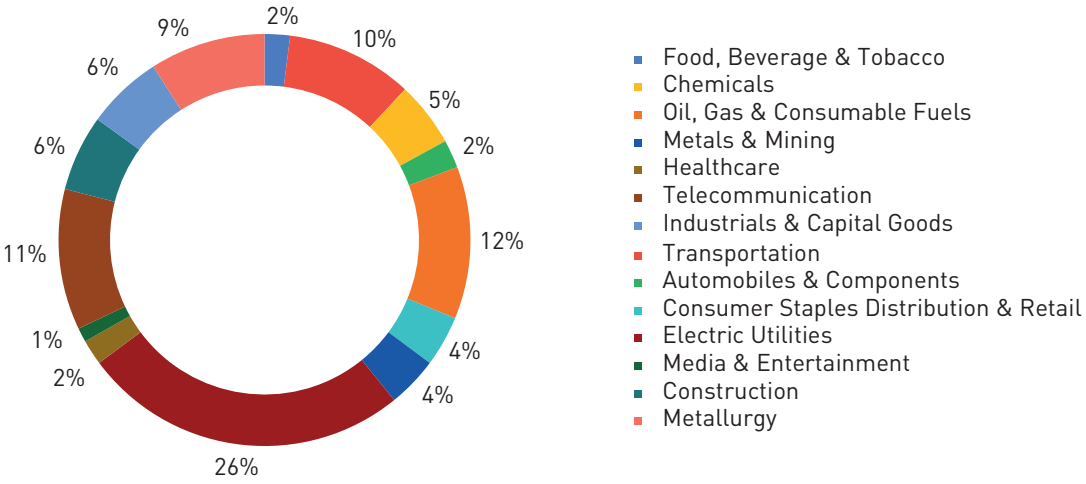
To confirm the hypothesis that the announcement of a dividend payout increase leads to a certain positive effect on stock prices, and the announcement of a dividend payout decrease leads to a stronger negative effect on stock prices due to investors' attitude towards risk, we plan to use regression analysis to calculate the coefficients of positive and negative news' impact on cumulative average abnormal return. Thus, an attempt will be made to confirm that investors in the Russian market are risk averse.

Data

The study examines Russian companies; therefore, the sample includes companies that are traded on the Moscow Stock Exchange or on the Moscow and St. Petersburg Stock Exchanges and make dividend payments. Initially, 214 companies were included in the sample. The sample included companies that paid annual dividends in 2008–2021. However, several data selection criteria were imposed. First, the sample does not include the companies that can be classified as illiquid, namely those that have not been traded on the market for more than two weeks. The paper does not select a strict liquidity criterion, e.g., daily trading in stocks (for example, [6]), only the largest and most well-known companies are most often continuously traded on the Russian market. This approach allows to remove companies with truly irregular trading patterns, but at the same time leave enough data. Secondly, in Russian practice, companies often pay dividends based on the quarterly results, from retained earnings, unplanned and so on. For this work, only the dividends paid according to the results of the year (or annual), were left in the dataset. Also, those observations were not taken into account if there were events like consolidation or splitting of shares in the year for which dividends were paid [28]. Third, financial sector companies are excluded due to the presence of features different from the real sector of the economy. In addition, it should be noted that the aforementioned announcements do not take into account other significant news that can affect

stock prices, such as profit announcements. After carefully selecting data in accordance with specific criteria, our final sample consisted of 66 companies and 452 dividend payment announcements. It's worth mentioning that the sample encompasses various sectors of the economy, with 14 industries represented (Figure 1).

Figure 1. Distribution of companies from the sample by industry



The period from 2008 to 2021 is selected as the study period since it includes both crisis years and periods of recovery and stability. Information about their belonging to the group of crisis or stable years is included in the analysis, which allows to make conclusions about the presence or absence of differences in the market reaction to the announcement of dividends in different periods of the state of the country's economy.

For the purpose of event analysis, the data which includes the names of the companies, their respective industries, the date of dividend payment announcement, and the total amount of dividends paid over the years under consideration have been gathered. Using this information, each event has been categorized into one of three groups – "Bad", "Neutral", or "Good" – based on a comparison of actual dividends with expected dividends or dividends from the previous year. Our analysis has revealed that there were 154 events categorized as "Bad", 86 events classified as "Neutral", and 212 events indicating an increase in dividend amount, which fall under the "Good" category.

The paper also uses methods for panel data (Fixed effects model), so it is necessary to determine which variables are included in the model. The dependent variable is CAR(T) or cumulative abnormal return for the event window T, which is 11, as indicated in the part before. The explanatory variable is Dividend change, which is defined as the relative change in actual dividends compared to expected dividends, that is, it is found by the following formula:

$$Dividend\ change = Dividend - Expected\ dividend, \#(12)$$

where Dividend is the actual amount of dividends; Expected Dividend is the amount of dividends for the previous year.

To obtain more accurate results, additional variables are included in the model, they are the variables of interest, such as:

- According to A. S. Amin et al. [35], the size of a firm can be measured by the logarithm of its capitalization. It is conjectured that the firm's size may not have any impact on CAR(T) or may have a negative effect. This is because bigger companies typically have a longer operating history, better control, and more liquid shares.
- The profitability of the company, expressed as ROA [35], and lagged for one year. It is assumed that ROA has a positive effect on CAR(T).
- The firm's age, expressed as a logarithm of the age of the company, to control for maturity [35].
- Tobin's Q is a market valuation indicator that measures the market price of a share on the day of the dividend payment announcement relative to the book value of one share at the end of the preceding year [36]. It is utilized to gauge investors' expectations regarding a company's growth and investment opportunities. Typically, this indicator is expected to have a negative impact on the dependent variable. This is due to the fact that the market reaction to dividend growth is higher for companies that possess fewer investment opportunities.
- The Debt-to-Equity (D/E) ratio is a crucial financial indicator that calculates the ratio of a company's total debt value to the value of its total equity at the end of the year preceding the change in dividends [36]. This ratio provides insights into the financial risk that a company carries. A higher D/E ratio implies a higher financial risk, which lowers the chances of increasing dividends. Therefore, a favorable outcome is anticipated, as the market reaction tends to be stronger with higher D/E ratios.
- Dummy variable to reflect the state of the economy, equal to 1 for the period of crisis and 0 for the period of recovery or stability.

Results

The reaction of the Russian market to the change in dividends for the entire sample and for three types of events

To begin with, the average abnormal return, cumulative average abnormal return indicators and the corresponding t-statistics for the entire sample as a whole were calculated. The results of this analysis are shown in Table 3. In general, a significant increase in abnormal return on the Russian stock market is observed 4 days before the announcement (at t = =–4 AAR = 0.33%; significant at the 5% level) and on the day of the announcement of the amount of dividends and one day after (at t = 0 AAR = 0.39% and at t = 1 AAR = 0.21%; significant at the 10% level). The CAAR value demonstrates a similar market reaction and by the end of the event window under consideration turns out to be equal to 1.15%, which is significant at 1% level. It can be concluded that the market reaction is generally positive as AAR around the event is more than 0 and CAAR is positive by day 5 after the announcement. That is, when companies provide information to the public about the amount of dividends, the market has an instant positive reaction to this news.

Table 3. AAR, CAAR, t-statistics for the whole sample

Day of event window	AAR, %	t-value (AAR)	CAAR	t-value (CAAR)
–5	–0.02	–0.21	–0.02	–0.21
–4	0.33	2.49**	0.30	2.04**
–3	0.05	0.52	0.36	1.93*
–2	0.11	0.90	0.47	2.07**
–1	0.06	0.44	0.52	2.01**
0	0.39	1.71*	0.91	2.71***
1	0.21	1.65*	1.13	3.10***
2	–0.13	–1.27	0.99	2.70***
3	–0.13	–1.41	0.86	2.32**
4	0.14	1.34	1.00	2.56**
5	0.15	1.25	1.15	2.73***

*Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.

The first group of events, which included the observations where the difference between dividend payments compared to last year exceeded 5%, is considered. Table 4 shows the results for this group. First, it can be noted that the largest average abnormal return (AAR) occurred on day 0, that is, on the day of the announcement of the decision to pay dividends and of their amount; the abnormal return is 1.38% on this day and it is significant at the 1% level. This means that when information that the company intends to pay larger dividends than it did last year, that is, than expected, becomes available to the public, the market reacts positively to this news. On the next day, on average, there is also a significant 10% positive market reaction (AAR = 0.34%). On the second day after the event, the abnormal return is –0.36% (significant at the 5% level). However, on the 5th day after the event, the AR again becomes significantly positive. The same situation is observed before the event. That is, it can be noted that on average the market demonstrates a positive abnormal return with small negative deviations 2 days before and 2 days after the announcement of dividends.

As for cumulative average abnormal return, there is clearly a positive trend towards an increase in the indicator from –2 days to 1 days. After the day of the event, the CAAR gradually decreases to the 4th day of the event window. Almost all values except t = –5 are significant. That is, the cumulative average abnormal return increases sharply on the exact day and on day after when companies announce an increase in dividends, but then decreases significantly for the market for t = 2 (Figure 4). In general, over the period of 11 days around the event (CAR(–5; 5)), the average abnormal return accumulates to a value of 1.98%. It is believed that if the value of CAAR is positive, then value has been created as a result of the event.

Table 4. AAR, CAAR, T-statistics for the Dividends Increases

Day of event window	AAR, %	T-value (AAR)	CAAR, %	T-value (CAAR)
–5	–0.12	–0.67	–0.12	–0.67
–4	0.24	1.57	0.15	0.83
–3	0.20	1.37	0.36	1.45

Day of event window	AAR, %	T-value (AAR)	CAAR, %	T-value (CAAR)
–2	–0.37	–2.39**	–0.01	–0.04
–1	0.27	1.65*	0.25	0.78
0	1.38	3.57***	1.64	3.33***
1	0.34	1.81*	1.98	3.54***
2	–0.36	–2.34**	1.62	3.00***
3	0.09	0.72	1.72	3.12***
4	–0.15	–0.96	1.56	2.69***
5	0.42	2.58**	1.98	3.15***

* Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.

For a group of events classified as neutral, it turned out that AAR is significant at the 5% level only 3 days before the announcement of the unchanged amount of dividends and is equal to 0.49% (Table 5), and is significant at the 10% level 3 days after the event (AAR = –0,38%). That is, according to this indicator, the market reacts positively before the event, perhaps counting on the good news, and then with a delay after learning that the dividends remain the same, the market shows a significant negative result. In addition, CAAR(–5; 5) demonstrates fairly rapid growth and by the end of the event window, the indicator is 1.46% and is significant at the 10% level.

Table 5. AAR, CAAR, T-statistics for the Unchanged Dividends

Day of event window	AAR, %	T-value (AAR)	CAAR, %	T-value (CAAR)
–5	0.04	0.15	0.04	0.15
–4	0.46	1.82	0.49	1.33
–3	0.49	2.38**	0.98	2.19**
–2	0.32	1.37	1.30	2.41**
–1	–0.17	–0.64	1.13	2.01**
0	–0.01	–0.03	1.12	1.85*
1	0.50	1.65	1.62	2.60**
2	–0.38	–1.73*	1.24	1.77*
3	–0.07	–0.29	1.17	1.74*
4	0.25	1.18	1.41	1.97*
5	0.05	0.25	1.46	1.91*

* Significant at the 10% level; ** Significant at 5% the level; *** Significant at the 1% level.

The third reviewed the results obtained for the announcements of a reduction in the amount of dividends. Table 6 shows the indicators of AAR and CAAR, as well as the corresponding t-statistics for this group of events. A test of the hypothesis about the difference between AAR and zero showed that at the 5% significance level in the period t = –3 and t = 3, that is, 3 days before and 3 days after the announcement of the reduced amount of the dividend payment compared to the previous year: at the 10% significance level in the period t = 2. Moreover, the AAR value on these days is negative (at t = –3 and t = 3 AAR = –0.53% and AAR = = –0.42%, respectively; at t = 2 AAR = –0.34%). That is, perhaps insider information is used 3 days before the event, and there is a delayed significant reaction to the decrease in dividends. Also, Figures 3 and 4 clearly demonstrate that in the event window (–5; 5) around the announcement of a negative change in the amount of dividends, there is a negative market reaction in 2008–2021. There is an increase in return in the market on average only 3 days after the announcement of a reduction in the amount of dividends.

Table 6. AAR, CAAR, T-statistics for Dividend Decreases

Day of event window	AAR, %	T-value (AAR)	CAAR, %	T-value (CAAR)
–5	0.01	0.08	0.014	0.10
–4	0.24	0.90	0.255	0.87
–3	–0.53	–2.53**	–0.272	–0.79
–2	0.38	1.44	0.108	0.25
–1	0.08	0.26	0.187	0.35
0	–0.21	–0.64	–0.020	–0.05
1	–0.20	–0.91	–0.221	–0.37
2	–0.34	–1.74*	–0.563	–0.85
3	–0.42	–2.45**	–0.988	–1.66*
4	0.33	1.75*	–0.656	–0.94
5	–0.03	–0.14	–0.688	–0.93

* Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.

The reaction of the Russian market to changes in dividends in different industries

The largest industries represented in this study are Electric Power, Oil and Gas, Telecommunications and Transportation. The above-mentioned four most frequently examined industries were used in the analysis, as well as a group that includes all other sectors. The group of other goods includes industries such as Metallurgy, Industrial & Capital Goods, Metals & Mining, Chemicals, Retail, Construction, Healthcare, Food, Beverages & Tobacco, Automobiles & Components and Media & Entertainment. The results showed several significant differences between industries. First, the most stable industries, which have almost no reaction to the announcement of dividends, are Electric Power and Oil and Gas. For the Electric Power industry, the AAR turned out to be significant at the 5% level only on the t = –2 (AAR = 0.56%), and for the Oil and Gas Industry there was no significant reaction. In addition, the graph with CAAR for different industries (Figure 5) demonstrates that they are closest to reaching zero for this indicator, especially the Oil and Gas industry. Moreover, the Transportation industry is most noticeably dissimilar. It demonstrated a clear and rapid upward trend, while the AAR turned out to be positively significant in the 1st and 4th days after the event. But for Telecommunications Services, the situation is the opposite, and on the 2nd and 5th days after the event, there is a negative market reaction to the event. Thus, market dynamics generally coincide for different industries, however, the Telecommunications sector and the Transport sector are distinguished.

If we consider these industries to adjust dividends in an upward direction, then all industries have positive dynamics of cumulative average abnormal return till the day of the event (Figure 3). For all industries, CAAR increased on day 0, and prices subsequently decreased. However, the results were significant only for Transport and Telecommunications. As for the negative changes in the amount of dividends, a strong decrease in abnormal return for other industries (other than the four under consideration) to t = = –1 and the increase in CAAR starting from the day of the announcement (Fig. 4) is apparent. Many industries belonging to the "Other" group are not mature, so investors are willing to sacrifice immediate benefits in the form of dividends in favor of making a profit in the future. In this case, companies can invest money in development and postpone dividends. Among industries belonging to the "Other" group, dividends are traditionally comparatively small in the market relative to Oil and Gas and Telecommunications, and therefore investors are weaker to react to changes, i.e., these changes are insignificant relative to the dividend per share. The decline is also observed for the Oil and Gas industry, but it is not significant. The Telecommunication industry demonstrates a significant increase in AAR on the day of announcement, but then a significant negative value on day 3. And for the Transport industry, on the contrary, after the day the market receives information, there is a significant increase in abnormal return.

Figure 2. Cumulative Average Abnormal Returns for Different Industries (all data)

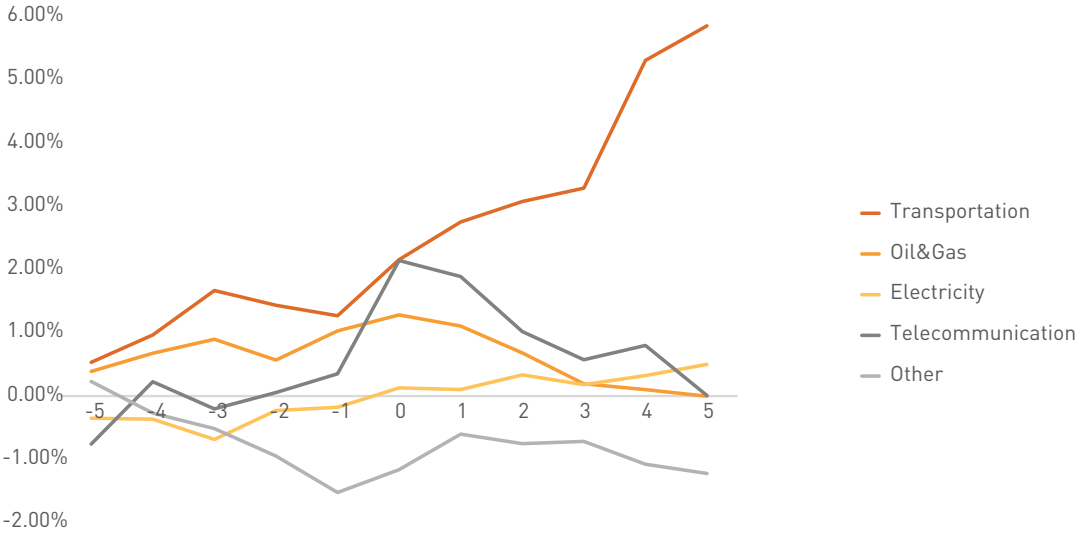


Figure 3. Cumulative Average Abnormal Returns for Different Industries (increase in dividend amount)

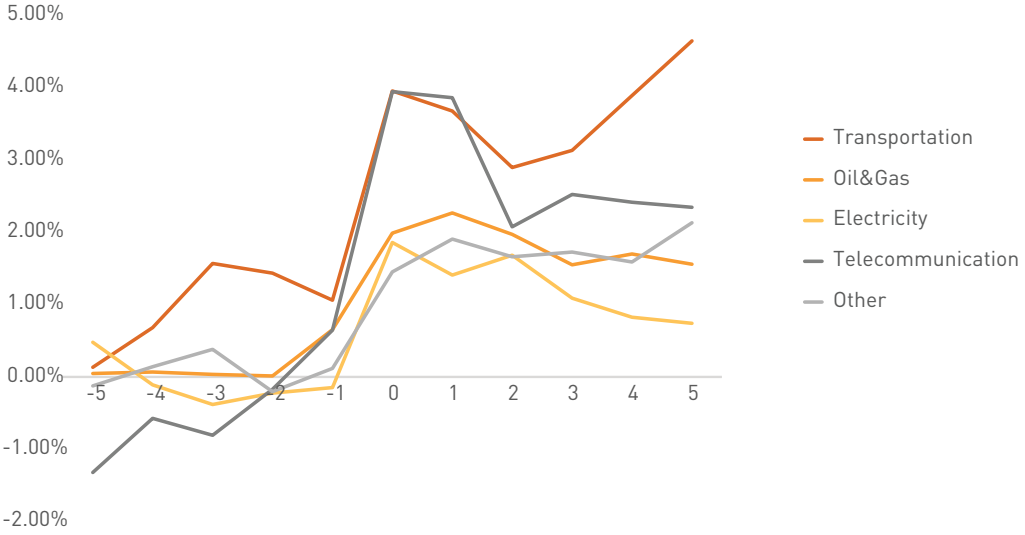
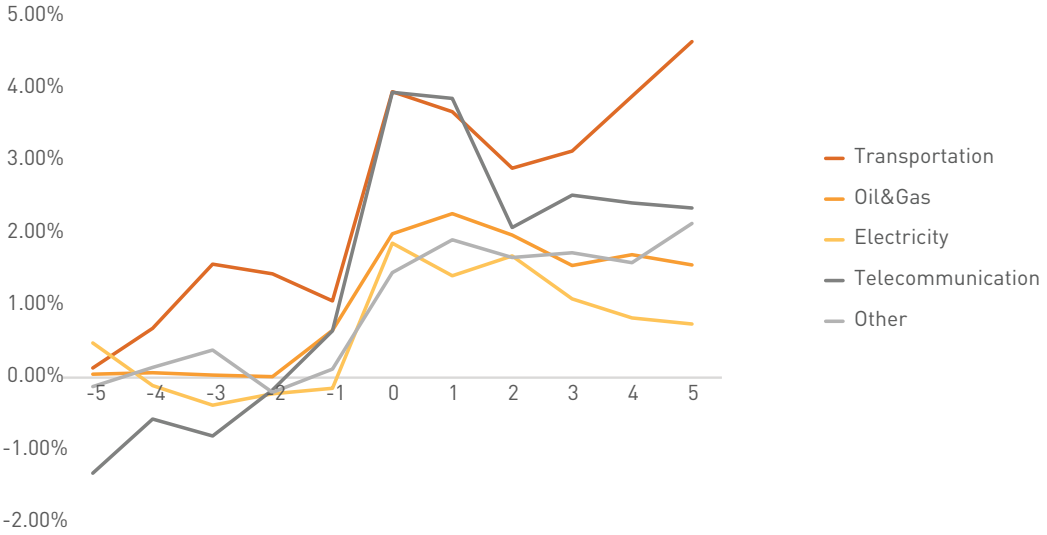


Figure 4. Cumulative Average Abnormal Returns for Different Industries (decrease in dividend amount)



Response of the Russian market to changes in dividends in the years of crisis and growth

Let us consider the results of the Event Study on a sample of Russian companies for crisis and non-crisis years. The years 2008–2021 were used for analysis. Based on the indicators of the index of physical volume of GDP, inflation and unemployment rate, the following years were included in the group of crisis years: 2008, 2009, 2013, 2014, 2015, 2020, and the following years distinguished by stability or growth were included in the group: 2010, 2011, 2012, 2016, 2017, 2018, 2019 и 2021. The crisis years were 2008 and 2009, as 2008 saw the U.S. mortgage crisis and a drop in oil and metal prices. These events had repercussions for financial markets around the world, affecting Russia as well. In the summer of 2008, the Russian stock market collapsed. At that time Russian companies had a record volume of foreign debts. The state had to intervene to support companies and prevent the collapse of the economy. In 2014–2015, there was a drop in world oil prices, and the country was still having a hard time because of the sanctions that were imposed after the annexation of Crimea. Dependence on energy resources had a negative impact on the country's economy when global oil prices fell sharply. In 2020, Russia was in the phase of overcoming the consequences of the COVID-19 pandemic. The crisis years were characterized by a drop in the physical index of the country's GDP, an increase in inflation and unemployment (Figure 5).

Figure 5. Macroeconomic indicators of Russian market

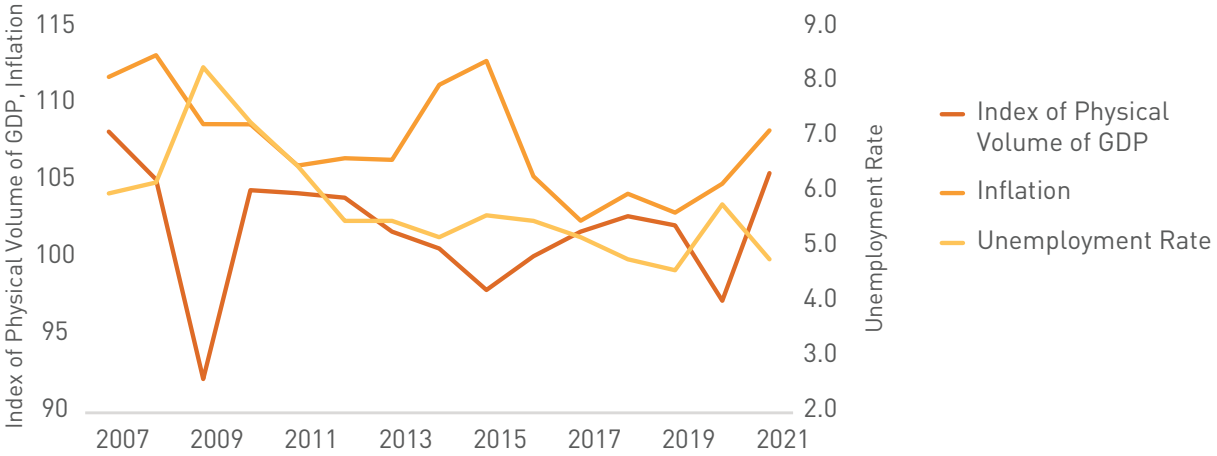
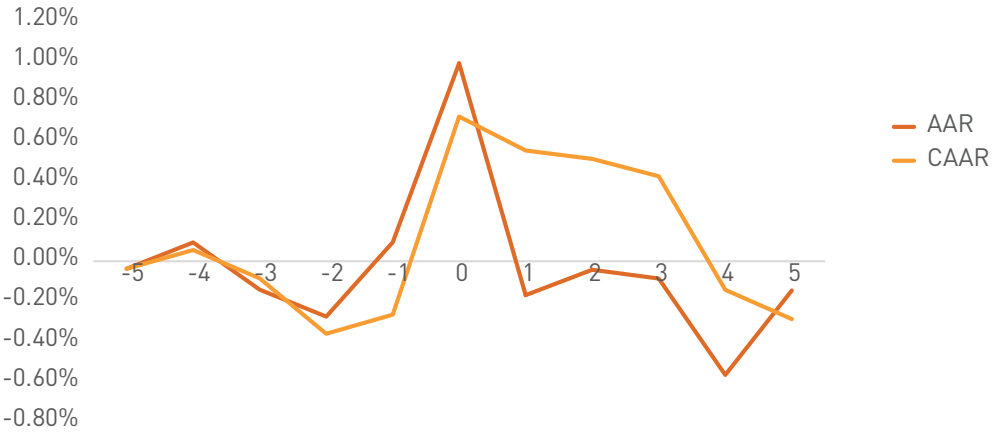


Figure 6. Cumulative Average Abnormal Returns and Average Abnormal Returns for Stable Years Group (increase in dividend amount)



News related to dividend announcements, as in the analysis above, were divided into good, neutral and bad. First of all, let's analyze the market reaction to announcements of increased dividends on the selected time horizon, characterizing stability or growth. For clarity, graphs of the behavior of Average Abnormal Return (AAR) and Cumulative Average Abnormal Return (CAAR) in the event window were created (Figure 6).

Testing of the hypotheses showed that the Average Abnormal Return is significantly different from zero on day t = 0 at the 10%-level of significance. In the meantime, the values of the Average Abnormal Return on day 0 are positive, so we can say that the increase in dividends was met with a positive response from investors, indicating their immediate reaction. We can see the gradual decrease of CAAR on the graph of the Cumulative Average Abnormal Returns from the day of the announcement of the dividend increase. The tendency for the Cumulative Average Abnormal Return to decrease from the day of announcement to the end of the observation is clearly visible in Figure 6. By the 11th day of the event window, the Cumulative Average Abnormal Return reached the value of –0.3%.

Below we consider the reaction of the Russian market to the announcement of an increase in dividend payments during the crisis years.

The results obtained during the analysis show that the Average Abnormal Return is significantly different from 0 on the day t = 0 at the 5% significance level and on the day t = 2 at the 10% significance level. In the meantime, the value of the Average Abnormal Return on day t = 0 is positive, but on the day t = 2 it is negative. The Russian market shows an immediate positive response to the news of increased dividends in the crisis periods, but then investors act cautiously again. The graph of Cumulative Average Abnormal Return shows the gradual increase of CAAR from the day of the announcement of the increased dividend amount (t = 0). Figure 7 clearly shows an upward trend in the Cumulative Average Abnormal Return from the day of the announcement of the increased dividend value until the end of the observation. By the 11th day of the event window, the Cumulative Average Abnormal Return reached the value of 2.02%.

The following is a discussion of the results obtained by analyzing neutral news about dividend announcements during periods of stability or growth. In such news, the change in the amount of dividends for the year does not exceed 5% in both positive and negative directions (Figure 8).

Figure 7. Cumulative Average Abnormal Returns and Average Abnormal Returns for Years of Crisis (increase in dividend amount)

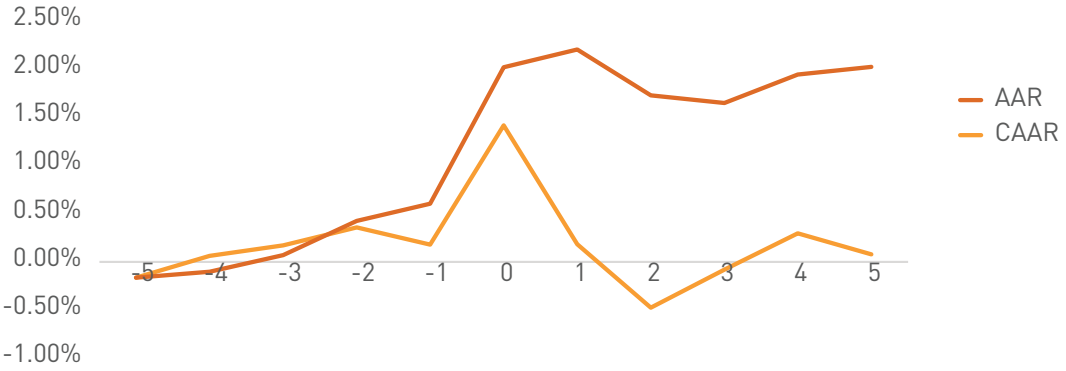
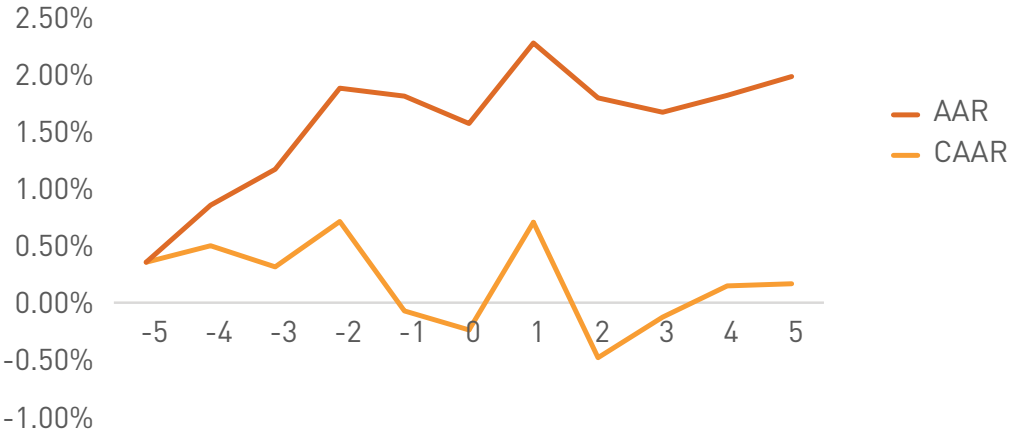


Figure 8. Cumulative Average Abnormal Returns and Average Abnormal Returns for Stable Years Group (the amount of dividends is constant)



For the group of events categorized as neutral, it turned out that two days before the announcement of an unchanged dividend, the AAR reaches 0.71%, which is significant at the 5% level. Then, it is significant at the 10% level on the day t = 1 and has a positive sign. But, then on the day t = 2 AAR is significant at the 5% level with a negative sign. Nevertheless, CAAR(–5; 5) shows stable growth and by the end of the event window the indicator is equal to 2%.

Below is a chart with the results of analysis on neutral news during the crisis years (Figure 9).

n the group of crises years, the analysis did not reveal a single day when the announcement of a slight change in the amount of dividend payments significantly affected the reaction of the Russian market. In the meantime, on the graph of Cumulative Average Abnormal Return we can see the fluctuation of CAAR. By the 11th day of the event window the Cumulative Average Abnormal Return value is almost negative.

Below we will consider the results of the analysis of bad news, i.e., announcements of reduced dividend payments during periods of stability or growth. Graphs of changes in the Average Abnormal Return, as well as the Cumulative Average Abnormal Return in the event window are shown in Figure 10. According to the graph, we can conclude that the "bad" news on the segment of stable years causes a negative reaction of the Russian market.

Figure 9. Cumulative Average Abnormal Returns and Average Abnormal Returns for Years of Crisis (the amount of dividends is constant)

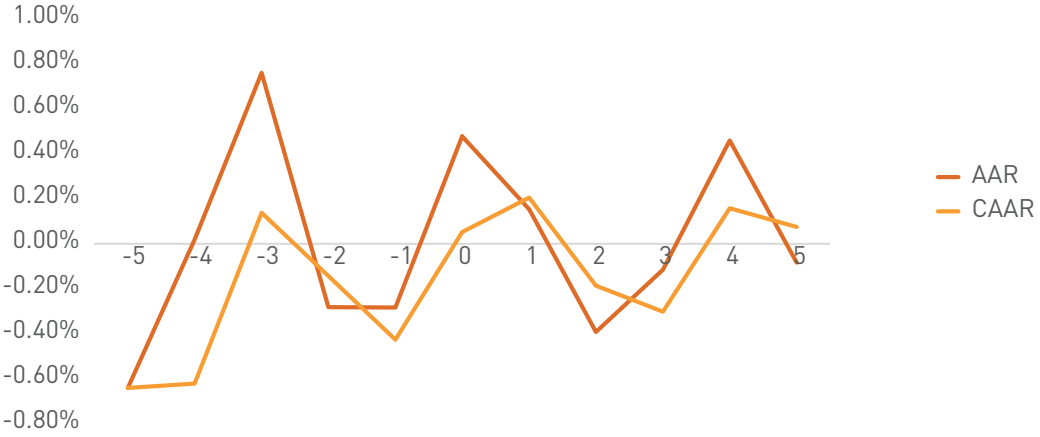


Figure 10. Cumulative Average Abnormal Returns and Average Abnormal Returns for Stable Years Group (decrease in dividend amount)

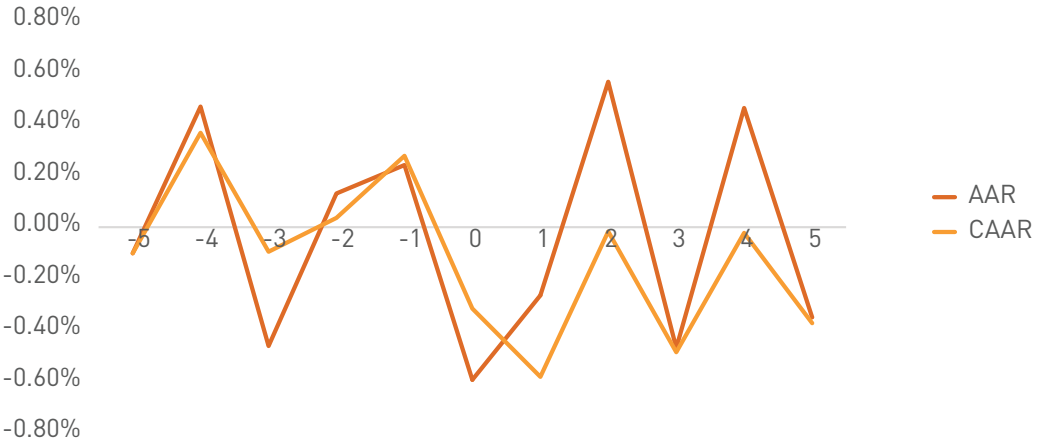
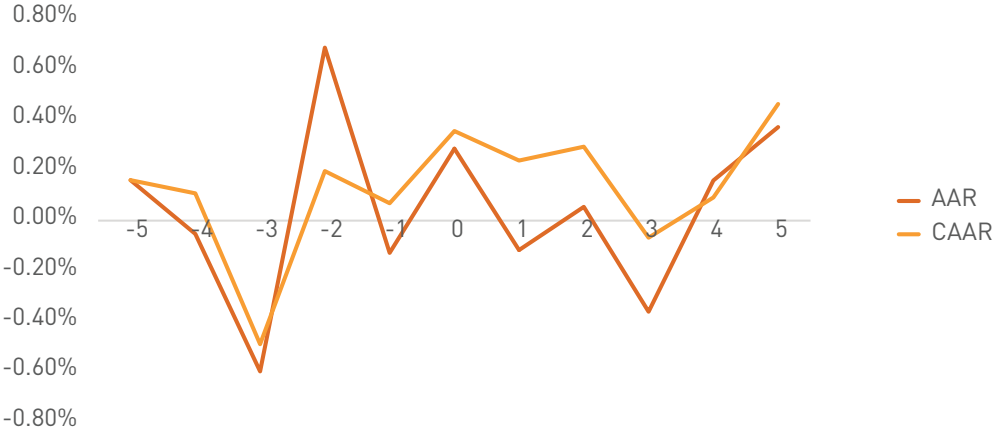


Figure 11. Cumulative Average Abnormal Returns and Average Abnormal Returns for Years of Crisis (decrease in dividend amount)



Testing of the hypotheses showed that at the 5% significance level the Average Abnormal Return is significantly different from 0 at day t = 2, at the 10% significance level at day t = 3, and at the 5% significance level at day t = 4. The Average Abnormal Return on day t = 2 is positive, but negative on day t = 3 and again positive on day t = 4, suggesting an unequivocal response to dividend declines announced during periods of stability or growth. The graph of the Cumulative Average Abnormal Return shows some jumps in values in the event window, with mostly negative values. At the same time, there is a gradual decrease in the Cumulative Average Abnormal Return on the day of the announcement, after which there is a fluctuation among values. The study has shown that announcements of reduced dividends convey negative information to the Russian market, resulting in a negative Cumulative Average

Abnormal Return on Russian company shares. This finding aligns with the signal theory of dividends. Below we will examine how the Russian market reacted to the news of reduced dividend payments during times of crisis, based on the analysis of the results.

In the group of crisis years the analysis did not reveal a single day when the announcement about the reduction of dividend payments significantly affected the reaction of the Russian market. In addition, in Figure 11 we can see that in the event window (–5; 5) around the proclamation of the negative dividend change there is a negative market reaction, but after day t = 3 there is an increase in CAAR. By the last day of the event window CAAR = 0.46%.

Russian market reaction to dividend changes: attitude to risk

In the regression analysis of all types of dividend changes (negative and positive), three types of regressions were built: Pooled OLS, Fixed Effects and Random Effects. The F-test, The Breusch and Pagan test, and The Hausman test were then conducted to choose between the three types of regressions listed. The test results showed that the Fixed effects model was the best. This approach allows controlling for unobserved company characteristics due to heterogeneity when it is constant over time.

Table 7 shows the results of the regression with fixed effects for all types of events, for positive events and for negative events separately. First, turning to the effect of changes in dividends, we can note that in all three cases there is a significant result (for all types of changes and for positive changes in dividends at the 10% level of significance, and for negative changes at the 5% level of significance). In general, the change in the amount of dividends by 1 ruble entails an increase in CAR by 0.020 percentage points. In a situation when actual dividends are higher than expected dividends, the dividend increase entails 0.052 change in CAR. However, when a smaller dividend change is considered, an increase in Dividend Change results in a 0.185-point decrease in CAR. Commenting on the control variables for the regression as a whole, we can note that only the logarithm of capitalization (firm size) (–0.018), company age (–0.048) and economic status of the country (0.016) were significant. That is, the increase in the first two indicators lead to a fall in CAR, and the last one – to an increase in CAR, which generally coincides with expectations. Thus, the regression results show that the negative news have a stronger and negative impact on the excess returns, while the positive changes also have an impact, but a positive and weaker one. It can be concluded that investors are more afraid of negative results than happy about positive news. Therefore, we can assume that investors in the Russian market are rather risk-averse. The results obtained with the help of the regression also serve to confirm the verification of Hypotheses 1 and 3 about the market reaction to an increase and decrease in the amount of dividends, respectively.

Table 7. Regression results for the whole sample and groups of positive and negative dividend changes

	For the whole sample	For positive changes in dividends	For negative changes in dividends
		CAR(11)	
Dividend Change	0.020* (0.008)	0.052* (0.025)	–0.185** (0 .054)
Logarithm of Capitalization	–0.018** (0.005)	–0.008 (.029)	–0.048 (0.040)
ROA	0.049 (0.149)	0.378* (0.131)	–0.468 (0.419)
Logarithm of Company's Age	–0.048* (0.017)	0.053* (0.028)	–0.023* (0.012)
Logarithm of Tobin's Q	–0.006 (0.021)	–0.007 (0.030)	0.032* (.0128)
D/E ratio	–0.001 (0.007)	–0.005 (.008)	–0.012 (0.025)
Economic State	0.016* (0.005)	0.027** (0.012)	0.049** (0.017)
R-squared	0.086	0.112	0.143

* Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.

Russian market reaction to dividend changes before and during the COVID-19 pandemic

Let us first consider the results that characterize the pre-pandemic period (Figure 12).

In the pre-pandemic period, the analysis did not reveal a single day when the announcement of a slight change in the amount of dividend payments significantly affected the reaction of the Russian market. In the meantime, the Cumulative Average Abnormal Return sharply increased on the day of the announcement of the increase in dividend payments and by the end of the event window maintained this level of growth (7.90%).

The following are the analysis results of neutral news in the pre-pandemic period.

Figure 12. Cumulative Average Abnormal Returns and Average Abnormal Returns for Pre-Pandemic period (increase in dividend amount)

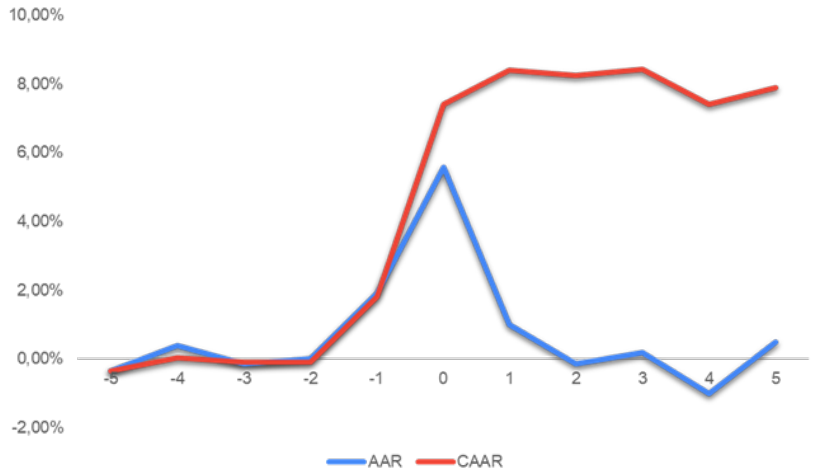
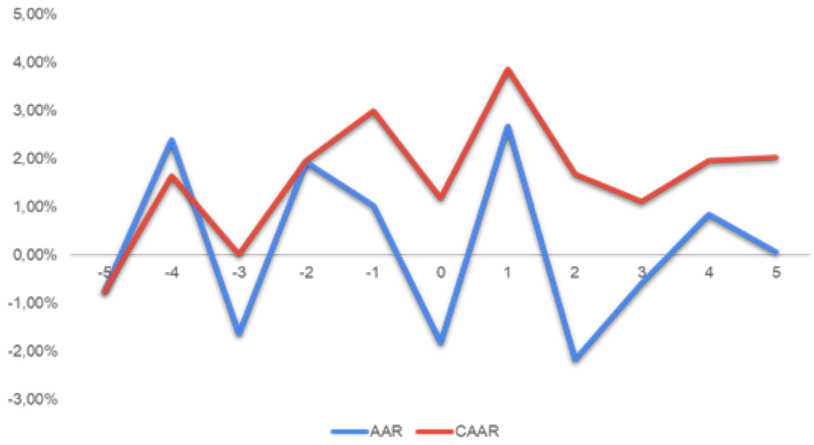


Figure 13. Cumulative Average Abnormal Returns and Average Abnormal Returns for Pre-Pandemic period (the amount of dividends is constant)



As can be seen from the above Figure 13, throughout the event window, the market perceives the announcement of an unchanged value of the dividend as a neutral signal as the graph of the Average Abnormal Return fluctuates around zero. There is no clear upward or downward trend in this time series. This implies that, on average, shares of Russian companies do not receive excess returns in response to the announcement.

We will discuss the outcomes resulting from the announcements of reduced dividend payouts made during the period of COVID-19 pandemic.

Testing of the hypotheses showed that at the 1% significance level the Average Abnormal Return is significantly different from zero on day t = 0, at the 1% significance level on day t = 2, and at the 5% significance level on day t = 3. On day t = 0, the value of the Average Abnormal Return is negative. However, it becomes positive on day 2 before turning negative again on day 3. The graph of the Cumulative Average Abnormal Return (Figure 14) shows a jump-like behavior of values in the event window.

The following are the results of the Russian market's reaction to good news during the pandemic period (Figure 15).

Figure 14. Cumulative Average Abnormal Returns and Average Abnormal Returns for Pre-Pandemic period (decrease in dividend amount)

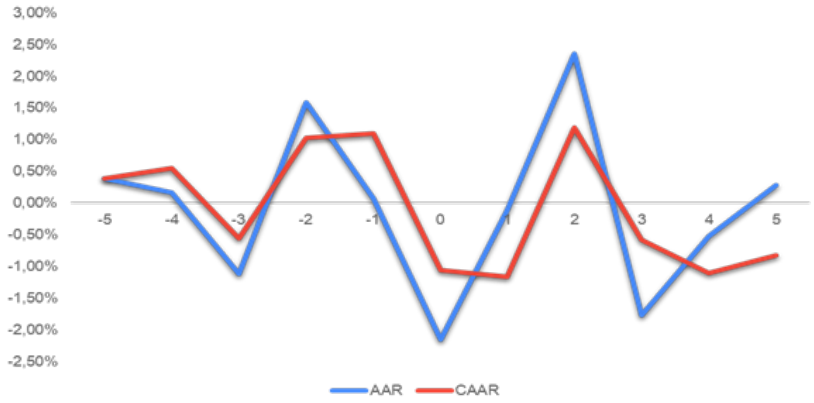


Figure 15. Cumulative Average Abnormal Returns and Average Abnormal Returns for Pandemic period (increase in dividend amount)

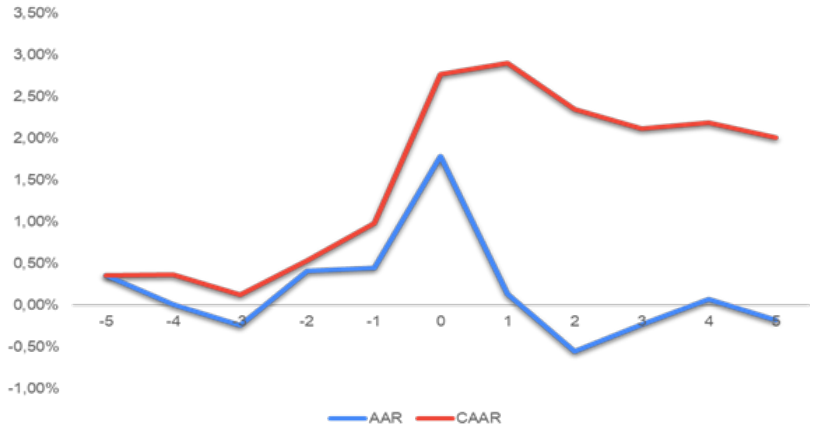
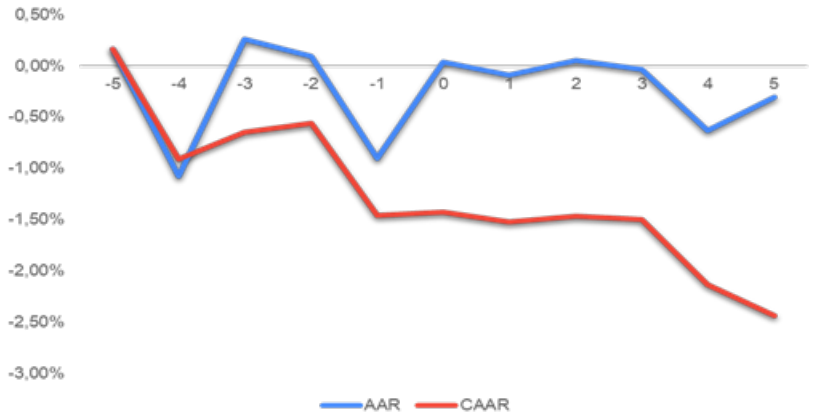


Figure 16. Cumulative Average Abnormal Returns and Average Abnormal Returns for Pandemic period (the number of dividends is constant)



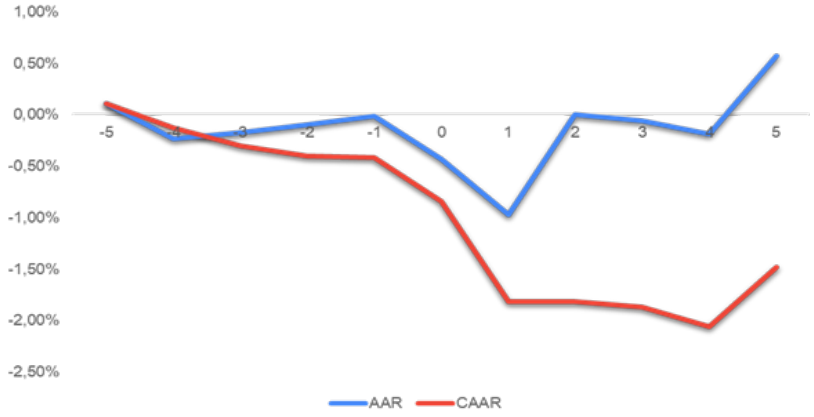
In the pandemic period the analysis did not reveal a single day when the announcement of a rise in the volume of dividends being paid out significantly affected the reaction of the Russian market. A sharp increase in CAAR on the day of the announcement of the increased dividend is apparent in the graph of the Cumulative Average Abnormal Return, by the end of the window of events CAAR = 2.01%.

Next, we examine the neutral news about the dividend announcement during the COVID-19 pandemic period.

The graph of the Average Abnormal Return in Figure 16 shows fluctuations around zero without a clear upward or downward trend within the event window. This suggests that the announcement of an unchanged dividend value does not result in an Average Abnormal Return in Russian company shares and is instead seen as a neutral signal by the market. Additionally, there are no significant values of the Average Abnormal Return. Shareholders whose dividends remain unchanged typically only receive normal yield during the event window.

Below we consider the results of the Russian market reaction to the announcements on reduction in dividend payments during the pandemic of COVID-19.

Figure 17. Cumulative Average Abnormal Returns and Average Abnormal Returns for Pandemic period (decrease in dividend amount)



Testing of hypotheses showed that at the 5% significance level the Average Abnormal Return is significantly different from zero on day t = 1. Moreover, the value of the Average Abnormal Return on day 1 is negative. The announcement of a reduced dividend value negatively affects stock returns soon enough. The graph of the Cumulative Average Abnormal Return (Figure 17) clearly shows a decreasing trend in the event window. In the meantime, the study's findings show that the announcement of reduced dividends has a negative impact on the Russian market, resulting in a decrease in the Cumulative Average Abnormal Return. The value further drops to –1.48%. This supports the signal theory of dividends and suggests that such announcements convey negative information to investors, leading to a negative excess return on shares of Russian companies.

Discussions and Limitations

Summarizing the results of the previous section, some conclusions can be drawn. The results of the analysis of the group of positive variations in dividend payouts showed that in 2008–2021, there was an immediate positive reaction on the market to the company's increase in dividends compared to what was expected. This result corresponds to the signal theory, which states that information about an increase in dividends is a signal from the company's managers to the market that the company expects an increase in cash flows and financial results.

The main conclusion that can be drawn based on the analysis of two groups of years (stable years or growth and crisis periods) is the following: the Russian market reacts more strongly to news regarding the reduction of dividend payments during periods of stability and growth, rather than during periods of crisis.

An increase in dividends leads to an increase in the share price. This conclusion corresponds to the works of Sh. Mahmood et al. [21], Sh. Taneem and A. Yuce [10]. However, the results cannot be correlated with most of the results of studies conducted on Russian companies, because they have the opposite results [5; 6; 7; 28]. This may be due to the fact that this paper considers a different time period from earlier works and the degree and direction of market reaction may have changed.

The results of the analysis of the group of "bad" events show that the announcements of the Russian companies about the reduced amount of dividends entail a negative reaction of the market, that is, they lead to a negative abnormal return on company shares and it confirms the signal theory. The results obtained correspond with the conclusions obtained in the works of I. Berezinets et al. [28], Sh. Mahmood et al. [21]. For part of the work on the Russian market, the opposite result was obtained [6; 7]. However, this difference can be explained by the fact that the works are mainly considered either only the years of recovery, or only the crisis years. The conclusions confirm the Hypothesis 1 posed in the study.

As for the group of neutral dividends changes, it is not easy to draw an unambiguous conclusion. On the one hand, the CAAR indicator is significant at the 10% level by the end of the event window, and it is positive. On the other hand, abnormal return is not significant on the day of the event and the first two days before and after it. Based on the second reason, it can be concluded that, on average, the announcement of an unchanged amount of dividends does not entail the occurrence of abnormal returns on shares of Russian companies and is not perceived by the market as a whole as a negative or positive signal. Thus, hypothesis 2 about the absence of a market reaction with a constant amount of dividends was confirmed. This result corresponds to the theory of signals, according to which the market should not react to such events, and to numerous works on this topic [21; 29]

For share prices of companies in the electric power and oil and gas industries, there is a trend – when companies announce the amount of dividends to be paid, in general, this amount does not differ significantly from the expected yield of their shares. Companies in these industries are more stable and are in the maturity stage. The transport industry generally reacts more strongly than others to the event under consideration, the reaction does not correspond to the signalling theory with dividend reduction. During the analysed period there is a clear distinction between firms from different sectors of the economy, which confirms hypothesis 3.

The analysis showed that the Russian market reacts stronger to bad news about dividend payments in periods of stability and growth than in periods of crisis. But the reaction is ambiguous, and, there probably is an element of speculation in the market during the announcement of dividend payments. The results obtained correspond with the conclusions obtained in the works of I. Berezinets et al. [28], Sh. Mahmood et al. [21].

During years of crisis, holders of shares whose dividend value remained unchanged receive, on average, only the normal yield in the event window. The signal theory of dividends suggests that the market does not receive any significant information that would result in excess returns on a company's shares when the company announces that the dividend value will remain unchanged. Therefore, the behavior of the yield aligns with this theory. This result corresponds to the theory of signals, according to which the market should not react to such events, and many works on this topic [29].

The Russian market reacts more strongly to bad news about dividend payments in periods of stability and growth, but not in periods of crisis. Perhaps investors are prepared for a worsening situation in periods of crisis, which entails a relatively weak reaction to a reduction in dividend payments. Similar results, where the market reacts more strongly to bad news regarding dividend payments in periods of stability and growth rather than in periods of crisis, are also found in M. Mazur et al. [27]; J. Cho et al. [11]

The impact of higher and lower dividend payments was more pronounced during the COVID-19 pandemic than during the pre-pandemic period. This is more distinct in relation to bad news. So, the part of Hypothesis 4 concerning pandemic and pre-pandemic periods was confirmed.

Neither at the time of COVID-19 pandemic, nor in the pre-COVID-19 times, did the market react significantly to announcements of higher dividend payments. Nor was there an abnormal reaction to announcements of unchanged dividends. This result corresponds to the work of H.R. Turaev [29], M. Mazur et al. [27]; H. Ali [24]

This study could be useful to investors trading in the Russian market. From the division of years into periods, it is clear that at least once every three years there are events that consistently lead to crises in the country. Investors would benefit from studying the market reaction to changes in stock prices that follow the announcement of changes in dividend values, broken down by period, industry, etc..

Using regression analysis, we tested the hypothesis that the negative effect of lower dividend payment announcements on the share price is stronger than the positive effect of higher dividend payment announcements. This hypothesis was confirmed. The coefficient on announcements of lower dividend payments is negative. The coefficient on dividend payout announcements is positive, but it has a weaker effect on stock prices than the negative coefficient on dividend payout decrease announcements. Thus, investors are more reactive to negative events, i.e., dividend payout declines, than to positive events (dividend payout increases). That is, they tend to avoid risk rather than seek it out. Hypothesis 5 was confirmed.

Table 8. Summing up the results of hypothesis testing

Hypothesis	Conclusion
Hypothesis 1	Hypothesis is not rejected
Hypothesis 2	Hypothesis is not rejected
Hypothesis 3	Hypothesis is not rejected
Hypothesis 4	The hypothesis about the years of crisis and stability is rejected, the hypothesis about the period before and during the COVID-19 pandemic is not rejected
Hypothesis 5	Hypothesis is not rejected

Turning to the limitations, it can be noted that, first, the paper considers a limited number of variables and limited number of years. Secondly, the work is carried out only for the Russian market. In addition, the paper uses a naive approach to determining the expected dividends, that is, the dividends of the previous year are used, rather than the forecasts of analysts closer to the announcement date. However, in the work of I. Berezinets et al. [28], the results show that there are no significant differences between the approaches, that is, both are acceptable.

Companies making decisions on the allocation of capital should consider the results obtained in the work and adjust decisions depending on the state of the economy. This will help them maximize the wealth of shareholders and, accordingly, get a greater value of the company, because the announcement of changes in the amount of dividends significantly affects the profitability of company shares.

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Leaving Russia: Exit Strategies of Foreign Companies

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Abstract

This study involves the compilation of a database detailing the exit of foreign companies from Russia in 2022 and the identification of their primary exit strategies. The current situation is unprecedented in its scale and has no analogues in the history of the Russian economy, therefore, it has not been sufficiently studied yet. A total of 28 industries across 25 countries were selected for the initial study. Through an analysis of exit patterns, nine primary strategies were identified, including joint venture exits, soft closings, sales to local buyers, suspension, liquidation, management buyouts, selling shares to partners, carving out to local legal entities, and sales to foreign buyers. The subsequent research stage focused on the oil and gas industry and examined the cases of its five leading companies: Shell, TotalEnergies, Equinor, ExxonMobil, and BP. It assessed both financial and non-financial losses incurred by these companies due to their decisions to withdraw from the Russian market. Financial losses were determined using the Discounted Cash Flow method and the Economic-Value-Added valuation method, while non-financial factors were assessed through operational indicators such as reserves and oil and gas production. The fundamental value of the above-mentioned companies was shown to comprise to $20.6 billion, $1.1 billion, $0.5 billion, $17.8 billion, and $36.5 billion, respectively. The study revealed that companies with strategically important and substantial projects in Russia, notably BP and TotalEnergies, pursued a "soft" exit strategy. Despite their decision to exit Russia, these companies continued to receive dividends and effectively retained ownership shares in assets, even though financial statements reflected impairments.

Keywords: discounted cash flow (DCF), economic value added (EVA), losses incurred by foreign companies, exits of foreign companies, oil and gas sector, exit strategies from the market

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Introduction

The year 2022 witnessed significant geopolitical tension, prompting the exit of numerous foreign companies from the Russian market. The political nature of these decisions, coupled with the diversity of the companies involved, resulted in varying outcomes, including the choice of ultimate buyers and transaction structures. Notably, not all companies that announced their exit from the Russian market fully withdrew.

This paper's **relevance** is underscored by the prevailing geopolitical environment, which has compelled foreign companies to disengage from the Russian market. The unprecedented scale of this situation, unique in the history of the Russian economy, has sparked academic interest. We aim to conduct a comprehensive study, classifying the exit strategies adopted by these companies and assessing the impact of their decisions to exit the Russian market on various aspects of their operations, such as operational and financial indicators.

The paper's **objective** is to provide an extensive overview of foreign companies' exits from the Russian market while examining how such exits affect their business. To achieve this, we will use several companies as case studies.

To accomplish our goals, we will:

1) Distinguish between the exit strategies employed by foreign companies leaving the Russian market.
2) Create an exit map based on industries, countries, and exit strategies.
3) Evaluate the impact of exit on oil and gas companies' value using two approaches: Discounted Cash Flow (DCF) and Economic Value Added (EVA).
4) Consider operational metrics relevant to the selected industry.

We have chosen the case study approach as our **research method**, as it allows for a thorough examination of how exiting the Russian market has impacted companies, taking their unique characteristics into account. Our **research focus** is five foreign companies in the oil and gas sector: *Shell, TotalEnergies, Equinor, ExxonMobil,* and *BP.*

We posit the following hypotheses:

1) Some companies that announced their intention to leave the Russian market did not execute a comprehensive exit strategy.
2) Companies deeply integrated into the local market tend to adopt a «soft» exit strategy.
3) Oil and gas companies with strategically significant assets in Russia will experience the most substantial losses compared to their counterparts in the industry.
4) Companies in the selected industry (oil and gas) exhibit mixed results after their exit.
5) Losses arising from the depreciation of Russian business, as disclosed in the financial statements of oil and gas companies, do not provide a complete picture of their losses.

The academic novelty of this paper lies in:

1) The development of an exit strategy map for foreign businesses leaving the Russian market.
2) A detailed examination of the impact of exit decisions on companies' operations, taking into account operational indicators and the assessment of enterprise value using the DCF and EVA models.

Why and How do Companies Exit the Russian Market

The decision for companies to exit a foreign market is influenced by various factors, as outlined in a paper by K.S. Ozkan [1]. These factors include:

1) **Conflict between Company Strategy and External Market Environment**: When a company's strategy is not aligned with the external conditions of the foreign market, it can result in competitive weaknesses and negative financial performance.
2) **High or Unpredictable Market Risks**: Companies may choose to exit a foreign market when the risks in that market are perceived as too high or unpredictable.
3) **Communication Difficulties and Cultural Differences**: Problems related to communication, cultural differences, or difficulties with local personnel can contribute to a decision to exit a foreign market.

Additional reasons for exiting a foreign market, identified in other studies [e.g., 2], encompass low profitability, misalignment between the corporate goals and capabilities and the market requirements, and insufficient experience in international operations.

Once a company decides to exit a foreign market, it has to choose among various exit strategies, which are determined by its specific goals and circumstances. Common exit strategies include company liquidation, selling to a local buyer, or facilitating management buyouts.

Influence of the Geopolitical Conflict in Ukraine

The geopolitical crisis involving Russia and Ukraine has brought about a heightened level of uncertainty and risk concerning political and economic consequences. Many foreign companies have encountered challenges related to sanctions, trade and investment restrictions, as well as the potential deterioration of the business climate.

Although this topic remains underexplored, papers dedicated to the withdrawal of foreign businesses from Russia have already appeared. For instance, according to data from Yale University [3], as of May 2023 over 1,000 major international companies had either withdrawn from Russia or were in the process of winding down their operations. Researchers from the university in their study [4] found that these departures accounted for approximately 40% of Russia's GDP.

Furthermore, a study by economists from the University of St. Gallen and IMD Business School in Switzerland [5] revealed that, by the end of November 2022, 8.5% of companies from the EU and G7 had sold at least one of their Russian subsidiaries. This figure is expected to increase as more companies that have announced their intention to exit the market proceed to do so.

However, foreign institutions were not the only ones interested in this topic. In October 2022, the Center for Strategic Research (CSR) in Russia published a report that examined 5,000 foreign companies [6]. As the CSR researchers noted, by the beginning of September 2022, 34% of the largest foreign companies operating in Russia had downscaled their activities in the country, 15% had ceased operations by transferring their businesses to new owners, and 7% had announced a complete exit. According to the research findings, among the companies that decided to sell their businesses in Russia, 33% had already completed the transfer to new owners, 34% were in the process of doing so, and 33% were actively seeking buyers (Figure 1).

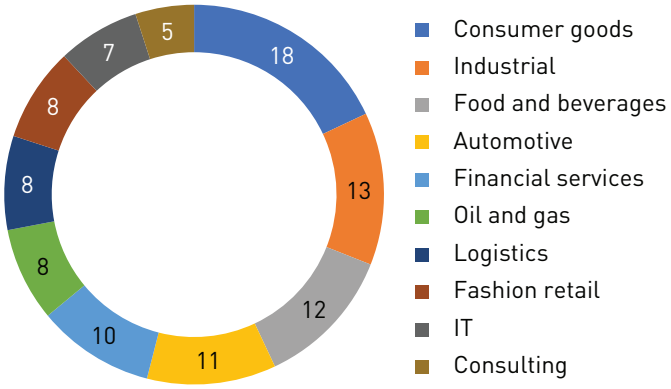
Analysis of Strategies Used by Foreign Companies Exiting Russia

To identify the strategies employed by foreign companies exiting the Russian market, we compiled a database consisting of 489 companies that had announced their intention to withdraw from Russia. Notably, the leading sectors in terms of exit activity were companies involved in consumer goods, food and beverages, as well as those in the industrial and automotive sectors.

These exiting foreign companies stem from 25 different countries, which include Germany, France, the USA, Italy, the Netherlands, Sweden, Finland, the United Kingdom, Denmark, Japan, Switzerland, Austria, Canada, Spain, Australia, China, Lithuania, Norway, Poland, Belgium, the Czech Republic, Ireland, Mexico, South Korea, and Taiwan.

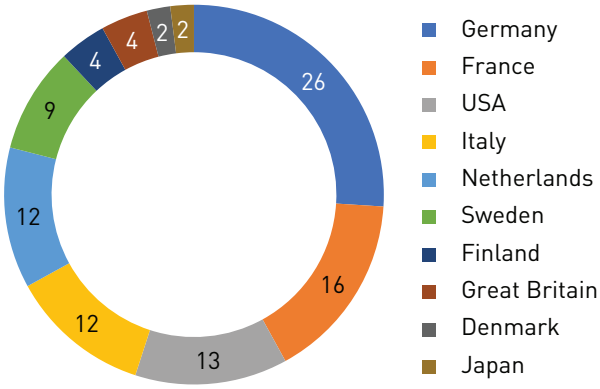
Figure 1. Analysis of Companies' Exit Strategies (%)

Structure of companies' exit by industries (top 10 industries)



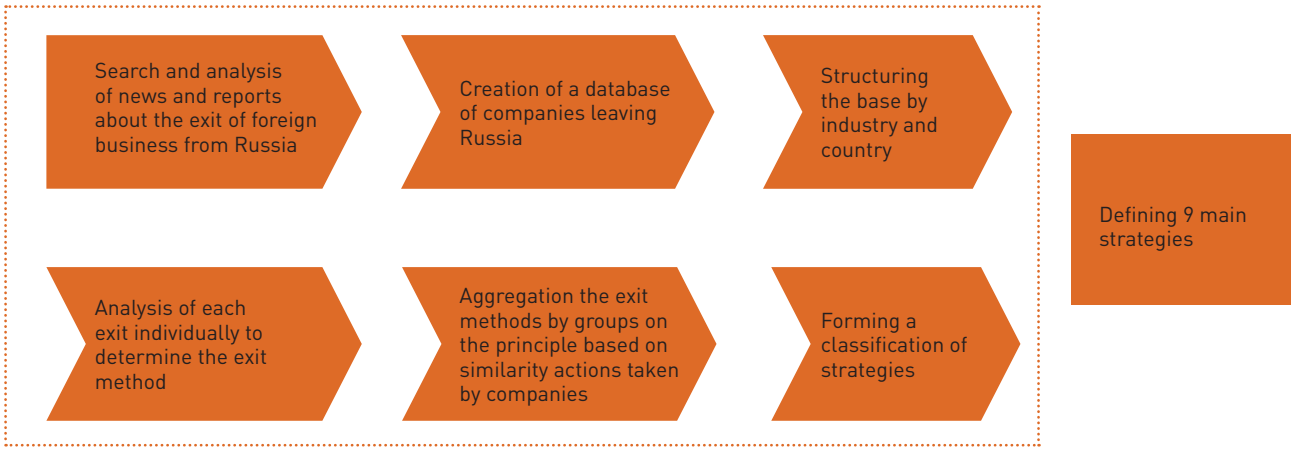
The leading industries in terms of foreign companies' exit are consumer goods, industrial, food & beverages and automotive

Structure of companies' exit by countries (top 10 countries)



The leading countries in terms of foreign companies' exit are Germany, France, USA, Italy

In total, our research identified nine primary exit strategies and developed a methodology for creating a map of them:



1) **Joint Venture (JV) Exit** (159 companies).
2) **Soft Closing** (128 companies) – This category encompasses companies that announced their intention to withdraw from the Russian market but did not take concrete steps toward exit. These companies essentially suspended their marketing and investment operations in their Russian representative offices while continuing their core business activities.
3) **Sale of a Legal Entity to a Local Buyer** (67 companies).
4) **Suspension of Operations in Russia with No Clear Further Steps Regarding Sale or Liquidation** (63 companies).
5) **Liquidation** (28 companies).
6) **Local Management Buyout** (24 companies).
7) **Sale of Shares to a Russian Partner** (11 companies).
8) **Carve-Out to a Local Legal Entity Operating in Russia** (4 companies).
9) **Sale of Russian Business to Another Foreign Company** (3 companies).

In the course of our research, we developed two maps depicting the relationships between exit strategies and industries and between exit strategies and the country of the company's incorporation.

Table 1. Map of Strategies: Correlation between Strategy and Country of Incorporation

Country	Carve-out to local legal entity	Suspend mode	JV exit	Liquidation	MBO	Sale to a local buyer	Sale to a foreign buyer	Sale of the share to the partner	Soft closing	Total
Germany	x	9	50	8	7	12	X	1	33	120
France	x	10	30	4	4	6	X	1	18	73
USA	x	11	7	1	3	11	2	4	20	59
Italy	x	12	25	x	x	4	X	x	13	54
Netherlands	1	9	26	8	1	3	X	1	4	53
Sweden	1	2	17	3	3	5	X	1	9	41
Great Britain	3	2	1	2	x	4	X	1	7	20
Finland	2	2	x	x	1	5	X	1	7	18
Denmark	x	1	x	x	1	3	X	x	5	10
Japan	x	2	x	x	x	1	X	x	4	7
Switzerland	x	1	1	x	1	2	X	x	1	6
Austria	x	x	1	2	x	x	X	x	2	5
Canada	x	1	x	x	1	1	X	x	x	3
Spain	x	x	x	x	1	1	X	x	1	3
Australia	x	x	x	x	x	2	X	x	x	2
China	x	x	x	x	x	1	X	x	1	2
Lithuania	x	x	x	x	x	1	X	x	1	2
Norway	x	x	x	x	1	x	X	x	1	2
Poland	x	x	x	x	x	1	1	x	x	2
Belgium	x	x	x	x	x	x	X	1	x	1
Czech Republic	1	x	x	x	x	x	X	x	x	1
Ireland	x	x	x	x	x	x	X	x	1	1
Mexico	x	1	x	x	x	x	X	x	x	1
South Korea	x	x	x	x	x	x	X	x	1	1
Taiwan	x	x	x	x	x	x	X	x	1	1
Total	8	63	159	28	24	63	3	11	130	489

Specific exit strategies exhibit distinctive patterns based on the country of the exiting company's origin. Notably, Germany, which leads in terms of exits from the Russian market, frequently employs strategies such as JV exit and soft closing. In contrast, companies from Great Britain tend to favor the sale of their legal entity to a local buyer, while the suspension of operations is characteristic of Italian and American companies. Liquidation as an exit strategy is equally common among German and Dutch businesses. Representative offices are most often sold to local companies by American and German businesses. Companies from the USA also tend to utilize strategies like selling to third-party foreign companies and transferring shares to local partners. Furthermore, the strategy of soft closing is not exclusive to German companies but is also adopted by French, American, and Italian firms.

Table 2. Map of Strategies: Correlation of Strategy and Industry

Industry	Carve-out to local legal entity	Suspend mode	JV exit	Liquidation	MBO	Sale to a local buyer	Sale to a foreign buyer	Sale of the share to the partner	Soft closing	Total
Consumer goods	1	5	22	4	4	9	1	1	14	61
Industry	1	7	22	2	2	5	x	x	7	46
Food and beverages	1	7	9	2	3	7	x	3	10	42
Automotive	x	5	15	x	2	6	x	1	10	39
Financial services	1	4	8	2	1	6	x	x	15	37
IT	x	1	13	4	x	2	x	x	9	29
O&G	x	1	12	2	2	4	x	x	8	29
Logistics	x	2	10	2	2	2	x	1	8	27
Fashion retail	x	9	1	1	1	x	1	x	11	24
Consulting	4	1	8	x	2	1	x	1	1	18
Pharmaceuticals	x	6	4	x	x	1	1	x	4	16
Chemical industry	x	1	3	2	x	2	x	x	7	15
Electronics	x	x	9	1	1	1	x	x	2	14
Manufacture	x	x	7	1	x	1	x	1	2	12
TMT	x	3	1	1	x	1	x	x	6	12
Construction	x	1	5	1	x	1	x	x	2	10
Agricultural	x	2	2	x	1	2	x	1	1	9
Construction materials	x	x	x	1	1	2	x	x	4	8
Retail	x	2	x	x	x	3	x	1	2	8
Hotels	x	2	x	x	x	x	x	x	4	6
M&M	x	x	2	x	x	2	x	x	1	5
Paper and package	x	x	x	x	2	3	x	x	x	5
Power generation	x	x	1	x	x	1	x	1	1	4
Real estate	x	x	2	1	x	x	x	x	1	4
Health care	x	2	x	x	x	1	x	x	x	3
Tourism	x	1	1	1	x	x	x	x	x	3
Ecology	x	x	1	x	x	x	x	x	x	1
Forestry	x	1	x	x	x	x	x	x	x	1
Grand total	8	63	158	28	24	63	3	11	130	489

The map of exit strategies reveals that the sale of a legal entity to a local buyer is more prevalent among consulting firms, while the suspension mode is more common in pharmaceutical and fashion retail companies. JV exits tend to be made by firms active in consumer goods, automotive, oil and gas, as well as oilfield services. Soft closing, on the other hand, is favored by companies in the consumer goods, fashion retail, and financial sectors. Liquidation and local management buyouts (MBO) are most frequently associated with consumer goods manufacturers. Additionally, companies producing consumer goods, food and beverages as well as financial institutions prefer selling to a local buyer.

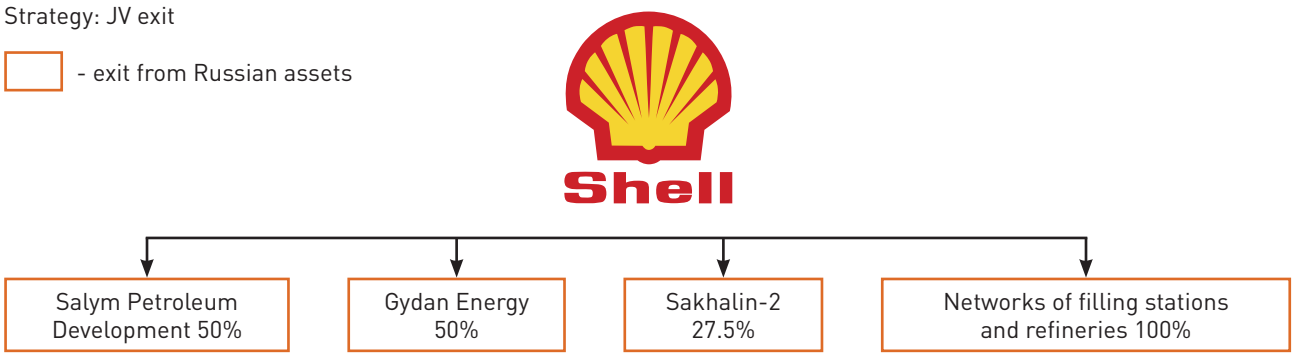
For our further research, we opted to focus on industries favoring the two most common strategies – JV exit and soft closing. We also aimed to explore an industry of significant importance to Russia's economy. Consequently, we chose the oil and gas sector, as the ambiguity surrounding the exit of certain oil and gas companies is a pertinent topic that warrants examination.

Within the oil and gas industry, we selected the two largest companies, *TotalEnergies* and *BP*, for the analysis of the soft closing strategy. To study the JV exit strategy, we chose the companies *Shell, Equinor*, and *ExxonMobil*.

Evaluating the Influence of the Exit of Oil and Gas Companies on Their Business

Shell

Figure 2. Structure of Assets in the Russian Federation and Strategy for Exiting the Russian Market



Following its withdrawal from the Russian Federation, Shell reported a loss of $3.9 billion. In addition to divesting its Russian assets in early March 2023, Shell announced its intention to refrain from purchasing Russian oil in the spot market and extending fixed-term contracts. At the same time, the company emphasized that it still holds long-term contracts for LNG purchases.

The Anglo-Dutch oil giant made the strategic decision to completely sever its business ties with Russia by employing the strategies of JV exit and asset sales to local entities.

Evaluating the Influence of Shell's Exit from the Russian Market on the Enterprise Value: DCF and EVA Models

To assess the impact of the chosen strategy, we constructed DCF and EVA models for Shell and other companies under two scenarios. In the first scenario, the results obtained consider enterprise value (EV) while including revenue from the Russian business. In the second scenario, EV is calculated without factoring in this revenue.

The discounted cash flow model (DCF) is employed for evaluating the company based on the present value principle. Using this model, we made forecasts of corporate cash flows for various business areas, taking into account financial statements, our own market analysis, and reports from investment banks. Future cash flows were then discounted using the calculated discount rate, which considers risks and the cost of equity.

The enterprise value can be calculated using the discounted cash flow method with the following formula:

$$DCF = \frac{CF_1}{(1+r)^2} + \frac{CF_2}{(1+r)^2} + \ldots + \frac{CF_n}{(1+r)^n}, \quad (1)$$

where *DCF* is the discounted cash flow, CF_1, CF_2, CF_n are the cash flows for specific periods, and r is the discount rate.

We also used the economic value added (EVA) method as an alternative approach to assessing enterprise value. This method is based on the notion that enterprise value is determined by the company's ability to generate economic profit that surpasses the cost of invested capital. To calculate EVA, it is necessary to determine the net operating profit adjusted for the cost of invested capital.

The formula for calculating economic value added is as follows:

$$EVA = NOPAT - (Capital\ Invested * WACC), \quad (2)$$

where *NOPAT* is the net operating profit after taxes, *Capital Invested* is the invested capital, and *WACC* is the weighted average cost of capital.

Revenue forecasts were calculated by breaking down the company's activities into areas, including exploration and production, gas and energy, oil products, and chemicals. Growth rates were determined based on market analysis and reports from investment banks. The estimated share of Shell's Russian business (including ownership stakes of 50% in Salym Petroleum Development LLC, 50% in Gydan Energy LLC, 27.5 % in Sakhalin-2, 100% in filling stations and oil refineries networks) accounts for approximately 5% of corporate operating profit.

Average historical turnover indicators were used to calculate working capital, while capital expenditures were assessed based on corporate operating segments (exploration and production, gas and energy, oil products, and chemicals) at historical average levels.

For calculating Shell's weighted average cost of capital (WACC), we used the yield to maturity of 10-year US Treasury bonds, country risk factors, industry average beta, capital structure data from A. Damodaran, and the yield of the company's 10-year bonds (see Table 3).

Table 3. Calculation of the Weighted Average Capital Cost of Shell

Indicator	Value	Source
Risk-Free Rate	3.40%	10-Y US Treasury
Unlevered Beta	0.90	Damodaran
D/E	11.50%	Damodaran
Tax Rate	25%	Marginal Tax Rate
Levered Beta	0.98	Calculations
ERP	5.94%	Damodaran
Cost of Equity	9.21%	**Calculations**
Pre-tax Cost of Debt	4.55%	10-Y Corp Bond
After-tax Cost of Debt	3.41%	**Calculations**
We	89.68%	Calculations
Wd	10.32%	Calculations
WACC	8.61%	Calculations

The results of calculating enterprise value using two models for the scenario in which the company maintains its business in Russia are presented in Table 4.

Table 4. DCF and EVA Models for Shell Before Exiting the Russian Market

DCF approach, USD mn	2022	2023E	2024E	2025E	2026E	2027E
	0	0.5	1.5	2.5	3.5	4.5
EBIT (excl. Russia)	42,674	36,455	33,635	34,109	34,783	35,582
EBIT Russia (retail & factory)	2,246	1,919	1,770	1,795	1,831	1,873
As % of Total EBIT	5.0%					
Total EBIT	44,920	38,373	35,406	35,904	36,614	37,454
Tax rate	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
NOPAT	33,690	28,780	26,554	26,928	27,460	28,091
D&A	21,019	20,825	21,050	21,629	22,199	22,750
Change in NWC	8,913	(1,227)	(1,898)	-	-	-
Capex	(22,600)	(26,106)	(29,614)	(31,623)	(33,133)	(34,146)
FCFF	41,022	22,272	16,093	16,935	16,526	16,694
WACC	8.6%					
Discount factor by year	1.00	0.96	0.88	0.81	0.75	0.69
DCF	X	21,371	14,218	13,776	12,378	11,512
NPV, USD bn	73					
Terminal Value, USD bn	178					
TGR	2%					
EV, USD bn	250.9					
EVA approach, USD mn	**2022**	**2023E**	**2024E**	**2025E**	**2026E**	**2027E**
	0	0.5	1.5	2.5	3.5	4.5
NOPAT	33,690	28,780	26,554	26,928	27,460	28,091
Capital Invested	239,141	279,354	284,925	297,184	309,655	322,424
Total IC	239,141	279,354	284,925	297,184	309,655	322,424

EVA approach, USD mn	2022	2023E	2024E	2025E	2026E	2027E
EVA	X	**4,729**	**2,024**	**1,342**	**801**	**332**
	236,145	239,108	244,679	253,573	263,403	273,688
WACC	8.6%					
Discount factor by year	1.00	0.96	0.88	0.81	0.75	0.69
Discounted EVA	X	4,538	1,788	1,092	600	229
NPV,USD bn	8					
Terminal Value, USD bn	4					
Invested capital, USD bn	239					
TGR	2%					
EV, USD bn	250.9					

The data in Table 4 shows that Shell's value for the first scenario amounts to $250.9 billion. We then calculated the enterprise value for the second scenario (Table 5).

Table 5. DCF and EVA Models for Shell After Exiting the Russian Market

DCF approach, USD mn	2022	2023E	2024E	2025E	2026E	2027E
	0	0.5	1.5	2.5	3.5	4.5
EBIT (excl. Russia)	42,674	36,455	33,635	34,109	34,783	35,582
Gain / loss from exit	176					
Total EBIT	42,850	36,455	33,635	34,109	34,783	35,582
Tax rate	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
NOPAT	32,138	27,341	25,226	25,582	26,087	26,686
D&A	21,019	20,825	21,050	21,629	22,199	22,750
Change in NWC	8,913	(1,227)	(1,898)	-	-	-
Capex	(22,600)	(26,106)	(29,614)	(31,623)	(33,133)	(34,146)
FCFF	39,470	20,833	14,765	15,588	15,153	15,290
WACC	8.6%					
Discount factor by year	1.00	0.96	0.88	0.81	0.75	0.69
DCF	x	19,990	13,045	12,680	11,349	10,544
NPV, USD bn	68					
Terminal Value, USD bn	163					
TGR	2%					
EV, USD bn	230.3					
EVA approach, USD mn	**2022**	**2023E**	**2024E**	**2025E**	**2026E**	**2027E**
	0	0.5	1.5	2.5	3.5	4.5
NOPAT	32,138	27,341	25,226	25,582	26,087	26,686
Capital Invested	239,141	279,354	284,925	297,184	309,655	322,424
Total IC	239,141	279,354	284,925	297,184	309,655	322,424
EVA	x	3,290	696	(4)	(572)	(1,073)

EVA approach, USD mn	2022	2023E	2024E	2025E	2026E	2027E
WACC	8.6%					
Discount factor by year	1.00	0.96	0.88	0.81	0.75	0,69
Discounted EVA	x	3,157	615	(3)	(429)	(740)
NPV, USD bn	3					
Terminal Value, USD bn	(11)					
Invested capital, USD bn	239					
TGR	2%					
EV, USD bn	230.3					

The obtained results indicate that the enterprise value decreased after exiting the Russian market by $20.6 billion, dropping from $250.9 billion to $230.3 billion.

Evaluating the Influence of Shell's Exit from the Russian Market on Operational and Other Indicators

1) Reserves

As of the end of 2021, Shell's proven and probable oil reserves totaled 9.4 billion barrels of oil equivalent (BOE). These reserves decreased by approximately 2 billion BOE, which accounts for about 21% of the company's total reserve volume.

2) Extraction Volume

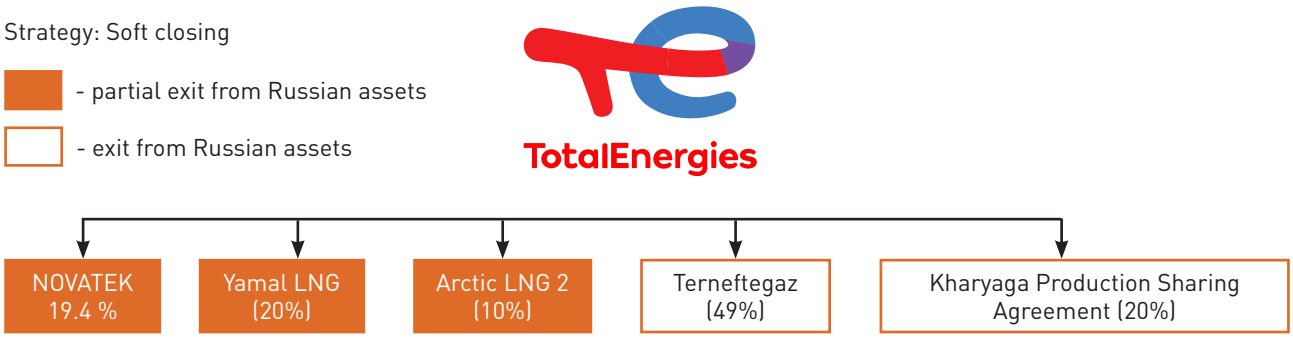
In 2021, Shell's oil output amounted to 344 million BOE, with about 4 million BOE produced in the Russian Federation. **As a result, the losses in oil production were relatively low, approximately 1%.**

3) Premium Asian Market

Since the majority of the gas produced by the Sakhalin-2 project is directed to the Asian market, primarily to Japan, Shell has experienced a 23% reduction in its LNG supplies to the Asian market. However, considering the geographical proximity of Sakhalin Island to the main LNG market in Japan, the logistic costs for transportation from Sakhalin to Japan are approximately four times lower than from Qatar and more than two times lower than from Malaysia and Brunei, where Shell has substantial gas assets.

TotalEnergies

Figure 3. Structure of Assets in the Russian Federation and Strategy for Exiting the Russian Market



Following its withdrawal from a portion of Russian assets, TotalEnergies reported a loss of $4 billion. The company also announced that it had ceased investments in the Russian Federation, halted purchases of Russian oil and LNG in the spot market, but continued to procure LNG under long-term contracts with Yamal LNG. TotalEnergies still maintains shares in Russian assets, from which the company continues to receive dividends. In 2022, these dividends amounted to 60 billion RUB.

TotalEnergies adopted the soft closing strategy, as it retained ownership of its key assets, including PAO Novatek, Yamal LNG, and Arctic LNG 2. The company only exited from less significant assets.

Evaluating the Influence of TotalEnergies' Exit from the Russian Market on the Enterprise Value: DCF and EVA Models

To assess the impact of TotalEnergies' exit from Russian assets, such as CJSC Terneftegaz and the Kharyaga Production Sharing Agreement, on the enterprise value, DCF and EVA models were employed. A revenue forecast was calculated, considering the geographical position and breaking down by the company's business areas, which include exploration and production, refining and chemicals, and integrated gas. The growth rates were determined based on market analysis and investment banks' reports. The share of the Russian business (CJSC Terneftegaz and the Kharyaga Production Sharing Agreement) constitutes approximately 0.3% of TotalEnergies' operating profit, accounting for its share in these projects (49% and 20%, respectively).

The calculated results for the weighted average capital cost (WACC) for TotalEnergies are provided in Table 6.

Table 6. Calculation of the Weighted Average Capital Cost for TotalEnergies

Indicator	Value	Source
Risk-Free Rate	3.40%	10-Y US Treasury
Unlevered Beta	0.90	Damodaran
D/E	11.50%	Damodaran
Tax Rate	33%	Marginal Tax Rate
Levered Beta	0.97	Calculations
ERP	5.94%	Damodaran
Cost of Equity	9.16%	Calculations
Pre-tax Cost of Debt	4.90%	10-Y Corp Bond
After-tax Cost of Debt	3.28%	Calculations
We	89.68%	Calculations
Wd	10.32%	Calculations
WACC	8.55%	Calculations

Now, let us analyze the results of evaluating the enterprise value for the first scenario, as shown in Table 7.

Table 7. DCF and EVA Models for TotalEnergies Before Exiting the Russian Market

DCF approach, USD mn	2022	2023E	2024E	2025E	2026E	2027E
	0	0.5	1.5	2.5	3.5	4.5
EBIT (excl. Russia)	50,522	32,944	31,024	32,692	32,740	33,252
EBIT Russia (Russia)	166	108	102	108	108	109
As % of Total EBIT (average)	0.33%					
Total EBIT	50,688	33,052	31,127	32,799	32,848	33,361
Tax rate	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%
NOPAT	33,961	22,145	20,855	21,975	22,008	22,352
D&A	12,316	12,175	12,121	12,130	12,128	12,131
Change in NWC	7,620	(1,026)	-	-	-	-
Capex	(9,773)	(11,589)	(13,008)	(13,405)	(13,330)	(13,588)
FCFF	44,124	21,706	19,967	20,701	20,806	20,896
WACC	8.6%					
Discount factor by year	1.00	0.96	0,88	0,81	0.75	0.69
DCF	x	20,833	17,655	16,862	15,612	14,444
NPV, USD bn	85					
Terminal Value, USD bn	225					
TGR	2%					
EV, USD bn	310.3					1.08
EVA approach, USD mn	**2022**	**2023E**	**2024E**	**2025E**	**2026E**	**2027E**
	0	0.5	1.5	2.5	3.5	4.5
NOPAT	33,961	22,145	20,855	21,975	22,008	22,352
Capital Invested	242,824	183,347	190,874	198,222	204,259	210,592
Total IC	242,824	183,347	190,874	198,222	204,259	210,592
EVA	x	6,465	4,531	5,024	4,540	4,343
	236,145	239,108	244,679	253,573	263,403	273,688

EVA approach, USD mn	2022	2023E	2024E	2025E	2026E	2027E
WACC	8.6%					
Discount factor by year	1.00	0.96	0.88	0.81	0.75	0.69
Discounted EVA	x	6,205	4,007	4,092	3,407	3,002
NPV, USD bn	21					
Terminal Value, USD bn	47					
Invested capital, USD bn	243					
TGR	2%					
EV, USD bn	310.3					

Table 7 indicates that TotalEnergies' enterprise value for the first scenario is $310.3 billion.

Now, let us calculate the enterprise value of TotalEnergies for the scenario in which it exits CJSC Terneftegaz and the Kharyaga Production Sharing Agreement, as shown in Table 8.

Table 8. DCF and EVA Models for TotalEnergies After Exiting the Russian Market

DCF approach, USD mn	2022	2023E	2024E	2025E	2026E	2027E
	0	0.5	1.5	2.5	3.5	4.5
EBIT (excl. Russia)	50,522	32,944	31,024	32,692	32,740	33,252
Gain / loss from exit	45					
Total EBIT	50,567	32,944	31,024	32,692	32,740	33,252
Tax rate	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%
NOPAT	33,880	22,072	20,786	21,903	21,936	22,279
D&A	12,316	12,175	12,121	12,130	12,128	12,131
Change in NWC	7,620	(1,026)	-	-	-	-
Capex	(9,773)	(11,589)	(13,008)	(13,405)	(13,330)	(13,588)
FCFF	44,043	21,633	19,899	20,629	20,734	20,823
WACC	8.6%					
Discount factor by year	1.00	0.96	0.88	0.81	0.75	0.69
DCF	x	20,764	17,594	16,803	15,558	14,393
NPV, USD bn	85					
Terminal Value, USD bn	224					
TGR	2%					
EV, USD bn	309.2					
EVA approach, USD mn	**2022**	**2023E**	**2024E**	**2025E**	**2026E**	**2027E**
	0	0.5	1.5	2.5	3.5	4.5
NOPAT	33,880	22,072	20,786	21,903	21,936	22,279
Capital Invested	242,824	183,347	190,874	198,222	204,259	210,592
Total IC	242,824	183,347	190,874	198,222	204,259	210,592
EVA	x	6,393	4,463	4,952	4,468	4,269
WACC	8.6%					
Discount factor by year	1.00	0.96	0.88	0.81	0.75	0.69
Discounted EVA	x	6,136	3,946	4,033	3,352	2,951

EVA approach, USD mn	2022	2023E	2024E	2025E	2026E	2027E
NPV, USD bn	20					
Terminal Value, USD bn	46					
Invested capital, USD bn	243					
TGR	2%					
EV, USD bn	309.2					

The results show that TotalEnergies' enterprise value decreased by $1.08 billion after its exit from two Russian projects, falling from $310.3 billion to $309.2 billion. This relatively small loss in value is primarily attributed to the limited contribution of the Russian assets to the company's overall revenue structure.

Evaluating the Influence of TotalEnergies' Exit from the Russian Market on Its Operational and Other Indicators

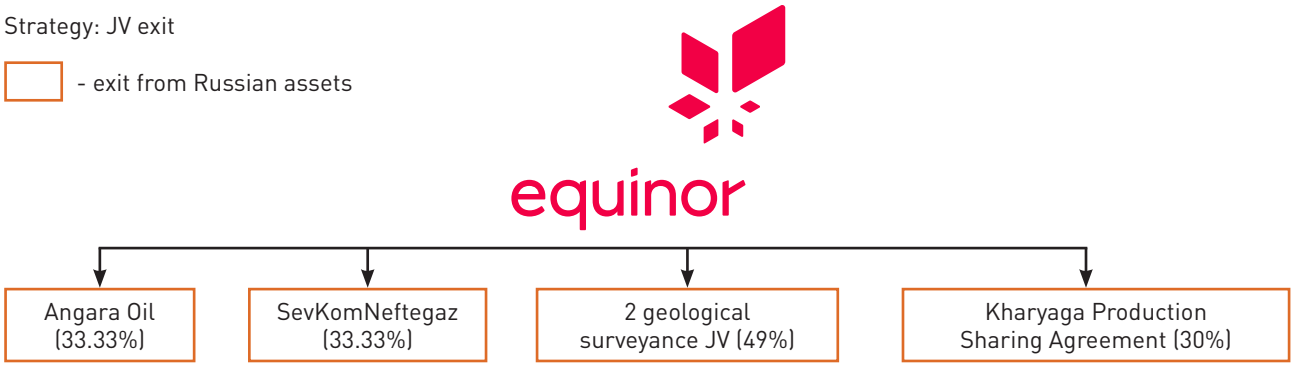
1) **Reserves**: As of the end of 2021, TotalEnergies' total reserves were approximately 12 billion barrels of oil equivalent (BOE). The reserves associated with its Russian assets, specifically CJSC Terneftegaz and the Kharyaga Production Sharing Agreement, accounted for about 0.5 billion BOE, representing roughly 4% of TotalEnergies' proven reserves.

2) **Extraction Volume**: In 2021, TotalEnergies' total extraction volume was around 193 million BOE. The extraction volume attributable to the Russian assets from which the company withdrew in the same year, in proportion to its participation share, was about 14 million BOE, equivalent to approximately 7% of the company's overall extraction volume.

3) **Logistic Costs**: TotalEnergies procured a significant portion of its oil from Russia, which was transported to the Leuna oil refinery in East Germany at a rate of 240-250 barrels per day through the Druzhba pipeline owned by PJSC Transneft. It is expected that TotalEnergies will replace the Russian oil with oil from the Middle East. However, it is worth noting that the transportation of oil through the Druzhba pipeline incurred lower costs than sea transport from the Middle East.

Equinor

Figure 4. Structure of Assets in the Russian Federation and Strategy for Exiting the Russian Market



The Norwegian company Equinor took the initiative to exit the Russian market by transferring its Russian assets to PJSC Rosneft for a nominal amount of 1 Euro. This strategic move allowed Equinor to free itself from obligations to invest $1 billion as stipulated in their agreements. In 2022, Equinor became the first oil and gas company to completely withdraw from Russia.

In this exit, Equinor followed the joint venture (JV) exit strategy. While the specific recipient of Equinor's shares in the Kharyaga Production Sharing Agreement was not disclosed, it is likely to be the project's operator, JSC Zarubezhneft.

Evaluating the Influence of Equinor's Exit from the Russian Market on the Enterprise Value

To evaluate the impact of Equinor's exit from its Russian assets, such as Angara Oil LLC, SevComNeftegaz LLC, and two geological surveyance joint ventures, we employed the discounted cash flow (DCF) and economic value added (EVA) models. These models allowed us to forecast revenues, considering the geographical location and breaking down for Equinor's business areas, which include exploration, production, refining, and liquefied natural gas (LNG) production. The growth rates were determined based on market analysis and data from investment banks.

In 2021, the revenue generated from Equinor's Russian business represented approximately 0.3% of the company's operating profit, taking into account Equinor's varying share percentages in these projects (33.3%, 33.3%, 49%, and 30%, respectively).

We calculated the weighted average capital cost for Equinor as shown in Table 9.

Table 9. Calculation of the Weighted Average Capital Cost for Equinor

Indicator	Value	Source
Risk-Free Rate	3.40%	10-Y US Treasury
Unlevered Beta	0.90	Damodaran
D/E	11.50%	Damodaran
Tax Rate	33%	Marginal Tax Rate
Levered Beta	0.97	Calculations
ERP	5.94%	Damodaran
Cost of Equity	9.16%	Calculations
Pre-tax Cost of Debt	4.60%	10-Y Corp Bond
After-tax Cost of Debt	3.08%	Calculations
We	89.68%	Calculations
Wd	10.32%	Calculations
WACC	8.53%	Calculations

Table 10 displays the enterprise value of Equinor for the first scenario.

Table 10. DCF and EVA Models for Equinor Before Exiting the Russian Market

DCF approach, USD mn	2022	2023E	2024E	2025E	2026E	2027E
	0	0.5	1.5	2.5	3.5	4.5
EBIT (excl. Russia)	74,941	47,397	47,793	41,743	37,971	37,044
EBIT Russia	205	130	131	114	104	101
As % of Total EBIT (average)	0.27%					
Total EBIT	75,146	47,526	47,924	41,857	38,075	37,146
Tax rate	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
NOPAT	22,544	14,258	14,377	12,557	11,423	11,144
D&A	8,879	9,061	9,132	9,269	9,250	9,212
Change in NWC	692	405	-	-	-	-
Capex	(7,772)	(9,998)	(11,800)	(12,284)	(12,164)	(12,007)
FCFF	24,343	13,726	11,710	9,542	8,509	8,348
WACC	8.5%					
Discount factor by year	1.00	0.96	0.88	0.81	0.75	0.69
DCF	x	13,176	10,356	7,776	6,389	5,775
NPV, USD bn	43					
Terminal Value, USD bn	90					
TGR	2%					
EV, USD bn	133.7					0,47
EVA approach, USD mn	**2022**	**2023E**	**2024E**	**2025E**	**2026E**	**2027E**
	0	0.5	1.5	2.5	3.5	4.5
NOPAT	22,544	14.258	14,377	12,557	11,423	11,144
Capital Invested	79,156	83,344	86,546	90,082	92,633	95,053

EVA approach, USD mn	2022	2023E	2024E	2025E	2026E	2027E
Total IC	79,156	83,344	86,546	90,082	92,633	95,053
EVA	x	7,148	6,994	4,872	3,520	3,035
	236,145	239,108	244,679	253,573	263,403	273,688
WACC	8.5%					
Discount factor by year	1.00	0.96	0.88	0.81	0.75	0.69
Discounted EVA	x	6,861	6,186	3,970	2,643	2,099
NPV, USD bn	22					
Terminal Value, USD bn	33					
Invested capital, USD bn	79					
TGR	2%					
EV, USD bn	133.7					

Table 10 illustrates that TotalEnergies' value for the first scenario is $133.7 billion. Next, we calculated its enterprise value for the second scenario, as presented in Table 11.

Table 11. DCF and EVA Models for Equinor After Exiting the Russian Market

DCF approach, USD mn	2022	2023E	2024E	2025E	2026E	2027E
	0	0.5	1.5	2.5	3.5	4.5
EBIT (excl. Russia)	74,941	47,397	47,793	41,743	37,971	37,044
Total EBIT	74,941	47,397	47,793	41,743	37,971	37,044
Tax rate	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
NOPAT	22,482	14,219	14,338	12,523	11,391	11,113
D&A	8,879	9,061	9,132	9,269	9,250	9,212
Change in NWC	692	405	-	-	-	-
Capex	(7,772)	(9,998)	(11,800)	(12,284)	(12,164)	(12,007)
FCFF	24,282	13,687	11,670	9,507	8,478	8,318
WACC	8.5%					
Discount factor by year	1.00	0.96	0.88	0.81	0.75	0.69
DCF	x	13,138	10,322	7,748	6,366	5,754
NPV, USD bn	43					
Terminal Value, USD bn	90					
TGR	2%					
EV, USD bn	133.2					
EVA approach, USD mn	**2022**	**2023E**	**2024E**	**2025E**	**2026E**	**2027E**
	0	0.5	1.5	2.5	3.5	4.5
NOPAT	22,482	14,219	14,338	12,523	11,391	11,113
Capital Invested	79,156	83,344	86,546	90,082	92,633	95,053

EVA approach, USD mn	2022	2023E	2024E	2025E	2026E	2027E
Total IC	79,156	83,344	86,546	90,082	92,633	95,053
EVA	x	7,109	6,955	4,838	3,489	3,004
WACC	8.5%					
Discount factor by year	1.00	0.96	0.88	0.81	0.75	0.69
Discounted EVA	x	6,824	6,151	3,943	2,620	2,078
NPV, USD bn	22					
Terminal Value, USD bn	32					
Invested capital, USD bn	79					
TGR	2%					
EV, USD bn	133.2					

The results obtained from evaluating the enterprise value for the scenarios of exiting and continuing business in Russia indicate that **the enterprise value decreased by $0.47 billion after exiting four Russian projects, resulting in a total value of $133.2 billion**. This minor decline in value is attributed to the relatively small share of Russian assets within the company's overall revenue structure.

Evaluating the Influence of Equinor's Exit from the Russian Market on Operational and Other Indicators

1) **Reserves:** At the end of 2021, Equinor's proven reserves totaled approximately 5.4 billion barrels of oil equivalent (BOE). The Russian assets of the Norwegian company jointly accounted for roughly 90 billion BOE. Therefore, the decrease in the reserve volume amounted to about 1.7% of the total volume of proven reserves.

2) **Extraction Volume:** In 2021, Equinor produced approximately 760 billion BOE. The Russian assets accounted for about 1% of the total extraction volume of the company. **Thus, Equinor's exit from the Russian market should not have a significant impact on its financial performance due to the small reserves and extraction volumes in the Russian Federation.**

ExxonMobil

Figure 5. Structure of Assets in the Russian Federation and Strategy for Exiting from the Russian Market

ExxonMobil opted for the JV exit strategy and publicly announced its complete withdrawal from Russia, revealing a loss of $2.3 billion.

Evaluating the Influence of ExxonMobil's Exit from the Russian Market on the Enterprise Value: DCF and EVA Models

To assess the impact on the enterprise value resulting from the decision to exit the Russian project Sakhalin-1, we began by using the DCF and EVA models to calculate a revenue forecast. This forecast considered the geographical location and breakdown by the company's business areas, including oil and gas production, refining and sales, and the chemical industry. Growth rates were determined based on the market analysis conducted by the research team and reports from investment banks. The revenues generated from Russian business (Sakhalin-1) account for approximately 2.9% of the operating profit for the group of companies, taking into account ExxonMobil's 30% share in the project.

Table 12 presents the calculation of the weighted average capital cost for ExxonMobil.

Table 12. Calculation of the Weighted Average Capital Cost for ExxonMobil

Indicator	Value	Source
Risk-Free Rate	3.40%	10-Y US Treasury
Unlevered Beta	0.90	Damodaran

Indicator	Value	Source
D/E	11.50%	Damodaran
Tax Rate	33%	Marginal Tax Rate
Levered Beta	0.97	Calculations
ERP	5.94%	Damodaran
Cost of Equity	9.16%	Calculations
Pre-tax Cost of Debt	4.10%	10-Y Corp Bond
After-tax Cost of Debt	2.75%	Calculations
We	89.68%	Calculations
Wd	10.32%	Calculations
WACC	8.50%	Calculations

Now, let us examine the results of assessing the enterprise value for the first scenario, as presented in Table 13.

Table 13. DCF and EVA Models for ExxonMobil Before Exiting the Russian Market

DCF approach, USD mn	2022	2023E	2024E	2025E	2026E	2027E
	0	0.5	1.5	2.5	3.5	4.5
EBIT (excl. Russia)	91,230	60,471	57,451	57,863	57,154	57,725
EBIT Russia	2,594	1,719	1,634	1,645	1,625	1,641
As % of Total EBIT (average)	2.8%					
Total EBIT	93,824	62,190	59,084	59,508	58,779	59,367
Tax rate	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%
NOPAT	67,553	44,777	42,541	42,846	42,321	42,744
D&A	23,740	20,324	21,127	21,966	22,653	22,880
Change in NWC	(194)	(196)	(198)	(200)	(202)	(204)
Capex	(22,472)	(21,136)	(21,460)	(21,470)	(21,470)	(21,685)
FCFF	68,628	43,769	42,009	43,143	43,302	43,735
WACC	8.5%					
Discount factor by year	1.00	0.96	0.88	0.82	0.75	0.69
DCF	x	42,020	37,173	35,186	32,550	30,301
NPV, USD bn	177.2					
Terminal Value, USD bn	475.7					
TGR	2%					
EV, USD bn	653.0					
EVA approach, USD mn	**2022**	**2023E**	**2024E**	**2025E**	**2026E**	**2027E**
	0	0.5	1.5	2.5	3.5	4.5
NOPAT	67,553	44,777	42,541	42,846	42,321	42,744
Capital Invested	318,445	242,247	240,713	240,347	239,299	241,692

EVA approach, USD mn	2022	2023E	2024E	2025E	2026E	2027E
Total IC	318,445	242,247	240,713	240,347	239,299	241,692
EVA	x	24,194	22,088	22,425	21,988	22,208
	236,145	239,108	244,679	253,573	263,403	273,688
WACC	8.5%					
Discount factor by year	1.00	0.96	0.88	0.82	0.75	0.69
Discounted EVA	x	23,228	19,545	18,289	16,529	15,387
NPV, USD bn	93.0					
Terminal Value, USD bn	241.6					
Invested capital, USD bn	318.4					
TGR	2%					
EV, USD bn	653.0					

Table 13 indicates that ExxonMobil's value for the first scenario is $653 billion. Next, we calculated the enterprise value for the second scenario, as shown in Table 14.

Table 14. DCF and EVA Models for ExxonMobil After Exiting the Russian Market

DCF approach, USD mn	2022	2023E	2024E	2025E	2026E	2027E
	0	0.5	1.5	2.5	3.5	4.5
EBIT (excl. Russia)	91,230	60,471	57,451	57,863	57,154	57,725
Total EBIT	91,230	60,471	57,451	57,863	57,154	57,725
Tax rate	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%
NOPAT	65,685	43,539	41,364	41,661	41,151	41,562
D&A	23,740	20,324	21,127	21,966	22,653	22,880
Change in NWC	(194)	(196)	(198)	(200)	(202)	(204)
Capex	(22,472)	(21,136)	(21,460)	(21,470)	(21,470)	(21,685)
FCFF	66,760	42,531	40,833	41,958	42,132	42,553
WACC	8.5%					
Discount factor by year	1.00	0.96	0.88	0.82	0.75	0.69
DCF	x	40,831	36,132	34,220	31,670	29,482
NPV, USD bn	172.3					
Terminal Value, USD bn	462.9					
TGR	2%					
EV, USD bn	635.2					
EVA approach, USD mn	**2022**	**2023E**	**2024E**	**2025E**	**2026E**	**2027E**
	0	0.5	1.5	2.5	3.5	4.5
NOPAT	65,685	43,539	41,364	41,661	41,151	41,562
Capital Invested	318,445	242,247	240,713	240,347	239,299	241,692
Total IC	318,445	242,247	240,713	240,347	239,299	241,692
EVA	x	22,956	20,912	21,240	20,818	21,026
WACC	8.5%					
Discount factor by year	1.00	0.96	0.88	0.82	0.75	0.69
Discounted EVA	x	22,039	18,504	17,323	15,649	14,568
NPV, USD bn	88.1					
Terminal Value, USD bn	228.7					
Invested capital, USD bn	318.4					

EVA approach, USD mn	2022	2023E	2024E	2025E	2026E	2027E
TGR	2%					
EV, USD bn	635.2					

The data in Table 14 reveals that **ExxonMobil's enterprise value decreased by $17.75 billion after exiting the Russian market, specifically the Sakhalin-1 project, falling from $653.0 billion to $635.2 billion.**

Evaluating the Influence of ExxonMobil's Exit from the Russian Market on Operational and other Indicators

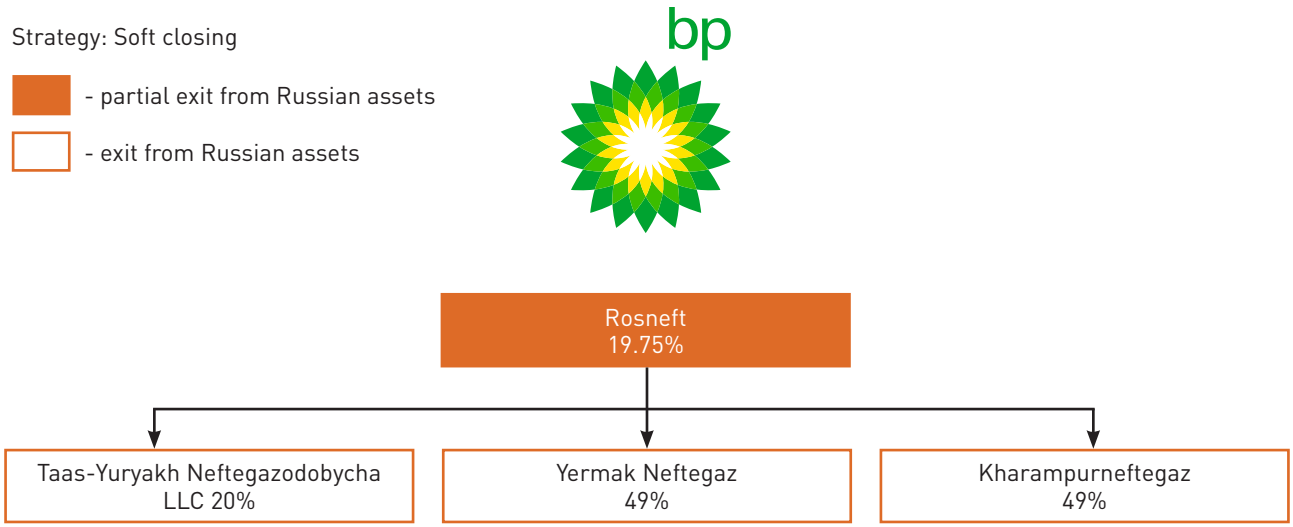
1) **Reserves:** As of the beginning of 2022, ExxonMobil's proven reserves totaled approximately $18.6 billion barrels of oil equivalent (BOE). The reserves associated with the Sakhalin-1 project, considering the company's ownership share, amounted to approximately 1.7 billion BOE, representing about 9% of the company's total proven reserves.

2) **Extraction Volume:** In 2021, ExxonMobil had a daily production rate of 4 million barrels of oil equivalent, which translates to an annual output of 1.5 billion BOE. The reduction in production resulting from the company's withdrawal from the Sakhalin-1 project amounted to 40,000 BOE per day, roughly 1% of the company's total production.

According to the Russian government, ExxonMobil discontinued the operations of the Sakhalin-1 project by decreasing the daily extraction volume from 220,000 to 10,000 barrels of oil equivalent. The estimated losses incurred by the Russian Federation due to this reduction amounted to RUB 20 billion. Therefore, this loss could potentially be subtracted from the final compensation to be received by the American company for its share in the project.

BP

Figure 6. Structure of Assets in the Russian Federation and Strategy for Exiting from the Russian Market



BP chose a soft closing strategy and, as a consequence of its exit from Russia, incurred losses of $24.4 billion [27], which have been documented in its first-quarter 2022 company performance report. Additionally, the company continues to receive dividends from its Russian assets [28-29], although it does not include them in its financial statements.

Evaluating the Influence of BP's Exit from the Russian Market on the Enterprise Value: DCF and EVA Models

To evaluate the impact of BP's decision to exit Rosneft and its associated projects on the company's value, we began by using the DCF and EVA models. This entailed generating a revenue forecast, factoring in geographical considerations, and breaking down the forecast across BP's various business sectors. These sectors encompassed oil and gas production, low-carbon energy, filling stations, and a joint venture with Rosneft. The growth rates were established through market analysis and input from investment banks. The revenue from BP's Russian operations constituted approximately 9.9% of its overall operating profit, considering BP's shares in Rosneft projects (20%, 49%, and 49%, respectively). Table 15 details the calculation of BP's weighted average capital cost.

Table 15. Calculation of the Weighted Average Capital Cost for BP

Indicator	Value	Source
Risk-Free Rate	3.40%	10-Y US Treasury
Unlevered Beta	0.90	Damodaran
D/E	11.50%	Damodaran
Tax Rate	33%	Marginal Tax Rate
Levered Beta	0.97	Calculations
ERP	5.94%	Damodaran
Cost of Equity	9.16%	Calculations
Pre-tax Cost of Debt	4.70%	10-Y Corp Bond
After-tax Cost of Debt	3.15%	Calculations
We	89.68%	Calculations
Wd	10.32%	Calculations
WACC	8.54%	Calculations

Now, let us analyze the results obtained from evaluating the enterprise value for the first scenario, as presented in Table 16.

Table 16. DCF and EVA Models for BP Before Exiting the Russian Market

DCF approach, USD mn	2022	2023E	2024E	2025E	2026E	2027E
	0	0.5	1.5	2.5	3.5	4.5
EBIT (excl. Russia)	47,076	40,410	38,489	38,376	37,571	36,759
EBIT Russia	5,171	4,439	4,228	4,216	4,127	4,038
As % of Total EBIT	9.9%					
Total EBIT	52,247	44,849	42,717	42,592	41,698	40,798
Tax rate	34.3%	40.0%	40.0%	40.0%	40.0%	40.0%
NOPAT	34,307	26,909	25,630	25,555	25,019	24,479
D&A	15,163	15,219	14,505	15,584	15,457	17,780
Change in NWC	8,128	4,809	3,343	214	2,417	-8,568
Capex	(22,892)	(18,748)	(18,440)	(16,501)	(15,140)	(15,238)
FCFF	34,706	28,189	25,038	24,852	27,753	18,453
WACC	8.5%					
Discount factor by year	1.00	0.96	0.88	0.81	0.75	0.69
DCF	x	27,058	22,143	20,249	20,834	12,762
NPV, USD bn	103					
Terminal Value, USD bn	199					
TGR	2%					
EV, USD bn	302.2					
EVA approach, USD mn	**2022**	**2023E**	**2024E**	**2025E**	**2026E**	**2027E**
	0	0.5	1.5	2.5	3.5	4.5
NOPAT	34,307	26,909	25,630	25,555	25,019	24,479
Capital Invested	125,733	139,895	140,573	144,601	149,096	154,049

EVA approach, USD mn	2022	2023E	2024E	2025E	2026E	2027E
Total IC	125,733	139,895	140,573	144,601	149,096	154,049
Econ profit	x	14,965	13,628	13,209	12,289	11,326
WACC	8.5%					
Discount factor by year	1.00	0.96	0.88	0.81	0.75	0.69
Discounted econ profit	x	14,364	12,052	10,762	9,225	7,833
NPV, USD bn	54					
Terminal Value, USD bn	122					
Invested capital, USD bn	126					
TGR	2%					
EV, USD bn	302.2					

Table 16 reveals that BP's value for the first scenario is $302.2 billion. We then calculated the enterprise value for the second scenario, as shown in Table 17.

Table 17. DCF and EVA Models for BP After Exiting the Russian Market

DCF approach, USD mn	2022	2023E	2024E	2025E	2026E	2027E
	0	0.5	1.5	2.5	3.5	4.5
EBIT (excl. Russia)	47,076	40,410	38,489	38,376	37,571	36,759
Tax rate	34.3%	40.0%	40.0%	40.0%	40.0%	40.0%
NOPAT	30,911	24,246	23,094	23,026	22,542	22,056
D&A	15,163	15,219	14,505	15,584	15,457	17,780
Change in NWC	8,128	4,809	3,343	214	2,417	-8,568
Capex	(22,892)	(18,748)	(18,440)	(16,501)	(15,140)	(15,238)
FCFF	31,310	25,526	22,502	22,323	25,276	16,030
WACC	8.5%					
Discount factor by year	1.00	0.96	0.88	0.81	0.75	0.69
DCF	x	24,501	19,899	18,188	18,975	11,087
NPV, USD bn	93					
Terminal Value, USD bn	173					
TGR	2%					
EV, USD bn	265.6					
EVA approach, USD mn	**2022**	**2023E**	**2024E**	**2025E**	**2026E**	**2027E**
	0	0.5	1.5	2.5	3.5	4.5
NOPAT	30,911	24,246	23,094	23,026	22,542	22,056

EVA approach, USD mn	2022	2023E	2024E	2025E	2026E	2027E
Capital Invested	125,733	139,895	140,573	144,601	149,096	154,049
Total IC	125,733	139,895	140,573	144,601	149,096	154,049
EVA	x	12,301	11,091	10,679	9,812	8,903
WACC	8.5%					
Discount factor by year	1.00	0.96	0.88	0.81	0.75	0.69
Discounted econ profit	x	11,808	9,809	8,701	7,366	6,158
NPV, USD bn	44					
Terminal Value, USD bn	96.06					
Invested capital, USD bn	125.73					
TGR	2%					
EV, USD bn	265.6					

According to Table 17, **BP's enterprise value decreased by $36.5 billion after exiting two Russian projects, falling from $302.2 billion to $265.6 billion**. These significant losses are primarily attributed to BP's substantial involvement in Russian projects, notably its 19.75% share in Rosneft, accounting for approximately 10% of the overall company's operational profit.

Evaluating the Influence of BP's Exit from the Russian Market on Operational and Other Indicators

1) Reserves: At the end of 2021, the company's proven reserves stood at 16,954 billion barrels of oil equivalent (BOE). However, in 2022, the company did not include information about its joint ventures with Rosneft in its operating results. Consequently, the reserves decreased to 7,183 billion BOE, marking a 55% decline. Similarly, at the end of 2021, the proven gas reserves amounted to 39,615 billion cubic meters (billion m^3). However, the company did not record the joint ventures with Rosneft in its 2022 operating results, resulting in reserves declining to 18,481 billion m^3, a decrease of 53%.

2) Extraction Volume: At the end of 2021, the company's extraction volume was 3,316 billion BOE. In 2022, the reported extraction volume decreased to 2,438 billion BOE, representing a 26% reduction. Furthermore, in 2021, the company produced 7,915 billion m^3 of gas. By the end of 2022, the reported gas extraction volume had decreased to 7,101 billion m^3, indicating a 10% reduction in production.

Conclusion

Our research has successfully achieved its intended purpose by compiling a comprehensive database related to the exit of foreign companies from the Russian market. We have analyzed key trends, including the industries from which companies withdrew and the countries of incorporation of exiting companies. Furthermore, we identified nine primary exit strategies employed by these companies.

Our analysis reveals that the majority of exits were carried out by German, French, and American companies. Sectors such as consumer goods, commodities, food and beverages, and automotive manufacturing saw the highest number of withdrawals. The most common exit strategies included joint venture exits and soft closings, characterized by a reduction in investment project funding, marketing termination, and a lack of a clear and unambiguous exit plan from Russia. This trend was particularly prominent in the oil and gas industry, Russia's largest and most strategically significant sector.

Our study of selected companies resulted in the following conclusions:

1. Shell's decision to withdraw from the Russian market led to a substantial decrease in enterprise value, amounting to $20.6 billion when assessed using two valuation models (DCF and EVA). This loss exceeded the write-off of Russian assets reported in the corporate financial statements. Shell employed a strategy involving the exit from a joint venture and the sale of assets to a local player. Operationally, the company experienced significant losses in reserves, approximately 21% of the total volume, while extraction volumes were only minimally impacted (1%). The loss of approximately 23% of gas supplies to Asia had a significant impact due to the low transportation costs of LNG to Japan from Shell's Russian assets.

2. TotalEnergies' fundamental value decreased by $1.1 billion following its decision to exit Russia. The company adopted a soft closing strategy, retaining its key assets such as PAO Novatek, Yamal LNG, and Arctic LNF 2 while divesting less significant assets, including the Kharyaga Production Sharing Agreement and CJSC Terneftegaz. The exit resulted in a 4% decrease in reserves and a 7% reduction in extraction volumes compared to 2021 figures.

3. Equinor's withdrawal from the Russian market resulted in the smallest decrease in enterprise value, amounting to

$0.5 billion. This exit is not expected to significantly impact the company's financial performance due to its small reserves and extraction volumes in the Russian Federation: the company's total reserves decreased by approximately 1.7% of the total amount, while its extraction volumes decreased by only 1%. Equinor applied a joint venture exit strategy.

4. ExxonMobil lost $17.8 billion in value as determined by the DCF and EVA models. Lost reserves, proportionate to the company's participation share, accounted for approximately 1.7 billion barrels of oil equivalent or about 9% of ExxonMobil's total volume of reserves. Extraction volume decreased by just 1%. The company employed a strategy of exiting from the Russian joint venture.

5. BP utilized a soft closing strategy, declaring its withdrawal from Rosneft's capital while still retaining its status as a shareholder. However, BP cannot record dividends received from Rosneft in its cash flows. As a consequence of this exit, the company reported losses of $24.4 billion. The decision of leaving Russia cost the company $36.5 billion of fundamental value, the largest amount among the oil and gas companies considered here. BP also incurred significant losses in oil reserves (55%) and gas reserves (26%) as a percentage of the company's total reserves. Oil production decreased by 53%, and gas production by 10% of the total amount, indicating substantial strategic losses related to the company's exit from its joint venture with Rosneft, which has implications for the company's future reserves (Table 18).

Table 18. Comparison of Company Losses Caused by Exiting the Russian Federation

#	Criterion	BP	Shell	ExxonMobil	TotalEnergies	Equinor
1	Loss caused by withdrawal from Russia, as reflected in company reports, $ billion	(24.4)	(3.9)	(2.3)	(4)	(1)
2	Evaluation of company losses by the DCF and EVA methods, $ billion	(36.5)	(20.6)	(17.7)	(1.1)	(0.5)
3	Decrease in the reserves volume in o.e., %	(≈ 50%)	(≈ 21%)	(≈ 9%)	(≈ 4%)	(≈ 1.7%)
4	Decrease in the extraction volume in o.e., %	(≈ 30%)	(≈ 1%)	(≈ 1%)	(≈ 7%)	(≈ 1%)
5	Loss of convenient logistics in strategically important markets	YES	YES	YES	NO	NO

Based on a comprehensive analysis of the strategies employed by Western oil and gas companies when exiting the Russian market, the evaluation of their value before and after withdrawal, and an examination of the impact on their operational indicators, the following conclusions can be drawn:

The Norwegian company Equinor incurred the least significant losses as a result of its exit from Russia. This can be attributed to its limited engagement in Russian operations compared to other Western oil and gas companies. This validates the hypothesis that companies with stronger ties to the local market experienced more substantial losses.

BP recorded the most substantial reduction in value. At the same time, companies involved in strategically important projects, such as BP and TotalEnergies, adopted a soft exit strategy from the Russian market. This finding aligns with one of our hypotheses. Despite their decision to withdraw from Russia, these companies continue to receive dividends and maintain ownership stakes in assets, the impairment reflected in their financial statements notwithstanding.

Some companies refrained from procuring Russian hydrocarbons in the spot market after their exit, but they still engage in long-term contracts for such procurement. For instance, TotalEnergies continues to purchase LNG from the Yamal LNG project, and Shell, even after exiting the Sakhalin-2 project, still acquires LNG from the Sakhalin Field.

In summary, our research confirms the hypotheses proposed at the beginning of the study. In fact, the actual losses incurred by oil and gas companies exceed the losses reported in their financial statements. The overall impact of exiting the Russian market on these companies is complex and multifaceted.

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Impact of ESG Ratings on Companies' Financial Performance: Evidence from Asia

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Abstract

ESG ratings have emerged as a critical instrument for investors to evaluate the long-term risks and ethical dimensions of companies. These ratings quantify companies' performance in environmental, social, and governance aspects. Nevertheless, variations in ESG ratings persist across nations owing to distinct regulatory regimes and rating agency methodologies. Despite extensive scholarly attention to the influence of global ESG factors, Asian ratings have been barely scrutinized. The research aims to assess the influence of ESG ratings on the financial performance of companies in Asia, with particular focus on South-West Asia (Turkey, Israel, and Saudi Arabia) and South-East Asia (China, Hong Kong, Singapore, and Malaysia). The study, which gathered data from 276 firms over a five-year period (2018–2022), employed STATA software to conduct panel data regressions, with return on assets, return on equity, and price-to-book value serving as dependent variables. First, the results of hypothesis testing show that ESG ratings have a positive effect on financial performance in South-West Asia, but not in South-East Asia where they have a negative effect. Second, in South-West Asia, one of the environmental, social, or governance (ESG) factors has a more notable influence and results in positive financial ratios, while in South-East Asia, there is no influence from the ESG factors. The study found that ESG ratings have varying effects on financial performance in South-West and South-East Asia, which may be attributed to differences in the historical and cultural development of ESG issues. This study will aid in the development of ESG rating practices for Asian countries.

Keywords: ESG indicators, ESG rating, the impact of ESG ratings on companies' financial results, rating agencies, random effects models, fixed effects models

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Introduction

At present relevance of ESG ratings (*Environmental*, *Social and Governance* or ecology, social sphere and governance) has increased all over the world. They have become an important instrument for investors and customers who wish to assess business immunity to long-term risks as well as ethical and social aspects of goods and services manufacture. In recent years many large corporations took measures to improve their ESG performance in order to meet increasingly demanding requirements. This process was especially important during the COVID-19 pandemic.

One of the main advantages of using ESG ratings is that they enable investors to evaluate a wide range of factors which may influence business success including the impact on the environment, relations with employees and society, observance of human rights and governance rules. ESG ratings are of particular importance for the companies operating in the industries with the greatest environment pollution: metallurgy, processing industry, pharmaceuticals, mining etc. As a rule, the companies leading in reduction of greenhouse gas emissions and transition to low-carbon technology have higher ESG ratings.

However, ESG ratings are not a universal instrument and differ from country to country because some countries have stricter regulatory and standards systems while others – less strict ones. Apart from that, some rating agencies focus on specific areas or criteria while others apply a broader approach.

The main purpose of the present research is defining the influence of ESG ratings on financial performance of Asian companies taking into consideration the differences in cultural aspects of South-East and South-West Asia.

In order to analyze panel data of 276 companies we used *STATA* program package. The data covers the time interval of 2018 to 2022.

Review of Studies Dedicated to ESG Ratings

The problem of influence of ESG ratings on corporate financial performance was addressed in many academic papers of recent years. Almost all studies dealing with ESG ratings and corporate social responsibility apply the same methodology, that is, a wide range of data, especially from developed countries where the level of information disclosure is higher than in emerging countries. But at present similar studies of Asian countries have become relevant.

First, we are going to consider the studies about a positive influence of ESG ratings and a wide disclosure of information about ESG indicators, efficiency and risk factors, corporate governance on corporate financial performance.

One of them [1] proves that there is a positive dependence between ESG indicators and net dividend income in the previous period. First of all, it is important for investors who study company reports. Apart from that, it was established that return on equity (ROE) improves due to an increase in estimate indicators of the social component.

Another research [2] analyzes the correlation between companies' financial performance and their ESG ratings during political turmoil in Egypt. The authors trace the dependence of the company's market value on ESG ratings and make the conclusion of their significant influence on financial performance of Egyptian companies when the country goes through tough times.

The authors of the research dedicated to investors' market response to publication of sustainable development reports [3]determined that environmental and social reporting and open access publication of data are conducive to achievement of higher ROE and return on invested capital (*ROIC*). At the same time, corporate governance is not a significant factor which is able to influence financial performance.

Papers [4, 5] where the authors studied data from the USA and China provide positive estimates of influence exerted by ESG indicators. Their main conclusion is that improvement in transparency of ESG indicators correlates with an increase in the corporate stock price. In particular, they have revealed that it is of special importance for high-risk companies.

The ESG rating and individual ESG indicators were also studied in banking. It turned out that in banks influence of ESG indicators on financial performance was more pronounced than in the industrial sector [6].

Some authors [7–8] assert that advantages and components of ESG indicators may improve corporate financial resilience.

Almost in all studies considered below the authors use the company size as the control or command variable. Thus, in the research of influence of ESG indicators and green investments on financial performance using 115 British and 90 German firms [9]as an example the authors applied regression analysis and revealed a positive influence of environmental conduct on financial performance and found out that large companies were more productive and innovative than small ones.

The purpose of another paper [10] is analysis of the transparency level among the companies from the *S&P 500* index concerning ESG indicators. To perform it the authors used *MSCI ESG Research* databases and statistical analysis in order to study the dependence between the growth factors and transparency level of ESG indicators in the reports of companies included in the *S&P 500* index. For each company the reporting quality index was calculated. The authors found out that there were significant differences in the ESG indicators' disclosure level between industries and sectors. At the same time some industries are more transparent than others. They also pointed out that in general the quality and quantity of ESG reports improved as time passed.

Another paper [11] considers the issue of a relation between sustainable development (ESG) practices and debt instruments' value in European countries. The authors studied 348 credit organizations in 15 countries of the EU

for 5 years. This enabled them to reveal a positive relationship between the ESG governance quality and debt-related risk. Thus, a conclusion may be made that use of ESG is an important aspect for all commercial organizations because they may become more competitive due to a lower cost of capital and a better issue of securities.

We also should mention the paper in which the authors study a relationship between the level of ESG indicators' disclosure and financial productiveness of companies as well as consider the role of this relationship's management mechanism [12]. The authors established that the level of ESG disclosure was positively related to companies' financial productivity both before and after implementation of the integrated reporting framework (IR).

There is a series of studies which examine influence of corporate financial performance on ESG ratings. One of them [13] showed that the value of the ratio of the profitability factor to equity may have a positive impact on the ESG rating.

Now we are going to consider the negative or neutral influence of disclosure of company's ESG indicators, its corporate governance and social sustainability on economic performance.

The authors of two studies [14; 15] determined that governance and environmental sustainability indicators were related negatively or insignificantly to the equity value. However, the variable related to the social aspect of ESG showed either a neutral or slightly positive influence on the equity value. Nevertheless, in the model describing the complex behavior of ESG indicators they all produce a joint positive influence on the economic resilience and equity value.

Inconclusive results were obtained in one of the studies [16]. Its conclusions imply a mixed effect between various levels of ESG disclosure and corporate performance. The author observes a strong negative correlation between a high level of ESG disclosure and financial performance. But at the average disclosure level a positive dependence on ESG indicators is revealed.

Some other studies [17; 18] assert that the ESG rating produces a negative impact. Their authors provide a conclusion based on observations over 136 companies in France and their credit indicators from 2014 to 2018. They found out a positive relationship between the level of company's ESG disclosure and its creditworthiness. However, they also describe a negative influence of the level of ESG disclosure of the company's cost of debt. When a regression with ESG components was built a negative impact of the *E* factor on the total debt was revealed.

The authors of one more research [19] obtain negative or inconclusive results of ESG rating influence on financial performance. They assert that each ESG indicator separately has a very weak impact on financial performance.

When it comes to studies related to the Asian region we have to mention paper [20] which studies the role of socially responsible governance (ESG) during the financial crisis caused by the COVID-19 pandemic in China. This research showed that high ESG efficiency of a corporation may help to improve its financial performance during the crisis in comparison to the companies less responsible in terms of the environmental and social issues. It was established that portfolio managers inclined to deal with companies with high ESG ratings showed better results in the periods of macroeconomic shocks such as the financial crisis of 2008 and the COVID-19 crisis.

Research by O. Weber [21] provides an extensive coverage of Chinese companies and their pursuance of responsible behavior in terms of ESG. At present there is a great number of listed companies in China which publish ESG reports. It is expected that others will follow the lead of socially responsible companies because the demand of investors for ESG information grows.

Chinese ESG ratings were also studied in paper by S. Li et al. [22]. The authors examined the *MSCI*, *FTSE*, *CASVI* ratings and their influence on financial performance of the companies listed in the Shanghai Stock Exchange. They arrived at the conclusion that the higher the company's rating the lower the risk of decrease in the value of its shares.

In the research of the Indian securities market [23] the authors defined that the ESG reporting quality may have a significant influence on the company's success in the securities market. On the basis of the obtained results the authors make the conclusion that it is necessary to improve ESG reporting of all companies, especially the ones in the *S&P 500* index.

Comparative Analysis of ESG Ratings

ESG ratings are an estimate of the way in which companies fulfill their obligations in terms of social responsibility, environmental sustainability and corporate ethics governance. However, various ESG rating agencies may use different methodologies to calculate the rating.

So, *MSCI* – one of the largest ESG rating agencies with a wide coverage of companies in different parts of the world applies the methodology based on evaluation of risks and opportunities related to ESG factors. ESG ratings of *MSCI* are premised on general results of 35 individual indicators, over 1,000 control points of companies' ESG policy for 20 years, 80 geographical metrics, 150 program metrics, over 100 governance metrics.

The Chinese ESG rating agency *SynTao* uses its own methods to compile corporate ESG ratings based on 14 categories: financial management, internal working conditions, risk management, broad participation in community issues, adherence to public interests, innovation capability, environment management, ethical aspects etc.

The Chinese financial information service *WIND* evaluates Chinese companies on the basis of *E*, *S* and *G* aspects. The *E* estimate indicates energy efficiency and amount of emissions, the *S* estimate shows the health and safety level, level of employees' rights and interests support and social responsibility and the *G* estimate manifests the quality of management of the company.

The Chinese agency *CSR* specializes in assessment of companies from China, Hong Kong and other Asia Pacific countries. Ratings for subsidiaries are compiled on the basis of the parent company's rating. 12 subcategories of efficiency are used, estimates obtained from various sources are compared and data correction is performed.

The international ESG rating agency *Refinitiv* which has united *Bloomberg ESG* and *ESG Analytics* uses over 630 various key indicators to evaluate ESG factors such as greenhouse gas emissions, share of women on the company board, level of concern with climate change etc.

The largest world agency of financial news *Bloomberg* also compiles ESG ratings using over 630 different indicators such as the complaint rate, the brand rating and mass media interest to the company.

The international agency *S&P Global* which consolidates *S&P Dow Jones Indices* and the ESG rating agency *Trucost* applies the *Trucost*'s methodology to assess environmental risks and opportunities as well as the opportunities of business management related to it. The estimates of *S&P Global* are based on over 1,500 key indicators in 61 subindustries.

The international ESG rating agency *FTSE* owned at present by the London Stock Exchange evaluates companies on the basis of ESG data collected from over 50 publicly available sources. Estimates of ESG factors are based on 14 topics (including climate-related risks, corporate ethics management and sustainable development), they comprise 300 indicators, 47 developed markets.

Large rating agencies *Sustainanalytics*, *RobecoSam*, *Moody's*, *Corporate Knights*, *Thompson Reuters* evaluate ESG indicators of companies all over the world. Several small local rating agencies should also be mentioned. They mainly assess the companies of South-East Asia: *CASVI*, *Biotech*, *Sino-Securities*.

In spite of different approaches of various ESG rating agencies to evaluation of ESG factors all of them take into consideration social responsibility, environmental sustainability and corporate ethics management when assessing companies.

We are going to consider in more detail the rating by *SynTao* because we will use it for comparative analysis in a regression.

The Chinese ESG rating agency *SynTao* developed its own methods to assess companies on the basis of factors of social responsibility, environmental sustainability and corporate ethics management. The agency evaluates over 5,000 companies including large government-owned ones, small local and foreign companies operating in China.

SynTao applies a set of indicators to assess companies' compliance with ESG regulations. At the first stage it evaluates the company's position in its industry, at the second – verifies compliance with internal rules and corporate standards and at the third – checks the company for conformance to industry-specific standards and international standards.

SynTao evaluates companies according to 14 indicators (6 social, 5 environmental and 3 governance ones): financial management, internal working conditions, risk management, broad participation in community issues, adherence to public interests, innovation capability, environment management, ethical aspects etc.

Each of the 14 indicators has a range of parameters (approximately 200). Then an industry-related model is constructed on the basis of these parameters (51 industry-related models in total). Based on the model and companies' weights a ESG rating is compiled (0 to 100). After evaluation it is transferred into a 10-letter scale (from *A*+ to *D*).

For analysis in a regression all letter values of the rating for each company will be transferred to numerical ones where *A*+ = 10 and *D* = 1.

Apart from the main final estimates *SynTao* also provides more detailed data for each evaluation parameter such as geographical data and macrodata. *SynTao* also offers ratings of products and services of a company separately.

SynTao compiles its rating on an annual basis and it is available only for subscribers but it is possible to collect information at its web site about companies from China and Hong Kong. It is one of the leading ESG rating agencies in China, it has important information on Chinese companies.

As long as we are going to consider various Asian regions in the present research we will use several different ratings.

On the basis of study of literature we have advanced two hypotheses.

Hypothesis 1. Influence of the ESG rating on corporate financial performance is positive for both considered Asian regions.

Hypothesis 2. Influence of one of ESG factors (environmental, social or governance) will be more pronounced in one region than in the other.

Methodology and Data

Since the present research is conducted on the basis of comparative analysis of two Asian regions we chose the countries which differ from each other greatly in terms of characteristics and geographical position. In South-West Asia we chose three countries rather extensively presented in the international rating of *S&P ESG Global*: Israel, Turkey and Saudi Arabia. In South-East Asia we chose four countries: Malaysia, Singapore, China and Hong Kong.

For this research we collected data manually vising official web sites of companies and using systems of information retrieval on corporate finance: *Google.Finance* and *Yahoo. Finance*. The data covers the time interval of 5 years: from 2018 to 2022. It encompasses the economy sectors to which the evaluated companies pertain. We chose large companies listed in Chinese stock exchanges (Shanghai, Hong Kong, Shenzhen), Singapore, Arab, Turkish and other stock exchanges.

For the present research we selected 276 companies: 99 ones from South-West Asia, 100 – from South-East Asia and 77 companies entered in the Chinese rating by *SynTao*

but not included in the *S&P* rating.

So, we have three data sets: 100 companies from South-East, 99 companies from South-West and one data set of 108 companies because the companies comprised by each hundred were added to the *S&P* rating. Therefore, we may build a regression model. In the second data set on South-East Asia the distribution by countries is as follows: 12 companies from China, 19 – from Hong Kong, 22 – from Singapore and 47 companies from Malaysia.

With regard to industry affiliation of the companies, these data sets represent almost all industries comprised by *S&P* and *SynTao* ratings. The largest number of companies represents the industrial sector (metallurgy, oil and gas, energy) – approximately 50 companies, services sector – 70. There are several companies (approximately 15) from pharmaceuticals and a lot of retailers (over 20).

We collected data on total assets, total equity and total debt for each of 276 companies and ratios of *ROA* (return on assets), *ROE* (return on equity) and *P/B*multiplier (*price to book value ratio* or the ratio of the current market capitalization of the company to its book value) for five years. We also collected accounting statements of companies (balance sheets, profit and loss statements, statements of cash flows).

Taking into consideration the fact that we collected data from public sources and did not process it in a uniform format as *Bloomberg* or *CSMAR* databases do, we collected additionally data on currency exchange rates as of each reporting date in order to represent the final assets in the same currency (US dollar). All values in the sample are presented in thousands. Logarithmic values were obtained from this data for *ROE*, *ROA*, total assets, debt to equity ratio (*D*/*E*), *P*/*B* multiplier. The logarithmic transformation allowed to smooth over abrupt jumps in dimensionalities. We also excluded financial companies from the sample. In case of missing data we used average values of the existing variables.

For the regression we chose the model specification with panel data:

$$ROA_{it} / ROE_{it} / \frac{P}{B_{it}} = \alpha + \beta_1 \cdot ESG_{it} + \beta_2 \cdot \mathrm{Ln}_{\mathrm{asesets_{it}}} +$$
$$+ \beta_3 \cdot Sales_{growthit} + \beta_4 \cdot Assets_{growthit} + \beta_5 \cdot Ln\left(D / E\right)_{it} +$$
$$+ u_{it} + \varepsilon_{it}, \quad (1)$$

where *ROA* is a natural logarithm of return on assets; *ROE* – a natural logarithm of return on equity; *P*/*B* – a natural logarithm of the correlation between the market value of a share to the book value of a share;Ln_*assets* (company size) – a natural logarithm of assets; *Sales_growth* – gain in revenues from sales; *Assets_growth* – gain incorporate total assets for a year; Ln(*D*/*E*) – gain in revenues from sales of the debt to equity ratio.

For the second regression according to the *S&P* rating we chose a specification just for one year – 2022 – because web sites of rating agencies provide available data on each of the *E*, *S* and *G* factors individually only for this year.

$$ROA_i / ROE_i / \frac{P}{B_i} = \alpha + \beta_1 \cdot E_i + \beta_2 \cdot S_i + \beta_3 \cdot G_i +$$
$$+ \beta_4 \cdot \mathrm{Ln}_{\mathrm{asesets_{it}}} + \beta_5 \cdot Sales\_growth_i +$$
$$+ \beta_6 \cdot Assets\_growth_i + \beta_7 \cdot Ln\left(D / E\right)_i +$$
$$+ u_i + \varepsilon_i. \quad (2)$$

Many researchers use return on assets, equity and market capitalization of the company as the dependent variable, however, the *P*/*B* multiplier may also be used as a dependent variable. The regressors for both models of this type of research are chosen in a standard way: ratios of leverage, growth in assets and sales as well as the company size which manifests itself as the amount of assets. Some variables will be taken in logarithms to balance the sample and mitigate fluctuations.

Table 1 presents descriptive statistics of variables.

Table 1. Descriptive statistics of variables for three models with the same ESG rating

Variable/ Country/Region	Number of observations			Mean value		
	South-West Asia	South-East Asia	China and Hong Kong	South-West Asia	South-East Asia	China and Hong Kong
ROA	495	500	540	0.050212	0.0567262	0.0361848
ROE	495	500	540	0.0809702	0.0685333	0.0543683
P_to_B	495	500	540	7.606808	3.70646	4.417796
ESG_score_SP/Syntao	495	500	540	13.86599	22.69	5.970926
Total_asset	495	500	538	9,403,572	1.19e+07	9,782,471
D_to_E	495	500	540	1.578362	3.865507	14.37889
Asset_growth	495	500	540	0.2439267	0.1125173	–0.9237176
Sales_growth	495	500	540	0.2575859	0.1262442	0.2167991

Variable/ Country/Region	Standard deviation			Minimum		
	South-West Asia	South-East Asia	Chins and Hong Kong	South-West Asia	South-East Asia	Chins and Hong Kong
ROA	0.0507271	0.0776179	0.0612072	–0.2521	–0.1363	–0.1792
ROE	0.1030046	0.2259983	0.0946869	–0.5412	–4.092347	–0.2598
P_to_B	57.49769	6.630098	7.043911	–674.4	–2.14	–19.3
ESG_score_SP/Syntao	14.31341	16.07877	1.371789	1	79	0
Total_asset	1.88e+07	1.842336	27,126.28	70,505.1	0	38.7495
D_to_E	10.52236	134.4021	2.099023	–77.258	–1537.72	0
Asset_growth	0.4466562	0.2191222	1.459495	–0.8609	–0.63	–4.60517
Sales_growth	0.552522	0.3476424	0.7094604	–0.937	4.1415	–0.8374

(Table 1 continued)

Variable/ Country/Region	Maximum		
	South-West Asia	South-East Asia	China and Hong Kong
ROA	0.2738	0.6687	0.9098
ROE	0.85	0.9882	0.9909
P_to_B	1,050	44.83	103.8
ESG_score_SP	66	79	9
Total_asset	1.31e+08	18.84	289,600
D_to_E	202.399	1,845.46	21.7
Asset_growth	6.405	1.46	2.750471
Sales_growth	5.82	4.1415	8.1027

Source: calculations in *Stata*.

Let us consider descriptive statistics of three data sets. In South-West and South-East Asia *ROA* equals 5% and 5.67%, *ROE* – 8% and 6.85% respectively. In both regions *ROA* is lower than *ROE*: in South-West Asia – by 1.6 and in South-East Asia – by 1.2. Return on assets is higher in South-East Asia and return on equity, on the contrary, is higher in South-West Asia.

Let us consider individually the third data set which comprises only companies from China and Hong Kong. Here *ROA* = 3.6%, *ROE* = 5.4%. A trend of exceedance of return on equity over return on assets by 1.5 can be seen.

Now we are going to consider the *D*/*E* ratio (leverage ratio) which has the normative value of 1–2 for medium-sized companies and may be higher for large companies. In South-West Asia the leverage amounts to approximately 1.5 which is within the normative value. However, in South-East Asia the average leverage value is 3.86 which exceeds the norm. But if we pay attention to total assets is becomes clear that in the sample from South-East Asia large companies prevail. In China and Hong Kong the average value of the leverage exceeds 14, i.e. the companies use more borrowed funds than their own. It should be noted that we have data for the past 5 years, during 3 years of which the COVID-19 pandemic took place. Most of all it hurt the Chinese economy because China imposed the strictest restrictions and quarantine. The Chinese government lifted all prohibitions only at the beginning of 2023. Therefore, the companies bought on credit and borrowed more in order to survive. At the same time the amount of assets only in Chinese and Hong Kong companies is a little higher than the amount of all companies from South-West Asia.

Further we are going to focus on the variables of "assets growth" and "sales growth". On average these values differ slightly for South-West and South-East Asia. In other words, in both regions sales growth is a little higher than assets growth. This indicates that, probably, the companies increment sales by means of increasing assets. However, if we compare the two regions it becomes clear that sales growth in South-West Asia exceeds the similar indicator of the South-East Asia almost twice (25.75% versus 12.62%).

This phenomenon may again be attributed to Covid restrictions of China and South-East Asia in general. In South-West Asia these restrictions were lifted as far back as 2022.

It is interesting to consider the data set for China and Hong Kong from this point of view. Thus, the average revenue growth amounted to 21.6%, however, the average assets growth went in the negative and equals –0.9, i.e. a lot of companies sold out their assets and went bankrupt.

Results of Hypotheses Verification

So, we are going to verify *hypothesis 1* stating that influence of ESG indicators on corporate financial performance is positive for both Asian regions. We will build three regressions for each of the two data sets from South-West and South-East Asia: for *ROE*, *ROA* and *P/B*. Since we use panel data we have to conduct tests for accuracy of data selection, that is multicollinearity and heteroscedasticity tests.

First, we have to decide which model will be used for South-West Asia: the random effects model or fixed effects model. For this purpose we will compare the models according to specifications with pooled regression applying three tests: the Wald test for the regression model with fixed effects, the Breusch – Pagan test for the random effects model and the Hausman's test to compare two regressions – with random and fixed effects.

The Hausman's test showed that it was better to apply the random effects models in two specifications: with *ROA* and *ROE*. However, the principal hypothesis is not rejected because *p-level* > 0.01. In the third specification with the *P/B* multiplier it is better to use the fixed variables model because *p-value* = 0. A modified Wald test was carried out for it. It detected heteroscedasticity. The Breusch – Pagan test for the three models showed that in two models with *ROA* and *ROE* it was better to use the random effects model than the pooled regression while in the third model with *P/B* – the fixed effects model. Consequently, the data is characterized by heterogeneity of observations, i.e. heteroscedasticity. This is a drawback of data collected manually.

For the three specifications we conducted *vif* tests for multicollinearity which showed its absence among the variables. The autocorrelation test also showed its absence in the model specifications.

Table 2. Results of the regression for the data on South-West Asia

Variable	ROA	ROE	P/B
ESG_score_SP	0.006955	0.0055647	–0.0113683
Sales_growth	0.0030538	0.0030065	–0.0027773
Ln_assets	–0.2523723	–0.1743416	–0.3946621
Ln_Debt_to_eq	–0.017689	–0.0160256	0.130985
Asset_growth	0.0004874	0.0003273	–0.0003442
_cons	4.879144	4.123832	7.553831
Permissible value of p-value			
ESG_score_SP	0.008	0.048	0.000
Sales_growth	0.000	0.000	0.000
Ln_assets	0.000	0.001	0.000
Ln_Debt_to_eq	0.449	0.524	0.043
Asset_growth	0.404	0.599	0.336
_cons	0.000	0.000	0.000
R-squared			
Within	0.1017	0.0927	0.3462
Between	0.2596	0.1188	0.1155
Overall	0.2263	0.1128	0.1439

Source: calculations in *Stata*.

Now we are going to evaluate results of the obtained regressions (Table 2). The variable of ESG indicators turned out to be significant in all three specifications unlike the leverage and assets growth variables. It can be observed that the ESG rating has a positive impact on *ROA*, *ROE* but produces a negative impact on *P/B*. And although this influence is insignificant (totally 0.007 and 0.0055) it does exist, hence, hypothesis 1 may be confirmed partially.

As for other variables the sales growth predictably exerts a positive influence on profitability but a negative influence – on the shares' price to book value ratio (however, this influence is insignificant – approximately 1%). The dependence on the assets logarithm, i.e. the company size, is negative for all three specifications. It means that the bigger the company, the larger its assets (both current and non-current) the lower its profitability. This is quite applicable to the large companies, data on which we have collected. In order to increase profitability it is necessary to drive up profits or asset turnover instead of the amount of assets.

It should also be stated that in all model specifications the R-squared is low. It is due to unnormalized data because companies have been selected manually. In the best specification $R^2 = 0.25$. It means that just 25% of the variance of corporate financial performance is attributed to the model, however, the purpose of the present research is to determine the relationship between the two factors: ESG indicators and financial performance. And we have managed to determine it.

Conclusion: for South-West Asia the hypothesis of a positive influence of ESG indicators on financial performance of companies is partially confirmed. At the same time the ESG rating has a positive impact on the profitability ratios and has a negative impact on the correlation between the market and book value of shares.

Now we are going to consider companies from South-East Asia (Table 3). Similar to the previous stage of

analysis we conducted tests in order to choose the random effects and fixed effects model. Exactly in the same manner as with South-West Asia we chose the random effects models for specifications with *ROA*, *ROE* and the fixed effects model for *P/B*, the *vif* test did not detect multicollinearity. Heteroscedasticity also was present in this data, autocorrelation was not revealed. We applied the robust transformation to the fixed effects model. It decreases the *p-value* but does not manifest itself in the ratios.

Table 3. Results of the regression for the data on South-East Asia

Variable	ROA	ROE	P/B
ESG_score_SP	–0.0056281	–0.0045036	–0.0029694
Sales_growth	0.0067906	0.0070549	–0.0013241
Ln_assets	–0.0201658	–0.0251241	0.000559
Ln_Debt_to_eq	–0.0526155	–0.0509342	0.0042058
Asset_growth	0.0026339	0.0023344	0.0012329
_cons	1.610765	1.900533	0.6292191
Permissible value of p-value			
ESG_score_SP	0.002	0.015	0.012
Sales_growth	0.000	0.000	0.398
Ln_assets	0.154	0.078	0.938
Ln_Debt_to_eq	0.033	0.044	0.917
Asset_growth	0.034	0.062	0.420
_cons	0.000	0.000	0.000
R-squared			
Within	0.2093	0.2170	0.0305
Between	0.1142	0.1140	0.0036
Overall	0.1342	0.1303	0.0001

Source: calculations in *Stata*.

In all three cases the impact of ESG indicators on financial performance turned out to be negative (ratios of –0.0056, –0.004, –0.0029). It means that the higher the corporate ESG rating the less revenue it earns. Probably, it implies that it is necessary to invest more in development of ESG principles. This manifests itself in profitability. As for other variables, in the third specification the ratios of assets and sales growth, leverage and the total assets logarithm (i.e. the company size) are statistically insignificant. The total significance of R^2 model is also rather low which has been explained above. So, in South-East Asia hypothesis 1 is not confirmed. In other words, in the Asian market the rating by *S&P ESG Global* has a negative impact on corporate financial performance.

Thus, in South-West Asia the hypothesis was partially confirmed while in South-East Asia it was rejected completely. This result demonstrates the difference between the conduct of business principles in the south-west and south-east of Asia. While in South-West Asia participation in such ratings helps a company to raise new investments as well as increases profitability (as we have shown graphically above), in South-East Asia it is vice versa: the higher the *S&P* rating the lower the company's profitability. Although this influence is highly insignificant, is exists anyway. While in South-West Asia (Saudi Arabia, Turkey, Israel) participation in the *S&P ESG Global* rating and high scores is beneficial for a company, i.e. it enables the company to become more attractive and competitive, in South-East Asia (Malaysia, Singapore, China, Hong Kong) high scores in the *S&P* rating, on the contrary, reduce profitability and, probably, will scare investors away.

In order to understand whether it is beneficial for East Asian companies to pursue the ESG agenda at all we will try to use the same regression to evaluate the data set only for China and Hong Kong (108 companies) applying the *SynTao* rating because it is more or less similar to the *S&P*'s evaluation methodology. First, we are going to conduct tests with previous data sets.

For specifications with *ROA* and *ROE* the tests showed that it was better to use the random effects model while in the *P/B* specification – the fixed effects model. As with other data sets heteroscedasticity exists. It was verified by means of the modified Wald test. However, in this data set multicollinearity is present. According to the *vif* test the

ESG_score_Syntao and Ln_assets variables show a seriously inflated variance (values exceeding 20). Therefore, we decided not to take into consideration the Ln_assets variable in the model. The Pearson correlation matrix shows that the coefficient of correlation between these two parameters is positive and exceeds 0.5 and this is indicative of a significant relationship. Reasoning from this we may say that the bigger the company size the higher the rating.

Results of the regression using China and Hong Kong as an example and applying the *SynTao* rating are presented in Table 4.

Table 4. Results of the regression using China and Hong Kong as an example and applying the *SynTao* rating

Variable	ROA	ROE	P/B
ESG_score_SynTao	–0.1218916	–0.0985843	–0.046679
Sales_growth	0.0176976	0.1792735	–0.0024066
Assets_growth	0.1111184	0.1272014	0.0247313
Ln_Debt_to_eq	–0.0405298	–0.0196879	–0.00475
_cons	–2.189225	–2.046264	1.182562
Permissible value of p-value			
ESG_score_SynTao	0.023	0.054	0.025
Sales_growth	0.856	0.015	0.915
Assets_growth	0.466	0.366	0.630
Ln_Debt_to_eq	0.401	0.676	0.830
_cons	0.000	0.000	0.000
R-squared			
Within	0.0004	0.0104	0.0098
Between	0.0821	0.0556	0.1382
Overall	0.0315	0.0281	0.1095

Source: calculations in *Stata*.

Table 4 shows that in each specification the ESG rating is significant at different confidence levels. In the specification with *ROA* and *P/B* the significance level belongs to the confidence range of 5% while in the specifications with *ROE* the confidence level of 10% is permissible. At the same time, the influence of ESG rating on *ROA*, *ROE* and *P/B* is negative as is the case with the *S&P* rating. The rest of the variables in this model are statistically insignificant. Only the sales growth entails *ROE* growth by 0.179. But this is predictable because return on equity is directly related to the company's revenue.

Thus, the results of this model support the conclusions for the *S&P* rating on a negative influence of the ESG rating on corporate financial performance. It is not advantageous for East Asian companies to put effort into development of ESG principles and participate in ESG ratings. Probably, for companies it is related to greater expenses, so it is easier for them not to get involved in implementation of ESG principles and participation in the ranking scores of international and local agencies.

Now we are going to verify *hypothesis 2* stating that in one of the verified regions influence of any ESG factors on corporate financial performance will be more pronounced than in the other region. In order to verify this hypothesis we will use two subsamples of the same data. Since the expanded ESG ratings on individual factors exist only for 2022 the new samples will comprise just 99 observations from South-West Asia and 100 observations – from South-East Asia.

Table 5. Descriptive statistics of variables for two regions for 2022

Variable	Number of observations		Mean value		Standard deviation	
Region	South-West Asia	South-East Asia	South-West Asia	South-East Asia	South-West Asia	South-East Asia
ID	99	100	50	50.5	28.72281	29.01149
Company	0	0				
Country	0	0				

Variable	Number of observations		Mean value		Standard deviation	
Region	South-West Asia	South-East Asia	South-West Asia	South-East Asia	South-West Asia	South-East Asia
Industry	0	0				
Year	99	100	2022	2022	0	0
ROA	99	100	5.606566	5.75	5.817006	7.131662
Ln_ROA	99	100	1.380442	1.272211	1.015046	0.9170197
ROE	99	100	8.799596	14.84	10.01262	14.84943
Ln_ROE	99	100	1.759904	1.471442	1.05349	0.9786752
P_to_B	99	100	3.724949	2.915	4.338663	5.558312
Ln_P_to_B	99	100	0.9352828	0.4506	0.9469385	0.9947984
Sales_growth	99	100	47.74141	16.956	74.5861	31.04795
ESG_score_SP	99	100	20.79798	31.45	18.07128	18.61539
Ln_assets	99	100	15.20302	14.9808	1.283856	2.123766
Total_assets	99	100	9,976,050	9,191,453	1.90e+07	1.31e+07
Total_assets	99	100	9,976.05	9,191.453	19,032.32	13,119.11
D_to_E	99	100	1.107545	1.348279	1.565311	1.850767
Ln_Debt_to~q	99	100	–0.6333232	–0.477865	1.671484	1.823456
Asset_growth	99	100	26.50242	7.40825	36.01511	14.24616
E	99	100	18.63636	30.8	21.32903	19.61344
S	99	100	21.71717	37.48	18.05436	34.60264
G	99	100	23.52525	35.31	15.0532	16.1074

(Table 5 continued)

Variable	Minimum		Maximum	
Region	South-West Asia	South-East Asia	South-West Asia	South-East Asia
ID	1	1	99	100
Company				
Country				
Industry				
Year	2022	2022	2022	2022
ROA	–9.34	–7.61	27.38	43.91
Ln_ROA	–1.89712	–0.5276327	3.309813	3.782142
ROE	–17.43	–68	48	98.82
Ln_ROE	–1.049822	–0.4004776	3.871201	4.59
P_to_B	–16.65	0	20.45	44.83
Ln_P_to_B	–1.609	–1.43	3.018	3.8
Sales_growth	–83.2	–65.94	453.1	120.85
ESG_score_SP	1	1	66	79
Ln_assets	15.2	10	18,679	17.92
Total_assets	141,510	43,243.2	1.29e+08	6.04+07

Variable	Minimum		Maximum	
Region	South-West Asia	South-East Asia	South-West Asia	South-East Asia
Total_assets	141.51	43.2432	129,459.6	60,400
D_to_E	–4.294	0	9.821	9.93
Ln_Debt_to~q	–7.059	–7.418581	2.285	2.29556
Asset_growth	–14.63	–25.18	139.04	59.02
E	0	0	74	87
S	0	1	65	84
G	5	6	69	75

Source: calculations in *Stata*.

First, we are going to consider descriptive statistics of the variables for two regions (Table 5). The average *ROA* in South-West Asia is positive and equals 5.6%, ROE – 8.79%, in South-East Asia *ROA* equals 5.75%, *ROE* – 14.84%. Exceedance of *ROE* over *ROA* is a positive sign of competitiveness because the company uses its own and borrowed funds. Exceedance of *ROE* over *ROA* almost 3 times in South-East Asia is due to larger crediting of these companies in comparison to South-West Asia which is most likely caused by the Covid restrictions of 2022. It is also confirmed by the mean sales growth in 2022 in South-West Asia by 47% and in South-East Asia – just by 16%.

The correlation between the debt and equity in both regions is permissible: 1.1 and 1.34 respectively. The mean assets growth in South-West Asia is 26% while in South-East Asia – just 7.4%. However, it should be noted that on average the estimates for the *E*, *S*, *G* factors are lower in South-West Asia (18–23) than in South-East Asia (30–35).

Now we are going to evaluate regressions for these two regions. When we built the regression for South-West Asia we revealed that in the *vif* test the values of the three variables of *E*, *S*, *G* exceed the permissible 5 points, i.e. there is multicollinearity. In this relation we may construct the Pearson correlation matrix and ensure that the correlation between these factors exceeds 0.8 and 0.9 points which is of great significance and indicates a direct relationship between these factors: the greater, for example, the *S* and *G* factors the greater the *E* factor. Therefore, these variables cannot be called independent, while they should be independent by definition and according to methodology of the *S&P ESG Global* rating.

As the purpose of the present research is to study the influence of three variables on financial performance we are going to build a regression for each of these factors for three financial ratios. As long as in the model the results of other variables are insignificant we may ignore them. At the 10% confidence level *E* has a positive impact on *ROA* and *P*/*B*. The influence is described by the ratios of 0.0079 and 0.0076. Also at the 10% confidence level we may see the impact of the *S* factor on *P*/*B* (the influence ratio of 0.01). At the 5% confidence level the *S* factor produces a positive impact on *P*/*B* (0.012). This means that *E*, *S* and *G* factors exert an insignificant but positive impact on financial performance.

When we constructed a regression using data on South-East Asia multicollinearity was not detected. We conducted the Breusch-Pagan and White tests for heteroscedasticity and they showed that the zero hypothesis about heteroscedasticity is not rejected, *p-value*> 0.05. Hence, there is no heteroscedasticity in data. However, all ratios in the regression are insignificant. Even if we try to build separate dual regressions the individual *E*, *S*, *G* factors turn out to be insignificant again. Thus, they do not influence separately the dependent variables. They do it only together as a part of the total ESG rating.

Consequently, hypothesis 2 of different dependence of financial performance in the two regions on individual ESG factors is confirmed. Thus, in South-West Asia, in such countries as Turkey, Israel and Saudi Arabia the *E*, *S* and *G* factors produce a positive influence on *ROA* and *P*/*B*. In South-East Asia, in China or Malaysia, these factors have no impact of corporate financial performance at all. Probably, this result may be due to characteristic features of historic, cultural and social development of the regions. In south-west regions of Asia people have long been concerned with the impact of emissions, contamination and the environment. In south-east regions of Asia the trend for conscious resource consumption and ESG ratings has been introduced rather recently and this explains such difference in influence of ESG ratings on corporate performance.

Conclusion

The present paper is dedicated to study of the impact of ESG ratings on financial performance of companies from the Asian region. The purpose of the paper is to reveal, taking into consideration the historical and social-and-cultural preconditions of regions' development, the influence of ESG ratings on ratios of corporate financial performance: return on assets, return on equity and the ratio of company's market capitalization to its book value.

The paper begins with a theoretical substantiation of the problem of ESG ratings' development in the Asian region

and analysis of the existing scientific publications on ESG indicators and ratings.

On the basis of study of publications we advanced two hypotheses for empiric study. The data was collected manually, the sample comprised 276 companies from two regions: South-West Asia (Turkey, Israel, Saudi Arabia) and South-East Asia (China, Hong Kong, Singapore and Malaysia). We studied the time interval of 5 years: from 2018 to 2022. The information was collected from accounting statements of companies and two rating agencies: the international *S&P* and local Chinese rating agency *SynTao*.

In the practical part of this research we used *STATA* software, evaluated two regressions: the panel data and data for one year. The ratios of *ROE*, *ROA*, *P*/*B* in the form of logarithms were used as dependent variables; data on ESG ratings, individual *E*, *S* and *G* factors as well as indicators of assets growth, sales growth, the leverage ratio, the total assets logarithm as the variable of the company size were the independent variables. In total we have studied 15 different model specifications for two hypotheses. In some specifications we excluded collinear elements.

In the hypotheses and regression specifications we used random effects and fixed effects models, conducted the tests to choose the best model and made an adjustment for data heteroscedasticity.

When we verified the first hypothesis on a positive influence of the ESG rating on corporate financial performance in both Asian regions we found out that the hypothesis was confirmed just partially. The positive influence is observed in South-West Asia while in South-East Asia negative effects of the ESG rating (both global and local) were revealed.

The second hypothesis on a different impact of individual *E*, *S*, *G* factors was confirmed completely. In the western regions of Asia a positive influence of individual factors on some financial performance ratios was revealed, in the eastern regions there is no influence of individual factors, hence, the companies from South-West Asia are more susceptible to change of the ESG agenda in the world than companies from South-East Asia.

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Do Inclusive Growth Strategies Affect Corporate Financing Policy? Evidence from The Metal and Mining Sector

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Abstract

The influence of inclusive growth strategy on corporate financing policies is examined within the metals and mining industry. A dataset comprises 212 of the largest publicly traded companies observed from 2016 to 2021. An econometric analysis revealed no significant effect of inclusion indicators on the financing policies of these companies. However, a positive association between the corporate resource efficiency and leverage levels was observed. Though no single inclusion indicator influences the volume of sustainable financing, the indicator of human rights compliance positively impacts the number of such financing arrangements. Furthermore, only the levels of emission reduction and the extent of improvement in living standards of local communities significantly influence the cost of capital (with a positive dependence for the former, and a negative dependence for the latter). Inclusion indicators have little impact on the capital structure, with leverage levels largely determined by metals pricing dynamics. Higher levels of inclusion correlate with increased utilization of sustainable financing. The findings can be used when implementing inclusive growth strategies in the metals and mining industry as well as when deciding on the financing of projects within this sector. We believe that analysis of other industries and a longer period of time, different results may be obtained. This is, on the one hand, a limitation of this work, and on the other hand, an area for further research.

Key words: inclusive growth, metals and mining sector, UN sustainable development goals, ESG rating, random effects model, fixed effects model, pooled panel data model, Tobit model, ordered logit model

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Introduction

The world has witnessed significant geopolitical and economic transformations in recent years, including trade wars, sanctions, epidemiological restrictions, an escalation of protectionist measures, the decarbonization trend, active efforts to combat climate change, and cross-border carbon regulations, to name just a few. Technological advancements and rising social tensions in certain regions have further compounded these challenges. Corporations find themselves increasingly vulnerable to these complex issues. Addressing them and sustaining effective development necessitate adjustments to strategy, business models, corporate governance practices, and interactions with stakeholders. These changes must align with inclusive growth strategies, which entail company development that not only achieves financial and operational growth and an increase in market value but also fosters an environment conducive to improving the quality of life and providing equal opportunities for all population groups, both within the countries where the company operates and globally. Adhering to these strategies enables companies to navigate turbulent economic, technological, and geopolitical landscapes with minimal losses.

Implementing such transformations requires substantial investments, and identifying the sources of financing is essential. This choice significantly influences the specifics of a company's financing policy and the extent to which different sources of funding are employed.

This paper focuses on the metals and mining sector, which presents a unique case. On the one hand, it represents one of the primary contributors to environmental pollution, accounting for approximately 8% of global greenhouse gas emissions in 2021, according to Our World in Data. On the other, products manufactured by companies in this sector, such as steel, copper, aluminum, nickel, zinc, and silicon, play a pivotal role in transitioning to a green economy and decarbonizing the transportation and power generation sectors. Consequently, these companies are indispensable to the world's efforts to achieve sustainable, eco-friendly manufacturing practices. As such, they must undertake strategic transformations and invest in green technology to remain relevant. This research focuses on the world's largest publicly traded companies in terms of market capitalization within the metals and mining sector in 2021. The sample comprises 212 companies and encompasses 1,272 observations spanning from 2016 to 2021.

This paper aims to define quantitative indicators for evaluating company adherence to inclusive growth strategies and explore the relationships between inclusive growth and company financing policies. It sheds light on previously unstudied issues, such as the impact of inclusive growth indicators on the volume and number of issues of sustainable (responsible) financing instruments and the circumstances under which they arise in the metals and mining sector.

The findings from this research can be valuable for companies in the metals and mining sector, particularly in the areas of strategy development and corporate finance, as they work toward implementing inclusive growth strategies and making decisions regarding the financing of related projects.

Literature Review

Notion and Concept of Inclusive Growth

This section delves into academic and practical literature to elucidate the meanings of "inclusion" and "inclusive" or "sustainable" growth and outlines the characteristics of companies committed to inclusive growth. Our initial search for pertinent scholarly papers was conducted using such databases as Scopus, ScienceDirect, JSTOR, and Springerlink. Additionally, we examined practical reports on the topic from esteemed global consulting firms such as BCG and McKinsey, as well as international organizations including the UN, ECE, OECD, and the Asian Development Bank.

According to specialists at the Asian Development Bank [1], inclusive growth entails not only generating new economic opportunities but also ensuring equal access to these opportunities for all segments of society, particularly for disadvantaged population groups. The OECD [2] defines inclusive growth as economic growth that fosters opportunities for all demographic groups and fairly distributes the benefits of increased prosperity, both monetarily and non-monetarily, across society. The Eurasian Economic Commission and UNCTAD [3] characterize inclusive growth as economic growth closely linked to the establishment of favorable conditions that enhance the quality of life and guarantee equal opportunities for all segments of a country's population.

Inclusive growth is intrinsically tied to the attainment of the United Nations Sustainable Development Goals (UN SDGs), a set of 17 interconnected objectives formulated in 2015 by the UN General Assembly to serve as a "blueprint to achieve a better and more sustainable future for all" [4]. These SDGs aim to enhance prosperity and protect the planet. Consequently, endeavors to accelerate economic growth must align with resolving issues in healthcare, education, social protection, environmental conservation, and the battle against climate change. The 17 UN SDGs encompass:

1) No poverty.
2) Zero hunger.
3) Good health and wellbeing.
4) Quality education.
5) Gender equality.
6) Clean water and sanitation.
7) Affordable and clean energy.
8) Decent work and economic growth.
9) Industry, innovation, and infrastructure.
10) Reduced inequalities.
11) Sustainable cities and communities.

12) Responsible consumption and production.
13) Climate action.
14) Life below water.
15) Life on land.
16) Peace, justice, and strong institutions.
17) Partnerships for the goals.

Thus, the achievement of inclusive growth is intrinsically linked with the realization of the UN SDGs. However, there is currently no universally accepted method for companies to demonstrate their alignment with the SDGs. Empirical measurement of company commitment to inclusive growth is frequently accomplished through Environmental, Social, and Governance (ESG) metrics [5].

The growing trend of ESG practices and non-financial information disclosure represents a novel approach where companies voluntarily pursue non-financial and sustainable development goals that create value for corporate investors and other stakeholders [6]. ESG ratings quantify the efficiency with which a company progresses toward sustainable development objectives. Consequently, a comparison of ESG and SDG parameters provides information for investors and other stakeholders on the efficacy with which a company is advancing toward the SDGs. Drawing from scientific research [7] and our own analysis, we have compared SDG components and ESG categories (Figure 1). A significant number of the SDGs align with the Environmental and Social categories, with some SDGs intersecting both. The Governance category relates to a smaller number of SDGs, which simultaneously intersect with the Environmental and Social categories.

Figure 1. Correspondence of SDGs to ESG components

Source: compiled by the authors based on [7].

In alignment with SDG strategies pursued by major public companies in the metals and mining sector, such as BHP Group, Vale S.A., Anglo American Plc, and Polymetal International Plc, we have selected the most relevant SDGs for this sector and examined their correspondence to ESG metrics (Figure 2).

Figure 2. SDG in the metals and mining sector

ЦУР в секторе «Металлы и добыча»

Соответствие ЦУР компонентам ESG

Source: compiled by the authors.

Inclusive Growth Strategies and Characteristics of Companies with Inclusive Growth Strategies

Research conducted by BCG [8] has identified nine distinct strategies for achieving inclusive growth:

1. Reimagining Core Activities: Companies should rethink their core areas of operation to contribute to societal prosperity, aiming for stable and long-term Total Shareholder Return (TSR). This involves integrating social responsibility into core business operations.

2. Digital Solutions: Beyond physical products or services, companies should offer in-demand digital solutions and modes of interaction to meet evolving consumer needs.

3. Localized Growth: Focusing on profitable growth in specific markets by adopting methods tailored to meet local requirements.

4. Value Source Nets: Companies should expand traditional value chains by creating dynamic "value source nets" that generate and implement solutions and modes of interaction aligned with consumer demand.

5. Technological Investment: Investing in cutting-edge technology, establishing multiple local facilities, and optimizing delivery centers to enable quick customization of offerings and cost reduction.

6. Global Data Architecture: Developing a global data architecture and analytical skills as a foundational element for the other strategies.

7. Flexible Organizational Structure: Replacing the classical matrix organizational model with flexible and adaptive teams oriented toward consumers, supported by platform capabilities.

8. Talent Attraction and Development: Attracting, retaining, incentivizing, and nurturing technologically proficient and motivated employees.

9. Continuous Change Culture: Fostering a culture of ongoing change rather than relying on isolated change initiatives.

In our assessment, strategies 1, 3, 5, 6, 8 and 9 are particularly relevant to companies in the metals and mining sector due to the specific nature of their operations.

Furthermore, companies that pursue inclusive growth strategies should exhibit the following characteristics, according to BCG [8]:

- Maximizing Total Societal Impact (TSI): Prioritizing the maximization of TSI to drive TSR growth.
- Customized Digital Solutions: Offering personalized digital solutions and services.
- Selective Growth Strategy: Implementing a selective approach to growth and market presence.
- Ecosystem Creation: Developing ecosystems to enhance value creation.
- Flexible Logistics: Establishing a flexible logistics system.
- Comprehensive Data Management: Creating a robust data handling system.
- Agile Management: Adopting an agile approach to management.
- Continuous Transformation: Embracing continuous adaptation in response to changing circumstances.

In addition, companies committed to inclusive growth tend to have diverse boards of directors, as shown by [9]. This aligns with agency theory and the stakeholder approach, both of which emphasize the importance of the board of directors in increasing a company's inclusivity. According to agency theory, separating the roles of chairman of the board of directors and CEO is more common among companies following inclusive growth strategies, as it enhances monitoring and control of executive actions. When the CEO also serves as the chairman of the board of directors, the effectiveness of monitoring is compromised.

Relationship between Inclusive Growth and Special Features of Company Financing

In order to examine the relationship between inclusive growth and the specific features of companies' financing policies, we have categorized relevant scientific papers into three subgroups based on the focus of their study:

1) Capital Structure and Inclusive Growth. An analysis of academic literature on the relationship between inclusive growth and the company's capital structure reveals mixed findings. Overall, authors in [10] emphasize that companies with strong indicators of Corporate Social Responsibility (CSR) face fewer limitations in raising capital. This is attributed to two factors: First, high CSR correlates with closer stakeholder engagement, reducing the likelihood of opportunistic behavior and promoting more efficient interactions. In other words, the interaction with stakeholders on the basis of mutual trust and cooperation decreases potential agency costs and pushes managers towards profit-making long-term decisions instead of short-term ones. Second, companies with higher CSR indicators tend to disclose information on their CSR activities publicly, enhancing transparency and accountability. Higher transparency levels reduce information asymmetry between the company and investors, thereby mitigating risk.

M. Benlemlih [11] concludes that U.S. companies with high CSR levels tend to use more equity and short-term debt for financing their operations. These companies expedite debt maturity to demonstrate their high quality and address concerns of CSR overinvestment. CSR initiatives related to diversity and community engagement have the most significant impact on reducing debt maturity.

Subsequently, Dimitropoulos and K. Koronios [12] reached similar conclusions after studying a sample of European companies, finding that companies with high corporate environmental responsibility rely more on equity and short-term debt rather than long-term debt. R. Khaled et al. [7] highlight that profitable, large companies with lower leverage are more likely to have higher inclusive growth indicators.

O. Villaron-Peramato et al. [13], drawing from agency theory, suggest that a need for higher debt may arise from the external control mechanism of CSR investments, which managers use to obtain personal benefits, maximize their utility functions, mitigate shareholder and stakeholder criticism, and mask their discretion in decision-making.

H.Al Amosh et al. [14] observe that an increase in the use of medium-term and long-term debt is associated with high ESG performance. Management aims to reduce agency costs through lower information asymmetry, which is achieved by investing in ESG projects.

On the other hand, L. Lindkvist and O. Saric [15] contend that sustainable development initiatives do not significantly impact a company's capital structure. However, they note a significant relationship between the corporate governance component and leverage ratios, with companies exhibiting high corporate governance levels finding it easier to secure loans. These results suggest that inclusion and sustainability considerations have not yet become decisive factors in financial decision-making. Nevertheless, companies should engage in inclusive growth projects because they yield benefits for shareholders and stakeholders.

2) Cost of Capital and Inclusive Growth. S. El Ghoul et al. [16] conducted an analysis of companies from various countries and found that high levels of corporate environmental responsibility lead to a decrease in stock capital value. Successful environmental performance may reduce a company's risk and enhance its attractiveness to investors, resulting in a lower stock capital value.

D. Schoenmaker et al. [17] reached similar conclusions, asserting that high environmental and social ratings are associated with a lower cost of capital. Sustainable development indicators positively influence company value by reducing costs through a lower cost of capital. They also argue that external factors such as the economic and institutional environment, as well as cultural characteristics, significantly influence the relationship between the cost of capital and corporate inclusion indicators.

T.C. Goncalves et al. [18] found that companies with high ESG performance tend to have lower stock capital values because shareholders are willing to accept lower returns in exchange for the company's commitment to inclusivity. Conversely, a high cost of debt is linked to high performance in corporate governance and the social sphere. Creditors may perceive investments in inclusive projects as less efficient and attractive, leading to a demand for additional returns.

3) Credit Rating and Inclusive Growth. G. Dorfleitner and J. Grebler [19] discovered that high environmental and social ratings among companies in North America, Europe, and Asia correlate with higher credit ratings. C.E. Bannier et al.'s research [20] generally supports this finding, indicating that high environmental ratings for U.S. companies lead to decreased credit risk. European companies exhibit similar results. Another significant factor in credit risk mitigation is a high social rating. H. Li et al. [21] substantiate these results for Chinese companies, concluding that high ESG ratings reduce default risk, especially over longer default risk timeframes (1 to 12 months). They also show that the influence of ESG ratings on default risk is less pronounced for production companies compared to non-production companies.

In summary, the analysis of scientific papers on this topic reveals several gaps in research:

1. There is no comprehensive approach to evaluating company adherence to inclusive growth strategies.

2. The influence of inclusive growth indicators on the volume and number of issues of sustainable (responsible) financing instruments has not been thoroughly explored.

3. The impact of inclusive growth indicators on a company's capital structure remains ambiguous.

Research Methodology

Indicators for Evaluating Companies Adhering to Inclusive Growth Strategies

One of the research objectives is to define quantitative indicators for evaluating company adherence to inclusive

growth strategies. We have based our approach on the study by R. Khaled et al. [7], which posits that pursuing inclusive growth strategies is closely linked to achieving Sustainable Development Goals (SDGs), which, in turn, are assessed using Environmental, Social, and Governance (ESG) metrics/ratings.

Many international organizations, such as S&P, MSCI, Refinitiv, and Sustainalytics, compile comprehensive ESG ratings for public companies. These ratings are based on various indicators, each with different weights in the final rating, depending on industry affiliation. While an ESG rating by itself does not directly evaluate SDG achievement or adherence to inclusive growth strategies, some of its components can be used for this purpose.

We believe that the concept of "inclusion" extends beyond ESG rating indicators. Assessing a company's commitment to inclusive growth encompasses not only its environmental (E), social (S), and corporate governance (G) activities but also its business strategy and the unique characteristics of its external environment, including the macroeconomic situation, institutional environment, and state policies in the countries of operation.

To measure a company's commitment to inclusive growth, we have defined five areas that capture various aspects of inclusion:

1. Environment: This area includes indicators from the 100-point Refinitiv ESG Score, such as the Emissions Score (reflecting a company's efforts to reduce emissions during its operations) and the Resource Use Score (indicating the company's reductions in materials, energy, or water usage and its search for environmentally efficient solutions through supply chain management improvements).

2. Social Sphere: This area encompasses additional components of the Refinitiv ESG Score, including the Workforce Score (evaluating improvements in job safety, employee qualifications, education, and job satisfaction), the Human Rights Score (measuring advancements in human rights), the Community Score (assessing contributions to enhancing the quality of life in local communities), and the Product Responsibility Score (evaluating the creation of high-quality and safe products or services).

3. Corporate Governance: This area focuses on the Governance Score, a component of the Refinitiv ESG Score that reflects the level and quality of corporate governance within the company.

To ensure a comprehensive and unbiased evaluation, all the above indicators are adjusted for the value of the Refinitiv ESG Controversies Score. This score accounts for ESG controversies arising from discrepancies between data reported in corporate public reports and information available in the public domain. Adjustments are made by averaging the values when the underlying indicator's value exceeds the Controversies Score.

4. Inclusion of Countries of Operation: This area considers the Country SDG Index Score, provided by the UN Sustainable Development Solutions Network. This score characterizes a company's achievement of SDGs in the countries where it operates, on a scale from 0 to 100, with higher values indicating greater SDG achievement.

5. Business Strategy: This area is evaluated by the McKinsey Corporate Horizon Index (CHI), a complex indicator consisting of five components: investment level, profitability growth, increase in earnings per share (EPS), and revenue management [20]. CHI helps classify companies based on their strategic orientation. If the index value exceeds 50 (on a scale from 0 to 100), the company is considered "long-sighted," while a value less than 50 suggests a "shortsighted" approach. Longsighted companies prioritize long-term value creation, invest consistently and with higher quality, avoid pursuing accounting-based ("paper") earnings, and aim to exceed the ESG consensus forecasts of analysts, in contrast to shortsighted companies.

Research Hypotheses

We propose five hypotheses based on the classification presented in the literature review. The first three hypotheses (H1, H2.1, H2.2) pertain to the examination of the relationship between inclusive growth and capital structure.

H1: It is characteristic of companies in the metals and mining sector that follow inclusive growth strategies to use borrowed funds more widely (resulting in high leverage). In other words, there is a positive relationship between the inclusive growth indicators and the leverage level (D/E ratio).

We contend that a high level of inclusion empowers companies to mitigate financial, operational, and reputation risks, enhancing their long-term business continuity, market positioning, and attractiveness to investors. Consequently, these companies are more inclined to secure larger loans for financing their activities, including projects related to inclusion.

The scientific literature does not provide a definitive consensus on the influence of inclusive growth indicators on capital structure. Similar hypotheses were examined in studies by O. Villaron-Peramato et al. [13] and H. Al Amosh et al. [14], both of which confirmed the existence of a positive relationship between inclusive growth indicators and leverage levels. Conversely, research by L. Lindkvist and O. Saric [15] found no correlation between sustainable development initiatives and capital structure. Other studies [11; 12] even suggest a negative relationship, indicating that highly inclusive companies tend to rely more on stock capital.

H2.1: It is characteristic of companies in the metals and mining sector that follow inclusive growth strategies to employ sustainable (responsible) financing tools more widely. In other words, there is a positive relationship between the inclusive growth indicators and the volume of issues of sustainable (responsible) financing tools.

H2.2: It is inherent to companies in the metals and mining sector that follow inclusive growth strategies to use sustainable (responsible) financing tools more widely. In other words, there is a positive relationship between the inclusive growth indicators and the number of issues of sustainable (responsible) financing tools.

Sustainable (responsible) financing tools encompass green, social, sustainable, adaptable bonds, as well as bonds and credits linked to SDGs and climate transfers. Although these hypotheses have not been previously explored, we believe that companies following inclusive growth strategies may diversify their sources of financing by incorporating such tools. This expansion would enable them to take full advantage of investment projects aligned with inclusive growth principles.

Hypothesis H3 aims to evaluate the impact of inclusive growth on the weighted average capital cost (WACC).

H3: A low weighted average capital cost (WACC) is characteristic of companies in the metals and mining sector that follow inclusive growth strategies. In other words, there is a negative relationship between the inclusive growth indicators and WACC.

Our assumptions from H1 can be extended by asserting that high inclusion levels empower companies to reduce their capital costs due to lower associated risks. Existing research by S. El Ghoul et al. [16], D. Schoenmaker et al. [17], and T.C. Goncalves et al. [18] generally supports the existence of a negative relationship between inclusive growth indicators and the cost of capital.

Hypothesis H4 investigates the relationship between inclusive growth and credit ratings.

H4: Companies in the metals and mining sector that follow inclusive growth strategies tend to have higher credit ratings. In other words, there is a positive relationship between the inclusive growth indicators and the credit rating level.

This assumption aligns with the aforementioned points: high inclusion companies typically exhibit lower financial and operational risks, which translates into higher credit ratings. Research conducted by G. Dorfleitner and J. Grebler [19], C.E. Bannier et al. [20], and H. Li et al. [21] supports the notion that high inclusive growth indicators correlate with elevated credit ratings and reduced default risks.

Description of Variables

To test H1, we utilized the Book D/E ratio, which represents the ratio of total debt to stock capital based on accounting values from financial reports. This served as our dependent variable to gauge the level of leverage.

For hypotheses H2.1 and H2.2, we employed independent variables related to the volume (Volume of Sustainable Financing) and the number (Number of Sustainable Financing) of sustainable (responsible) financing tools used. To gather this data, we retrieved all information regarding green, social, sustainable and adaptable bonds and credits, as well as those linked to Sustainable Development Goals (SDGs) and climatic transfer, from the Refinitiv database.

In the evaluation of hypothesis H3, the dependent variable used was the Weighted Average Capital Cost (WACC) measured in US dollars, sourced from the Refinitiv database.

To investigate H4, we employed the implied credit rating of companies as the dependent variable. This rating was calculated based on a comparison of a company's interest coverage ratio with the level of credit spread, referencing A. Damodaran's table.

In line with our earlier analysis, we considered several independent variables indicative of a company's adherence to inclusive growth strategies. These included components from the Refinitiv ESG Score (adjusted for the Refinitiv ESG Controversies Score), the Country SDG Index Score and the McKinsey Corporate Horizon Index.

Additionally, we introduced a dummy variable for the type of economy in the country of operation (Economy Type), with a value of 1 denoting a developed country and 0 representing an emerging country. This variable allowed us to examine the potential influence of the country's economic status on our hypotheses.

A second dummy variable (SubIndustry) was used to account for a company's affiliation with a subindustry.

Furthermore, we considered several control variables:

1. Size: Calculated as the natural logarithm of total assets. Larger companies typically exhibit more stable cash flows, greater resilience, higher levels of information disclosure, and the ability to provide substantial collateral, leading to lower bankruptcy risk, higher credit ratings, greater loan attractiveness, and a lower cost of capital.

2. Profitability: Represented by the EBIT margin. According to the pecking order theory, highly profitable companies often have sufficient cash flow from operations to finance their activities and therefore require less borrowed capital. These companies typically possess high credit ratings and a low cost of capital.

3. Growth: Measured by the Tobin's Q ratio. According to the same theory, companies with high expected growth rates may rely more on borrowed capital since they often lack internal resources to fund their operations. Consequently, their cost of capital tends to be higher due to cash flow instability and increased risks associated with growth initiatives. These companies are also more likely to have lower credit ratings.

4. Capital Expenditure Intensity (CapEx Intensity): Calculated as the ratio of capital expenditure to total assets. In periods of increased capital expenditure, companies may take on more debt to finance investment projects. The impact on credit ratings and the cost of capital depends on market conditions, financial performance, and various other factors, making it difficult to determine a straightforward relationship.

Additionally, for hypothesis H3, invested capital was included as a control variable, as a low cost of capital is typically associated with larger companies due to their greater stability and lower risks. In hypothesis H4, we also included the Book D/E ratio as an additional control variable, as changes in a company's leverage often have an inverse effect on its credit rating.

Empiric Study: Econometrics

Research Sample

This paper focuses on public companies in the metals and mining sector, specifically those with the largest capitalization in 2021. Data, both financial and non-financial, was sourced from the information and analytical system Refinitiv and other platforms such as Investing, Reuters, Damodaran, and the UN Sustainable Development Solutions Network. All financial figures are denominated in US dollars.

The study encompasses the time span from 2016 to 2021. This timeframe was chosen because countries committed to working toward the achievement of Sustainable Development Goals (SDGs) in 2016, and it was also around this time that the ESG agenda, including ESG ratings, gained global prominence. The upper limit of this interval is dictated by the fact that, at the time of the research, most of the analyzed companies had not yet published their financial results for 2022.

The sample consists exclusively of companies with complete data available for the period from 2016 to 2021. After excluding companies with missing data, we retained 212 suitable companies. In total, this resulted in 1,272 data points over the six-year period.

The resulting sample is sufficiently diverse in terms of the countries in which the companies operate and the subindustries they belong to. A majority of the companies are registered in developed countries, comprising approximately 60% of the total. The most prevalent subindustries within the sample include the ferrous metal industry and a diversified basket of metals, accounting for approximately 60% of the entire sample.

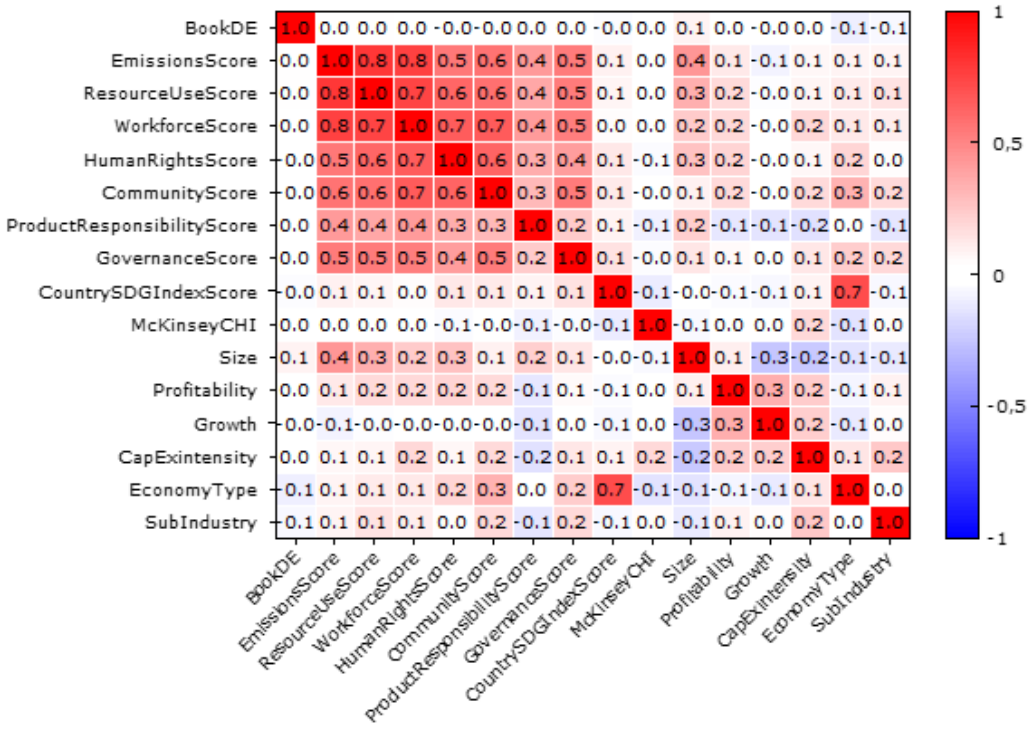
The data for each company is considered over a six-year period, resulting in a structured panel data format. Appendix 1 provides descriptive statistics. The panel structure offers both advantages and disadvantages. On the one hand, it allows for specific valuation methods that are only possible with this structure, which helps mitigate potential estimation biases arising from individual company characteristics. On the other, the panel structure does not account for time-invariant variables (e.g., subindustry or the economic type of the country where the company operates). To address this issue, dummy variables were introduced for subindustries and country economic types.

This research employs various models optimized for testing the proposed hypotheses, including random effects, fixed effects, pooled panel data, Tobit, and ordered logit models. These models are used to determine the relationship, if any, between inclusion indicators and specific aspects of the companies' financial policies.

Research Results

For the analysis of the relationship between inclusive growth indicators and leverage level (H1), we used the *random effects model*, which is particularly well-suited for this task. We constructed a regression between the leverage level (Book D/E) and the inclusion indicators and other financial metrics of companies. To ensure the validity of the analysis, we first examined the correlation matrix to detect potential multicollinearity among variables (Figure 3).

Figure 3. Correlation matrix (for hypothesis H1)



Source: calculated by the authors using Gretl.

Table 1. Panel specification (for hypothesis H1)

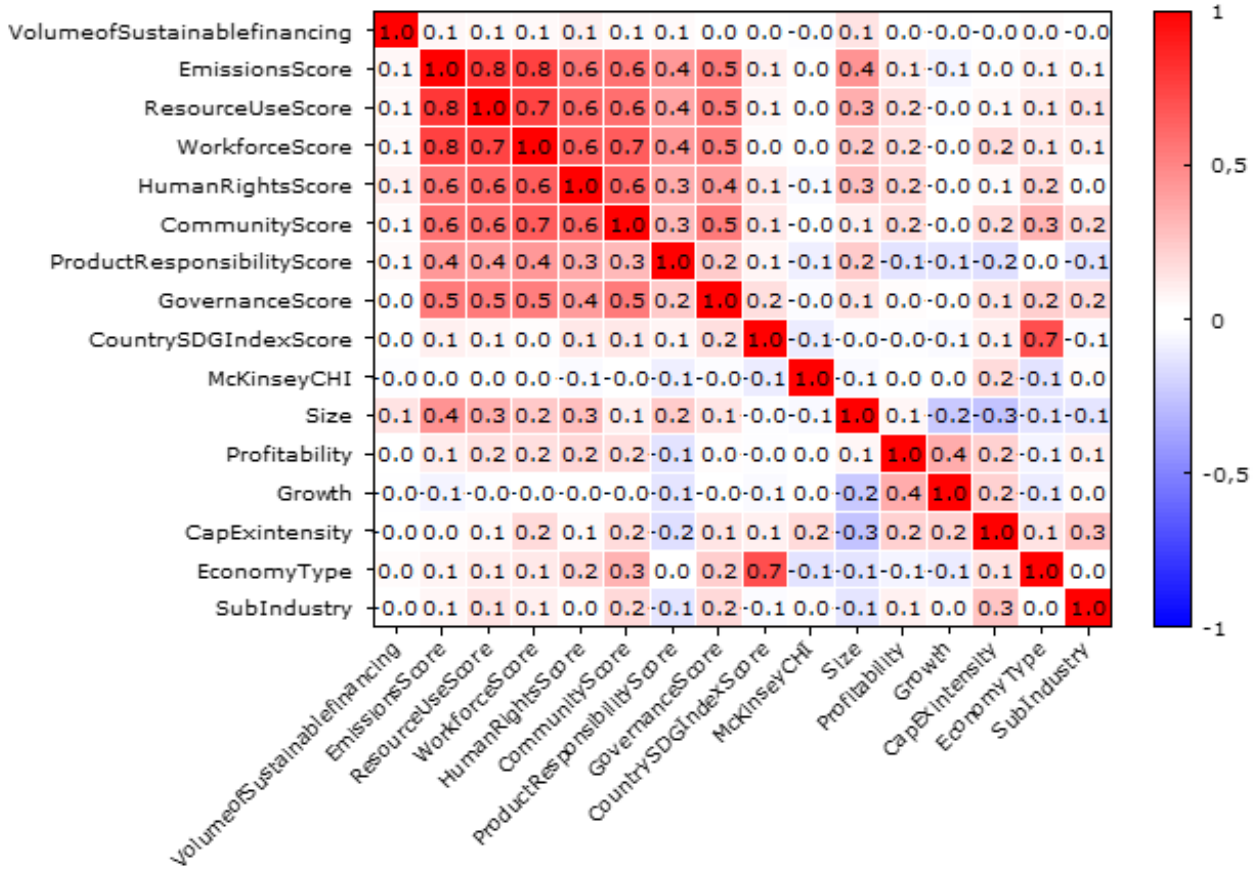
Test	P-value	Zero hypothesis	Required model
Joint significance of differences in group mean values	0.01	Adequacy of the pooled panel data model	Fixed effects model
Breusch – Pagan statistics	0.03	Adequacy of the pooled panel data model	Random effects model
Hausman's test	0.75	No correlation between individual effects and regressors	Random effects model

Source: calculated by the authors using Gretl.

The inflation factors method shows no significant multicollinearity in the data. We selected the optimal model for analysis through the panel specification test (Table 1).Based on this analysis, it is reasonable to proceed with the random effects model. This model includes dummy time variables, yet the Wald test did not support the presence of time effects (p-value of 0.47). Consequently, we decided to exclude them from the model due to their insignificance. Among the inclusion indicators, only the Resource Use Score is significant at the 10% level. Among the other variables, company size and economy type are significant at the 1% level, and the subindustry of diversified metals is significant at the 5% level.

For the analysis of the relationship between inclusive growth indicators and the volume of issues of sustainable (responsible) financing tools (H2.1), we examined various panel models to identify the most suitable one. The initial step involved constructing a correlation matrix to assess potential multicollinearity among variables (Figure 4).

Figure 4. Correlation matrix (for hypothesis H2.1)



Source: calculated by the authors using Gretl.

Using the inflation factors method, we determined that there is no significant multicollinearity in the data. To choose the most appropriate model for analysis, we conducted a panel specification test (Table 2).

Table 2. Panel specification (for hypothesis H2.1)

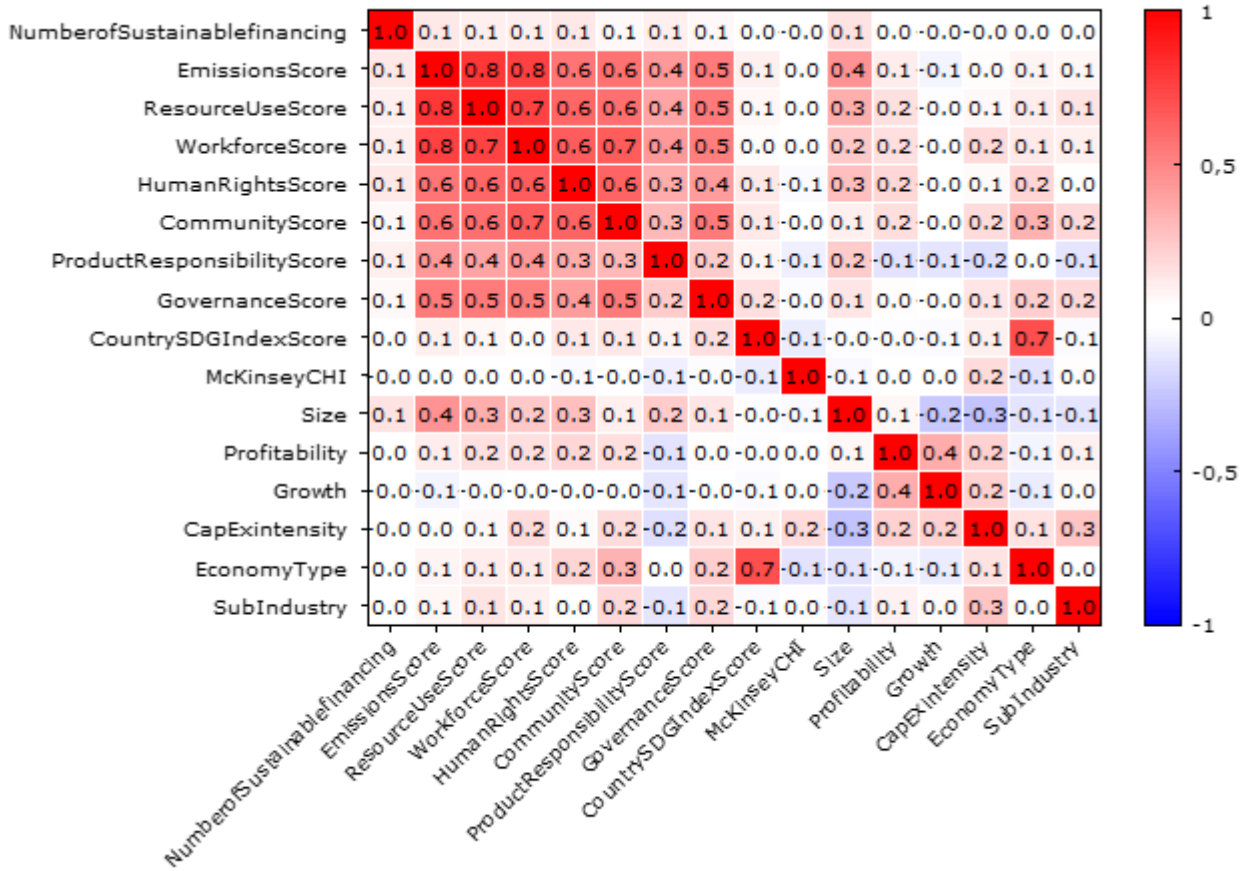
Test	P-value	Zero hypothesis	Required model
Joint significance of differences in group mean values	0.47	Adequacy of the pooled panel data model	Pooled panel data model
Breusch – Pagan statistics	0.56	Adequacy of the pooled panel data model	Pooled panel data model

Source: calculated by the authors using Gretl.

In the *pooled panel data model*, time effects were found to be significant, so we retained them as regressors. This decision was supported by the Wald test for the joint significance of time period dummy variables (p-value of 0.02). The results indicate that the dummy variable for 2019 is significant at the 5% level, and the dummy variable for 2021 is significant at the 1% level. There is no relationship between the inclusion indicators and the volume of attracted sustainable (responsible) financing. On the other hand, variables such as company size and the country's economy type are significant at the 1% and 5% levels, respectively.

For the analysis of the relationship between inclusive growth indicators and the number of issues of sustainable (responsible) financing tools (H2.2), the dependent variable is the number of issues, which is a whole number ranging from 0 to 4. Companies decide to issue sustainable (responsible) financing tools when they achieve a certain level of success in inclusion. However, other companies may be at different inclusion levels and may not see any current advantages in such issues. Therefore, the sample is censored, and the Tobit model is chosen as the most suitable one.
To ensure that multicollinearity is not present in the data, a correlation matrix was constructed (Figure 5).

Figure 5. Correlation matrix (for hypothesis H2.2)

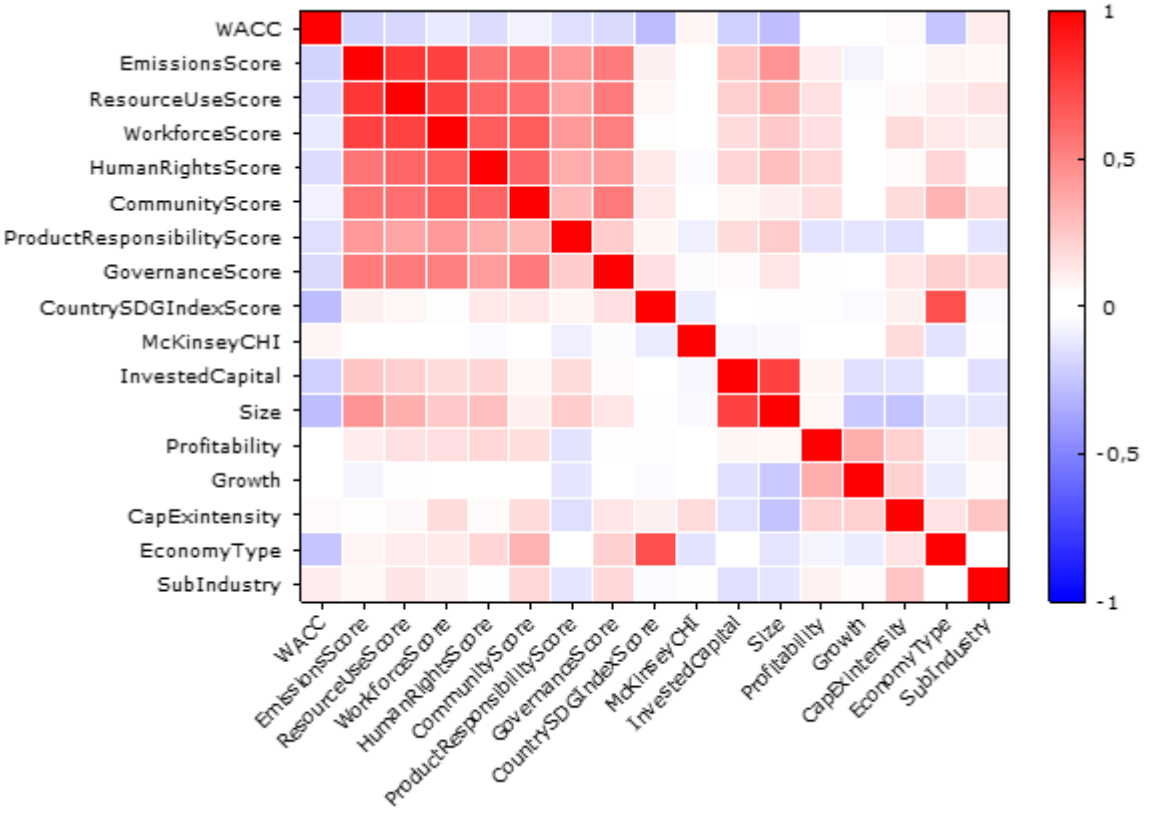


Source: calculated by the authors using Gretl.

The inflation factors method also indicated the absence of significant multicollinearity in the data. When testing this hypothesis, time effects were found to be insignificant. Consequently, we excluded them from the model, a decision supported by the Wald test for the joint significance of time period dummy variables. The Human Rights Score is significant at the 1% level, and the variables of company size and the subindustry of other precious metals are significant at the 1% level, while the subindustry of diversified metals is significant at the 5% level.

To test hypothesis H3, we utilized the *fixed effects model*, which provides a comprehensive view of the relationship between the inclusive growth indicators and the weighted average capital cost (WACC). Initially, we constructed a correlation matrix to assess potential multicollinearity among variables (Figure 6).

Figure 6. Correlation matrix (for hypothesis H3)



Source: calculated by the authors using Gretl.

The inflation factors method was also employed to check for significant multicollinearity in the data, and it confirmed the absence of such issues.

To determine the appropriate model for testing the relationship between inclusion indicators and WACC, we conducted a panel specification test, the results of which are presented in Table 3.

Table 3. Panel specification (for hypothesis H3)

Test	P-value	Zero hypothesis	Required model
Joint significance of differences in group mean values	2*10–123	Adequacy of the pooled panel data model	Fixed effects model
Breusch – Pagan statistics	2*10–177	Adequacy of the pooled panel data model	Random effects model
Hausman's test	5*10–006	No correlation between individual effects and regressors	Fixed effects model

Source: calculated by the authors using Gretl.

Based on the panel specification test results, the fixed effects model was selected as the appropriate choice for analyzing the relationship between inclusion indicators and WACC. It is worth noting that time effects remained significant during the testing, so they were retained as regressors in the model.

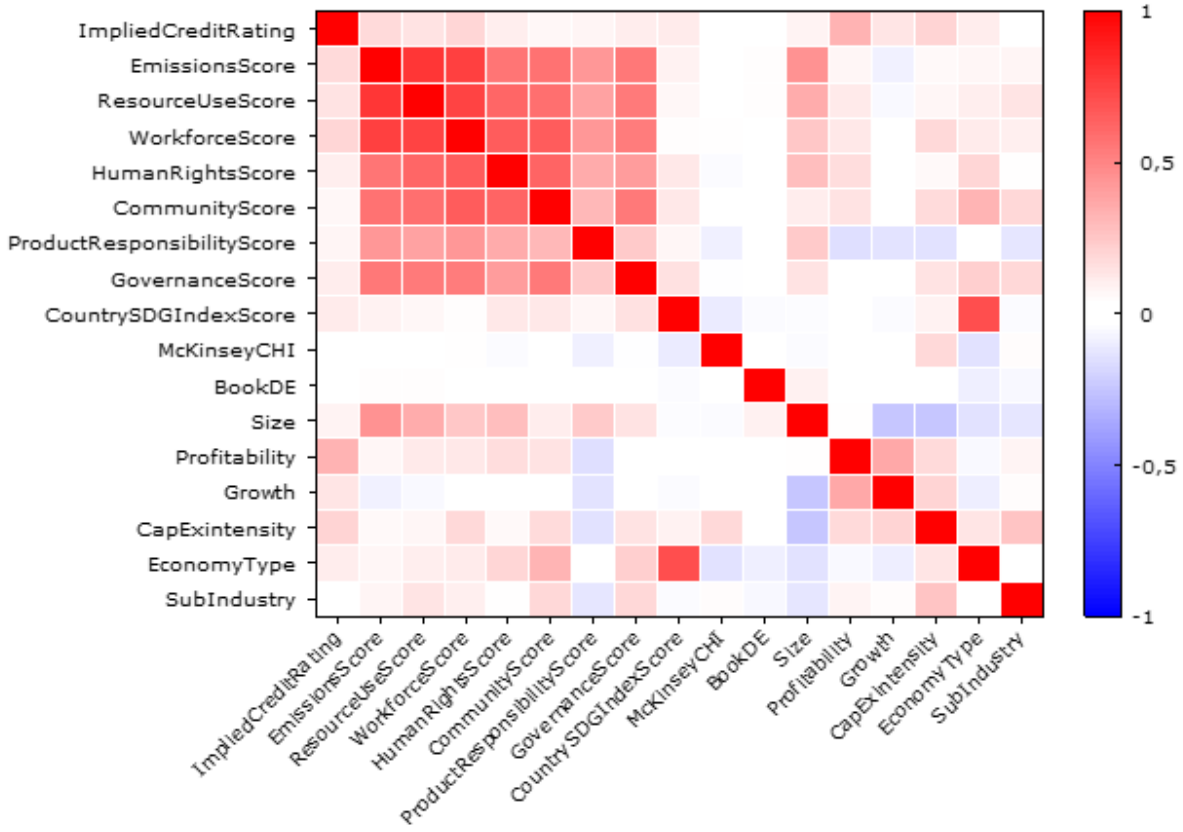
The results of the fixed effects model clearly indicate the significance of the independent inclusion variables. Specifically, the Emissions Score is significant at the 5% level, and the Community Score is significant at the 10% level. Additionally, variables such as company size, growth indicator, and dummy time variables for the years 2017, 2018, 2020, and 2021 are significant at the 1% level.

To analyze the relationship between the inclusive growth indicators and the credit rating level (H4), we took the corporate credit rating (Implied Credit Rating) as the dependent variable. This variable is discrete and ranges from 1 to 15, with 1 representing the worst rating and 15 the best.

To appropriately model the relationship with a discrete dependent variable like credit rating, the *ordered logit model* is the most suitable choice, considering that the dependent variable has a finite and ordered set of values.

The initial step in the regression analysis was to construct a correlation matrix (Figure 7) to assess potential multicollinearity among variables.

Figure 7. Correlation matrix (for hypothesis H4)



Source: calculated by the authors using Gretl.

The inflation factors method confirmed the absence of significant multicollinearity in the data.

In the logit model, time effects were found to be insignificant, leading us to exclude them as regressors. The results of the model indicate that several independent inclusion variables have significance. Specifically, the Workforce Score, Community Score, and Product Responsibility Score are significant at the 1% level. The Human Rights Score and McKinsey CHI variables are significant at the 5% level, and the Emissions Score is significant at the 10% level.

Interpretation of Results

The results of the econometric study show that the majority of inclusion indicators do not significantly impact the financing policy of companies in the metals and mining sector. These findings highlight the complexity of real-world business operations, which often do not align with advanced theoretical models. Several factors, including the subindustry in which a company operates, country-specific characteristics, cultural factors, institutional environments, and internal company-specific factors, can influence financing decisions.

The results are summarized in Table 4, which shows the influence of independent, control and dummy variables on the dependent variable.

Table 4. Results of the econometric study: final table with the signs of coefficients

Indicator designation	Hypothesis				
	H1	H2.1	H2.2	H3	H4
			Model		
	RE	Pooled	Tobit	FE	Ordered logit
			Dependent variable		
	Book D/E	Sustainable financing		WACC	Implied Credit Rating
		Volume	Number		
Independent variables					
Emissions Score	–	–	+	+**	+*
Resource Use Score	+*	–	–	–	–
Workforce Score	–	+	+	+	+***
Human Rights Score	–	+	+***	–	–**
Community Score	+	+	–	–*	–***
Product Responsibility Score	+	–	+	+	+***
Governance Score	+	–	+	+	+
Country SDG Index Score	+	–	+	–	+
McKinsey CHI	+	–	+	+	–**
Invested Capital (H3)				+	
Book D/E (H4)					–
Control variables					
Size	+***	+***	+***	–***	+
Profitability	–	–	+	–	+***
Growth	–	–	+	–***	+
CapEx Intensity	+	+	+	–	+***
Dummy variable					
Economy Type	–***	+**	–		+***
DSubIndustry_1: diversified basket of metals	+**	–	–**		+
DSubIndustry_2: ferrous metallurgy	+	–	–		+
DSubIndustry_3: copper	+	–	–		+
DSubIndustry_4: gold	+	–	–		–

Indicator designation	Hypothesis				
	H1	H2.1	H2.2	H3	H4
			Model		
	RE	Pooled	Tobit	FE	Ordered logit
			Dependent variable		
	Book D/E	Sustainable financing		WACC	Implied Credit Rating
DSubIndustry_5: Other precious metals (except for gold and silver)	–	–	–***		+
DSubIndustry_6: aluminum	–	+	–		+
Dummy variable for 2017		–		+***	
Dummy variable for 2018		+		+***	
Dummy variable for 2019		+**		+	
Dummy variable for 2020		+		–***	
Dummy variable for 2021		+***		–***	

Note: ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$; *RE* – random effects, *FE* – fixed effects, *Pooled* – pooled panel data model, *Tobit* – Tobit model, *Ordered logit* – ordered logit model.

Source: calculated by the authors using Gretl.

Here is a summary of the key findings for each hypothesis:

H1: Relationship between Inclusion Indicators and Leverage Level (D/E Ratio)

Eight out of nine inclusion indicators had no significant impact on the leverage level (D/E ratio) of companies. (This generally confirms the conclusions made by L. Lindkvist and O. Saric [15], who did not find any relationship between sustainable development initiatives and capital structure.) Only the Resource Use Score was found to have a positive relationship with the D/E ratio (at the 10% significance level), indicating that companies with higher resource efficiency can better mitigate financial, operational and reputational risks, improve long-term business resilience, and attract more loans to finance inclusion-related projects.

H2.1: Relationship between Inclusion Indicators and Volume of Sustainable (Responsible) Financing

None of the inclusion indicators had a significant impact on the volume of sustainable (responsible) financing. This hypothesis was rejected.

H2.2: Relationship between Inclusion Indicators and Number of Issues of Sustainable (Responsible) Financing Tools

Only the Human Rights Score was found to have a positive relationship with the number of sustainable (responsible) financing tools issued (at the 1% significance level). This suggests that companies with higher scores in improving human rights are more likely to procure sustainable financing tools. The reason why the majority of inclusion indicators have no impact on the volume and number of issues of sustainable (responsible) financing may lie in the fact that the ESG agenda has seriously intensified only in recent years (since 2019). Given that the procurement of sustainable financing is a time-consuming process, companies may have simply failed to attract sufficient financing over the analyzed time interval. A longer-term study will most likely give different results.

H3: Relationship between Inclusion Indicators and Weighted Average Capital Cost (WACC)

Of the nine inclusion indicators, only the Emissions Score and Community Score were found to impact WACC, which partially supports the thesis by D. Schoenmaker et al. [17] that other external factors influence the cost of capital: the economic and market environment in which the company operates, the institutional environment, and cultural characteristics. The risk-free rate level influenced the dynamics of WACC, as evidenced by the significance of dummy variables in certain years.

The positive relationship between the Emissions Score and WACC (at the 5% significance level) may imply that com-

panies with a high Emissions Score have already invested enough in emission reduction projects and therefore do not need to borrow additional funds to implement environmental measures. Shareholders and creditors perceive investments by such companies in additional emission reduction projects as not being very efficient or attractive and so may require higher returns to invest in them.

In contrast, the Community Score had a negative relationship on WACC (at the 10% significance level). This indicator may be important for investors for the reason that many large companies possess major assets in remote and underdeveloped territories, where the quality of life of local communities needs improvement. Companies that are successful in this endeavor may convince investors and creditors to accept lower returns.

H4: Relationship between Inclusion Indicators and the Corporate Credit Rating

Six out of nine inclusion indicators were found to influence corporate credit ratings. Positive relationships were observed for the Workforce Score (at the 1% significance level), Product Responsibility Score (at the 1% significance level), and Emissions Score (at the 10% significance level), partially confirming the conclusions of G. Dorfleitner and J. Grebler [19], C.E. Bannier et al. [20], and H. Li et al. [21], who stated that high inclusive growth indicators of companies are related to high credit ratings and low default risks. The likely explanation is that rating agencies consider inclusion indicators, such as a company's success in improving job safety, creating safe and high-quality products, and reducing pollutant emissions, as being important for reducing risk.

In contrast, negative relationships were found for the Community Score (at the 1% significance level), Human Rights Score (at the 5% significance level), and McKinsey CHI (at the 5% significance level). The likely explanation is that investments by companies in projects for improving indicators in the first two fields are perceived as not being very efficient or attractive. Therefore, such companies bear more financial and other risks, which leads to a lower credit rating. A negative relation between McKinsey CHI and the credit rating level is due to the fact that the credit rating is based on short-term indicators and the current company situation, while a company with high McKinsey CHI focuses on success over the long term.

Overall, our results suggest that the impact of inclusion indicators on financing policies varies across different indicators. It is worth noting that the metals and mining sector may still be in the early stages of adopting inclusive growth strategies, and the effects may become more pronounced over time.

Empirical Case Study

Selection of companies for analysis

For further analysis, we selected the 20 largest public companies in the world in terms of market capitalization within the metals and mining sector for the year 2021. We obtained indicators reflecting each company's adherence to inclusive growth strategies in 2021. These indicators encompassed the Emissions Score, Resource Use Score, Workforce Score, Human Rights Score, Community Score, Product Responsibility Score, Governance Score, Country SDG Index Score, and McKinsey CHI.

Applying an averaging process to their values, we computed a consolidated inclusivity index (Inclusivity Index), which we used for ranking these companies (see Appendix 2 for details).

For the purpose of our analysis, we chose to focus on three specific companies: Anglo American Plc (Great Britain) – one of the inclusion leaders with an Inclusivity Index of 61.77; Vale S. A. (Brazil) – a company with a below-average index value of 50.30; and PJSC Mining and Metallurgical Company Norilsk Nickel (Russia) – another company whose Inclusivity Index is below average (48.02). These companies were selected for the following reasons:

1. The chosen companies possess a diversified range of extracted metals, rendering them comparable in terms of their business profiles and potential ESG risks.

2. They exhibit a strong commitment to high levels of information disclosure, a prerequisite for conducting a high-quality analysis.

3. These companies operate not only in developed nations but also in emerging markets, enabling a comparative analysis.

Our evaluation of these companies' adherence to inclusive growth strategies encompassed the components of the Refinitiv ESG Score, duly adjusted for the Refinitiv ESG Controversies Score. Additionally, we incorporated the Country SDG Index Score and the McKinsey CHI into our analysis. Furthermore, we reviewed the companies' annual reports and investor presentations.

Analysis of Anglo American Plc

Anglo American Plc is a British mining conglomerate founded in South Africa. The company holds an 85% stake in De Beers, an international corporation engaged in mining, processing, and selling natural diamonds, as well as manufacturing manmade diamonds for industrial purposes. Additionally, Anglo American is the largest supplier of platinum group metals, specifically platinum and palladium. The company's key revenue segments include platinum group metals (29%), iron ore (23%), diamonds (18%), and copper (13%).

Inclusive Growth

Anglo American Plc's strategic vision revolves around achieving sustainable development goals, with a core focus on reevaluating extraction practices to enhance the quality of life. In its strategic framework, the company identifies priority areas aligned with SDGs, including:

- Healthy Environment (SDGs 6, 9, 13, and 15):
  - Reducing greenhouse gas emissions by 30% by 2030.
  - Improving energy efficiency by 30% by 2030.

- Achieving carbon-neutral operations by 2040.
- Reducing freshwater intake by 50% by 2030.
- Exerting a purely positive influence on biodiversity.

- Communities' Well-being (SDGs 1, 3, 4, and 8):
  - Creating five jobs outside the company for each job within the company.
  - Achieving SDG 3 regarding the health of local communities.
  - Ensuring that schools in local communities rank among the top 20% in the country.
- Positioning as a Reliable Corporate Leader (SDGs 5, 12, 16, and 17):
  - Establishing local and national forums for accountability.
  - Playing a leading role in public education and fostering relations with stakeholders.
  - Certifying third-party mines by 2025.

Before delving into the inclusive growth indicators of Anglo American Plc, it is essential to consider the dynamics of our Inclusivity Index, alongside the Refinitiv ESG Score, ESG Controversies Score, and ESG Combined Score. Notably, the ESG Controversies Score experienced a significant decline due to an increased number of incidents at the company's industrial facilities and a minor drop in environmental performance in 2020–2021. This decline, in turn, contributed to a reduction in the ESG Combined Score. Concurrently, the Inclusivity Index also decreased during this period.

Our methodology for assessing inclusivity based on Refinitiv data, adjusted for the ESG Controversies Score, led to an overall decline in the company's indicators in 2020–2021. It is worth noting that Anglo American Plc, as one of the world's largest companies in the metals and mining sector, faces heightened public scrutiny, which may sometimes result in a lower ESG Controversies Score, despite the incidents potentially being less severe than they appear. Nevertheless, we believe that factoring in this indicator provides a slightly more impartial assessment of inclusivity.

To assess the company's environmental efforts, we considered the Emissions Score and Resource Use Score. Between 2016 and 2019, Anglo American Plc consistently maintained high scores in emissions and resource utilization. However, in 2020–2021, these indicators experienced a slight decline due to minor setbacks in decarbonization and resource efficiency efforts.

In the realm of social responsibility, the company has excelled in areas such as job safety, employee skills enhancement and education, and the promotion of employee rights. Furthermore, its relationships with local communities are commendable. However, the occurrence of several fatal incidents at the company's manufacturing facilities led to a decline in these indicators in 2020–2021, whereas previous years witnessed fewer incidents. Currently, Anglo American Plc has learned from these incidents and taken steps to enhance safety and improve employee welfare.

Corporate governance quality also stands as an important determinant of inclusion. According to information disclosed in Anglo American Plc's annual reports, the company consistently adheres to best corporate governance practices. This is exemplified by the presence of external directors, accounting for at least 67% of the board of directors from 2018 to 2021, as well as a minimum of 69% of non-management directors. Additionally, there is a recurring annual trend of increasing female representation on the board of directors, with an increase from 20% in 2016 to 39% in 2021.

Refinitiv data further supports the notion that the company maintains a high level of corporate governance. However, as previously mentioned, these indicators experienced a decline in 2020–2021 due to various accidents, which were, in part, attributable to management errors and misjudgments.

An important aspect of corporate governance quality is the diversity of skills and experience among board members. In 2021, the board of directors at Anglo American Plc possessed a diverse array of competencies, including executive director experience (62%), prior experience on other boards of directors (77%), expertise in climate change and clean energy (31%), proficiency in digital technology (46%), experience in safety, health, and environmental matters (85%), marketing or trading in primary commodities (69%), financial acumen (69%), experience in construction within the extractive sector (54%), proficiency in large-scale project management (92%), engineering expertise (62%), and experience in extraction (54%). This high degree of diversification in board member skills and experience signifies effective corporate management.

In summary, our assessment indicates that the company consistently enhances its corporate governance practices on an annual basis, maintaining a high level of governance quality. Anglo American Plc operates on a global scale, with its primary activities concentrated in Australia, South Africa, Canada, and Latin America. In recent years, these regions have demonstrated a high level of achievement in relation to Sustainable Development Goals, positively impacting the company.

An analysis of the McKinsey Corporate Horizon Index reveals that Anglo American Plc exhibits a long-term perspective, focusing on value creation in the extended term. After registering a value slightly below 50 in the years 2017–2020, this figure reached 60 in 2021. This positive shift can be primarily attributed to significant and high-quality investments, improved operational performance, and a commitment to refraining from practices centered solely on creating accounting ("paper") earnings.

Relationship between Inclusive Growth Indicators and Financing Policy

The company predominantly finances its operations through equity. Over recent years, the Debt-to-Equity (D/E) ratio has remained relatively stable, ranging from 0.3 to 0.4. An analysis of the dynamics of the capital structure and the combined inclusivity index of Anglo American Plc

from 2016 to 2021 revealed no discernible relationship. As a result, hypothesis H1, positing a positive correlation between inclusive growth indicators and leverage levels (D/E ratio), is rejected.

Given the cyclical nature of the metals and mining sector, the prevailing market conditions influence companies' financial performance and financing policies. This observation is substantiated by an analysis of the dynamics of the company's D/E ratio in relation to the price index for commercial metals. A negative relationship was identified: when product prices were higher, the leverage was lower, whereas lower prices corresponded to a higher D/E ratio. This trend can be attributed to the fact that in favorable market conditions, companies generate sufficient cash flows, allowing them to finance their operations primarily through internal resources while resorting to loans to a minimal extent. Therefore, it can be asserted that Anglo American Plc adheres to the "financing order" concept (pecking order theory).

Operating in a capital-intensive industry where projects may span several years, the company makes use of borrowed capital consisting largely of long-term debt, which had a stable share of approximately 90% within the analyzed time period. Additionally, from 2017 to 2022, the Net Debt-to-EBITDA ratio remained consistently at or below 1. This signifies that the company's debt burden is relatively low, and it possesses the capability to quickly repay borrowed funds.

Starting in 2022, Anglo American Plc initiated green financing efforts. On June 9, 2022, the company entered into a $100 million loan agreement with the International Finance Corporation (IFC), extending over a 10-year term. This loan is directly linked to SDGs (Sustainability Linked Loan) and is part of the company's sustainable development financing concept. It represents the first loan of its kind by the IFC in the mining sector and is considered the world's first loan in the mining sector specifically focused on social development indicators. The loan's objectives include supporting the development of communities in rural areas near the company's mining operations in the Republic of South Africa, including the creation of jobs and the enhancement of education for 73 thousand students. The company has committed to allocate additional funds for agreed social goals should it fall short of its targets related to education and poverty alleviation, as per the terms of this loan.

On September 14, 2022, the company issued its first tranche of Sustainability Linked Bonds (SLBs) totaling €745 million, maturing over a 10-year period, following the publication of the company's sustainable development financing concept. These bonds feature a base coupon rate of 4.75%. Bondholders have the opportunity to receive an elevated final coupon payment if the company fails to achieve specific goals:

1. Reduce absolute greenhouse gas emissions (Scope 1 and 2) by 30% by 2030 compared to 2016.

2. Decrease freshwater intake in regions with water deficits by 50% by 2030 compared to 2015.

3. Provide five jobs outside the company for each job within the company by 2030 (the ratio was 1.9:1 in 2021).

The bond terms stipulate a 40 basis points increase in the coupon rate starting from September 2031 for each unmet Key Performance Indicator (KPI) or if proof of goal achievement is not published.

In summary, sustainable financing for Anglo American Plc as of late 2022 constituted a relatively small portion, approximately 2% of the total invested capital and about 6% of the total debt. However, within its industry, the company is a leader in these indicators. Thus, hypotheses H2.1 and H2.2, which propose that companies with high inclusivity indicators utilize sustainable (responsible) financing tools, were confirmed.

Throughout the analyzed time interval, no relationship was identified for Anglo American Plc between the cost of capital (WACC) and the inclusivity index. Consequently, hypothesis H3, suggesting a negative relationship between inclusive growth indicators and WACC, is rejected. Moreover, the level of the risk-free interest rate had a more significant impact on WACC dynamics. Notably, the interest rate for the aforementioned bond issue linked to SDGs is lower than the current WACC.

The company's credit rating, calculated based on the Interest Coverage Ratio relative to the credit spread level from A. Damodaran's table, remained consistently high above the A level during the considered period, except for a decline in financial indicators in 2016. However, no discernible relationship was found between the inclusivity index and the credit rating level. Consequently, hypothesis H4, positing a positive correlation between inclusive growth indicators and the credit rating level, is also rejected.

Analysis of Vale S.A.

Vale S.A. stands as one of the world's largest mining companies, with its roots in Brazil. It holds a prominent global position in the extraction of iron ore and nickel. The majority of its revenue is derived from the iron ore segment (81%).

Inclusive Growth

However, over the past decade, Vale S.A. has faced two of the most significant ecological disasters in Brazilian history, which have had profound environmental and human consequences. These events have tarnished the company's record substantially.

1. Mariana Dam Disaster (2015): On November 5, 2015, the Bento Rodrigues dams in Minas Gerais, Brazil, breached, releasing millions of tons of accumulated sludge from iron ore mining. Toxic tailings inundated downstream villages and contaminated the river, eventually reaching the Atlantic Ocean. The disaster resulted in 20 fatalities, 20 missing persons, 50 injuries, and extensive harm to the environment. The environmental impact is projected to last for 30 years.

In 2016 BHP together with Vale S.A. and Samarco agreed to pay the Brazilian government a fine of 20 billion reals ($4.8 billion). The fine did not comprise compensations to

people who suffered from the disaster or the cost of restoration of territories.

2. Brumadinho Dam Disaster (2019): On January 25, 2019, the Brumadinho dam collapsed due to catastrophic damage to the tailing dump at an iron ore mine in Minas Gerais, Brazil. This catastrophe obliterated everything in the Casa Branca river valley. 259 people died, and over 300 people were reported missing. Toxic waste severely damaged the ecosystem of the Paraopeba river. The company's failure to address problems with automatic equipment near the dams that had been reported before the accident contributed to this tragedy.

These disasters imposed significant financial burdens on the company and necessitated substantial changes in strategy and policy. Vale S.A. articulated several key objectives, including risk mitigation, enhanced liquidity management, and value creation to facilitate growth opportunities. It also adopted new values focused on safety benchmarks, leadership in low-carbon practices, and adherence to Environmental, Social, and Governance (ESG) practices.

The inclusion of these accidents within the ESG Controversies Score in 2016 and 2019–2021 resulted in a significant decline in the ESG Combined Score and the inclusivity index for Vale S.A. The example underscores the importance of adjusting indicators for the ESG Controversies Score to ensure a more unbiased assessment of a company's inclusive growth. In this case, the common ESG Score exhibited no reaction to the disasters or even increased.

The environmental impact of these incidents also led to a decrease in the company's Emissions Score and Resource Use Score. Furthermore, since these accidents adversely affected human lives, including the company's employees, various social indicators saw corresponding declines.

Given that these catastrophes were human errors, including those of top management, the indicator of corporate governance quality also witnessed a reduction.

In the aftermath of the 2019 catastrophe, Vale S.A. made a significant organizational decision by terminating the Vale S.A. Shareholders' Agreement and transitioning to a corporate structure with dispersed capital. This structural shift involved changes to the company's charter, including independent board majorities, approval of the chief external director, and the election of the chairman and deputy chairman of the board by shareholders.

Starting in 2019, Vale S.A. began to modify its top management's motivation system, with a significant portion of the president's and vice-president's remuneration being tied to long-term results and long-term motivation, aligning with best corporate governance practices.

Geographically, Vale S.A. operates primarily in Brazil, where the level of SDG achievement was not notably high during the analyzed period, although there was a trend of improvement.

An analysis of the McKinsey Corporate Horizon Index did not provide a definitive classification for the company as either "longsighted" or "shortsighted." While Vale S.A. tended more toward the former, a decline in this indicator has been observed in recent years. The company stands out for its substantial and attractive investment projects, does not engage in creating accounting-based earnings, and endeavors to exceed the ESG consensus forecasts of analysts.

Relationship Between Inclusive Growth Indicators and Financing Policy

Vale S.A. primarily relies on equity capital to finance its operations. Over the period from 2017 to 2021, its Debt-to-Equity (D/E) ratio remained stable, ranging between 0.35 and 0.50. Analysis of the capital structure dynamics and the consolidated inclusivity index of Vale S.A. for the years 2016 to 2021 yielded no apparent correlation between these indicators. Consequently, hypothesis H1, positing a positive relationship between inclusive growth indicators and leverage levels (D/E ratio), is not supported.

Similar to Anglo American Plc, Vale S.A. displayed a negative correlation between the index of commercial metal prices and the D/E ratio. This finding reinforces the argument that the current market environment plays a more substantial role in shaping the financing policies of companies in the metals and mining sector. It suggests that Vale S.A. also adheres to the "financing order" concept (pecking order theory).

In absolute terms, Vale S.A.'s debt decreased after 2016. Moreover, the borrowed capital primarily consists of long-term debt, amounting to over 90% for most of the analyzed time frame. This underscores the sector's characteristics and the dominance of long-term debt in its financing structure.

Since 2017, the Net Debt-to-EBITDA ratio has remained consistently below 1, indicating a low debt burden for the company.

Vale S.A. does not possess particularly high inclusive growth indicators and does not utilize sustainable (responsible) financing tools. This finding lends support to hypotheses H2.1 and H2.2, which propose a positive relationship between inclusive growth indicators and the volume (H2.1) and number (H2.2) of sustainable (responsible) financing tools.

Throughout the period from 2016 to 2021, no relationship was discerned between Vale S.A.'s Weighted Average Cost of Capital (WACC) and the inclusivity index. Thus, hypothesis H3, suggesting a negative relationship between inclusive growth indicators and WACC, is rejected. It is worth noting that, similar to Anglo American Plc, Vale S.A.'s WACC was more influenced by the level of the risk-free interest rate.

During the analyzed period, the company maintained a consistently high credit rating, calculated on the basis of a comparison of the Interest Coverage Ratio to the level of credit spread from A. Damodaran's table. However, no significant relationship between the inclusivity index and the credit rating level was identified. As a result, hypothesis H4, proposing a positive correlation between inclusive growth indicators and the credit rating level, is also rejected.

Analysis of PJSC Mining and Metallurgical Company Norilsk Nickel

PJSC Mining and Metallurgical Company Norilsk Nickel (Nornickel) is the leader of Russia's mining and metallurgical industry. It is the largest producer of palladium and class 1 nickel globally and is also a significant player in the manufacture of platinum, copper, silver, gold, rhodium, cobalt, ruthenium, and more. The company's main revenue streams are derived from palladium (32%), nickel (27%), and copper (22%).

Inclusive Growth

However, the company experienced an emergency at one of its mines in 2019, followed by a major accident in 2020 when a diesel fuel storage tank at Heat-and-Power Central Station 3 (TETs-3) suffered damage due to the collapse of its foundation supports, resulting in the leakage of approximately 21 thousand tons of fuel. An investigation by the Federal Environmental, Industrial, and Nuclear Supervision Service (Rostechnadzor) attributed the fuel spillage to design and construction defects, as well as poor facility usage control. In 2021, extraction operations at one of Nornickel's mines were suspended due to groundwater flooding.

These accidents had a detrimental impact on Nornickel's ESG indicators and inclusivity index. The company had not previously been a leader in ESG, particularly in the environmental domain, and its ESG Combined Score and Inclusivity Index declined even further from 2019 to 2021. Remarkably, the common ESG Score did not respond to the accidents at all. Subsequently, Nornickel renewed its inclusive growth strategies to prevent such incidents in the future.

Nornickel is committed to fully supporting the United Nations Sustainable Development Goals (SDGs) until 2030:

- Environment: The company aims to minimize its environmental impact, efficiently manage waste, and responsibly operate tailing dumps.
- Social Aspect: Nornickel's policies focus on supporting social and cultural diversity, combating discrimination, and strengthening long-term relationships with local communities in the regions where the company operates.
- Corporate Governance: Nornickel corporate culture emphasizes the efficient implementation of the company's development strategy, including sustainable development principles, and bolstering the company's reputation.

Nevertheless, due to the accidents, the company's Emissions Score and Resource Use Score decreased because of the significant environmental damage. However, the Resource Use Score remained at an average level throughout the analyzed period, indicating that the company's resource efficiency is not among the highest.

The social indicators were negatively affected as well, considering the impact of the accidents on people's lives and health. Nornickel performed the best in dealing with local communities and producing safe and high-quality products.

Overall, Nornickel's corporate governance quality suffered due to frequent disagreements with principal shareholders and public disputes between shareholders and management. The indicator of corporate governance quality declined as a result of the accidents. During the analyzed period, the percentage of external directors on the company's board of directors increased, the percentage of non-management directors remained largely unchanged, and the percentage of women on the board remained at a low 8%.

Nornickel's primary operational assets are located in Russia, a country with an above-average level of achievement in terms of the SDGs during the analyzed period. Additionally, there is a trend of improvement in this indicator.

According to the McKinsey Corporate Horizon Index, Nornickel can be described as a "longsighted" company focused on creating value over the long term. It stands out for its substantial, high-quality investments and consistently high operating performance. While a slight decrease in this indicator was observed in 2021, it remains just below the threshold of 50.

Relationship Between Inclusive Growth Indicators and Financing Policy

Nornickel predominantly finances its operations through loans, and over the analyzed period, its Debt-to-Equity (D/E) ratio hovered around 2.0x or slightly higher. An analysis of the dynamics of the leverage level and the consolidated inclusivity index of Nornickel for the years 2016 to 2021 did not reveal an evident relationship between these indicators. As a result, hypothesis H1, proposing a positive correlation between inclusive growth indicators and the D/E ratio, is rejected.

Similarly to other companies in the metals and mining sector, Nornickel displayed a negative relationship between the index of commercial metal prices and the leverage level. This underscores the notion that the current market conditions exert a more significant influence on the financing policies of companies in this sector. It suggests that Nornickel also adheres to the "financing order" concept or pecking order theory.

It is characteristic of Nornickel, as well as other companies in the sector, to primarily rely on long-term debt within their debt structure. In general, the share of long-term debt ranged between 85% and 90%, although there were periods when it was significantly lower (in 2012 and 2022). The Net Debt-to-EBITDA ratio has remained around 1 over the past few years and was even lower previously (0.5–0.6), indicating a low debt burden for the company.

Despite its relatively low level of inclusion, Nornickel did not engage in sustainable (responsible) financing. This aligns with hypotheses H2.1 and H2.2, which suggest a positive correlation between inclusive growth indicators and the volume (H2.1) as well as the number (H2.2) of sustainable (responsible) financing tools.

Throughout the analyzed period, no discernible relationship was identified between Nornickel's Weighted Average Cost of Capital (WACC) and the inclusivity index. Thus, hypothesis H3, positing a negative relationship between inclusive growth indicators and WACC, is rejected. Notably, similar to other companies, Nornickel's WACC was more influenced by the level of the risk-free interest rate.

Throughout the analyzed period, Nornickel maintained a consistently high credit rating (calculated through a comparison of the Interest Coverage Ratio to the level of credit spread from A. Damodaran's table), never falling below the AA level. The inclusivity index did not appear to have any influence on the credit rating level. Consequently, hypothesis H4, proposing a positive correlation between inclusive growth indicators and the credit rating level, is also rejected.

Conclusion

In the modern scientific literature, inclusive growth is understood as economic growth accompanied by the creation of favorable conditions to improve the quality of life and ensure equal opportunities for all segments of a country's population and the global community. This implies that companies should not solely focus on improving financial and operational indicators but also emphasize the environmental and social aspects of corporate development. Inclusive growth is achieved through the implementation of the 17 UN Sustainable Development Goals (SDGs) established in 2015 by the UN General Assembly.

Specifically, companies adhering to inclusive growth strategies pursue the following goals: prioritizing Total Shareholder Impact (TSI) for resulting Total Shareholder Return (TSR) growth, offering customized digital solutions and services, implementing selective strategies for growth and market presence, creating ecosystems and flexible logistics systems, establishing comprehensive data handling systems, adopting agile management approaches, and continuously adapting to changing circumstances.

Our empirical study, conducted through the construction of econometric models, revealed that the majority of inclusive growth indicators had no significant influence on the financing policies of the world's largest public companies in the metals and mining sector during the period of 2016–2021. This lack of influence may be attributed to the fact that the ESG agenda has significantly intensified only in recent years (since 2019), and companies are just beginning to adopt inclusive growth strategies, which requires time for transition.

However, our research has identified specific relationships between certain inclusion components and indicators characterizing distinctive features of financing policies:

Companies with high achievements in resource efficiency tend to use more borrowed capital.

Companies with strong records in improving human rights are inclined to utilize more sustainable (responsible) financing tools.

Companies with notable success in reducing pollutant emissions tend to have higher capital costs.

High achievement in improving the quality of life for local communities is associated with a lower cost of capital.

Companies with higher indicators in job safety, the creation of safe and high-quality products, and pollutant emissions reduction tend to receive higher credit ratings.

Companies excelling in improving human rights, enhancing the quality of life for local communities, and exhibiting less long-term planning are more likely to have lower credit ratings.

A case study was incorporated into our econometric study, examining three large companies engaged in the production of a diversified range of metals, each varying in their degree of inclusivity (Anglo American Plc, Vale S.A., PJSC Mining and Metallurgical Company Norilsk Nickel).

The research findings confirmed the absence of a direct relationship between inclusive growth indicators and the D/E ratio. Moreover, it was revealed that the pricing environment in commodity markets influenced the capital structure of companies in the metals and mining sector. A negative relationship between the price index for commercial metals and the D/E ratio was observed. In general, deleveraging was a common trend among all three analyzed companies following the commodity market crises in 2014–2016. This led us to conclude that these companies adhere to the "financing order" concept or pecking order theory.

Among the three companies analyzed, Anglo American Plc, a leader in implementing inclusive growth strategies, utilizes sustainable (responsible) financing methods, including credit and bond loans linked to the SDGs, amounting to 2% of its total invested capital and 6% of its total debt. Conversely, Vale S.A. and Nornickel, which have lower inclusion indicators, do not employ such financing sources. Thus, we see that more inclusive companies have the capacity to diversify their financing sources and adopt sustainable (responsible) financing tools, confirming the argument that higher inclusion levels correlate with a greater utilization of sustainable financing.

The results of our case study aligns with the conclusions drawn from the econometric model: inclusive growth indicators do not significantly impact a company's Weighted Average Cost of Capital (WACC). Instead, WACC is primarily influenced by factors such as the risk-free interest rate, current market conditions, and premiums associated with country-related and other specific risks.

Contrary to the econometric study, which identified a relationship between the credit rating and six inclusive growth indicators out of nine, the analysis of the dynamics of inclusion and credit rating levels of the three considered companies showed discrepancies. The credit ratings of these companies remained consistently high throughout the analyzed period, irrespective of their inclusion levels. This can be attributed to their relatively low debt burdens during this period.

Despite the somewhat mixed results from the empirical analysis, it remains our belief that all companies in the metals and mining sector, including those in Russia, should

focus on inclusive growth strategies. Doing so can help companies mitigate financial, operational, and reputational risks, enhance long-term business resilience, bolster their market positions, and increase their attractiveness to investors. Consequently, these companies may achieve reduced capital costs and greater diversification of financing sources.

Best practices from leading companies in this field worldwide can serve as a guide for transformation. This transformation is closely tied to the necessity of implementing large-scale investment projects and determining their financing sources. In such cases, sustainable (responsible) financing tools with potentially favorable rates may be employed.

We expect that further research conducted over a longer time frame will yield more representative results, offering opportunities for future study.

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Appendices

Appendix 1. Descriptive statistics

Variable	Mean	Median	St. deviation	Min.	Max.
Book D/E	0.553	0.446	3.41	−105	15.8
Volume of sustainable financing	29.865	0.00000	291.02	0.0	5400.0
Number of sustainable financing	0.05110	0.0000	0.3017	0.0000	4.000
WACC	0.08445	0.08383	0.02231	0.03561	0.2945
Implied credit rating	10.2	12.0	5.11	1.00	15.0
Emissions score	51.1	55.4	29.0	0.000	99.9
Resource use score	48.9	52.0	30.0	0.000	99.9
Workforce score	51.0	53.7	29.5	0.000	99.9
Human Rights score	34.8	32.5	31.8	0.000	97.4
Community score	48.6	53.3	30.9	0.000	99.9
Product responsibility score	41.9	45.4	32.4	0.000	99.8
Governance score	51.8	54.9	25.3	0.000	98.7
Country SDG index score	74.3	74.5	5.24	57.2	86.5
McKinsey CHI	50.0	50.0	11.6	8.90	94.5
Invested capital	7,863	3,701	12,283	96.83	89,222
Size	8.47	8.54	1.33	4.80	11.8
Profitability	0.156	0.113	0.151	−0.719	0.769
Growth	1.57	1.32	0.949	0.275	8.78
CapEx intensity	0.0610	0.0499	0.0445	0.000	0.389

Source: calculated by the authors on the basis of Gretl.

Appendix 2. TOP-20 companies in terms of market capitalization from the metals and mining sector in the world in 2021 and their inclusion indicators

№	Компания	Специализация	Страна	Emissions Score	Resource Use Score	Workforce Score	Human Rights Score	Community Score	Product Responsibility Score	Governance Score	Country SDG Index Score	McKinsey CHI	Inclusivity Index
1	Newmont Corporation	Золото		80.73	83.46	80.04	69.87	81.49	45.69	83.53	74.50	32.58	70.21
2	Grupo Mexico SAB de CV	Диверсифицированный		79.04	97.76	48.99	72.15	85.99	65.46	35.25	70.16	47.76	66.95
3	ArcelorMittal SA	Черная металлургия		68.08	58.02	66.00	67.27	70.04	53.61	58.21	75.65	42.36	62.14
4	Anglo American Plc	Диверсифицированный		60.98	66.54	66.20	65.90	62.61	31.40	61.36	80.53	60.38	61.77
5	Southern Copper Corp	Медь		65.50	76.30	40.17	72.02	94.90	64.62	24.59	70.16	43.34	61.29
6	Franco-Nevada Corp	Золото		83.20	43.67	38.68	92.79	63.34	23.79	68.94	77.68	47.56	59.96
7	Baoshan Iron & Steel Co Ltd	Черная металлургия		93.62	59.23	90.47	22.15	15.13	91.53	41.67	72.36	53.18	59.93
8	Freeport-McMoRan Inc	Медь		62.56	55.80	48.86	50.91	63.32	54.62	61.86	74.50	62.56	59.44
9	Ganfeng Lithium Group Co Ltd	Диверсифицированный		90.28	59.13	75.76	9.82	46.61	44.71	66.60	72.36	64.74	58.89
10	Saudi Arabian Mining Company SJSC	Диверсифицированный		55.34	67.41	33.97	34.06	83.97	65.46	70.36	66.36	50.42	58.59
11	Nucor Corp	Черная металлургия		42.32	57.65	32.40	83.39	49.78	65.46	50.16	74.50	42.16	55.31
12	Glencore Plc	Диверсифицированный		50.70	50.81	51.13	48.59	48.67	49.24	48.57	80.67	34.88	51.47
13	Vale SA	Диверсифицированный		51.09	54.47	52.15	51.06	49.01	32.29	48.14	72.76	41.70	50.30
14	Fortescue Metals Group Ltd	Черная металлургия		55.59	48.01	59.23	56.07	54.02	21.59	32.86	75.58	44.42	49.71
15	BHP Group Ltd	Диверсифицированный		48.95	45.92	53.40	45.27	53.29	15.47	52.51	75.58	56.20	49.62
16	Rio Tinto Plc	Диверсифицированный		42.50	41.84	51.24	48.59	48.89	34.93	34.05	80.53	50.60	48.13
17	GMK Noril'skiy Nikel' PAO	Диверсифицированный		46.18	50.68	39.74	41.57	49.95	51.66	29.60	74.06	48.70	48.02
18	Barrick Gold Corp	Золото		48.85	51.42	39.60	50.51	51.93	16.02	38.51	77.68	50.60	47.24
19	Zijin Mining Group Co Ltd	Золото		55.93	53.24	45.31	22.25	21.99	58.62	28.15	72.36	48.40	45.14
20	China Northern Rare Earth Group High-Tech Co	Диверсифицированный		28.26	16.62	39.35	69.87	8.41	51.61	49.85	72.36	49.56	35.11

Note: All indicators are measured on a scale from 0 to 100 (the higher the value, the better the company performs in the corresponding area).
Source: compiled by the authors.

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Impact of ESG Activities on the Innovation Development and Financial Performance of Firms

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Abstract

In the technology-driven economy, a firm's sustainable financial performance is significantly influenced by its efficiency in research and development (R&D) and broader innovation initiatives. Conversely, while embracing ESG-related activities can potentially open up a broader spectrum of funding, it may also impose challenges on companies as they strive to meet the escalating demands for sustainability practices and contend with increasing ESG-related risks. Hence, businesses are confronted with the imperative of making prudent ESG-related investments while simultaneously maintaining a strong track record in innovation performance. The findings of numerous studies suggest that investments in ESG projects can yield both positive and negative outcomes for innovation performance. However, recent trends within the ESG industry have amplified concerns regarding the trade-offs between ESG considerations, innovation endeavors, and overall financial performance

Keywords: ESG, social responsibility, R&D investments, innovation performance, information asymmetry, ESG rating

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Introduction

In the past few decades, businesses worldwide have significantly expanded their focus on ESG (Environmental, Social, and Governance) considerations. This shift towards greater social and environmental responsibility has substantially influenced resource allocation strategies within companies. This strategic shift, however, appears to be in conflict with the predictions of standard economic theory, famously articulated by Milton Friedman: "The social responsibility of business is to increase its profits" [1]. The substantial transformation in business practices and the underlying reasons for this transformation have garnered considerable attention from scholars. This paper seeks to provide a comprehensive overview of the academic discourse surrounding the relationship between ESG practices and company innovation activities, shedding light on potential risks to R&D performance arising from the growing prominence of ESG agendas.

Initially, the proliferation of ESG practices was often linked to various benefits for businesses, including a positive influence on long-term financial performance and the advancement of R&D initiatives. However, recent literature has documented diminishing benefits for firms engaging in social responsibility practices as well as raising concerns about the synergistic effects of ESG and innovation activities.

A critical question for financial scholars pertains to whether adherence to ESG criteria generates added value for investors [2–4]. The discussion regarding market reactions to ESG-labeled assets and the drivers behind the substantial surge in ESG investments is explored in the first section of this paper.

The environmental, social, and governance dimensions of ESG practices are frequently cited as factors that could potentially enhance a firm's innovation performance [5; 6]. However, several authors have posited that a trade-off may exist between social responsibility and R&D projects [7; 8]. The literature examining the relationship between ESG and innovation and its implications for a firm's R&D performance is examined in the second section.

While ecological innovations and improvements in HR management and social governance practices are generally regarded as catalysts for technological advancement, the benefits of social responsibility have led to the rapid and often unregulated proliferation of ESG activities. This, in turn, has given rise to the phenomenon of "greenwashing" and an information asymmetry between businesses and various stakeholders [9; 10]. Consequently, the diversity in ESG practice standards, coupled with economic instability, introduces additional risks that may undermine the positive outcomes of ESG activities on R&D development. These risks are explored in the third section of this paper, which is followed by a concluding summary.

ESG and Financial Performance

The significant growth in the ESG-labeled assets market has prompted a crucial question in contemporary finance research: What motivates investments in ESG? On the one hand, portfolio theory posits that investors are rational, aiming to optimize risk-return ratios; therefore, the pursuit of green investments should be driven by superior returns, effectively transforming investors' social responsibility into a quest for profitability [11]. Nonetheless, numerous studies have found that ESG-labeled assets often fail to deliver higher returns [3]. An examination of equity mutual funds in the U.S. market from 2004 to 2012 showed the existence of financial rewards from socially irresponsible investments [12]. Country-level analyses highlight the significance of the economic environment and financial stimuli in emerging countries, where the ESG aspects of investments are frequently overlooked [13]. On the other hand, the nonpecuniary utility of investors suggests an alternate behavior pattern [14]: investors may be willing to sacrifice some returns if they have strong preferences for ESG investments [15]. Some research challenges the positive relationship between ESG performance and market returns. For example, B.R. Auer and F. Schuhmacher [16] found that ESG investors achieved market-level returns in the Asia-Pacific region and the U.S., while ESG assets often underperformed in the European market.

Despite decades of research, predicting the market's reaction to ESG-related news remains challenging. Several authors have focused on analyzing the financial market's response to the emergence of ESG-related news and its impact on company value. However, while there is some consistency in the negative effects of bad news, the connection between positive news and company performance remains unclear. P. Krüger [17], who collected data on 2,116 corporate events categorized as positive or negative, revealed that the market reacts negatively to both good and bad corporate social responsibility-related news, although the effect of positive news is smaller, and linked the negative effect of positive news to the agency problem. In contrast, G. Capelle-Blancard and A. Petit [18], who studied a sample of 33,000 ESG news items about public companies, found that negative news from the media decreased a firm's market value by 0.1%, while the impact of positive news was insignificant. Consequently, while "being good" and taking steps toward social and environmental responsibility does not pay, the market penalizes companies for "being bad" [19]. Recent studies by G. Serafeim and A. Yoon [20; 21], in contrast to prior literature, found that positive (negative) news led to positive (negative) stock price reactions.

Although empirical research on the market's reaction to firms' ESG activities yields mixed results, various meta-analyses aggregating empirical research have concluded that, in general, socially responsible investing and ESG considerations can be associated with higher returns compared to conventional instruments (e.g., [4; 22; 23]). Firms with good ESG performance can achieve higher long-term and short-term returns (e.g., [24–26]), as well as improved return on assets (ROA) [24; 27] and return on equity (ROE) [28]. Most empirical literature also supports the view that good ESG performance is usually associated with lower risk and a lower cost of capital [2]. ESG investing has an indirect impact and serves as a marketing tool,

increasing customer satisfaction and demand for the firm's products [29]. Given the potential benefits of ESG projects, poor ESG performance and negative media coverage increase the likelihood of CEO dismissal [30].

It is also essential to note that the rapid growth of ESG assets has not been limited by the overall growth of the financial market itself; rather, there has been a shift towards ESG investing and a diversion of funds from conventional assets. For instance, a significant study analyzed the impact of the launch of Morningstar sustainability ratings in the mutual fund industry in 2016. This natural experiment resulted in statistically significant increases in fund inflows for highly rated ESG assets, while low sustainability ratings were associated with net outflows [31].

Nevertheless, it is noteworthy that market reactions to ESG assets can change over time. A case in point is the important and widespread ESG practice of green bond issuance. Green bonds have been negatively perceived up until recently due to higher associated costs, lower returns, and increased risk [32; 33]. Green bonds, as financial instruments, resemble conventional bonds but aim to finance environmental projects. Recent studies, however, show a changing landscape: the index of green municipal bonds slightly outperformed the closest S&P index in the secondary market from 2014 to 2018, and the introduction of a "green" premium in the primary market also holds promise [34].

ESG and Innovation Performance

The previous section delved into the effect of ESG on financial performance and value creation. Equally significant in the ESG literature is the exploration of the relationship between social responsibility and a company's innovation activity. The allocation of limited resources has always been a major topic of interest for economists [35]. In today's rapidly evolving business landscape, efficient utilization of innovations and new technologies significantly influences both financial and overall firm performance [36]. Therefore, it is crucial to investigate the connections between ESG activities and R&D development. Modern economic growth, in the Schumpeterian sense, is fundamentally rooted in a continuous flow of innovations [37; 38]. Leveraging new technologies is a critical competitive advantage not only for R&D-intensive industries. The consequences of deciding not to invest in innovations and the inability to adapt to changes often outweigh the inherent risks associated with R&D activities [39–41]. However, a fundamental issue with the ESG agenda must be kept in mind: ESG encompasses a broad and often inconclusive spectrum of environmental, social, and governance practices, while the impact of E, S, and G factors on a firm's R&D performance varies significantly [42]. Academic literature describes scenarios of both synergy and trade-offs in the direct relationship between ESG activities and a firm's R&D performance [43; 44].

The synergy effect is particularly significant when ESG activities and R&D projects overlap [5; 6; 45]. For instance, many ecological innovation programs enhance the efficiency of core business processes, offering innovators a competitive advantage, especially when implementing successful proactive environmental strategies [6; 46]. As an example of gains from ESG-driven innovations, several authors have discussed cost reductions due to efficient resource utilization [47; 48]. Recent research has shown that ecological innovations in the Chinese market from 2014 to 2019 typically improved a company's overall ESG profile, with the enhancement of the ESG rating playing a pivotal mediating role between green innovation and financial performance [49].

However, outside of overlapping R&D – ESG projects, most environmental practices introduce additional risks for firms, insofar as the latter tend to perceive the choice between ESG and R&D as a trade-off [7]. Nevertheless, green subsidies and direct government regulations remain significant instruments for promoting green development [50; 51]. Some scholars have revealed a positive link between R&D intensity and CSR specialization [52]: R&D-intensive firms tend to be more focused in their selection of ESG activities and avoid resource-related trade-offs between processes [53]. Another study found that higher R&D investments are usually associated with better green innovation performance measured by the number of green patents [54]. Given that the environmental aspect of the ESG agenda implies increased efficiency in energy and materials usage and promotes a sustainable, low-emission economy, some scholars have emphasized sectoral differences in the ESG – R&D relationship and identified synergistic effects from environmental practices in the industrial sector [55]. Implementing any ESG practice requires additional internal resources, and firms often face resource constraints [8]. Moreover, as several studies have emphasized, despite the importance of ecological and social investments, such investments are generally less attractive than R&D development in terms of returns [8; 56]. As a result, some scholars have discussed the role of society in supporting ESG initiatives and improving environmental quality through regulatory enhancements and subsidies [57].

Excluding the synergistic potential of green projects, the link between social practices and R&D performance is usually perceived as a trade-off between labor costs and labor productivity. However, R&D performance also correlates positively when ESG activities improve labor conditions, staff motivation, and organizational structure [58]. To a large extent, the individual innovativeness and creativity of key knowledge employees determine the efficiency of R&D investments [59; 60]. Empirical research demonstrates that fostering social values and social capital formation within R&D teams often yields positive outcomes for innovation performance [61].

Regarding the assessment of ESG impact on corporate profitability, several studies have emphasized the crucial role of corporate governance practices and the ability to establish efficient management systems aligned with the interests of the firm's shareholders [62]. The relationship between R&D investments and corporate governance has been explored at both firm and country levels [63]. Inno-

vation-oriented companies tend to rely on equity financing and typically have a higher proportion of activist institutional investors [64], while lower leverage and the presence of activist investors are often associated with greater levels of R&D investments [65]. Good corporate governance, meanwhile, sets the stage for efficient investments in environmental and social projects, creating value for shareholders and other stakeholders [66]. Overall, corporate governance plays an integrating role, as unagile management has limited capacity to benefit from investments in environmental and social projects and foster technological development. In contrast, good governance implies greater discipline and a focus on long-term sustainability [67].

ESG-related Risks and Innovation Performance

For several decades, the implementation of ESG activities did not prioritize high returns, not counting innovative firms with overlapping R&D and ESG specialization. Nevertheless, businesses have undeniably benefited from the ESG agenda, as all stakeholders, including investors and consumers, have exhibited a growing demand for it [68; 69]. ESG disclosure practices, in particular, have helped compliant firms attract additional financial resources on financial markets and increase revenues due to product differentiation and heightened customer attention [69]. Thus, common ESG practices have aimed to enhance company reputation and attract investors and customers. Firms tend to report only such ESG information that demonstrates regulatory compliance [68]. ESG practices have evolved into useful business tools with a positive impact on core business activities, with innovation playing a mediating role in this process [70]. Nevertheless, for a number of reasons the benefits of ESG-enhanced innovation may significantly diminish in the future.

Firstly, due to the growth of the ESG industry, firms are compelled to allocate more resources to compete with other ESG-compliant enterprises. In other words, when everyone is socially responsible, being socially responsible no longer gives a competitive advantage. As the new generation of investors may be hesitant to invest in firms with poor ESG performance [69], every business will be obligated to allocate resources to ESG merely to maintain its presence in the market. For companies with average ESG records, this increased spending can lead to additional financial constraints, potentially crowding out R&D investments and reducing financial efficiency. Scholars are already discussing the potential effects of mandatory ESG disclosure, which, in addition to the direct costs of report preparation and certification, could involve proprietary costs and litigation expenses [71].

Secondly, a growing body of literature on regulatory practices asserts that the ESG field requires additional regulation to assure greater transparency and coverage [72; 73]. Information asymmetry is one of the primary challenges in ESG investments. Companies typically provide non-standardized reports on ESG, often emphasizing their own achievements. The costs associated with processing this information, along with news from the media, are exceedingly high and typically require a certain level of professional expertise, thereby biasing investment decisions and diminishing financial market efficiency.

To some extent, information asymmetry can be mitigated by professional intermediaries. Over the last decade, various rating agencies have attempted to make ESG performance more transparent. However, the use of ESG ratings as a proxy for socially responsible business practices still faces significant limitations. One of the main problems is that raters from different providers frequently disagree about a firm's ESG profile [74]. The industry suffers from a lack of standardized rankings, resulting in inconsistent information being available to investors [75]. For example, F. Berg et al. [76] reported that the average correlation between five different ESG raters ranged from 0.42 to 0.73, whereas the correlation between the credit ratings of leading agencies is often close to 1. Furthermore, ESG ranking can be subject to bias, with several researchers noting that large companies with more resources may gain advantages in corporate sustainability assessments (e.g., [77; 78]). Each ranking system aggregates the three pillars, yet these aggregations differ substantially and typically do not capture sectoral distinctions [79]. Consequently, while ESG investors differentiate among environmental, social, and governance issues, the ESG score has limited implications for the academic discussion of the factors directing the modern financial market [80]. Disagreement about a firm's ESG profile is positively correlated with equity risk, while the lack of reporting standards diminishes the potential benefits of ESG investments, as it remains unclear which practices matter to rating agencies and influence investor decisions [81]. From an investor's standpoint, mixed information about ESG profiles increases uncertainty, with the perspectives for above-market returns depending on the choice of ranking provider [10]. This may pose even greater challenges for firms actively engaged in innovation activities.

Finally, the global crisis has introduced additional risks to ESG-related markets. Some investors have considered ESG investing as a strategy to reduce portfolio risks [82]. However, the market downturn caused by COVID-19 provided a critical examination of the sustainability of ESG investments. The high level of uncertainty resulted in a surge of fund flows into low-ESG-risk assets [83]. However, some scholars pointed out that ESG assets displayed mixed financial performance [84; 85]. While investors sought safer investment strategies to mitigate downside risks [86], ESG assets did not prevent financial losses during severe economic shocks [87; 88]. The reasons behind instances of poor risk mitigation by ESG assets may be linked to the failure of ranking systems to capture what genuinely matters in ESG practices. Moreover, the pursuit of higher ESG ratings can incentivize "greenwashing" and ineffective ESG procedures rather than real actions toward sustainable development, with the consequences only becoming apparent during a crisis [9]. The volatile behavior of investors with regard to ESG-related risks during economic down-

turns can increase the cost of capital and negatively impact the innovation performance of firms.

Conclusion

The proliferation of ESG practices has been driven by society's inclination to reward socially responsible firms. Nevertheless, the absence of standardized reporting norms, discrepancies in ranking systems, the inability to effectively mitigate downside risks, and fragmented regulations have given rise to substantial information asymmetry and uncertainty regarding the true ESG profiles of firms. Consequently, as ESG practices become commonplace, company expenditures on social responsibility no longer confer competitive advantages and diminish the potential for synergy between ESG and R&D projects.

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