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Foreign Ownership and Capital Structure in Times of Crises: Case of South Korea

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Abstract

This paper presents the results of analysis of the role of foreign investors in capital structure choice. The analysis is conducted using regression analysis of panel data. Operating with data of 809 companies listed in the South Korean market in 1997-2020, we demonstrate that the debt-to-equity ratio of companies with foreign investors is lower than in the rest of the firms. In this case, foreign investors' monitoring of a company's performance can be a substitute for debt financing as a disciplining mechanism for management. Foreign investors also indirectly affect the capital structure by impacting the speed of adjustment to the target leverage. The results of our study show that the speed of adjustment to the target debt-to-equity ratio increases along with a rise in foreign investor participation. The results are most pronounced for over-leveraged firms. Whereas during financial crises, we observe no effect of the presence of foreign investors on the changes in the target debt-to-equity ratio, we find a significant increase in the speed of adjustment to the target leverage in companies with foreign investors. During the current coronavirus crisis, corporate debt of companies with foreign investors is decreasing even more, while the speed of adjustment decreases. We attribute these effects to the non-financial nature of the crisis, which makes the role of foreign investors in monitoring management less meaningful. In practice, results can be used by company managers when facing crises or other macroeconomic shocks. The results obtained can also be used by public authorities in shaping policies to stimulate foreign investment.

Keywords: capital structure, foreign ownership, crisis, dynamic trade-off theory, South Korea

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Introduction

The world has been regularly experiencing global crises: the Great Depression in the 1930s, the Post-war crisis, the global financial crisis in 2007-08, the recent COVID-19 crisis. Even though crises appear to be an old problem, each one provides the world with new lessons about the actions required to prevent the repetition of their consequences. Before the COVID-19 turmoil, the world experienced financial crises that resulted in massive defaults. The severity of previous crises has led economists to explore the macro patterns and causes of crises. It also emphasised the importance of firm-level responses, specifically, capital structure policy. Although many papers are devoted to capital structure determinants and theories, implications for debt-to-equity choice in crisis have not yet been developed.

The COVID-19 pandemic has made evident the deep global integration of the modern economy in the goods and capital markets, which increases trade gains and exposure to external shocks. As the markets grow even more integrated, foreign participation gains greater significance. An analysis of foreign investment in the macroeconomic context is of little use to individual companies that need to deal with the consequences of crisis in the absence of stabilising policies. On the contrary, foreign ownership allows assessing the firm-level effect of foreign participation.

This paper investigates the relationship between capital structure and foreign ownership in a crisis framework. We conducted our analysis on the data from 1997 to 2020 for 809 companies listed on the Korea Stock Exchange. Our paper aims to fill the gap in literature on microeconomic responses with regard for global integration. The implications could help in facilitating the recovery and reducing the severity of the recent crises' effects.

Our key results show that foreign ownership has a significant negative impact on corporate leverage. The effect is even more pronounced for over-leveraged firms. Another finding reveals that foreign ownership facilitates a higher speed of adjustment to the target leverage level, especially during financial crises, but not during the COVID-19 crisis.

The rest of the paper is organised as follows: the introduction includes literature review and hypotheses. The methodology part presents the stages of the research and describes the data. We then provide the results and their discussion, which are followed by the conclusion.

Literature review

An overview of the South Korean market

South Korea has become an economic miracle mainly due to its export-oriented industrialisation. First, taking advantage of the demand for cheap, labour-intensive and later for capital-intensive goods, its economic growth has been export-driven. The case of South Korea captures the attention of researchers with its significant economic performance improvement and much greater capital inflows since 1996 [1]. Korean stock market is considered one of the fastest-growing [2].

Before the recent COVID-19 crisis, South Korea was hit hard by two financial crises: the 1997 Asian financial crisis and the 2008 global financial crisis. The country was one of the few countries that successfully overcame the 2008 crisis and quickly pulled out of the recession. According to IMF data, while many OECD economies are still experiencing the consequences of that recession, South Korea entered a positive output gap by 2010[1].

Asian Financial Crisis

The Asian financial crisis originated in 1997 with Thailand abandoning fixed exchange rates, which allowed to preserve the stability of the currency system and ensured the confidence of foreign investors. Currency declines spread rapidly throughout East Asia, and South Korea also abandoned its pegged exchange rate in 1997 [3].

Chaebols, large business groups in South Korea, are considered vital in understanding the country's growth and consequent crisis development [4–6]. In the second half of the 1990s, the top-5 chaebols accounted for 10 per cent of GDP [7].

Financial liberalisation started in the 1980s, with the first attempts resulting in both currency and banking crises in 1997-1998. Before the crisis, chaebols had excessive debt, including foreign debt. Lee et al. [8] and Claessens et al. [9] consider this to be one of the primary reasons for the 1997 Korean crisis and its severity. Their high leverage also prevented Korean companies from adapting quickly to the recession and the credit crunch that followed the crisis.

Global Financial Crisis

South Korea was not directly involved in the U.S. subprime market crisis. However, the credit crunch hit the Korean financial markets severely. The credit crunch induced foreign and domestic liquidity crises and a currency collapse [10]. The currency depreciation was a by-product of the global deleveraging of households and financial businesses, which began with the U.S. subprime crisis in 2007 and deepened after Lehman's collapse in September 2008. As the crisis unfolded, there was a massive capital outflow between September 2008 and December 2008, estimated as 30% of the gross capital inflow since 1998 [10].

COVID-19 crisis

Unlike the previous crises in Korea, the COVID-19 turmoil is not a result of a system failure; it is a purely exogenous macroeconomic shock [11]. The pandemic and the resulting lockdown disrupted the business operations of many companies. With declining revenues and accruing expenses, even financially sound firms found them-

[1] https://www.economywatch.com/economic-statistics/Korea/Output_Gap_Percent_of_Potential_GDP/

selves in a liquidity crisis [12; 13]. Testing, tracking and an early lockdown allowed South Korea to slow down the rapid pandemic spread faster than in many other developed countries[2]. However, such measures may not be the only reason for a successful struggle with the COVID-19 pandemic. Apart from them, the Korean government and the BOK have implemented relatively numerous policies during 2020 to support the economy and the nation[3]. Financing needed for firms to stay afloat is likely to change companies' balance sheets significantly.

Capital structure during crises. The severity of the previous crises has led many economists to explore their macroeconomic patterns and causes. However, microeconomic responses remain less thoroughly studied. For instance, capital structure analysis has acquired new significance since the crisis of 1997, when the high debt ratio of East Asian firms at the outset of the crisis implied subsequent sharp declines in the region's investment and growth [14]. The financial crisis ignited in 2007-08 has witnessed a series of corporate bankruptcies mainly owing to sub-optimal investing by firms fueled by their sub-optimal capital structure [15], thus emphasising the role of crises' effects on corporate capital structure.

Even though theories and determinants are common in literature on capital structure, it is essential to understand that these theories consider the demand side only, implicitly assuming a perfect elasticity of capital supply. This is primarily irrelevant during crises, even with well-functioning financial intermediaries. The agents' unwillingness to lend given economic uncertainty or scrutinising borrowers makes it difficult to take out loans and decrease overall lending. Therefore, it is possible that the firm indeed targets leverage, and it is optimal to increase debt, but there are insufficient funds in the market [16].

The existing papers prevailingly find the negative effect of crises on a firm's leverage [15–17]. For South Korea, debt ratios were expected to decrease after the Asian financial crisis, as high leverage was one of the main drivers of the crisis. The same pattern is expected for the global financial crisis, but the reason falls behind the credit crunch, which impedes debt financing, so the choice is shifted towards equity financing. On the contrary, the recent crisis can be expected to have a positive effect on the level of capital structure due to the absence of a credit crunch, increasing number of loan programs, the necessity to cover expenses under conditions of halted business activities.

Foreign ownership. This study focuses on firm-level foreign ownership. The literature on the determinants of investors' decisions to invest in a particular company is minimal, especially for foreign investors. In South Korea, there are some restrictions on foreign investors. Among the 1145 industrial sectors identified in the Korean Standard Industrial Classification, the Foreign Investment Promotion Act (FIPA) lists 61 exclusive sectors with no foreign investment and 28 restricted sectors[4]. Min and Bowman [18] draw attention to book-to-market ratio, dividend payout ratio, current ratio, and liquidity when analysing foreign ownership.

Foreign ownership and capital structure. Traditional theories outline the importance of agency costs, asymmetric information for leverage choice, and the role of monitoring in reducing market inefficiencies. The effectiveness of monitoring can affect the severity of firms' agency costs [19; 20]. For example, it may reduce the conflicts of interest between shareholders and managers, influencing capital structure decisions. Effective monitoring can lead to more efficient leverage levels, as debt financing is often used to discipline managers.

Ferreira and Matos [21] find that foreign investors monitor corporations worldwide based on a sample of 27 countries. Similarly, the results of Aggarwal et al. [22] suggest that international portfolio investment promotes good corporate governance practices around the world, analysing 23 countries.

Besides the monitoring role of foreign ownership, foreign investors may provide a broader set of credit sources [4], which is especially valuable during credit crunches. Eppinger and Smolka [23] conclude that foreign ownership provides companies with a financial advantage. Both the 1997 Asian and the 2008 global crises resulted in the deterioration of credit conditions, while no problems with credit supply were present during the 2020 COVID-19 crisis, which prompts investigating the role of foreign ownership as an additional channel of financing i.e., a direct substitute of debt.

The most recent papers on capital structure analysis use the dynamic trade-off theory [24; 25]. It is also often used in papers focusing on South Korea [26; 5]. Tsoy and Heshmati [5] use the dynamic trade-off theory to investigate the impact of crises on the capital structure in South Korea. Since it is suggested that foreign ownership reduces market inefficiencies, it is reasonable to assume that it increases the speed of adjustment of actual leverage towards the target [4]. The intuition is also consistent with Kim et al. [27], who show that firms with a higher share of foreign investments adjust rapidly towards their optimal level of capital structure.

Hypotheses

Based on literature review, we formulate the following hypotheses.

Hypothesis 1: Companies with foreign investors tend to have lower leverage ratios.

The hypothesis is based on the evidence that foreign investors are likely to engage in effective monitoring [21; 22].

[2] https://www.nytimes.com/2020/03/23/world/asia/coronavirus-south-korea-flatten-curve.html

[3] OECD Economic Surveys: Korea 2020.

[4] Regulation for Foreign Investment and Technology Introduction, Ministry of Industry, Trade and Energy, 2018.

The monitoring decreases the incentives to use debt for its disciplinary role, reducing agency costs [19; 20].

Hypothesis 2: Companies with foreign investors are expected to adjust towards the target capital structure faster.

Following the intuition about foreign ownership reducing market inefficiencies, it is also expected that foreign ownership has an indirect effect on leverage through the speed of adjustment towards the target. According to [27], firms with a higher degree of foreign investment adjust rapidly towards their optimal level of capital structure.

Hypothesis 3: Foreign ownership results in higher leverage during crisis periods compared to non-period periods.

Foreign investors may provide a more extensive set of credit sources [4], which can be used in periods of credit crunches and liquidity constraints [23]. As a result, it may imply that companies with foreign investors can attract more debt during crises than companies without foreign investors. Thus, the effect of foreign ownership as a disciplining role and provision of more credit sources work in different directions and leverage during crises is expected to be higher than in regular times.

Methodology and data

The paper uses the framework of the dynamic trade-off theory to explain the capital structure dynamics. The total debt to total assets ratio is used to measure capital structure [28]. Foreign ownership is calculated as the percentage of shares outstanding owned by foreign investors. The analysis starts with the identification of channels via which foreign ownership can impact capital structure. The first channel refers to the direct effect of foreign ownership on the target leverage ratio. The second channel is the indirect effect of foreign ownership via its impact on the adjustment speed. These channels are later incorporated into the basic specifications of the dynamic trade-off theory.

Basic specification. The optimal leverage $L^*_{i,t}$ for firm i at time t is modelled as a function of firm characteristics in the previous period $X_{i,t-1}$:

$$L^*_{i,t} = \beta X_{i,t-1} \quad (1)$$

where $X_{i,t}$ is a vector of commonly used firm characteristics, including profitability, growth opportunities, non-debt tax shield, size, tangibility, business risk, and chaebol affiliation. The description of the variables can be found in Table 1.

Under perfect conditions, the observed leverage should be equal to optimal leverage $L^*_{i,t}$ that can be written as:

$$L_{i,t} = L^*_{i,t}$$

Then the leverage adjustment can be written as follows:

$$\Delta L_{i,t} \equiv L_{i,t} - L_{i,t-1} = L^*_{i,t} - L_{i,t-1}$$

Because the process of adjustment from one state to another can be costly for a company, it adjusts gradually with the speed of adjustment $\lambda_{i,t}$:

$$L_{i,t} - L_{i,t-1} = \lambda_{i,t}(L^*_{i,t} - L_{i,t-1}) \quad (2)$$

$$L_{i,t} = (1-\lambda_{i,t})L_{i,t-1} + \lambda_{i,t}L^*_{i,t} \quad (3)$$

Plugging the equation for the target leverage, equation (1), and introducing random shock $\varepsilon_{i,t}$ in the model, the resulting model specification could be formulated as follows:

$$L_{i,t} = (1-\lambda_{i,t})L_{i,t-1} + \lambda_{i,t}\beta X_{i,t-1} + \varepsilon_{i,t} \quad (4)$$

Foreign ownership and capital structure. To account for the direct effect of foreign ownership $F_{i,t}$ on capital structure, we added $F_{i,t}$ to the model explicitly as a determinant of the target leverage. To mitigate the reverse causality problem, the lagged value $F_{i,t-1}$ is introduced. To account for possible asymmetry in the foreign ownership effect between under and over-leveraged companies, an interactive dummy variable $M_{i,t}$, is introduced, which takes the value of 1 if a company is under-leveraged and 0 otherwise:

$$L_{i,t} = \gamma_1 F_{i,t-1} + \gamma_2 M_{i,t-1}F_{i,t-1} + (1-\lambda_{i,t})L_{i,t-1} + \\ + \lambda_{i,t}\beta X_{i,t-1} + \varepsilon_{i,t} \quad (5)$$

Foreign ownership and speed of adjustment. According to Faulkender et al. [29], a change in leverage can occur without any actual adjustment of leverage towards the target due to changes in net income and retained earnings. The adjustment caused by profit is a "passive" adjustment, while the one caused by accessing capital markets (actual debt or equity is attracted) is an "active" adjustment. The paper focuses on active leverage adjustments. Then, an active deviation $dL_{i,t}$ involves the subtraction of a passive mechanical component $L^p_{i,t}$ from the target level $L^*_{i,t+1}$:

$$dL_{i,t} \equiv L^*_{i,t+1} - L^p_{i,t} \quad (6)$$

where

$$L^*_{i,t+1} = \beta X_{i,t}$$

$$L^p_{i,t} \equiv \frac{D_{i,t}}{A_{i,t} + NI_{i,t+1}}$$

The fitted value of target leverage from (4) is used as a proxy of $L^*_{i,t+1}$, $D_{i,t}$ denotes a book value of outstanding debt in period t, $A_{i,t}$ indicates a book value of total assets in period t, and $NI_{i,t+1}$ denotes net income in period $t+1$.

Then, equation (2) can be revised to model an active adjustment of leverage towards the target leverage:

$$\Delta L^a_{i,t} \equiv L_{i,t} - L^p_{i,t-1} = \lambda_{i,t}(L^*_{i,t} - L^p_{i,t-1}) + \varepsilon_{i,t} \quad (7)$$

Using equation (6), equation (7) can be rewritten:

$$\Delta L^a_{i,t} \equiv L_{i,t} - L^p_{i,t-1} = \lambda_{i,t} dL_{i,t-1} + \varepsilon_{i,t} \quad (8)$$

Then the active speed of adjustment can be derived from the ratio of active leverage adjustment to active leverage deviation:

$$\lambda_{i,t} = \frac{\Delta L^a_{i,t}}{dL_{i,t-1}} + \varepsilon_{i,t} \quad (9)$$

The speed of adjustment is modelled explicitly to account for the influence of foreign ownership:

$$\lambda_{i,t} = \lambda_0 + \lambda_1 F_{i,t-1} + \lambda_2 M_{i,t-1} F_{i,t-1} + \lambda_3 Z_{i,t-1} \quad (10)$$

where $Z_{i,t}$ is the vector of control variables including size, dividends [30], corporate governance [7], firm and annual fixed effects.

Foreign ownership and capital structure during crises. We introduced an interactive crisis dummy D_t to account for the change in the significance of foreign ownership during crisis periods, where D_t is the vector of crises dummies for the periods of Asian, global and COVID-19 crises, respectively [5; 1]:

$$L_{i,t} = \gamma_1 F_{i,t-1} + \gamma_2 M_{i,t-1} F_{i,t-1} + \gamma_3 D_{i,t} F_{i,t-1} + \\ + \left(1 - \lambda_{i,t}\right) L_{i,t-1} + \lambda_{i,t} \beta X_{i,t-1} + \varepsilon_{i,t} \quad (11)$$

Foreign ownership and speed of adjustment during crises. To account for the change in the significance of foreign ownership during crisis periods, an interactive crisis dummy $D_{i,t}$ is introduced in the equation (10):

$$\lambda_{i,t} = \lambda_0 + \lambda_1 F_{i,t-1} + \lambda_2 M_{i,t-1} F_{i,t-1} + \\ + \lambda_3 D_{i,t} F_{i,t-1} + \lambda_3 Z_{i,t-1} \quad (12)$$

Table 1. Description of variables

Variables	Measurement
Profitability	The ratio of net income to total assets
Growth opportunity	Market-to-Book ratio
Non-debt tax shield	The ratio of depreciation expenses to total assets
Size	Natural logarithm of total revenues
Asset tangibility	The ratio of tangible assets to total assets
Chaebol affiliation	1997-2001: 1 if categorised as chaebol by KFTC; 0 otherwise 2002-2008: 1 if total assets exceed two trillion KRW; 0 otherwise 2009-2016: 1 if total assets exceed five trillion KRW; 0 otherwise 2017-2020: 1 if total assets exceed ten trillion KRW; 0 otherwise
Dividends	The ratio of dividends to total revenue
Corporate governance	The ratio of non-floating shares to the total number of shares outstanding

Sources: Prepared by the authors.

We applied the Generalised Method of Moments (GMM) that results in unbiased and consistent estimates [31; 25] for the analysis of the direct effect, equations (5) and (11). We estimated the indirect effect (10, 12) using Pooled, Fixed Effect or Random Effect models.

Sample construction. The research is based on a sample of companies listed on the Korean Stock Exchange in the 1997-2020 financial years. Financial data was downloaded from the Bloomberg database. Additionally, data on total assets denominated in Korean won was downloaded to be consistent with the KFTC criteria when identifying chaebols. Chaebol dummies introduced in the model will be different for different periods to avoid identification bias.

Financial companies are excluded from the sample according to the specific balance sheet and income statement data [5]. We excluded the firm-year observations with missing information on significant variables and with fewer than two years of data. The final data set includes 809 firms with 11 275 firm-year observations. We keep the data unbalanced to avoid survivorship bias.

Discussion of results

This part opens with a presentation of the results of foreign ownership and capital structure analysis without accounting for crisis periods explicitly to test (Hypothesis 1) and (Hypothesis 2). Then, a crisis variable will be introduced to the models to present the results of Hypothesis 3 testing.

Based on the Lagrange Multiplier Test – Honda test results[5] for equations (10) and (12), the data panel structure should be considered, with Wooldridge's test[6] results in the Random Effect model being the most statistically appropriate for the estimation. All estimation methods are implemented to control for the individual and time-specific effects and use robust standard errors.

Foreign ownership and capital structure

Table 2 shows the results of the GMM estimation of the equation (5). The dependent variable is leverage.

[5] Equation (10) Langrange Multiplier Test - Honda: p-value = 2.384e-13
Equation (12) Langrange Multiplier Test - Honda: p-value = 6.945e-13.

[6] Equation (10) Wooldridge's test: p-value = 0.307.
Equation (12) Wooldridge's test: p-value = 0.3061

Table 2. Leverage estimation output (GMM)

Variable	Estimate
Foreign ownership	-0.0166*** (0.0046)
Foreign ownership x Median dummy	-0.1232*** (0.0076)
Leverage (-1)	0.6969*** (0.0348)
Profitability	0.0280* (0.0141)
Growth opportunities	-0.0681 (0.0463)
Non-debt tax shield	-0.0257 (0.1695)
Size	-1.6761 (1.2415)
Tangibility	0.1243. (0.0749)
Median leverage	0.1318* (0.0553)
Chaebol dummies	Yes
	p-value
Sargan test	0.084003
Autocorrelation test (1)	< 2.22e-16
Autocorrelation test (2)	0.36605

Note: significance codes are 0 (***), 0.001 (**), 0.01 (*), 0.05 (.).

First, the negative and highly significant foreign ownership coefficient indicates downward pressure on the target leverage level, which results in lower observed leverage levels. Moreover, an interactive dummy of median leverage introduced in the model shows that when observed leverage is above the median level (Median dummy = 1), foreign ownership results in a more significant target leverage decrease than in an under-leveraged company.

Secondly, the effects of profitability, growth opportunities, non-debt tax shield, and tangibility are consistent with the trade-off theory expected signs. Year- and sector-specific median leverage ratio has positive significant coefficients, which is consistent with the fact that the leverage of individual companies converges with the median leverage of the whole industry in a specific period.

Overall, these estimation results support (Hypothesis 1) about foreign ownership facilitating lower levels of leverage. The channel of influence is likely to be the monitoring role of foreign investors, as the disciplining role of debt can be substituted.

Foreign ownership and speed of adjustment. Table 3 contains information on estimation output using the Random Effect model. The dependent variable is the speed of active adjustment.

Table 3. Speed of active adjustment estimation output (Random Effect)

Variable	Estimate
Constant	-1.6921*** (0.0122)
Foreign ownership	0.0016** (0.0006)
Foreign ownership x Median dummy	0.0180*** (0.0006)
Size	0.1066*** (00137)
Dividends	-0.0000 (0.0000)
Corporate governance	0.0027*** (0.0006)
	p-value
Chisq	< 2.22e-16

Note: Significance codes are 0 (***), 0.001 (**), 0.01 (*), 0.05 (.). *Source: authors' calculations*

The foreign ownership variable is positive and significant, meaning that the speed of active adjustment increases with foreign ownership. As the interactive median dummy and foreign ownership coefficient is positive and significant, it can be concluded that foreign ownership increases the speed of active adjustment more in over-leveraged companies. The result is intuitive; firms with relatively high leverage ratios tend to be financially distressed and are likely to substitute debt whenever possible. In this case, debt can be replaced by foreign ownership if it is issued to reduce agency costs of equity.

The results also offer evidence that larger companies and those with more non-floating shares tend to have a higher speed of active adjustment, which can be interpreted as companies having lower transaction costs.

Overall, the results from Table 3 support (Hypothesis 2): the faster speed of active adjustment in case of higher foreign ownership. The expected channel of influence is the reduced transaction costs due to monitoring in which foreign investors are engaged.

Results from Table 2 and Table 3 reflect the general pattern of the impact of foreign ownership on capital structure and find a direct influence on the target leverage and indirect effect via the speed of active adjustment.

Foreign ownership and capital structure during crises. Table 4 shows the results of the GMM estimation of the equation (11) and provides general information about foreign ownership during crises and, additionally, distinguishes different crises for a deeper analysis. The second column contains estimates using a model that does not account for various crises. The third column includes estimates that incorporate multiple crises periods. The dependent variable is leverage.

The effect of the crises can be broken down into the effects of Asian, Global and COVID-19 crises separately. Interestingly, foreign ownership resulted in even lower leverage levels during all crises, with only the COVID-19 impact being significant. The channel through which this change can be explained is likely the difficulty and high cost of debt attraction, so less debt can be used for its disciplining role when foreign ownership increases.

The analysis of crisis specifications does not support (Hypothesis 3) since, in all crisis periods, foreign ownership resulted in even lower leverage ratios, which contradicts the tested hypothesis. It is still possible that foreign investors expand the credit sources, which increases leverage, but the impact of monitoring probably outweighs it and the overall leverage decreases.

Table 4. Leverage estimation output during crises

Variable	Estimates	
Foreign ownership	-0.0168*** (0.0046)	-0.0160*** (0.0046)
Foreign ownership x Crisis dummy	-0.0031 (0.1505)	
Foreign ownership x Asian		-0.0349 (0.0292)
Foreign ownership x Global		-0.0331 (0.1242)
Foreign ownership x COVID-19		-0.0697* (0.0283)
Foreign ownership x Median dummy	-0.1234*** (0.0076)	-0.1282*** (0.0078)
Leverage (-1)	0.6967*** (0.0348)	0.6916*** (0.0348)
Profitability	0.0284* (0.0141)	0.0276* (0.0138)
Growth opportunities	-0.0675 (0.0459)	-0.0707 (0.0500)
Non-debt tax shield	-0.0219 (0.1680)	-0.0189 (0.1633)
Size	-1.6603 (1.2401)	-1.6234 (1.2304)
Tangibility	0.1233. (0.0744)	0.1182 (0.0741)
Median leverage	0.1319* (0.0552)	0.1362* (0.0560)
Chaebol dummies	Yes	Yes
	p-value	**p-value**
Sargan test	0.081829	0.075399
Autocorrelation test (1)	< 2.22e-16	< 2.22e-16
Autocorrelation test (2)	0.36847	0.35938

Note: significance codes are 0 (***), 0.001 (**), 0.01 (*), 0.05 (.).
Source: authors' calculations.

Foreign ownership and speed of adjustment during crises. Table 5 contains information on estimation output for the effect of foreign ownership on the speed of active adjustment during crises using the Random Effect model. The dependent variable is the speed of active adjustment.

Table 5. Speed of active adjustment estimation output (Random Effect)

Variable	Estimates	
Constant	-1.6922*** (0.0122)	-1.7095*** (0.0123)
Foreign ownership	0.0016** (0.0006)	0.0016** (0.0006)
Foreign ownership x Crisis dummy	0.00007 (0.0009)	
Foreign ownership x Asian		0.0042** (0.0015)
Foreign ownership x Global		0.0043* (0.0020)
Foreign ownership x COVID-19		-0.0065*** (0.0016)
Foreign ownership x Median dummy	0.0180*** (0.0006)	0.0186*** (0.0006)

Variable	Estimates	
Size	0.1065*** (00137)	0.1080*** (00137)
Dividends	-0.0000 (0.0000)	-0.0000 (0.0000)
Corporate governance	0.0027*** (0.0006)	0.0028*** (0.0006)
	p-value	**p-value**
Chisq	< 2.22e-16	< 2.22e-16

Note: significance codes are 0 (***), 0.001 (**), 0.01 (*), 0.05 (.).
Source: authors' calculations.

It is apparent that foreign ownership is positive and significant both during crisis and non-crisis periods and close to the values in Table 3. Overall, the change in foreign ownership influence during crises is positive and insignificant. However, from the analysis of the specific crises, it can be inferred that a single percentage point increase resulted in a more significant increase of the speed of active adjustment by 0.42 and 0.43 percentage points, on average, ceteris paribus, during Asian and Global financial crises, respectively. While the result of the COVID-19 crisis is precisely the opposite and more significant: during the crisis, a percentage point increase in foreign ownership reduces the speed of active adjustment by 0.65 percentage points, on average, ceteris paribus, and even makes the influence on the speed negative. The channels of changes may be inherent in the nature of the crises. The first two are financial crises, while the latter is a pandemic. During the financial crises, the ability to borrow is limited, which is likely to result in debt substitution, and the contribution of foreign investors becomes relatively higher. On the other hand, credit supply was not limited during the COVID-19 crisis. Moreover, additional loan supporting programs have been introduced, which has made borrowing cheap and has reduced the significance of foreign investors in the speed of active adjustment since adjustment can be easily financed by debt.

Overall, the findings support the intuition that foreign ownership is a substitute for debt in its disciplining role.

Conclusion

This study provides insights into the foreign ownership effect on the firms' capital structure in crisis and non-crisis periods, which remains unexplored.

In the paper, we show that foreign ownership has a significant negative impact on company target leverage and, through that, on the observed leverage with a more significant effect for the over-leveraged firms. When analysing the Asian financial crisis, the global financial crisis, and the COVID-19 crises, it becomes apparent that all three resulted in even lower leverage. Still, only the latter implied a significant change in the impact of foreign investors on company leverage.

An analysis of active adjustment led us to conclude that foreign ownership facilitates a higher speed of adjustment towards the target leverage level. The cost of borrowing during crises can explain the directions: substitution of debt when credit supply is limited or expensive (Asian and Global crises), and substitution of foreign ownership when borrowing is cheaper (COVID-19 crisis). An analysis of the crises demonstrates that foreign ownership increased the speed of active adjustment during the Asian and global financial crises, while COVID-19 reduced its influence.

Overall, the paper concludes that foreign ownership influences a company's capital structure directly by changing the target leverage and indirectly via the speed of adjustment. The findings are consistent with those of empirical papers that presume concluding lower leverage ratios for companies with higher foreign ownership and of theoretical papers focusing on the monitoring role of foreign investors.

The results of the research paper are helpful both in academic and practical spheres. Academics can use the paper to benchmark foreign ownership and its relationship with capital structure in crisis and non-crisis periods. In practice, results can be used by company managers when facing crises or other macroeconomic shocks. The findings may also guide policymakers in credit crunches and liquidity crises to facilitate investment from abroad when credit supply is limited.

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The Impact of Corporate Social Responsibility on Corporate Financial Performance: Evidence from Russian and Dutch Companies

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Abstract

This paper studies the impact of Corporate Social Responsibility (CSR) reporting on the Corporate Financial Performance (CFP) of Russian and Dutch companies. Using the theoretical framework of stakeholder theory, we apply regression analysis to obtain quantitative evidence on CSR-CFP relations. The companies' CSR involvement is measured by their reputation index provided by CSRhub – transparent data platform developing consensus ratings of companies' ESG performance all around the world. The return on equity ratio is used as a measure of corporate financial performance. The sample consists of 45 Russian and 55 Dutch companies from the CSRhub list (2017 data.) We study all companies rated by CSRhub from two European countries – Russia as an emerging economy and the Netherlands as the developed country with a coordinated market economy. Our findings demonstrate a weak positive correlation between CSR and the companies' ROE. The CSR has a higher impact on the financial performance of Russian companies than on their Dutch counterparts. The proposed explanations relate to the different levels of business risk and trust in these countries, the dissimilar nature (mandatory and voluntary) of non-financial reporting, and the transparency of national businesses for investors. Different perceptions of business risk by investors as well as different levels of company transparency may explain the lower CSR effect on the performance of Dutch companies in comparison to the Russian case. These results may be used by corporate management for assessing financial returns from CSR strategies.

Keywords: corporate social responsibility, sustainability, return on equity, corporate financial performance, regression analysis, Russian companies, Dutch companies

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Introduction

The Corporate Social Responsibility (CSR) concept has become a leading business trend over the last few years [1–3]. The CSR approach refers to companies' voluntary initiatives to take responsibility for both positive and negative impacts on society and the environment from their core business activities, "a form of international private self-regulation focused on the reduction and mitigation of industrial harms and provision of public good" [4, p. 644]. The implementation of CSR strategies is a key task for any modern company that wants to maintain its competitive advantages and Corporate Financial Performance (CFP). However, there is no consensus on how CSR initiatives relate to the performance of companies and other actors. Since CSR policies cannot exist independently of the economic and political issues of their countries [5–7], one can expect to see differences between the nature of the CSR-CFR relations in different national contexts.

The aim of this paper is to investigate the impact of CSR strategies on Corporate Financial Performance, which is believed to be positive. We study this issue by considering companies from two European countries – Russia as an emerging economy and the Netherlands as a developed country with a coordinated market economy. The special focus of our research is to compare results for samples of companies from these two countries. Given the significant differences in institutional, cultural and economic stances between Russian and Dutch businesses, we also expect to identify cross-national distinctions within the scope of our research.

Our methodology is based on regression analysis of CSR and financial data for Russian and Dutch organizations. The study has the following targets:

- Developing a unified operationalization of the CSR concept for Russian and Dutch companies;
- Analysing CSR-CFP relations for Russian companies;
- Analysing CSR-CFP relations for Dutch companies;
- Comparing the strength of CSR-CFP relations between Russian and Dutch companies;
- Deriving conclusions regarding the existence of CSR-CFP relations and determining further areas of research.

This study will contribute to the existing literature by providing quantitative results of CSR-CFP relations for Russian and Dutch companies from various business sectors. We employ the stakeholder approach to explain the observed relations and take an institutional point of view when discussing possible cross-country differences.

To meet our main research targets, we divide this paper into five parts. The part 1 explains the business context of CSR practices with an emphasis on Russian and Dutch companies. Part 2 focuses on the scope of CSR research and sets out the main findings of Corporate Social Responsibility studies and the main approaches to CSR operationalization by reviewing previous papers. Part 3 proposes a research design for CSR-CFP relation modelling, while Part 4 develops the model itself. Finally, Part 5 discusses the results of our statistical analysis and its limitations. The Conclusion summarizes the main results of the study and its possible implications.

1. CSR definition and business context

CSR concept and business practices

The concept of Corporate Social Responsibility has numerous scopes and definitions. Traditionally, CSR has been perceived as a company's contribution to the life of the local community or society in general. A seminal research project on the CSR topic [8] states that Corporate Social Responsibility comprises the economic, legal, ethical, and philanthropic expectations that any community has about any type of business and, in addition, the expectation for an organization to be constantly profitable so that its owners and investors fulfil their economic goals.

The recent view on CSR as Shared Value refers to the management strategy of finding business opportunities in social problems. The ordinary CSR concept focuses on giving something back to society or minimizing the harmful effect of business on the local community. Shared Value offers businesses the opportunity to maximize their competitive advantages by solving social problems in new markets or for new customers [9].

Most experts agree to recognize a business as socially responsible if it complies with the following criteria. First of all, a company has to meet the economic, legal, ethical, and philanthropic expectations of society. Secondly, a firm must implement sustainable practices and initiatives that go beyond the legal necessities set down by official law. Furthermore, to be considered as an advanced CSR user, a business should build its core operations around a particular social problem that requires an urgent and/or permanent solution. With the help of these criteria, it is possible to identify the degree to which a business is socially responsible and to quantify this degree.

By the 2000s, it had become clear that voluntary initiatives were insufficient and corporate self-regulation was not effective in view of the different scandals regarding sweatshop issues in developing countries, financial fraud, and other unethical behaviour of multinational companies. The CSR concept began to receive particular attention from the international business community after a major scandal involving the Enron and Arthur Anderson corporations [10]. In order to prevent the repetition of such mistakes, international companies started to pay more attention to CSR policies that provide some degree of control over corporate behaviour. Moreover, some governments and non-profit organizations (NPOs) also responded to the problem of unethical corporate behaviour by issuing ethical guidelines and codes of conduct. For instance, the Sarbanes-Oxley Act for US corporations and the EU Non-Financial Disclosure Directive for EU

organizations made it mandatory for all publicly traded companies to disclose both financial and non-financial data about their business operations[1]. After these events, CSR practices became a strategic aspect for many Western companies and started to appear in the corporate culture of emerging market countries, too. As a result of CSR practices, companies with better disclosure became more attractive for stakeholders and enjoyed financial benefits in the long run. The reasons for such effects are multiple: the most common explanation makes use of the stakeholder perspective and states that CSR disclosure adds information to financial accounting data, leading to a better understanding of the company's activities, decreasing information asymmetry and reducing the incentives for the opportunistic behaviour of management. This is especially valuable when and where information supply is scarce – for example, in countries with slack corporate reporting legislation or poor transparency. In this paper, we shall explore whether this is the case for the two European countries under consideration.

National context of corporate social responsibility: the case of Russia

Corporate Social Responsibility practices started to emerge in the Russian business environment quite recently in comparison with the West. Russian legislation does not even require publicly traded companies to report on CSR activities. Even though most Russian companies have already adopted the GRI framework for preparing CSR reports, different metrics are used to measure non-financial performance, which makes it difficult to compare companies with each other. Nevertheless, assessing the efficiency of social investments has become a growing trend among Russian companies.

There are few good studies of the corporate social responsibility of Russian companies. Black and Rachinsky have explored the relation between corporate governance and the market value of companies. They conducted a time-series analysis of a number of available governance indices for Russian companies from 1999–2006. The authors found an economically and statistically strong correlation between company governance and market value [11]. However, this study did not completely cover the CSR concept, since corporate governance is only one of many CSR dimensions. In addition, market value is just an external measure of a company's performance. Orazalin and Mahmood studied the sustainability indicators of Russian oil and gas companies. They found that "companies with a share of foreign ownership disclose more transparent sustainability information than companies owned only by local investors"; however, more valuable information is found in reports addressed to local stakeholders (in Russian) than in reports to foreign ones (in English) [12, p. 70]. Shvarts et al. identified a trend of the enhanced disclosure of environmental issues by Russian oil and gas companies [13].

All these papers say little about the issue considered here. So, there are significant gaps in the study of CSR-CFP relations for Russian companies.

National context of corporate social responsibility: the case of the Netherlands

The Netherlands was one of the first European countries to develop strategic CSR. In 2000–2002, the Dutch government financed the "National Initiative for Sustainable Development" – a programme that included 19 Dutch companies which incorporated CSR into their core business strategies and subsequently conducted CSR marketing to present the information to the public [14]. In 2015, Euronext Amsterdam became a sustainable stock exchange, introducing a commitment letter that made it mandatory for all listed companies to report on non-financial practices and promote responsible investment[2]. A comparison of the Netherlands with other European countries suggests that, in implementing CSR, Dutch companies focus "on water and climate change, diversity and sustainable building" [5, p. 26]. As a result, Dutch companies have accumulated extensive experience in the preparation of CSR reports, which makes them a benchmark for comparison.

Both Dutch corporate management and stakeholders strive to measure the CSR performance of Dutch companies against their European counterparts. However, this is quite a complicated task due to the use of different KPIs to measure sustainable practices [15]. Nevertheless, early research already showed that enhanced CSR disclosure by European (including Dutch) companies "translates into more precise earnings forecasts by analysts" [16, p. 643] on financial markets and in the public sphere than in the case of US companies.

Existing literature on the CSR of Dutch companies speaks about the problem of comparability, which also exists for Russian companies. This causes the number of research papers where the authors statistically analyse the impact of CSR on company financial performance. For instance, [17] reveals a positive correlation between the environmental performance of European (including Dutch) companies and their ROA (return on assets). Another paper [18] examines the determinants of company participation in CSR practices for Dutch businesses. The author conclude that the magnitude of CSR practices depends on company size and level of ownership. However, no correlation between business financial resources and the size of CSR activities has been found.

Thus, our analysis of previous studies points to a shortage of quantitative research on the impact of CSR on the performance of Dutch companies, just as for their Russian counterparts. This paper aims to contribute to the existing literature by providing empirical evidence on CSR-CFP relations in the Netherlands as well as in Russia.

[1] Timeline of Business Ethics and Compliance. URL: https://www.ethics.org/resources/free-toolkit/ethics-timeline/

[2] Retrieved from the Sustainable Exchange Initiative: URL: https://sseinitiative.org/stock-exchange/euronext-amsterdam/

2. CSR research scope

Previous findings of CSR research

After exploring the questions of whether CSR is necessary at all and how it should be organized, recent discussions have focused on how CSR affects different aspects of company performance. Recent papers have touched on the impact of CSR on financial performance (an issue of particular interest for us), market structure [19] and brand [20], innovative activities [21; 22], company market value [23; 24], ratings [25], etc.

Most authors agree that CSR activity and disclosure benefit companies and society insofar as they strengthen company and market transparency, reduce information asymmetry and raise stakeholder awareness. Some recent studies have accented the links between CSR disclosure and financial performance by examining company risks. [26] showed that companies with high CSR scores are more likely to have lower idiosyncratic risk [27], showed that companies with low CSR scores are more likely to experience financial distress [28] found that bank debts cost more for companies with low CSR scores than for companies with higher scores [29; 30] demonstrated the same result for the cost of equity.

It has been shown that "CSR has a significant impact on [the] capital allocation process: market participants are more willing to allocate scarce capital resources to firms with better CSR performance. Moreover, by disaggregating the CSR performance into its components, we are able to show at a more fine-grained level that both the social and the environmental aspect of CSR activities reduce capital constraints" [31, p. 17].

CSR-CFP relations have been statistically examined in numerous papers [2; 32]. Previous academic publications have extensively studied CSR-CFP relations using the data of Western and Asian companies. While most studies have identified positive relations between these variables, several authors have managed to find negative, neutral, U-shaped, or more complicated relations.

A certain positive effect has been found for companies from different countries. Skare and Golja [33] examined the financial results and CSR of 45 US companies included in the DJSIndex and compared them with 45 companies that do not engage in CSR practices. The study revealed a strong positive correlation between responsible behaviour and financial performance. A study by Purnamasari et al. showed the positive effect of CSR on operating cash flow and reduced costs for Indonesian companies in the short and long term [34]. Lin et al. revealed the positive influence of CSR on financial performance with intellectual capital as the mediator and the industry type as the moderator [35]. Another paper found a positive correlation between CSR and ROA of Indonesian telecommunication companies [36]. Mervelskemper and Streit [23] studied how capital market investors evaluate ESG disclosure with regard to the form and the content of reports. Their results indicate that ESG (environmental, social, and corporate governance) performance is targeted more strongly and in the (desired) positive direction when firms publish ESG reports irrespective of their type (stand-alone or integrated), although integrated reporting is better insofar as it correlates more strongly with better company outcomes in comparison with distinct reports for ESG and corporate governance performance. Margolis et al. [32] found a positive yet small effect of CSR on CFP and explained it by the existence of external variables or situational contingencies that could substantially bias the results.

Du Toit and Lekoloane [37] did not find any correlation between CSR practices and the financial performance of companies listed on the Johannesburg Stock Exchange.

Peng and Yang [38] investigated how the impact of ownership concentration moderated the link between corporate social performance (CSP) and CFP for a sample of Taiwanese listed companies during the period from 1996 to 2006. The results of the empirical analysis provided strong support for the idea that the divergence between control rights and cash flow rights of controlling owners negatively moderates the link between social and short and long-term financial performance. Elouidani and Faical [39] constructed their own CSR index for publicly traded companies on the Casablanca Stock Exchange. The authors showed a strong negative impact of CSR on company financial indicators. A recent study [40] of the stock market reaction to the environmental performance of US, Canadian and Scandinavian companies revealed the negative reaction of the stock market towards environmental issues: firms with the highest (lowest) environmental performance scores are quoted at significantly lower (higher) price-to-sales multiples than other companies.

Non-linear relations between distinctive parts of CSR and CFP were reported by a number of researchers. Brammer and Millington [41] showed that companies with unusually poor CSP performance were the best in the short term, and unusually good social performers were the best over the long run. Wang et al. [42] found that corporate philanthropy and financial performance can be linked by an inverse U-shape curve. The same dependence was proposed by Barnett and Salomon [43], who showed that companies from the Kinder, Lydenberg, and Domini (KLD) rating database with low or high corporate social performance have higher CFP than companies with moderate CSP.

Even more complicated and interesting links have been found. Braga-Alves and Shastri [44] established that higher CSR scores lead to higher market value but not to higher profitability. Alareeni and Hamdan [45] showed that, on the whole, ESG disclosure positively affects the performance (ROA and ROE) of US S&P 500 companies. However, measuring ESG components separately showed that environmental and social disclosure was negatively associated with ROA and ROE but positively related to Tobin's Q. At the same time, corporate governance disclosure was positively related to ROA and Tobin's Q and negatively related to ROE. It is also important that proxies for the total ESG and its components (social, environmental and governance proxies) tend to be higher for firms with high assets and high financial leverage. Jaisinghani and

Sekhon [46] inquired into the profit persistence of Indian companies that disclose their CSR. The overall impact was found to be significantly positive, while individual dimensions of CSR disclosure demonstrate a mixed impact on company profitability. CSR dimensions relating to overall community development and product-related disclosures have a positive relationship, while environmental and customer-related dimensions have a negative relationship to financial performance.

Table 1 provides a summary of the results from existing literature on the CSR-CFP relationship.

Table 1. Types of CSR-CFR relations identified by previous studies

Authors	Type of Relations
Moneva, Ortas, 2010 [17] Skare, Golja, 2012 [33] Purnamasari et al., 2015 [34] Lin et al., 2015 [35] Firli, Akbar, 2016 [36] Mervelskemper, Streit, 2017 [23]	Overall positive
Du Toit, Lekoloane, 2011 [37]	Neutral
Peng, Yang, 2014 [38] Elouidani, Faical, 2015 [39] Garcia-Blandon et. al., 2020 [40]	Overall negative
Brammer, Millington, 2008 [41] Wang et al., 2008 [42] Barnett, Salomon, 2012 [43]	U-shape
Braga-Alves, Shastri, 2011 [44] Alareeni, Hamdan, 2020 [45] Jaisinghani, Sekhon, 2020 [46]	Ambiguous

Source: Adapted by the authors from the existing literature.

Our review of research papers devoted to the relationship between Corporate Social Responsibility and Corporate Financial Performance reveals different findings. The main reason for the different results of empirical studies is the different ways in which CFP and CSR are measured.

CFP is traditionally measured using financial ratios computed from the data of company financial statements. However, the operationalization of CSR practices is apparently more challenging for several reasons. First of all, there is a lack of generally accepted standards within the business community that would establish official or generally used CSR measures. Instead, several different guidelines have been set down by non-government and non-profit organizations. Corporate managers are not obliged to comply with all the rules contained in any one guideline. Management is free to choose a framework that will present CSR information in the clearest, fairest and most complete manner. Depending on their choice of guideline, companies use different metrics to make their CSR performance transparent. This makes it impossible to compare the performance of firms even in the same industry. Another factor that adversely affects research results is the inability of corporate management to adopt measurable sustainable objectives. CSR policies mainly consist of non-financial data that is difficult to quantify in real figures. As a result, an inadequate choice of CSR metrics may lead to an unfair description of business performance and result in seemingly biased research findings.

The operationalization of CSR and its components as measurable variables is the main issue discussed by experts conducting quantitative research in this field.

CSR operationalization

CSR measurement approaches may be divided into two main types: content analysis and CSR reputation indices. CSR indices are the most common method used by researchers to make quantitative measurements of company social responsibility. These indices are computed by independent expert agencies. One of the most famous indicators is the Dow Jones Sustainability Index (DJSI) established by Standard and Poor's in 1999. The index tracks the performance of large international companies according to economic, environmental, and social criteria[3]. DJSI is computed for different geographical regions, making it possible to investigate the CSR performance of companies from different countries. However, it includes only firms that fulfil certain sustainability criteria and are the best in environmental, social, and governance (ESG) disclosure. Other major indices that have been used by researchers include Vigeo CSR scores for European companies and the MSCI KLD 400 Social Index for US publicity traded companies [47]. However, these indices are designed only for a particular region. Authors facing this problem have used CSR scores developed by local rating agencies. For instance, Du Toit and Lekoloane [37] based their research on the Socially Responsible Investment Index computed for all the Southern African companies listed on the Johannesburg Stock Exchange. Experts from China have used CSR composite ratings provided by an independent firm that reviews the CSR performance of Chinese firms annually [48]. Nevertheless, such indices have several weaknesses. First of all, they are developed by private agencies, which do not always use scientific methods or completely disclose their calculation methodology. Secondly, agencies normally publish aggregate CSR scores, making it impossible to examine social, environmental, and economic dimensions separately [49].

[3] DJSI index family. URL: https://www.sustainability-indices.com/index-family-overview/

In view of these disadvantages, some researchers have constructed their own CSR scores. For instance, Wang [50] calculated social responsibility scores based on the economic, social, and environmental dimensions of CSR and using information from the financial statements of Taiwanese companies.

As none of the aforementioned indices include Russian companies, which are at the focus of our research, they cannot be used in this study. Even Wang's method is not applicable to Russian companies due to the lack of publicly available data for Russian organizations.

The second method of social responsibility measurement is based on content analysis. Content analysis codifies a written text into different categories. As existing research papers show, this approach enables scholars to obtain valid results for corporate environmental and social reporting practices [51]. Gamerschlag, Möller and Verbeeten [52] have managed to develop a Social Responsibility Index for German companies based on the content analysis of company reports. The authors identified 32 keywords for each dimension using Global Reporting Initiative guidelines and then counted the number of these words in company CSR reports. The main advantage of this methodology is that it covers all the CSR dimensions and is relatively easy to replicate for checking the validity of the results. This approach has also been used to measure the effect of CSR reporting practices on the financial performance of UK firms [53]. Nevertheless, this method may lead to a lack of research objectivity, since researchers determine the keywords themselves while analysing company reports [49]. This can result in the distortion of the studies' findings.

Both approaches, whether sustainable indices or content analysis, have advantages and drawbacks that must be mentioned in the research limitations. The operationalization of CSR in our paper is based on the index approach, which normally provides higher reliability since CSR scores are calculated by independent CSR experts.

We use the CSRhub reputation index as a metric for evaluating company social practices. CSRhub is an independent agency that develops CSR scores for companies around the world. The scores are based on "Stakeholder Theory", reflecting the firms' responsibility to multiple stakeholders[4]. CSRhub recognizes four main categories of company stakeholders: community, employees, environment, and governance. Each of the categories is divided into three subcategories, as shown in Table 2.

Table 2. Components of CSRhub scores

Community	*Philanthropy*	*Product*	*Human Rights & Supply Chain*
Business commitment and effectiveness within the local, national and global communities in which companies operate	Companies' donations, charitable activities and volunteerism of staff	The responsibility of business for the development, design and management of products and services and their impact on customers and society	Companies' commitment to respect human rights and operate without using child, forced or compulsory labour
Employees	*Compensation & Benefits*	*Diversity & Labour Rights*	*Training, Health & Safety*
Companies' disclosure of policies and programmes in diversity and labour relations	Includes employee rewards, equal compensation, and fair financial benefits	Policies for the non-discriminatory treatment of labour	Companies' ability to provide employees with a safe and healthy workplace
Environment	*Energy & Climate Change*	*Environmental Reporting*	*Resource Management*
Interaction between business and environment	Companies' efficiency in addressing the problem of climate change through appropriate strategies and policies	Companies' environmental reporting and adherence to specific disclosure standards	Measuring how efficiently a business uses its resources while manufacturing or delivering products/services
Governance	*Board*	*Leadership Ethics*	*Transparency & Reporting*
Executive compensation, attention to stakeholders, disclosure of policies and procedures	The effectiveness of the Board of Directors in corporate governance	How efficiently a company manages its relations with its main stakeholders	To what extent a business is transparent to its stakeholders, complies with sustainability goals and follows sustainable guidelines

Source: Adapted by the authors from https://content.csrhub.com/files/CSRHub_Data_Schema_2014_11.pdf

[4] CSRhub. The CSR Rating Methodology. URL: https://esg.csrhub.com/csrhub-ratings-methodology

CSRhub collects data in each category for every company. When all the information is processed, the categories are weighted, and the results are summed together to make the final CSR score. The validity of these scores has been confirmed by several papers that used them to study the relationship between the companies' CSR performance and their cost of debt and brand value [54; 55]. Hence, we can expect valid results from our regression analysis based on the use of CSRhub scores for operationalizing the CSR concept.

3. Research design for studying CSR-CFP relations

CSR and CFP metrics

To choose an adequate research methodology, it is important to understand which CSR and CFP metrics appear in the reports of modern companies. While the aforementioned studies do not examine CSR-CFP relations, their results may help us to select the dependent and explanatory variables for building an econometric model in our paper.

We use Return on Equity (ROE) as a proxy for corporate financial performance. ROE is a common measure of business financial profitability that is used by most investors and analysts to assess business efficiency and the performance of company top management. ROE, as well as ROA, often appear in CSR research [56; 57]. The alternative way to measure financial performance is to use market-based indicators such as Tobin's Q. Accounting-based ratios seem to be more appropriate for our research because they reflect the companies' current status-quo, whereas market-based indicators show expectations about future results and can be influenced by a lot of market and/or macroeconomic factors that are beyond a company's control. Moreover, accounting measures seem to show a stronger positive relationship between CSR-related factors and CFP than market-based measures [58]. That is why accounting-based indicators have been chosen as the variables for our study: ROE for the basic model and ROA for testing the model's robustness.

As a proxy for corporate social responsibility, we use the CSRhub score – a compound index assigned to companies by the CSRhub agency. The method of calculating the scores and their validity was discussed in the previous section. The CSRhub scores of different companies are chosen as the operationalization of our main explanatory variable. In order to isolate the CSR's impact on company financial performance, we use the profit margin, assets turnover, and financial leverage as control variables. The choice of additional explanatory variables is based on the DuPont analysis that assumes that ROE is a product of three ratios:

ROE = Profit Margin • Assets Turnover • • Financial Leverage,

where

Profit Margin = Net Income / Sales

Assets Turnover = Sales / Total Assets

Financial Leverage = Total Assets / Equity

The profit margin adjusts for possible variation in ROE across companies due to different profitability levels. The assets turnover explains the variation in ROE caused by differences in the firms' size and efficiency of production. Financial leverage measures the level of business indebtedness, whose increase can artificially boost a company's ROE. Thus, the inclusion of the chosen control variables allows us to avoid the problem of endogeneity in the model and, consequently, to obtain valid measurements of the impact of CSR on business financial performance.

Methodology

Our research uses regression analysis to determine the quantitative impact of CSR reporting practices on company financial performance. In view of the methodology of recent research papers and the fact that econometric models are the most common way to measure the correlation between two variables, a multiple regression analysis is performed in the form of a lin-lin econometric model.

We use the Stata statistical software package for data analysis and modelling.

Developing the research hypotheses

The literature on CSR-CFP relations presents many different conclusions. Nevertheless, most authors of recent studies agree that a statistically significant nexus exists between these factors and that their relationship is positive. Stakeholders suppose that CSR efforts are part of "doing good" and will transfer to "doing well". The comprehensive CSR intentions, practices and ways of disclosure of companies are evaluated positively by stakeholders (personnel, customers, investors) and result in high productivity, considerable sales and investments. All of these factors lead to high company performance.

Based on the results of previous research papers and the fact that CSR-CFP relations have not been examined extensively for Russian and Dutch companies so far, we make a two-tailed hypothesis:

H1: CSR reporting practices have a significant positive effect on the CFP of Russian and Dutch companies.

There is another stream of studies that compares how CSR relates to some activity aspects of companies in different countries. It was observed in [16] and [59] that environmental disclosure reduced the information risk and was viewed very differently by analysts and asset managers in Europe and in North America. Significant differences in SCR-related ratings were reported by authors [60] for companies in Europe and companies in other world regions.

It was observed for developed and developing countries that "corporations implement more socially responsible management practices in countries with stronger law enforcement relative to countries with weaker law enforcement" [61, p. 16, 27].

All the aforementioned studies explain the differences in the character of CSR-CFP relations in their subsamples by the cultural, institutional, and legal features which characterize the companies in a given country.

Table 3. Research variables

Dependent variable	ROE = Net Income / Equity
Main explanatory variable	Corporate Social Responsibility (CSR) – CSRhub score
Control variables	Profit Margin = Net Income / Sales
	Assets Turnover = Sales / Total assets
	Financial Leverage = Total assets / Equity
	Country = 1 if Dutch company, 0 if Russian company
	CSR#Country – cross variable that is 0 for Russian companies and non-zero for Dutch companies

Source: Created by the authors.

Black, de Carvalho and Gorga [62] demonstrated the strong influence of country characteristics on CSR performance, which they studied for companies from emerging economies. Considering the fact that the CSR concept has existed in the Netherlands for a longer period of time than in Russia, we can expect that Dutch consumers and investors are more aware of the importance of social responsibility and, consequently, are more likely to distinguish responsible and non-responsible practices. This leads to the following hypothesis:

H2: The CSR effect on CFP differs for Russian and Dutch companies.

In view of the nature of relations between our variables and the literature analysis performed above, we use a lin-lin econometric model to test our research hypotheses in the form:

$$ROE = ß_1 + ß_2\, Profit\ Margin + ß_3\, Assets\ Turnover + ß_4\, Financial\ Leverage + ß_5\, CSR + ß_6\, CSR\#Country + e_i.$$

To test our second research hypothesis and measure the potential differences in CSR impact between the two countries, the dummy variable "Country" and the cross variable "CSR#Country" are added to the model. Table 3 shows all the determining variables for our regression model.

Dataset

Given the fact that CSRhub provides scores for only 45 Russian and 55 Dutch companies, our study is limited to a sample of 100 organizations. They include companies that are either listed on national stock exchanges – Euronext (Amsterdam, the Netherlands) and MOEX (Moscow, Russia) – or are officially registered and have their corporate headquarters in Russia or the Netherlands. Our sample also contains data on firms operating in different industries such as oil & gas, energy, mining, consumer goods, transport, and financial services. Nevertheless, we do not make a cross-industry analysis due to the fairly small number of companies in any particular industry. The division of the sample into business sectors would not provide reliable statistical evidence.

The research variables were calculated using information from the financial reports of the sampled firms for the year 2017. All the data is presented in euro to enable a comparison between Russian and Dutch organizations.

Descriptive statistics for data

To develop a valid econometric model, we begin by conducting an analysis of our data set. Table 4 presents summary statistics for the research variables.

Table 4. Summary statistics

Dutch companies					
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
ROE	55	0.025	0.01	0.0008	0.073
Profit Margin	55	0.839	0.06	0.73	1.039
Financial Lev.	55	1.05	0.06	0.74	1.17
Assets Turnover	55	0.96	0.09	0.78	1.42
CSR	55	53.50	8.69	33	67
Russian companies					
Variable	Obs	**Mean**	**Std. Dev.**	**Min**	**Max**
ROE	45	0.027	0.099	0.0002	0.052
Profit Margin	45	0.9	0.092	0.66	1.27
Financial Lev.	45	1.04	0.032	1.00	1.11
Assets Turnover	45	0.96	0.068	0.66	1.036
CSR	45	49.69	7.39	33	60

Total sample					
Variable	Obs	Mean	Std. Dev.	**Min**	**Max**
ROE	100	0.026	0.011	0.0002	0.073
Profit Margin	100	0.904	0.075	0.66	1.27
Financial Lev.	100	1.04	0.048	1.00	1.17
Assets Turnover	100	0.96	0.079	0.66	1.42
CSR	100	51.79	8.32	33	67

Source: Output from the Stata computer programme.

Remarkably, there are quite a few differences in summary statistics for Russian and Dutch companies. For instance, the mean values of all the variables except CSR are almost equal in the two subsamples. For this reason, we infer limited variation in ROE by country and, consequently, expect the dummy variable "Country" to be insignificant. The difference in the mean values of CSR scores for the two subgroups is larger than for other variables. Therefore, we assume the existence of various CSR effects for Russian and Dutch companies and, as a result, expect the cross variable "CSR#Country" to be statistically significant.

To determine a correct specification for our model, we examine the type of relations between the dependent and explanatory variables. Scatter plots of the dependant variable ROE against the explanatory variables show us a positive correlation between ROE and CSR: companies with high CSR scores tend to have higher ROE. Thus, we can assume the existence of linear relations between ROE and CSR. Moreover, we expect to obtain a positive beta coefficient for the CSR variable in our model. Other control variables demonstrate a weak positive correlation with our dependent variable. Normally, company management develops strategies to increase the profit margin, assets turnover, and financial leverage in order to improve corporate ROE. Considering this argument and our graphical evidence, we can expect positive beta coefficients for all the control variables reflecting the existence of direct relations between the profit margin, assets turnover, financial leverage, and ROE. Finally, our scatter plots do not show any potential non-linear relations between the variables. Therefore, we use a lin-lin specification of the model. Table 5 presents the expected results of our estimates.

To avoid multicollinearity between our regressors, which can lead to biased results due to low t-statistics and insignificant coefficients, we make a correlation matrix and a variation inflation factor for our explanatory variables (Table 6).

Table 5. Expected results for econometric model

Theoretical interpretation	Econometric interpretation
Profit margin positively affects ROE	H0: $\beta_2 < 0$ H1: $\beta_2 \geq 0$
Assets turnover positively affects ROE	H0: $\beta_3 < 0$ H1: $\beta_3 \geq 0$
Financial leverage positively affects ROE	H0: $\beta_4 < 0$ H1: $\beta_4 \geq 0$
H1 research hypothesis: CSR reporting practices have an effect on CFP of Russian and Dutch companies	H0: $\beta_5 = 0$ H1: $\beta_5 \neq 0$
H2 research hypothesis: CSR effect on CFP differs for Russian and Dutch companies	H0: $\beta_6 = 0$ H1: $\beta_6 \neq 0$

Source: Created by the authors.

Table 6. Correlation matrix and VIF for explanatory variables

Correlation matrix						
	Profit margin	**Assets turnover**	**Finance leverage**	**CSR**	**CSR_Country**	**Country**
Profit margin	1.0000					
Assets turnover	–0.4867	1.0000				

Correlation matrix						
	Profit margin	Assets turnover	Finance leverage	CSR	CSR_Country	Country
Finance leverage	–0.0791	–0.5024	1.0000			
CSR	0.0531	0.3583	–0.0029	1.0000		
CSR_Country	–0.1320	0.0866	0.0660	0.4035	1.0000	
Country	–0.1643	0.0243	0.0846	0.2297	0.9724	1.0000
VIF (variation inflation factor)						
Variable	VIF	1/VIF				
CSR_Country	50.30	0.0199				
Country	44.63	0.0224				
CSR	3.54	0.2826				
Assets turnover	3.27	0.3062				
Profit margin	2.10	0.4758				
Finance leverage	1.97	0.5084				
Mean VIF	17.63					

Source: Output from the Stata computer programme.

Table 6 shows that VIF for the profit margin, assets turnover, financial leverage, and CSR is below 5, which points to the absence of a significant correlation between explanatory variables in the model. However, VIF for CSR#Country and Country has extreme values of 50.3 and 44.63, respectively. This is evidence of strong relations between these regressors, which is also suggested by their high correlation index of 0.97. Hence, the inclusion of both variables in the regression will cause severe multicollinearity that can degrade the quality of our model. To avoid this problem, we exclude the variable "Country" from the regression, keeping only the cross variable CSR#Country. The analysis of summary statistics demonstrates similar results in the two subsamples, implying that all the variables except CSR do not vary much by country on average. Therefore, we assume that the exclusion of the dummy variable "Country" will not significantly influence our results.

To ensure that our model does not suffer from heteroskedasticity that causes low standard errors and high t-statistics and, consequently, lowers the precision of estimates, we examine the distribution of the model error term. To be more specific, we test the residuals for its homogeneity. The White, Breusch-Pagan, and Shapiro-Wilk tests show that our error term is distributed closely to normality and that heteroskedasticity is not severe in the model and so should not substantially affect the validity of our results.

4. CSR-CFP relations models for Russian and Dutch companies

Estimation of CSR-CFP relations

To obtain quantitative evidence on the impact of CSR on company performance, we estimate our regression using the least squares method. We use the model:

$ROE = -0.459 + 0.143\ Profit\ Margin + 0.159\ Assets\ Turnover + 0.183\ Financial\ Leverage + 0.00024\ CSR - 0.00004\ CSR\#Country + e_i$.

The output of the model is presented in Table 7.

Table 7. Results of estimated CSR-CFP model for the whole sample

Source	SS	df	MS
Model	0.011351285	5	0.002270257
Residual	0.001254449	94	0.000013345
Total	0.012605734	99	0.000127331

Number of obs = 100

F (5, 94) = 170.12

Prob > F = 0.0000

R-squared = 0.9005

Adj R-squared = 0.8952

Root MSE = 0.00365

ROE	Coef.	Std. Err.	T	P>|t|	[95% Conf. Interval]	
Profit margin	0.14307	0.00706	20.25	0.000	0.12904	0.15709
Assets turnover	0.15914	0.00836	19.05	0.000	0.14255	0.17573
Finance leverage	0.18342	0.01065	17.22	0.000	0.16227	0.20457
CSR	0.00022	0.00006	3.63	0.000	0.00010	0.00034
CSR_Country	–0.00004	0.00002	–2.56	0.012	–0.00007	–8.8e-06
Cons.	–0.45857	0.02098	–21.86	0.000	–0.50022	–0.41692

Source: Output from the Stata computer programme.

The regression estimates support our initial conjectures.

Our control variables demonstrate a positive impact on company ROE. As the P-value for these regressors is quite small, we can reject the null hypothesis about the insignificance of control variables. This is an expected result.

The coefficient for the CSR and CSR#Country variables turns out to be significant at the 5% level. Since the CSR scores were calculated from information disclosed by companies, our H1 research hypothesis that *CSR reporting has an effect on the financial performance of Russian and Dutch companies* cannot be rejected. Thus, we conclude that CSR positively affects CFP for both Russian and Dutch companies. Moreover, as we will show in the next subsection, the H2 hypothesis that the impact of CSR on CFP differs between countries cannot be rejected, either.

Robustness of the CSR-CFP relations model

In order to derive a final conclusion on the relations between CSR practices and business performance, we test our model for robustness in two ways. At first, we compare the model based on the two country subsamples. Next, to assure that our main model is sustainable to changes in regressors and, consequently, measures the true CSR effect, we re-estimate the initial regression with new control variables.

To ensure that our regression does indeed reflect the dependence of ROE on CSR for both Russian and Dutch companies and to test the H2 hypothesis, we build two separate models for these countries. The output of these models is presented in Table 8.

Table 8. Estimation of separate models

Russian companies

Source	SS	df	MS
Model	0.003799208	4	0.000949802
Residual	0.000541607	40	0.00001354
Total	0.004340815	44	0.000098655

Number of obs = 45
F (5, 94) = 70.15
Prob > F = 0.0000
R-squared = 0.8752
Adj R-squared = 0.8628
Root MSE = 0.00368

ROE	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
Profit margin	0.13096	0.01237	10.59	0.000	0.10596	0.15596
Assets turnover	0.15925	0.01741	9.15	0.000	0.12406	0.19444
Finance leverage	0.15989	0.02083	7.67	0.000	0.11778	0.20199
CSR	0.00025	0.00011	2.42	0.020	0.00004	0.00047
Cons.	–0.42489	0.03957	–10.74	0.000	–0.50486	–0.34491

Dutch companies

Source	SS	df	MS
Model	0.007386274	4	0.001846569
Residual	0.000560627	50	0.000011213
Total	0.007946901	54	0.000147165

Number of obs = 55
F (5, 94) = 164.69
Prob > F = 0.0000
R-squared = 0.9295
Adj R-squared = 0.9238
Root MSE = 0.00335

ROE	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
Profit margin	0.16484	0.00944	17.45	0.000	0.14586	0.18382
Assets turnover	0.15686	0.00880	17.82	0.000	0.13918	0.17454
Finance leverage	0.18211	0.01158	15.72	0.000	0.15884	0.20538
CSR	0.00013	0.00006	2.01	0.050	–2.04e-08	0.00026
Cons.	–0.47171	0.02267	–20.81	0.000	–0.51724	–0.42618

Source: Output from the Stata computer programme.

The results of estimates for the two separate models are similar to our initial findings. All the coefficients remain significant, meaning that our main regression is robust to changes in the sample. Hence, we conclude that *the impact of CSR on corporate ROE exists for both Russian and Dutch companies*. However, new estimates demonstrate a variation in the CSR effect for both subgroups. Thus, the CSR coefficient increases slightly from 0.00021 to 0.00025 for Russian companies while falling from 0.00021 to 0.00013 for Dutch organizations. We see that sustainable reporting has a smaller impact on Dutch businesses than on Russian companies. Thus, our H2 hypothesis cannot be rejected, and so we conclude that *CSR affects CFP differently for Russian and Dutch companies*.

To check the robustness of our model in another way, we replace the profit margin and assets turnover with the return on assets (ROA). Furthermore, we replace financial leverage by the debt-to-equity ratio. We pursue the robustness check by using the new explanatory variables:

Return on Assets ROA = Net Income / Total Assets

Debt to equity ratio D/E = Total Liabilities / Total Equity

The new model looks as follows:

$ROE = -0.137 + 0.09\ ROA + 0.0646\ Debt\_Equity + 0.0004\ CSR - 0.00008\ CSR\#Country + e_i$.

The new model's output is presented in Table 9.

Table 9. Robustness testing of CFP-CSR relations

Source	SS	df	MS
Model	0.009480242	4	0.002370061
Residual	0.003125491	95	0.0000329
Total	0.012605734	99	0.000127331

Number of obs = 100
F (5, 94) = 72.04
Prob > F = 0.0000
R-squared = 0.7521
Adj R-squared = 0.7416
Root MSE = 0.00574

ROE	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
ROA	0.09032	0.00927	9.74	0.000	0.07191	0.10873
Debt_Equity	0.06457	0.00807	8.00	0.000	0.04854	0.08060
CSR	0.00042	0.00009	4.66	0.000	0.00024	0.00059
CSR_Country	–0.00008	0.00002	–3.38	0.001	–0.00013	–0.00003
Cons.	–0.13736	0.01104	–12.43	0.000	–0.15930	–0.11543

Source: Output from the Stata computer programme.

The regression with the new explanatory variables shows that a unit increase in a company's ROA improves its return on equity by 0.09 monetary units. This is slightly less in comparison with our initial estimates of profit margin and assets turnover effects. A new measurement of business indebtedness also explains the small variation in ROE in comparison with financial leverage in the first model. Nevertheless, the P-value for the two control variables demonstrates the significance of these regressors at any critical level.

Note that the coefficients of CSR and CSR#Country are slightly higher than our initial estimates. The growth of the coefficients of these two variables leads to almost similar CSR effects for Russian and Dutch companies, meaning that sustainable practices have the same impact on corporate performance regardless of the country of business operations. A possible reason for the change in the estimated CSR effect may be the poorer quality of our second regression, while the new control variables explain a smaller variation in ROE, as shown by the decrease in R^2. Therefore, part of the unexplained variation in the dependent variable is due to the coefficients of CSR and CSR#Country, which artificially increase the total CSR effect. Hence, the new regression explains only 75% of the variation in

ROE in comparison with 90% in our initial model. Nevertheless, the coefficients of CSR and CSR#Country are still significant in the second model, indicating that the level of sustainable practices does indeed have an impact on business performance. Thus, we can conclude that our initial model is a better approximation of CSR-CFP relations and, consequently, delivers more valid results about the impact of CSR on a company's ROE. Moreover, the re-estimation of the regression with new explanatory variables does not result in any substantial bias of the CSR and CSR#Country coefficients. Hence, we can state that our estimate of CSR-CFP relations is reasonably robust.

5. Discussion of CSR-CFP relations

The results of the regression analysis confirm both of our research hypotheses. As for Hypothesis 1, we found a significant and positive correlation between companies' CSR scores and their financial performance in the full sample and in both national subsamples for Russia and the Netherlands. This is consistent with a lot of previous studies ([5; 16; 33; 61] and other papers mentioned above). We see that companies' CSR scores explain some variation in ROE. Thus, we can assert that CSR disclosure facilitates stakeholder's trust, reduces the likelihood of opportunistic behaviour among managers [63] and serves as an indicator of the degree of "good management" in the long-term orientation.

At the same time, the strength of CSR-CFP relations is quite weak. This can be explained by the following reasons.

First of all, the CSR score we use in our model as a proxy for CSR is not Corporate Social Responsibility per se. It is only a proxy calculated by a reliable rating agency that took a lot of factors into account yet could have overlooked or omitted other factors. And, in any case, information disclosure about some activity is not tantamount to this activity but is only a picture drawn by company management to meet the expectations of users and stakeholders. This picture may skew the strength of some links in the models.

Secondly, the weak CSR impact on ROE can also be explained by the low recognition of corporate social practices as an essential component of business success. As an emerging concept, the level of corporate sustainability may still not be considered by company management and other stakeholders as an important business indicator. As a result, companies do not strive to develop sustainable strategies that could increase net income and, consequently, improve ROE.

Thirdly, this study is based on cross-sectional analysis. Within the period in question, the observed CSR-CFP relationship may be weak because of a lag between the two variables. We can predict other results using panel data.

As for Hypothesis 2, our study demonstrates lower returns from CSR reporting practices for Dutch companies in comparison with Russian organizations. This fact can be explained by the different levels of business risk and trust in these countries. Dutch companies, especially those listed on the national stock exchange, are required to disclose non-financial information about their core business operations. In contrast, Russian organizations report about their non-financials on a voluntary basis. This results in the higher transparency of Dutch businesses in comparison with Russian companies. Moreover, Dutch institutions that regulate the behaviour of corporations are stronger than their Russian counterparts due to their longer history. Hence, Dutch government and society impose stricter controls on local businesses in comparison with the Russian state. In view of the above, investors may perceive Dutch businesses as less risky than Russian companies. This decreases the importance of CSR reporting for Dutch companies, as local stakeholders are sure in advance of the high sustainability of national organizations and, consequently, pay less attention to CSR disclosure. In contrast, Russian businesses have been historically characterized as non-transparent or poorly transparent ([13; 64; 65]). Therefore, the CSR reports of Russian companies are highly valued by stakeholders, as they provide additional information about businesses that is necessary for making solid investments and other decisions. Hence, the different perceptions of business risks by investors as well as different levels of company transparency can explain the lower impact of CSR on the performance of Dutch companies in comparison with Russian organizations.

The limitations of the study stem from different sources. This paper studies the CSR performance of Russian and Dutch companies only. As a result, our research findings may be only relatively applicable to organizations from other countries. In addition, the sample may not be sufficiently large to make proper statistical inferences. Furthermore, our model does not include the effect of time that is required to show returns from CSR strategies. Therefore, panel data analysis should be performed for a more precise study of CSR-CFP relations.

Finally, our results may be affected by the sub-optimal operationalization of the main variables. There are no unified measurement standards for the CSR concept. The chosen operationalization of the CSR concept as the CSRhub index might affect our results as well. The usage of other scores and/or content analysis of company CSR reports for quantifying the sustainability concept may provide different evidence of CSR-CFP relations. In addition, ROE as an accounting-based measurement of corporate performance might not completely reflect the expectations of company shareholders which are frequently affected by the level of long-term business sustainability. For some samples, the usage of market-based measures of business performance such as EPS (earnings per share) or the market-to-book ratio may provide evidence of stronger CSR-CFP relations than our model does. This might be due to the fact that companies with low CSR scores may be perceived as not being sustainable and so face a higher risk of being penalized for unethical behaviour or violation of environmental legislation. Since few investors would choose to have a stake in such businesses, the demand for their shares would fall. Hence, the total market value of unsustainable companies may be adversely affected by negative shareholder expectations. This effect is not captured by our model.

Conclusions

The disclosure of CSR practices is not mandatory in most countries around the world. For this reason, relatively few companies (mostly big businesses) prepare annual CSR reports. This leads to a lack of transparency about core business operations. As a result, investors may unintentionally provide funds to companies that engage in harmful or illegal practices.

The main goal of the present paper is to provide quantitative evidence about the effect of CSR practices on business performance and to encourage more organizations to issue CSR reports so as to become more transparent for stakeholders and society. Using a sample of Russian and Dutch companies, we performed regression analysis to estimate CSR-CFP relations. Our results demonstrate the existence of a small positive impact of sustainable activities on corporate performance measured by ROE. This can be partly explained by our choice of independent variable – ROE. The return on equity (ROE) may not fully reflect the expectations of investors about future business performance, which can be adversely affected by negative news about unethical or unsustainable corporate actions. The small impact of sustainable activities may also be due to their lack of recognition as an important element for good business performance. As a result, neither company management nor shareholders focus on the company's level of CSR engagement when making decisions, considering sustainability to be a secondary factor of business success. That may explain why our analysis suggests the low capacity of CSR to explain variation in ROE.

Our study also reveals a higher CSR impact on the performance of Russian companies in comparison with Dutch organizations. This phenomenon may be due to different levels of business risk and company transparency in these countries. When deciding about investing in Russian businesses, which is less transparent and riskier than Dutch firms, investors are more likely to require additional information about a company's core operations. This leads to the higher value of CSR reports for Russian organizations, and the information disclosed in these reports affects business performance more substantially than it does for Dutch companies. We conducted two robust tests which showed that our results have a reasonable level of validity.

This study did not examine the effect of CSR reporting over time, which can be quite considerable given that CSR strategies may not provide an immediate return. Therefore, a panel data analysis should also be performed to capture the effect of time. Furthermore, we did not analyse CSR impact by industry due to the lack of data. However, the growth of CSR reporting may result in more information becoming available in the near future. This will make it possible to perform a cross-industry analysis to determine business sectors that are especially sensitive to CSR activities. Finally, a study based on a different way of operationalizing CSR should be performed to support the credibility of our findings. For instance, the development of a CSR index that could be calculated for most companies using the available data would significantly contribute to the existing academic sources and help to bridge the gaps in the statistical analysis of CSR-CFP relations.

These research findings may be useful for both external and internal users. In particular, they should be important for companies from countries with emerging economies where CSR disclosure serves as an indicator of good company management and is more informative than the same information in developed European countries. Investors on financial markets could use CSR disclosure to help to evaluate the assets they select. Company management and other stakeholders should understand the nature and character of the CSR-CFP link when assessing expected returns from investments in CSR practices. Our evidence of a positive correlation between CSR and CFP may encourage more companies to disclose information about their social practices and, consequently, make their operations more transparent. Finally, our study contributes to the existing literature by proposing an approach to CSR operationalization that can be used for further statistical and econometrical modelling in CSR research.

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Bank Portfolio Allocation Strategy and Its Probability of Failure: Case of the Russian Banking Sector Purge

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Abstract

This paper aims to discover portfolio allocation strategies that facilitate a bank's stability. The paper examines the phenomenon of massive failures of Russian banks in the period from 2013 to 2019, in order to identify which of the banks' strategic decisions regarding assets and liabilities, as well as portfolio structure, lead to higher stability. The dataset contains financial indicators and prudential ratios of 895 commercial banks operating in Russia during that period. 507 banks, or 57% of all banks, lost their license during the considered period. Cases of bank failures were classified depending on whether the Central Bank identified any illegal activities conducted by the failed bank. The high failure rate provides an opportunity to study the differences between failed and non-failed banks in order to determine the factors associated with lower failure probability. Following the approach applied in most of the previous studies, we use a logistic regression to model the effect of different asset and liability portfolio structure on the failure probability. The hypothesis that failure probability of a bank is affected by its strategic focus of forming an assets and liabilities portfolio was statistically confirmed. We found that the focus of a bank's activity on providing loans to individuals and attracting deposits from companies leads to lower failure probability, confirming the results of previous studies. Also, we found that more active cooperation with other banks in terms of both borrowing and lending is associated with lower failure probability. Furthermore, we found that banks are less likely to borrow from or lend money to their fellow banks that later fail with illegal activity accusations. Finally, we found that unlike the EU banks, Russian banks with higher profitability ratios are more stable. The results are relevant for industry practitioners in facilitating the development of a more resilient bank strategy, as well as for regulators for incorporation in early warning models.

Keywords: banks, bank strategy, bank failure, bank management, bank portfolio allocation, bank profitability

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Introduction

When the new chairman of the Russian Central Bank, Elvira Nabiullina, took up the position in 2013, the radical changes in the approach of interacting with inefficient banks were subsequently implemented [1]. This period can be referred to as the "banking sector purge". In 2016 alone, 15% of all the Russian banks lost their license. Such numerous license revocations were unprecedented in Russia's modern economic history (Figure 1) [2].

Overall, the banking sector purge initiated by the Central Bank seems to have had a positive effect on the economy. This purge resulted in revealing a plethora of banks engaged in shady activity or earning management [1]. This also led to some negative consequences, such as a reallocation of assets to bigger banks [3; 4]. For many small and medium-sized banks, the question of survival has emerged. In such circumstances, it is worth studying the comparative resilience of different banks.

There are multiple outcomes that can be considered a failure for banks. It can be bankruptcy, according to national legislation [5], voluntary liquidation [6], or supervisory merger [7]. All of these outcomes lead to a bank's inability to continue its operations as an independent entity and loss of license, i.e. a failure of its strategy. In this study, we do not distinguish between these outcomes and use the term 'failure' to refer to all cases of license revocation.

The main argument for initiating the banking sector purge was the involvement of many Russian banks in shady activities and the fact that they did not really serve the economy. This argument can be supported with the data. Among the 507 bank failures registered during the period in question, 264 occurred due to illegal activities. The reasons for the failure of law abiding and misbehaving banks may be different. Therefore, we conducted separate analyses for these two groups.

The Russian banking industry is a unique example of an emerging market that has experienced a large number of bank failures during the last decade, and experienced an impressive economic and banking sector growth in recent years [8]. The assets of the Russian banking sector are highly concentrated. On June 1st 2020, 70% of total assets belonged to the 11 biggest banks [9, p. 5]. This puts the rest of the small and medium banks (which numbered 417 as of June 1st 2020 [9]) in danger of being unable to compete with the market leaders. Such a vulnerable position of the majority of banks indicates the fragility of the whole banking sector [10].

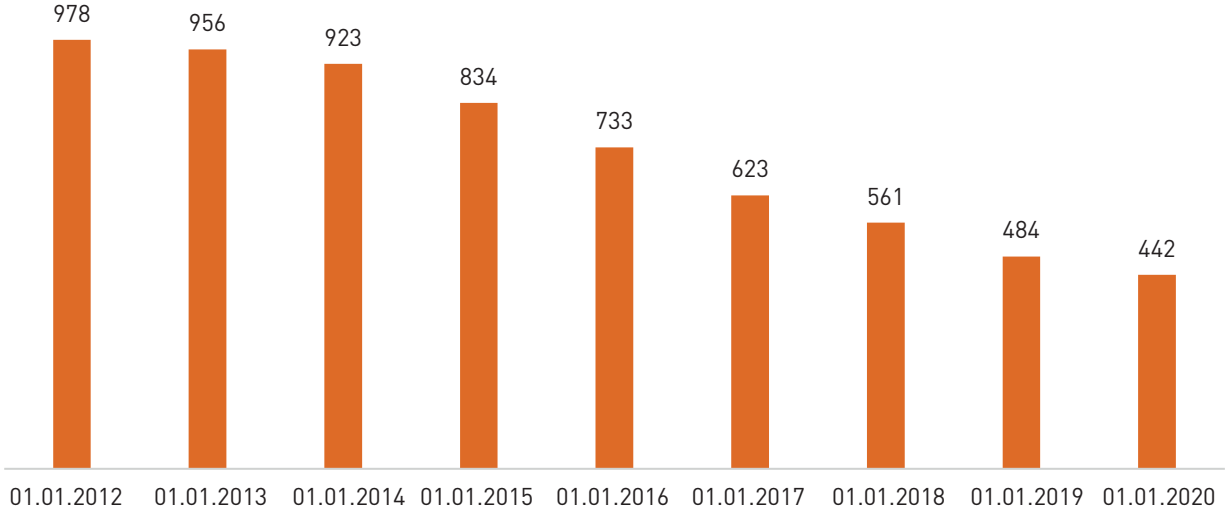
Ensuring financial stability is one of the main functions of the Central Bank. Much has been done to this end: the adoption of Basel I, II, and the current adoption of Basel III regulatory frameworks, adoption of new technologies, and implementation of the daily monitoring of banks' prudential ratios. The Central Bank also tries to mitigate external risks, such as global financial crises and natural resource price fluctuations, which can be very dangerous for the banking system [11; 12]. If necessary, the government can provide additional support to systemically important banks, like it did in the 2008–2009 global financial crises [13, p. 33].

The Central Bank has to conduct all its regulatory interventions against commercial banks non-publicly. Otherwise, the information about such interventions will substantially worsen the situation in a bank due to a potential bank run. The Central Bank reveals information only when serious intervention is necessary. Such intervention usually means a bank failure [4]. It is important for the public to find reliable failure risk estimation methods.

The possibility for an external observer to predict a forthcoming bank failure has been a relevant issue for many years. It seems rather challenging to identify the fine line between a problem bank and a bank in crisis, or a stable bank and a bank with insignificant current difficulties [12].

There are multiple bank rating systems utilized by central banks around the world. One of the best-known ones is CAMELS (capital adequacy, asset quality, management,

Figure 1. Bank number dynamics 2012–2020



Source: The official website of the Central Bank of the Russian Federation.

earnings, liquidity, sensitivity) which is implemented in the US [14]. In order to use a system that is better fit for national peculiarities, many countries have developed their own. For instance, Germany uses BAKIS, a coefficient analysis method based on a system of 47 indicators that comprehensively assess credit risk, market risk, liquidity and profitability. In the UK there is the RATE system, which is based on measuring the effectiveness of risk assessment instruments. Russia, in turn, focuses on the conditions of a bank's financial stability, owned capital, assets, profitability, liquidity, interest rate risk, quality of management, and transparency of ownership structure [15]. Russian Central Bank monitors the commercial bank ratio set daily. The ratios are described in the Central Bank instructions No. 199-I issued on 29.11.2019 [16]. We use these ratios in our research as control variables.

As state regulators do not reveal their bank rating grades, the public usually uses the ratings issued by private rating agencies. There are 4 national rating agencies accredited by the Central Bank of Russia. It is a very convenient tool, since all the information about bank stability is compressed into a single rating grade [17]. In spite of the popularity of credit ratings, they have some drawbacks, which are particularly relevant for Russia. The main one is that rating agencies, both Russian and global, are usually slow in updating their grades, and banks with an investment grade sometimes lose their license. Ferri et al. [18] found that credit ratings alone are not sufficient to reliably predict bank failures. Karminsky and Kostrov [19] produced similar results for the Russian banking sector.

Bank management influences its failure probability [20]. A bank's strategy can be identified as a combination of its asset and liability management strategies. To be more precise, the strategy of attracting deposits and allocating loans are the most informative [21]. Therefore, variables that describe them should be good predictors of a bank's failure probability [22].

Literature review

The issues of bank stability have been of interest to researchers and practitioners for many years. Developing the ideas of Altman [23], Sinkey [24] suggested using the discriminant analysis to model the banks' failure probability. Subsequently, Martin [25] introduced logit regression for bank failure prediction. Since then, different models were applied to address the same problem: survival analysis models [20; 26], trait recognition models [5], and neural networks [27]. However, the logit remains the most popular model in the field, due to its simplicity and ease of interpretation [5; 10; 11; 15; 18; 27–30].

Management quality is a crucial factor affecting a bank's stability, but its adequate estimation is problematic. In traditional CAMELS, rating system management quality is estimated by on-site bank examinations. External stakeholders are unable to conduct such examinations. Moreover, a CAMELS rating calculated by the regulator is kept secret in order to prevent a bank run following a downgrade. So, the public needs other ways to estimate bank stability.

However, today, banks publish their financial statements in many countries, including Russia. Financial information can be used to identify a bank's strategy and management quality. Wheelock and Wilson [20] suggested measuring management quality by cost inefficiency and input and output technical inefficiencies using a bank's financial information.

The banks generate cash flows through a variety of different activities. When researchers model a bank's activity, they have to simplify it and reduce it to a limited number of functions. As investment banking in Russia is less developed than commercial banking, for most banks the main cash flow generating activity is attracting deposits and allocating them to loans. Forthis reason, in our study we focus on these types of banking activities.

Mamonov [1] reported that in failed banks population those who had higher proportion of deposits from individuals and loans to firms tend to have higher "holes" (negative capital) after the failure. Karminsky and Kostrov [19] have arrived at similar conclusions. They found that a larger share of loans to individuals and a lower share of deposits from individuals reduce the failure probability for banks with negative capital. Deposits from individuals, despite typically being cheaper than other sources of financing like interbank borrowing, have their own risks. A higher proportion of deposits from individuals increases operational costs and makes a bank more vulnerable to liquidity risk after a bank run. Loans to individuals are more diversified and transparent than company loans. Their prevalence in the loan portfolio should make banks more stable.

Another group of relevant data is associated with the interbank market. Theory suggests that banks are better informed of the actual state of affairs in other banks than the general public or the regulator [31]. There is evidence that interbank market data can be useful in bank failure prediction [32]. It can be expressed through interbank market decisions when potentially problematic banks struggle to attract financing or allocate their resources on the interbank market.

Since 2017, when the above-mentioned studies were conducted, the "banking sector purge" in Russia hasn't ended yet. Thus, it may be interesting to check the earlier findings on the updated dataset. Furthermore, those studies are focused on the factors affecting a bank's negative capital after failure, while in our study we are more interested in bank strategies in regard to deposits and loan allocation that facilitate its resilience.

We will use the following research hypotheses.

More specific findings will be revealed below, which currently enables us to propose narrower hypotheses corresponding with the research direction.

H1.1: A bank's focus on issuing loans to individuals is likely to reduce its failure probability, while issuing more commercial loans increases failure probability.

H1.2: A bank's focus on attracting commercial deposits is likely to reduce failure probability, while attracting more deposits from individuals increases failure probability.

H1.3: The banks that fail due to illegal activities are less involved in interbank borrowing and lending.

The proposal of these hypotheses is driven by the related studies of Lanine and Vennet [5], Fungacova and Weill [10] and Zakirova et al. [15]. In addition, other findings are yet to emerge.

The study is unique in several ways. It encompasses an extensive time period known as the second wave of Russian banks' failure. Furthermore, it distinctly emphasizes the role of different financial indicators in portfolio allocation, as well as prudential ratios. Lastly, the research scale is massive, which is illustrative and relevant when discussing the Russian banking system phenomenon.

Data and methodology

The dataset contains monthly information on 895 commercial banks operating in Russia from 2012 to 2019. Elvira Nabiullina was appointed as the head of the Russian Central Bank in June 2013. With her appointment, the Central Bank shifted its policy to purging the banking sector, actively revoking the licenses of problem banks. So, we included one full year before this policy shift in the sample. All the data is structured as a panel dataset, where all the indicators included in the forthcoming analysis are captured on a monthly basis. For each bank, the periods are numbered from 1 to 96, where the first period is January 2012 and the 96th period is December 2019. This enables us to conveniently follow bank number dynamics within the time period when the Central Bank was implementing its radical policy in relation to inefficient banks and revoked licenses. In other words, if the cells containing some data in a previous month become blank in the following month, it means that a bank has defaulted (Appendix 1).

We use the binary variable "failure" as a dependent variable , which is equal to 1 if a bank fails during the analyzed period, and 0 if it continues its operations.

The independent variables are divided into 2 groups. The first group includes 11 financial indicators reflecting bank performance and loan/deposit portfolio composition (Table 1).

Table 1. Description of financial indicators

Financial Indicator	Description and gathering method
Loans to individuals	Include loans to individuals for 180 days, from 181 days to 1 year, from 1 to 3 years, more than 3 years, overdrafts and past-due debt
Loans to companies	Include loans to legal entities for 180 days, from 181 days to 1 year, from 1 to 3 years, more than 3 years, overdrafts and past-due debt
Issued Interbank Loans	Include loans issued to other banks that are incorporated in the CB and total turnover
Individual deposits	Include deposits of individual clients for 180 days, from 181 days to 1 year, from 1 to 3 years, more than 3 years and their turnover
Company deposits	Include deposits of legal entities for 180 days, from 181 days to 1 year, from 1 to 3 years, more than 3 years and their turnover
Interbank Loans Raised	Include loans raised from other banks, the CB, all turnovers and Loro correspondent accounts
Total Assets	Include high-liquid assets [cash, Nostro correspondent accounts], issued interbank loans, investments in securities [stocks, bonds, bills of credit], investments in other legal entities' equity, loans to individuals, loans to legal entities, past due debt in credit portfolio, fixed, intangible and other assets
Net Income	Calculated as net difference between a bank's total revenue and its costs in a particular period
Return on Assets [ROA]	The indicator measures a bank's profitability in relation to its assets. Calculated as a ratio of net income to net assets
Bank Capital	The difference between a bank's assets and liabilities. The amount of a bank's own funds that constitutes the financial basis of its activity. The information is extracted from the 123 reporting form
Total Liabilities	Total amount of funds that are paid or will become due for payment by a bank to its customers. Calculated as the difference between Net Assets and Bank Capital

The data was extracted from Banki.ru [33], a website that contains all the relevant information about Russian credit organizations. Its reliability is additionally supported by the usage of this source in related papers [10; 15; 19].

Table 2. Description of bank normatives

Normative	Description
N1: Capital Adequacy Ratio	Regulates risks of insolvency and establishes the minimum value requirement (10 percent) of a bank's capital needed to cover credit, operational and market risks
N2: Quick Liquidity Ratio	Regulates liquidity loss risks within one working day. The minimum value is 15 per cent
N3: Current Liquidity Ratio	Regulates liquidity loss risks within 30 days immediately following the date of its calculation. The minimum value is 50 per cent
N4: Long-term Liquidity Ratio	Regulates liquidity loss risks resulting from investments in long-term assets (more than 365 calendar days). The maximum value is 120 per cent
N7: Maximum Volume of Large Credit Risks Ratio	Regulates total volume of large credit risks and establishes the maximum ratio (800 per cent) of the volume of large credit risks to a bank's capital
N12: Ratio of Using Bank's Capital For Purchasing of Shares of Other Legal Entities	Establishes the maximum ratio (25 per cent) of funds invested in share purchasing to the bank's capital

These indicators are highly significant, as they help identify the general strategy of credit organizations in terms of their assets and liabilities portfolio structure. For this purpose, six additional variables were created, representing the share of each loan and deposit type in a bank's portfolio:

In order to identify a bank's strategy in loan and deposit allocation, we use 6 relational ratios.

1) *Share of Loans to individuals = Loans to individuals / Total Assets [il_to_ta].*
2) *Share of Loans to companies = Loans to Legal Entities / Total Assets [cl_to_ta].*
3) *Share of Interbank Loans = Issued Interbank Loans / Total Assets [ib_to_ta].*
4) *Share of Deposits from individuals = Deposits from individuals / Total Liabilities [id_to_tl].*
5) *Share of Deposits from companies = Deposits of Legal Entities / Total Liabilities [cd_to_tl].*
6) *Share of Interbank Loans Raised = Interbank Loans Raised / Total Liabilities [ib_to_tl].*

The second group of variables consists of six prudential ratios, which are monitored by the Central Bank on a daily basis (Table 2). They characterize the risk of the bank. The closer the ratio value to the minimum or maximum threshold set by the Central Bank, the more risks a bank has. The data is collected from the Central Bank website [34].

The study involves 895 Russian commercial banks. Between 2012 and 2019, 507 of them lost their license. Such a high failure rate (57%) points at the banking sector purge process and enables researchers to investigate the differences between failed and non-failed banks. One important factor to consider in analyzing failure reasons is the criminal status of a failed bank. We merged our data with the dataset provided by A. Karas [35] in order to identify whether the Central Bank mentioned that the bank was involved in illegal activities in its bank license revocation press release. Illegal activities include captive and dubious activities, asset tunneling, fraud, and violation of anti-money laundering laws [35][1]. Table 3 reveals that more than half of the failed banks were accused of violating federal laws. As the Central Bank reveals such information only simultaneously or after the license revocation announcement, there are no observations of surviving banks involved in illegal activities (Table 3).

Also, we considered the ownership structure of the banks, particularly, state ownership (including regions, municipal and state companies), and foreign ownership. We extracted bank ownership data from [36]. We found that cases of failure in such banks are very scarce. Support from the state or international enterprises makes them intrinsically different from other banks. Therefore, we decided to exclude them from the sample. Table 3 shows the difference between the two samples. The second sample is smaller by 46 observations. Only five of them are failed banks. This proportion differs from that observed in the entire sample.

[1] We took all the reasons that start with "M" in [35]. There is also a set of failure reasons starting with "R" devoted to different regulation violations. Such violations are not always due to the bad intentions of bankers. They might be due to other reasons, i.e. insufficiency of funds or operational mistakes. Therefore, we did not take this set of failure reasons.

Table 3. Failure / Survival statistics for all banks (left) and for private domestic banks (right)

Illegal			
Bfail	0	1	Total
0	388	0	388
1	243	264	507
Total	631	264	895

Illegal			
Bfail	0	1	Total
0	347	0	347
1	239	263	502
Total	586	263	849

Table 4 contains descriptive statistics of independent variables. We can see that banks have different strategies in deposit and loan allocation. The counterparts of deposit or loan allocation, such as corporate clients, individual clients or other banks can be dominant or negligible for different banks. Regulatory ratios vary significantly as well, indicating different risk profiles of the banks.

Table 4. Descriptive statistics of independent variables

Variable	Obs	Mean	Std. dev.	Min	Max
il_to_ta	58,982	.1364998	.1535784	0	.969
cl_to_ta	58,974	.3683424	.2104017	0	.994
ib_to_ta	58,982	.1245544	.1641695	0	2.453
id_to_tl	58,999	.3194003	.2202368	0	1.945
cd_to_tl	58,999	.2890019	.1712651	0	1.318
ib_to_tl	58,910	.0590109	.1233367	0	1.397
roa	58,982	.0042499	.0335985	−2.963981	.575944
n1	57,642	28.0498	31.87949	−2.76	2232.73
n2	56,202	435.8618	16904.78	0	1843406
n3	57,430	221.1897	2581.701	0	456271.9
n4	56,038	48.00565	31.06678	0	708.6
n7	56,002	257.0356	8049.571	−2641.06	1902056
n12	54,811	1.336668	9.429133	0	1389.1

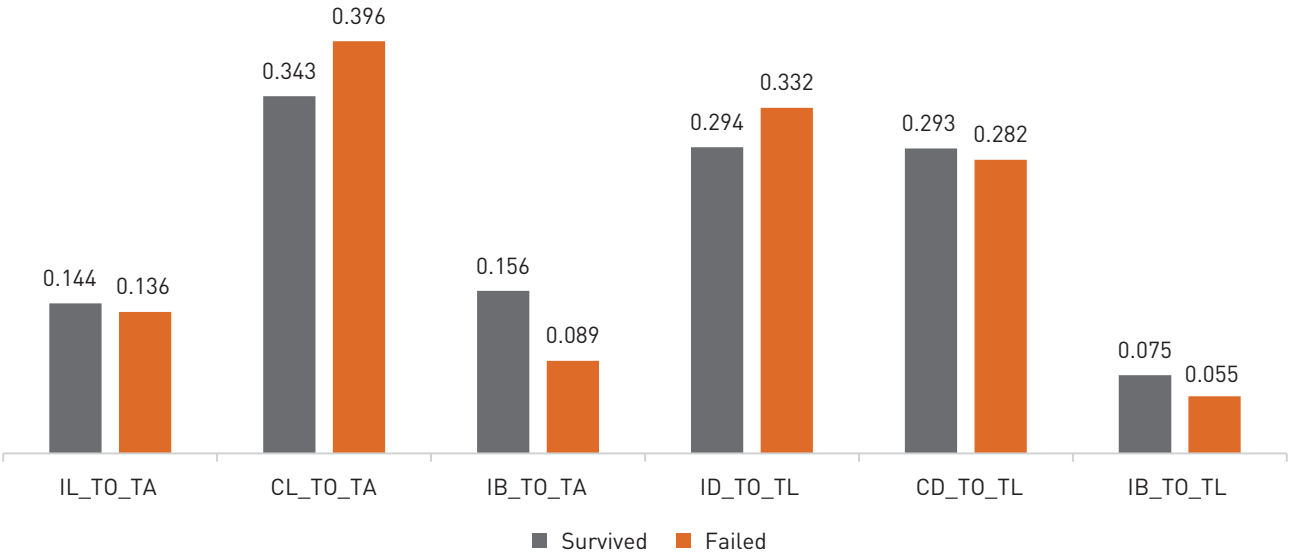
In addition, the VIF test was conducted in order to reveal possible multicollinearity issues (Table 5). VIF values indicate that multicollinearity is not an issue in our sample.

Table 5. VIF test

VIF	
il_to_ta	1.76
cl_to_ta	1.69
ib_to_ta	1.38
id_to_tl	2.14
cd_to_tl	1.76
ib_to_tl	1.44
roa	1.01

VIF	
n1	1.39
n2	1.03
n3	1.04
n4	1.49
n7	1.08
n12	1.09
Mean VIF	1.41

Figure 2. Average shares of strategies followed by failed and survived banks



Source: Based on Banki.ru.

Figure 2 illustrates the descriptive statistics of the loan and portfolio structure for failed and non-failed banks. We can see statistically significant differences in values between the two groups of banks.

The model we chose is the panel logit regression with random effects due to the binary nature of the dependent variable, as well as the ease of regression coefficients' interpretation. A fixed effects model does not calculate the probability of the outcome (i.e. failure). Instead, the model estimates the probability of having a non-zero outcome among all the observations of the particular panel unit (i.e., bank). Moreover, variable changes across time are small (from approximately one thousandth to one hundredth). This makes the application of fixed effects regression rather complicated or even impossible. Thus, the random effects model is popular in research on related topics [5; 10; 15; 28; 37].

Results and discussion

Table 6 displays the coefficients and marginal effects of the model. We ran separate logit regressions for the two samples, i.e., the banks that had failed without accusations of illegal activities, and banks that were accused of conducting such activities. The set of surviving banks is the same for both samples. The change in the log-odds does not provide a clear understanding of their actual influence on the probability of bank failure. In order to make the interpretation of model results easier, we also estimated marginal effects. Since all the variables are continuous, marginal effects measure the instantaneous rate of change, i.e. how the probability of bank failure will change if the independent variable value changes by one unit. These effects are more convenient, since they enable us to interpret the results in the same way as in the usual linear regression model.

The regression results are presented in Table 6. As the samples are different in size, we cannot compare the coefficients and marginal effects. What we can compare are their sign and significance. We can see that results are generally consistent for both samples. The signs of coefficients and marginal effects are mostly similar for both samples except for the share of interbank deposits in total liabilities. It might be due to the fact that the general public is not informed about a bank's potential misconduct, while other banks may have more information and prefer not to keep their assets in potentially criminal banks. An alternative explanation may be that shady banks, unlike their law-abiding competitors, do not need additional financing due to the nature of their operations.

Although we use a random effect model, the month dummies are still included in order to specify all the financial indicators for each of the 96 periods. Overall, 58,535 observations are included in the model that are clustered in 895 groups according to the number of banks.

Table 6. Results of the panel logit regression and marginal effects

Bank Failure	No illegal activities identified		Illegal activities identified	
	Regression Model Coefficients /Std. Err.	Marginal effects dy/dx /Std. Err.	Regression Model Coefficients /Std. Err.	Marginal effects dy/dx /Std. Err.
IL_to_TA	–0.601***	–0.0875251***	–1.210***	–.1748446
	(0.102)	(0.0153178)	(0.105)	(.0171644)

Bank Failure	No illegal activities identified		Illegal activities identified	
	Regression Model Coefficients /Std. Err.	Marginal effects dy/dx /Std. Err.	Regression Model Coefficients /Std. Err.	Marginal effects dy/dx /Std. Err.
CL_to_TA	0.447***	0.0650521***	0.312***	.0450795
	(0.0745)	(0.0112424)	(0.0714)	(.0105346)
IB_to_TA	−0.236*	−0.0343357*	−2.352***	−.3398107
	(0.0977)	(0.0143247)	(0.107)	(.02224)
ID_to_TL	0.723***	0.1052427***	0.337***	.0487159
	(0.0893)	(0.0138117)	(0.0849)	(.0124565)
CD_to_TL	−1.058***	−0.1540473***	−0.952***	−.1374846
	(0.103)	(0.0165258)	(0.0970)	(.015323)
IB_to_TL	0.461***	−0.0670916***	−2.899***	−.4189232
	(0.118)	(0.0174036)	(0.145)	(.0284712)
ROA	−5.450***	−0.7933378***	−9.509***	−1.374009
	(0.482)	(0.078554)	(0.529)	(.0984186)
H1	0.00112	0.0001637	0.00610***	.0008818
	(0.000655)	(0.0000957)	(0.000721)	(.000112)
H2	−0.00000238	−0.000000346	−0.0000190	−0.00000274
	(0.00000385)	(0.000000561)	(0.0000106)	(0.00000153)
H3	0.0000197	0.00000286	0.0000218*	0.00000315
	(0.0000150)	(0.00000219)	(0.00000998)	(0.00000145)
H4	−0.00286***	−0.0004158***	−0.00189***	−.0002729
	(0.000482)	(0.0000725)	(0.000454)	(.0000666)
H7	0.00000624**	0.000000908**	0.000000470	0.0000000679
	(0.00000229)	(0.000000337)	(0.00000163)	0.000000235
H12	−0.0237***	−0.0034465***	−0.00102	−.000148
	(0.00349)	(0.0005315)	(0.00218)	.0003152
Constant	−1.395***		−0.767***	
	(0.142)		(0.161)	
N	41110		43660	
Prob>chi2	0.000		0.000	
Log-likelihood	−21334.24		−23673.55	

*p<0.05, ** p<0.01, *** p<0.001.

The first key variable, IL_to_TA, which stands for the share of loans to individuals in total bank assets, has significant negative coefficients. That means that all else being equal, the strategy of increasing the share of loans to individuals in total bank assets has a positive effect on the bank's performance.

The second variable, CL_to_TA, indicates the strategic focus of increasing the share of loans to companies in a bank's total assets has positive value coefficients. This means that based on the given dataset, banks that were focusing on crediting legal entities experienced more frequent license revocations.

The share of interbank loans in total assets (IB_to_TA) is negatively associated with a bank's failure probability. The results are more significant for the sample with misbehaving banks. It may indicate that banks themselves possess additional information about their fellow banks and prefer not to lend money to banks that may be involved in illegal operations.

The second group of key variables is related to a bank's liability portfolio. Here, the indicators ID_to_TL (share of deposits from individuals in total liabilities) and CD_to_TL (share of deposits from companies in total liabilities) have coefficients with the same signs in both samples. The strategy of attracting personal deposits led to a higher chance of a bank losing its license, thus demonstrating poorer performance. The log-odds of bank failure probability decreases when there is a one-unit increase in the share of deposits from companies, all other things being equal. Our results confirm the findings of Mamonov [1], Karminsky and Kostrov [19], which stated that the strategy of attracting deposits from companies to lend to individuals is more sustainable than the opposite one.

Interestingly, coefficients at variable IB_to_TL (share of interbank deposits in total liabilities) have different signs in the 2 samples. In the sample of law-abiding banks it is associated with higher failure probability, while in the other sample we see that it has a significant negative association with failure probability. It might be due to the fact that it is more difficult to attract funds from other banks for misbehaving banks. It indicates that banks themselves have more information about their competitors and interbank money flow dynamics can be used to identify the banks involved in illegal activities.

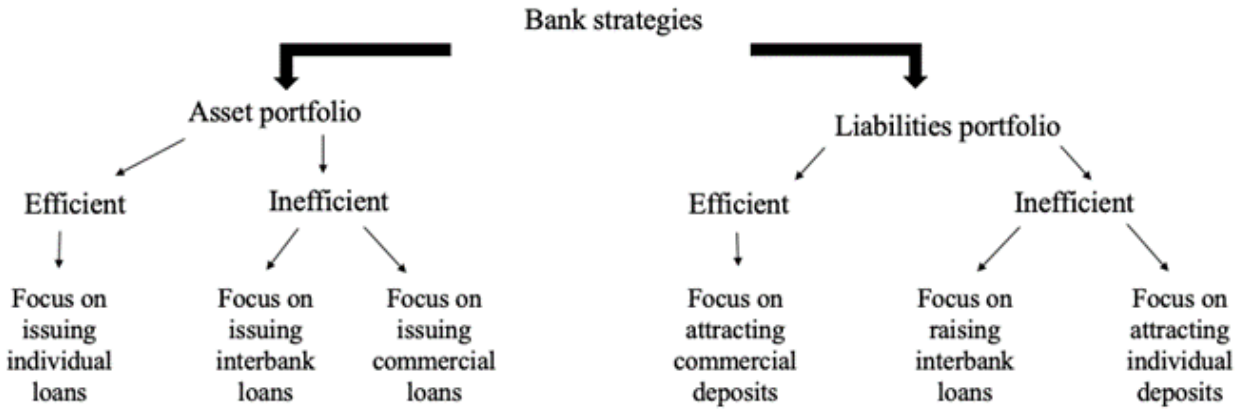
As for control regressors, the Return on Assets (ROA) showed a positive impact on bank performance. This finding contradicts the one by Pessarossi et al. [38] for European banks. This might be due to the different stages of banking sector development in the EU and Russia. It makes sense to reconsider the effect of ROA on bank stability in Russia again later, after the bank purge process is over and the number of banks becomes more stable.

The values of bank normative ratios mostly have little effect on the model and the signs of their coefficients are the same for both models. It is assumed that the changes in these indicators were insignificant for most of the periods except for a few shocks.

Taking into account the Prob>chi2 value, which equals zero (completely significant) and the statistical significance of four out of six independent variables representing bank strategies, the null hypothesis can be rejected. This means that the way a credit organization structures its assets and liabilities portfolio does affect the probability of default, hence, is capable of influencing bank performance.

The regression results confirm the research hypothesis that bank strategies do affect their probability of failure. Summing up the results of the study, the diagram of analyzed bank strategies is presented (Figure 3).

Figure 3. Efficient and inefficient bank strategies



Conclusion

This research aimed to find efficient strategies of forming the assets and liabilities portfolio of a bank. It examined the eight-year period from 2012 to 2019, when numerous commercial bank licenses were revoked by the Central Bank of Russia. The logit panel regression model demonstrated the statistical significance of the research hypothesis, namely, that a bank's strategy of loans and deposit portfolio allocation between different client segments does affect the probability of its default. The strategy of raising deposits from companies and distributing them as loans to individuals is more resilient than the opposite one. Unlike the EU banks, Russian banks with higher ROA tend to be more stable. Also, information on the interbank market strategy is relevant for failure prediction. The share of interbank deposits in total liabilities has a different effect on law-abiding and misbehaving banks. For the first group it is positively associated with failure probability, while for the second one we identified a strong negative association. This might indicate that banks themselves are reluctant to cooperate with potentially problematic banks, since they have more information about their peers. This finding suggests an avenue for future research and interbank market analysis for the purpose of failure prediction.

These results may be useful for financial experts, investors, and other economic professionals, people who seek to manage their personal assets more rationally, or to expand their general knowledge about commercial credit organizations. Also, the outcomes can be taken into account by the banks themselves in order to adjust their current strategies as a measure of failure prevention and enhancement of financial position. Finally, the financial regulator may use the findings of the study in the development of an early warning system.

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Appendices

Appendix 1. Example of the dataset with the failed bank

IB_TO_TL	0.003	0.003	0	0	0	0	0					
CD_TO_TL	0.131	0.123	0.121	0.12	0.118	0.114	0.02					
ID_TO_TL	0.541	0.549	0.563	0.561	0.562	0.563	0.552					
IB_TO_TA	0	0	0	0	0	0	0					
CL_TO_TA	0.794	0.791	0.785	0.804	0.81	0.809	0.758					
IL_TO_TA	0.002	0.001	0.001	0.001	0.001	0.001	0.001					
Bank Failure	1	1	1	1	1	1	1					
No. of period	61	62	63	64	65	66	67	68	69	70	71	72
Date	01.01.2017	01.02.2017	01.03.2017	01.04.2017	01.05.2017	01.06.2017	01.07.2017	01.08.2017	01.09.2017	01.10.2017	01.11.2017	01.12.2017
Bank Name	Yugra	Yugra	Yugra	Yugra	Yugra	Yugra	Yugra	Yugra	Yugra	Yugra	Yugra	Yugra

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The Impact of Corporate News on Stock Prices: Evidence from the Russian Stock Market

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Abstract

In the face of complex sanctions, Russian companies are looking for new mechanisms to ensure sustainability. An overcrowded corporate news backdrop could be the source for a significant decline in a company's market value or growth. Given the importance of information disclosure and corporate news for investors' expectations, we estimate the effect that four types of corporate news (Official publication of financial results for the quarters and for the year; M&A; Appointment of new persons; Dividend policy) impose on shares of three Russian companies in different industries: the financial, energy and high-tech sectors. In order to reflect corporate news' influence, we developed an index of corporate news for the companies concerned utilizing daily data ranging 2015–2021. By applying a vector error-correction model, we demonstrate that corporate news and corporate equities are related over the long run. Short-run results obtained with the Granger test suggest no evidence of causality. At the second stage, we construct impulse response functions that affirm the effect of corporate news on stocks. Corporate news has a high and positive effect on stock prices in the high tech and energy sectors, while the financial sector reacts in a mixed manner to corporate news, and the effect is weak. Obtained results serve as the basis for practical recommendations to individual and institutional investors, as well as to companies for market value management.

Keywords: corporate news, Russian stock market, stock price, index of corporate news, vicious cycle of influences between stocks

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Introduction

Contemporary investment environment is characterized by high dynamism and rapid reactions to info-events. In this framework, where institutional investors' trading in accordance with the news trends affects returns in the following weeks [1], monitoring corporate news is of mounting importance for investors.

Companies disclose different types of information. Some are mandatory disclosures, which vary across countries and mostly include financial statements, and some are voluntary disclosures. In our paper we focus on the second type of news. We examine the releases made by companies concerning their finances, changes in their capital structure, shifts in management setup, and dividend policy.

In an efficient market, information is presumably available to everyone at once [2], but this is not the case in reality. Asymmetry of information makes information an asset. News provides the market with signals that lead market agents to make certain decisions and determines the role of corporate news in shaping investors' opinions and evaluations. It serves as the basis of the stock market signal theory. According to this theory, information flows can either create or destroy a company's additional value [3].

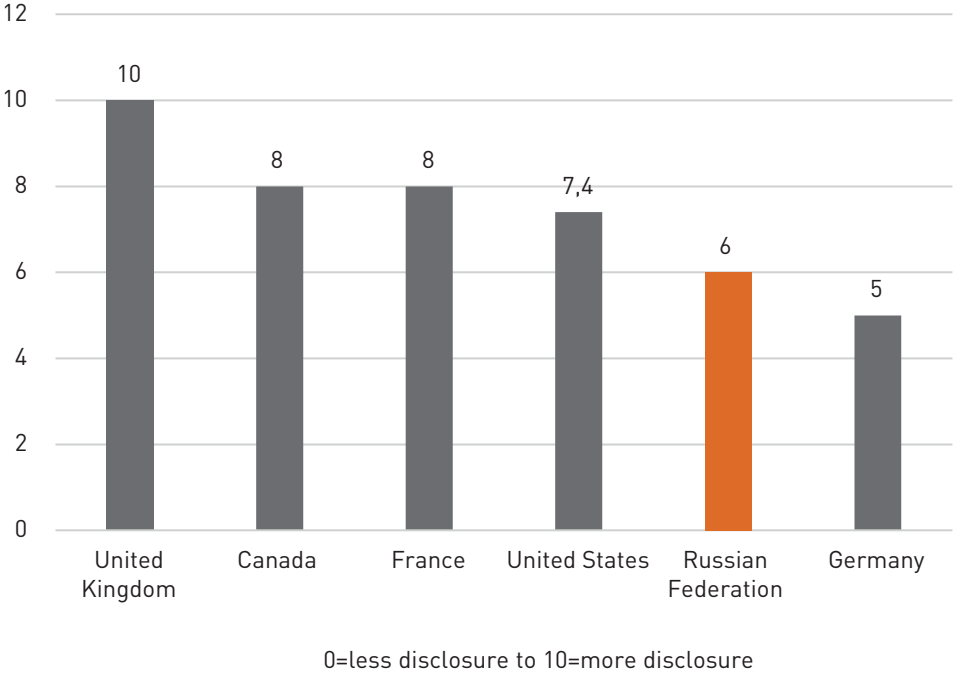
In the current paper, we seek to examine how a company's information openness, equivalent to extensive news coverage, contributes to investment inflows. We hypothesize that the effect of corporate news differs by structural breakdown for companies from different industries.

We conduct our research on the basis of specific company data rather than market indices due to several factors. First, an index cannot have corporate news, and it is exceedingly challenging to distinguish the impact of specific companies' news on the index's dynamics due to its composite structure. An index is significantly influenced by market news spanning specific industries or economies. News from a single company, even one with significant weight within an index, is not capable of dramatically affecting the entire index. Second, our methodology implies the introduction of a dummy variable for each specific company according to the days of press releases based on the analysis of informational publications of several types including financial, changes in the capital structure, changes in the management structure, dividend policy.

The current study is particularly relevant for publicly listed companies. Awareness of the impact of disclosure on market dynamics allows a company to engage in shaping investors' opinions and valuations, which in turn affect investments. A business's information transparency, tantamount to a great deal of news, facilitates investment inflow. Many companies utilize corporate and social media for this purpose. The abuse of this means is called greenwashing and can be illustrated by the well-known examples of Enron and British Petroleum, which we examine in more detail in the literature review.

Our motivation lies in the fact that the degree of importance of disclosure to investors depends on the institutional environment in which companies operate. If a high level of mandatory disclosure is legislated, then not much room is left for voluntary disclosure, thus, standing out becomes challenging. In comparison with other developed countries, the degree of disclosure in Russia is moderate, as seen in Figure 1. Generally, Russian companies are only obliged to publish accounting and financial information and statements of significant events [4].

Figure 1. Business extent of disclosure index in 2019



Source: World Bank Data [6].

Meanwhile, Krueger et al. [5] identified 29 countries that have introduced mandates for firms to disclose Environment Social Governance (ESG) information, including Australia (2003), China (2008), South Africa (2010), or the United Kingdom (2013). The authors also highlight that ESG reporting reduces the risk of negative ESG incidents and stock price crashes. Thus, we assume that Russian companies can benefit from ESG disclosure as it contains beneficial information for investors and demonstrates real effects. If a country's disclosure is poorly developed, the companies that follow best practices stand out significantly and attract the attention of investors. If there is a high level of disclosure in a country, investors are unwilling to pay a high premium for additional information. In Russia, the degree of disclosure is not high, so our research is particularly relevant in the context of Russian companies' data.

The contribution of the paper to the research literature corpus entails the fact that research on the topic is typically based on cases of companies involved in corporate scandals. In contrast, we would like to analyze the effect of daily, non-scandalous news. Furthermore, the topic is especially relevant for analysis in the Russian Federation since most of the available literature reviews European and US companies.

Literature review

Corporate news is an important channel of communication between a company and its investors. Released news can influence investor behavior, which will lead to a change in a company's financial performance.

According to efficient market hypothesis [7], prices on an efficient market provide accurate signals and fully reflect all available information. Therefore, stock prices will react to the information released in corporate news.

Researchers in their study [8; 9] revealed that the release of corporate news has an influence on stock closing prices. Another indicator that shows changes in investor behavior related to corporate news releases is abnormal returns [2; 10; 11]. An abnormal return describes the unusually large profits or losses generated by investment over a specified period. In several research papers [12; 13] stock price crash risk is used as an investor behavior proxy.

Corporate news can be used as tools to distort the real condition of a company. In April 2010, the largest oil spill occurred in the Gulf of Mexico after an explosion on the Deepwater Horizon oil drilling platform. The explosion occurred because of neglected safety issues and management failures of British Petroleum, despite the fact that the company was constantly undergoing inspections and published news that the company operations comply with safety standards. The company's financial condition worsened because of this incident, however, due to properly structured communication with the society during the crisis, it managed to cope with difficulties [14].

Sometimes distortion can lead to irreparable consequences. For example, Enron has hidden its large debts from the public and investors for several years using market value accounting and chain of special-purpose entities (parties) [15]. These methods allowed Enron to represent its transactions and investments as successful despite the fact that many of them were unprofitable. Disclosure of this deception led to a drop in Enron's share price, and to Enron's inability to pay its debts. On December 2, 2001, Enron filed for bankruptcy.

In order to determine whether news has an impact on a company's financial performance, we first need to define the contents of corporate news. Antweiler and Frank [2] collected the news from the Wall Street Journal and divided the news into 7 groups. Authors found that news about corporate governance (electing new CEO and etc.), earning reports, financial issues (dividend payments and etc.), operational issues (new contracts and products) have influence on Average Standardized Cumulative Abnormal Returns (ASCARs) in a 5-day window (2 days before and 2 days after the publication). Similarly, Strycharz, Strauss and Trilling [9] note that news about stock market, products, social activities, and business influence stock price fluctuations within a 17-day period.

Carretta et al. [16] used Italy's major financial newspaper as a source of news. Author document that news about corporate governance, corporate financial situation and their joint interaction have an impact on stock returns. The effect depends on the company's profitability at the time of the news publication, the content of the news (positive or negative) and the tone of the news (weak or strong).

Influence on financial performance of corporate news about environment were confirmed by the following studies [13; 17]. Flammer [18] found that negative stock market reaction to eco-harmful behavior has increased over time, while the positive reaction to eco-friendly initiatives has decreased.

Nam and Seong [19] found that corporate news about a firm in a particular industry will affect the stock price of not only that firm but also other firms in that industry. However, they did not find any difference in the effect of corporate news on firms from different industries.

Strycharz, Strauss and Trilling [9] analyzed 3 different Dutch companies from 3 different sectors: financial sector, technological sector, energy sector. The results show that the impact of news on companies in the technology and energy industry is stronger and more resilient than on those in the financial sector.

Methodology

We apply the index method to construct a corporate news index. It includes several types of news: financial, changes in capital structure, changes in management structure, dividend policy. We have chosen the index approach after considering papers that attempt to assess the effect of corporate news on the stock market returns. Carretta et al. [16] defined the category of news, and analyses the impact of the news, determining an index value between –1 and 1. Similarly, Capelle-Blancard and Petit [20] conduct an empirical analysis of the ESG news index that consists of over

30 000 news. Besides, Carlini et al. [21] consider different news characteristics: tone, media coverage and degree of certainty.

Given the high frequency of initial data and necessity of analysing the response to certain effects, we employ the Vector Autoregressive Approach. The rationale for focusing on this methodology is that the VAR model is one of the most advanced and responsive models for multi-dimensional time series analysis. The approach is particularly suitable for describing the dynamic behavior of financial time series. The model is described as follows:

$$\begin{pmatrix} y_t \\ x_t \end{pmatrix} = \begin{pmatrix} a_{11}\, a_{12} \\ a_{21}\, a_{22} \end{pmatrix} \begin{pmatrix} y_{t-1} \\ x_{t-1} \end{pmatrix} + \begin{pmatrix} \in_{y,t} \\ \in_{x,t} \end{pmatrix}, \qquad (1)$$

where $\in_{y,t}$ and $\in_{x,t}$ are two white-noise variables (correlated or uncorrelated). Depending on the presence of data cointegration, the VAR model can be superseded by the VECM model. An empirical study revealed the presence of data cointegration, hence this study is completely based on the Vector Error Correction Model.

To assess the impact of corporate news, we apply the following steps: First, we construct a corporate news index for each company under study based on published financial reports and press releases. Second, we estimate the impact of this indicator on the stock price by applying a k-dimensional Vector Error Correction Model (VECM). The VAR(p) process can be described as:

$$\nabla X_t = \Pi_{[k\times k]} \mathrm{X}_{t-1} + \Gamma_1 \nabla \mathrm{X}_{t-1} + \ldots$$
$$+\Gamma_{p-1} \nabla X_{t-p+1} + \varepsilon_t, \qquad (2)$$

where $\Pi_{[k\times k]}\mathrm{X}_{t-1}$ indicates an error correction term, $\Pi_{[k\times k]}$ stands for long run relationships, $Rank\left(\Pi_{[k\times k]}\right)$ represents number of cointegration.

If there are r co-integration vectors, $\Pi_{[k\times k]}$ can be expressed as:

$$\Pi_{[k\times k]} = \alpha_{[k\times r]} \beta'_{[r\times k]}, \qquad (3)$$

where α stands for the speed of adjustment parameters that are interpreted as the weight of each co-integration vector in a given equation and β stands for the long-run relationship coefficient.

Data

In our research of the corporate news' impact on stock prices we use several companies from different industries. We suppose that this effect can be extrapolated to different industries for the largest players.

- Oil and gas industry: Gazprom;
- Information Technology: Yandex;
- Financial sector: Tinkoff Bank.

Gazprom, Yandex, Tinkoff have the biggest shares in their respective industries in the Russian Federation. According to the statistical aggregator of search engine usage data Radar.Yandex [22], Yandex's share in this market averaged 60% in 2021. Gazprom is the world leader in natural gas production; it accounts for 12% of global and 68% of Russian gas production [23], which undoubtedly indicates its leading position both in Russia and abroad. Tinkoff Bank is the third largest bank in Russia in terms of the number of active clients [24]. Moreover, in 2021 Central Bank of Russia adds Tinkoff Bank to the list of systemically important credit institutions in Russia.

There are several reasons why we do not use Sberbank as an example from the financial sector. First, Sberbank has a developed ecosystem that includes various companies – from a marketplace to a logistics firm [25]. Second, the large number of products integrated under a single brand affect the frequency of a company's news releases. Daily news publication prevents the identification of the most significant ones and complicates the assessment of their effect on stock [26].

These companies are present in most of the largest stock indices in Russia. For example, the shares of these companies are included in the Moscow Exchange Blue Chip Index. The index is calculated on the basis of transaction prices and quotations of the 15 most liquid shares on the Russian stock market [27]. Moreover, the stocks of Tinkoff, Gazprom and Yandex are also incorporated in the RTS Index. It is a price-weighted, market capitalization-weighted composite index of the Russian stock market, including the most liquid shares of the largest Russian issuers from the main sectors of the economy, which are represented on the Moscow Exchange [28].

These companies can be compared by different multipliers. The first one is the EBITDA margin. This common financial indicator measures the profitability of a business, assesses an organization's ability to meet its obligations, and is used by financial analysts to determine the value of a business. Table 1 presents a comparison of EBITDA margins of Tinkoff, Gazprom and Yandex.

Table 1. Tinkoff, Gazprom, Yandex: EBITDA margin, 2019–2020 (%)

Company	2019	2020
Tinkoff	39.25	38.11
Ydex	27.36	29.56
Gazprom	30.58	14.74

The companies' EBITDA margin levels are positive and are on an approximately the same level. In 2020, Gazprom demonstrated a 2-fold drop of this indicator. This can be explained by a short-term shock caused by the oil crisis [29].

The next indicator that was used for comparison is Return On Assets (ROA). It is a financial coefficient that characterizes the return on the use of all assets of the organization, and the efficiency of property use. It shows how much net profit per monetary unit is generated by each unit of

assets available to the company. The higher the ROA ratio, the more efficient the company is in generating profits with its assets. This means that the company generates more income with less investments. Table 2 presents a comparison of this multiplier.

Table 2. Tinkoff, Gazprom, Yandex: ROA, 2019–2020 (%)

Company	2019	2020
Tinkoff	6.23	5.14
Yandex	4.41	4.93
Gazprom	5.50	0.58

Source: Finrange [30].

Again, the value of this indicator for the companies is positive and is approximately at the same level. Its average values range from 4 to 6%. However, we can again observe a strong change in the ROA of Gazprom, which may be caused by the shock year for oil companies in 2020.

The book value of a company's stock is the total assets of a company minus its liabilities. Thus, book value per share is the stake of the owner of one share in the net company assets. Table 3 contains the values of this indicator for the companies in question.

Table 3. Tinkoff, Gazprom, Yandex: book value per share, 2019–2020 (%)

Company	2019	2020
Tinkoff	482.08	637.29
Yandex	600.15	965.23
Gazprom	618.13	626.13

The average values are in the same range. This indicates an approximately equal ratio of net assets per share across companies. Moreoverover the period under review, the values of the indicators increased significantly, with the exception of Gazprom, which was more severely affected by the oil crisis in 2020.

Finally, these companies have their own press centers that publish major corporate news. The sites of the press centers have archives, as well as a filter by type of publication, which allows to conveniently search and segment corporate news. The following types of corporate news were selected for analysis:

- Financial reports. Official publication of financial results for the quarters and for the year.
- Mergers and acquisitions. Corporate news related to the acquisition and sale of company assets.
- Appointment of new persons. Appointments of persons to the board of directors, top management of the company or its major divisions.
- Dividend policy. Corporate news related to dividend policy announcements.

The first three types of news can be found in the archives of the Tinkoff, Yandex, and Gazprom press centers. The last type, related to dividend policy, is relevant only for Tinkoff and Gazprom, since Yandex does not pay dividends. However, we also include this type of news in our research data due to its direct impact on investor expectations, since dividend policy affects share profitability.

The sample includes daily data for 6 years (1 January 2015 – 31 October of 2021, total number of observations – 1673). The rationale for this is the absence of long-lasting crises during this period. We consider the dynamics of the RTS index for the specified period in Figure 2.

Figure 2. RTS index January 2015 – October 2021

Source: Finam [31].

The figure demonstrates that the RTS index overcame the market decline caused by the first wave of the coronavirus infection that started in February 2020. It was one of the biggest stock market declines, and was recovered in less than a year [32]. In contrast, the global stock market has been recovering from the aftermath of the 2008 crisis for six years. The highlighted time interval is characterized by more stable dynamics of the stock market. Also, during these years, the use of corporate news in the analyzed companies became more common.

Table 4 represents the description of all the variables used.

We find that corporate news has an extended effect on companies' stock price, as was revealed by Antweiler and Frank [2]. Authors highlight that publication of corporate news leads to abnormal returns in a 5-day window (2 days before and 2 days after the publication).

Results and discussion

To determine the order of integration for each time series, we employ the Dickey-Fuller test (Table 5). The null hypothesis of this test is the presence of a unit root, in other words, non-stationarity of the series.

Table 4. Description of variables

Name	Description	Source
price_g	Gazprom stock price (GAZP)	Yahoo! Finance [33]
price_t	Tinkoff stock price (TCSG)	Yahoo! Finance [33]
price_y	Yandex stock price (YNDX)	Yahoo! Finance [33]
dummy_g	The publication of a certain type of corporate news by Gazprom's press-center, where 0 is absence of news, 1 is presence of news	Press Center of Gazprom [34]
dummy_t	The publication of a certain type of corporate news by Tinkoff's press-center, where 0 is absence of news, 1 is presence of news	Press Center of Tinkoff [35]
dummy_y	The publication of a certain type of corporate news by Yandex's press-center, where 0 is absence of news, 1 is presence of news	Press Center of Yandex [36]

Table 5. Results of Dickey-Fuller test

	Intercept with trend		Output
Variable name	Level	First difference	
Dummy Gazprom	2.55	–21.66***	I = 1
Price Gazprom	0.87	–37.03***	I = 1
Dummy Yandex	3.23	–18.14***	I = 1
Price Yandex	0.79	–41.49***	I = 1
Dummy Tinkoff	2.89	–21.61***	I = 1
Price Tinkoff	3.62	–29.82***	I = 1

Table 6. Optimal number of lags

	Gazprom		Yandex		Tinkoff	
Lag	AIC	SC	AIC	SC	AIC	SC
0	11.69	11.69	17.99	17.99	9.80	9.81
1	5.84	5.86	11.39	11.41	3.04	3.06
2	5.82*	5.85*	11.37	11.40*	3.02	3.05*
3	5.82	5.86	11.38	11.42	3.01	3.05
4	5.82	5.88	11.37	11.43	3.01	3.07
5	5.82	5.89	11.37*	11.44	3.01	3.08
6	5.83	5.91	11.37	11.45	3.01	3.09
7	5.83	5.93	11.37	11.47	3.01	3.11
8	5.83	5.94	11.37	11.48	3.00*	3.11

We tested stocks of companies with trend inclusion, as all variables are trend assets. The order of integration of all variables is one, which confirms the application of Vector Autoregression as the primary modelling method. The rationale for this is the requirement for the same order of variable integration.

In the current research we tested 3 models: the impact of the relevant corporate news on Gazprom, Yandex and Tinkoff shares. Consequently, we consider a pair of indicators for each company: stock price and corporate news index. Furthermore, we measure the degree to which company stocks depend on one another in the short term (Granger test).

Given the sensitivity of VAR and VECM approaches to the number of lags, we applied the Lag Length criteria test. Based on the Likelihood ratio (LR), Final Prediction Error (FPE), Hannan-Quinn Criterion (HQ), Akaike's Information Criterion (AIC), Schwarz Criterion (SC) we define the optimal number of lags for each model (Table 6).

The basic information criteria are Akaike's Information Criterion (AIC), Schwarz Criterion (SC) (presented in Table 6), but the decision to select a criterion was based on the majority of criteria. Consequently, for Gazprom and Yandex we chose the 2nd lag order, while for Tinkoff bank we applied the 8th lag.

The Johansen cointegration test defines the presence of long-term relationships between the variables. Results of the test are presented in Table 7.

Table 7. Results of Johansen cointegration test

Gazprom				Yandex		Tinkoff	
Data trend	Test type	Trace	Max-Eig	Trace	Max-Eig	Trace	Max-Eig
None	No intercept, no trend	1	1	2	2	2	2
None	Intercept, no trend	1	1	1	1	2	2
Linear	Intercept, no trend	1	1	1	1	2	2
Linear	Intercept, trend	1	1	1	1	2	2
Quadratic	Intercept, trend	1	1	1	1	1	1

Table 8. Results of cointegration

Variable	Coefficient of corporate news	Standard errors	t-statistics	Critical value of t-statistics on 1% level	Output
Gazprom	–5969.93	152.63	–39.28	2.58	Significant at 1% level
Yandex	–34619.60	1865.73	–18.56	2.58	Significant at 1% level
Tinkoff	–5499.94	401.846	–13.6867	2.58	Significant at 1% level

Test results indicate the presence of pairwise cointegration if values of Trace and Maximum Eigenvalue statistics coincide. We observe the presence of cointegration in each company surveyed, which implies a long-run relationship between the corporate news index and stock price. Consequently, we apply the Vector Error Correction model for further analysis. For each autoregressive equation we include an intersection and a linear trend (option 4). Surprisingly, Tinkoff has two long-run relationships, which suggests the existence of both reporting effects on the company's stock performance and vice versa. Since positive press releases about the bank's updates and developments are promoting growth of company stock, the company is working increasingly more intensively on its media presence.

Table 9. Results of Granger causality test

Model 1			Model 2				
Dependent variable	Probability value Corporate news does not affect company`s stock price	Interpretation (short run)	Dependent variable	Independent variable Gazprom	Yandex	Tinkoff	Interpretation (short run)
Gazprom	0.1237	Absence of short-run effect	Gazprom	–	0.0222	0.8444	Gazprom => Yandex
Yandex	0.6554	Absence of short-run effect	Yandex	0.9410	–	0.0296	Yandex => Tinkoff
Tinkoff	0.7363	Absence of short-run effect	Tinkoff	0.0079	0.3992	–	Tinkoff => Gazprom

The cointegration equation quantifies the impact of the corporate news index on the stock price and the significance of this impact. Table 8 represents simulation results.

The coefficient estimate derived in the cointegration equation is not a direct reflection of the obtained effect. As a consequence, at this stage we can only determine the significance of the effect of corporate news on companies' stock prices. The results confirm the existence of the effect of report and corporate news in the long run, but the impact of these findings can be determined further by using the impulse response function.

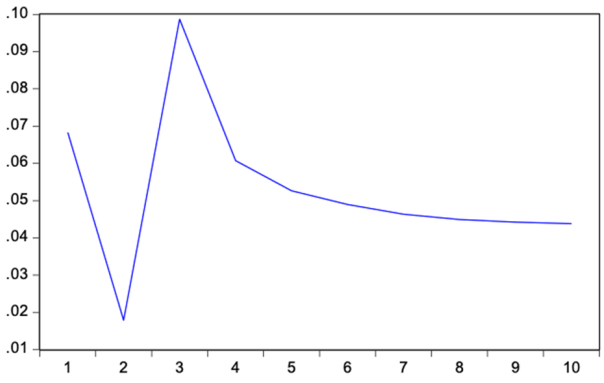
We employ the Granger causality test to determine the short-term effect. The results of the test are presented in Table 9.

The three models demonstrate the lack of effect of corporate news in the short run. As part of the analysis, we test for short-run causality between company stocks. The results of the tests show a vicious circle of causality. Gazprom shares the influence of Yandex shares, while Yandex shares influence Tinkoff-Bank shares. The rationale for this is the formation of a spill-over effect in the Russian stock market. The energy sector reacts first to external shocks, followed by the high-tech sector, which affects the energy sector unilaterally. The empirical evidence is in line with the study by Yin et al. [37], who documented the spill-over effects between commodity and industrial sectors that extend to the IT and financial sectors.

This sample does not include major macroeconomic shocks (with the exception of the 2020 pandemic, after which equities recovered fairly quickly), implying that the relationship in the short-term during crisis years may differ.

We apply the Impulse Response Function to depict the effect of corporate news index on the stock price (Figure 3).

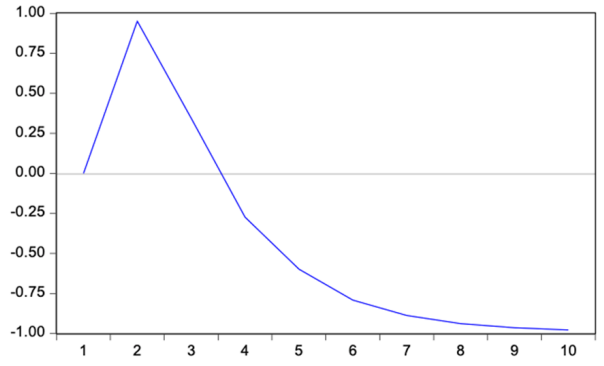
Figure 3. Response of Gazprom stock price to information disclosure



Gazprom's response following the release of news and reports is positive, implying a positive investor reaction to company performance. Meanwhile, the most significant effect (around 0.1) is achieved only after a few days, indicating asymmetry of information in the stock market, as well as a consistent rise due to the corporate news.

Figure 4 reveals the effect of corporate news on Yandex shares.

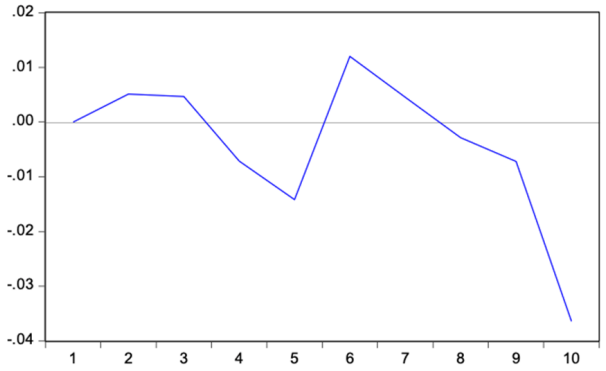
Figure 4. Response of Yandex stock price to information disclosure



Compared to energy sector stocks, high-tech assets are more volatile. As a consequence, the effect of corporate news is higher in absolute values and much more quickly processed by the market. As early as the fourth day, the effect loses significance as it crosses the zero mark. The rationale for this is the higher volatility of high-tech shares in comparison with oil and gas.

Figure 5 captures the impact of corporate news on Tinkoff shares.

Figure 5. Response of Tinkoff stock price to information disclosure



The results indicate a mixed performance of financial sector stocks. The effect is also diminished after the fourth day of observations and the absolute values are low, which may be due to the frequency of press releases and financial reports (more for the banking system); as a result, the effect of a single news or report is quite low.

Robustness check

The model robustness investigation includes two main tests – for heteroscedasticity and autocorrelation. A comparison table of the resulting models is provided at the end of the subsection. Table 10 shows the results of the LM autocorrelation test.

Table 10. Results of LM autocorrelation test

	Gazprom		Yandex		Tinkoff	
Lags	LM-Stat	Prob	LM-Stat	Prob	LM-Stat	Prob
1	4.36	0.36	21.32	0.00	2.22	0.69
2	2.64	0.62	26.49	0.00	8.36	0.08
3	1.34	0.85	23.88	0.00	11.23	0.02
4	5.27	0.26	13.47	0.01	6.30	0.18
5	3.78	0.44	9.48	0.05	2.89	0.58
6	2.50	0.65	8.26	0.08	6.51	0.16
7	0.53	0.97	2.02	0.73	3.56	0.47
8	4.72	0.32	6.12	0.19	18.78	0.00
9	1.33	0.86	6.38	0.17	11.68	0.02
10	9.97	0.04	6.22	0.18	8.59	0.07
11	2.42	0.66	17.27	0.00	10.91	0.03
12	4.13	0.39	8.60	0.07	6.55	0.16

The null hypothesis of the test is the absence of autocorrelation. If first-order autocorrelation is detected, the rest of the results, regardless of values, will also have correlated errors. We observe no autocorrelation for Gazprom and Tinkoff Bank stocks, while Yandex errors are correlated. This implies that we obtain more stable and predictable results in Tinkoff and Gazprom in comparison with Yandex.

We use the White test to test heteroscedasticity. The results of the test are presented in Table 11.

Table 11. Results of White test

Gazprom			Yandex			Tinkoff		
Chi-sq	df	Prob	Chi-sq	df	Prob	Chi-sq	df	Prob
214.06	81	0.00	280.75	60	0.00	1760.57	567	0.00

The null hypothesis of the test is homoscedasticity, or variance constancy. In all three cases, the null hypothesis is rejected, implying that there is a heteroscedasticity problem in the simulation.

The summary table allows for a comparison of models in a general format (Table 12).

Table 12. Summary of results

Comparison criterion	Gazprom Conclusion	Yandex Conclusion	Tinkoff Conclusion
Lag length criteria	2nd lag	2nd lag	2nd lag
Cointegration	Presence of 1 cointegrating vectors	Presence of 1 cointegrating vectors	Presence of 2 cointegrating vectors
Type of model	VECM	VECM	VECM
Heteroskedasticity	Heteroskedasticity is confirmed	Heteroskedasticity is confirmed	Heteroskedasticity is confirmed
Autocorrelation	Autocorrelation is not confirmed	Autocorrelation is confirmed	Autocorrelation is not confirmed
Impulse response function results	Significant for 10 days, positive effect	Significant for 3 days, positive effect	Significant for 3 days, weak mixed effect

The table reflects the robustness of the research results and the existence of differences in the effect of corporate news by sector: the lowest and mixed response is from the financial sector, while the response from the energy sector is positive and meaningful over a 10-day period. In addition, financial sector companies show the largest positive response, the reason for this is the significant response and liquidity of this blue chip.

Conclusion

This paper assesses the impact of corporate news on shares of selected companies in the financial, energy and high-tech sectors. The authors have developed a special index of corporate news that provides an accurate estimate of the effects. The index includes four types of corporate news, including financial news, mergers and acquisitions, changes in management structure, and dividend policy. Consequently, the index provides comprehensive information on selected companies. We apply a vector error-correction model to estimate the effects in the long-run and a Granger causality test in the short-run. To obtain quantitative estimates, we constructed impulse response functions.

The models show that corporate news and corporate equities are related in the long run. In the short run, we find no evidence of such a relationship. However, we do observe evidence of a vicious cycle of influence among stocks. Corporate news has a strong and positive effect on stocks in the high-tech and energy sectors, while the financial sector reacts to corporate news in a mixed manner, and the effect is weak.

Based on our results, we provide practical recommendations for individual and institutional investors. First, the presence of a positive correlation between energy and high-tech stocks in the long term enables automatic trading strategies to be customized to these stocks, considering the degree of asset volatility. Second, we shed light on the interaction of the stocks in these sectors in the short term. Based on the Granger test and the impulse response function, we argue that the energy sector is the first to receive external macroeconomic shocks, and then transmits them to the high-tech sector, which forwards this effect to the financial sector.

We believe that in the new Russian stock market environment affected by complex sanctions, the results related to the impact of news about external shocks on the stock prices in various sectors of the economy are significant. In addition, the limited opportunities to attract investors to Russian companies create a demand for assessing the role of corporate news. We consider implementation of advanced methods of analysis, e.g., text mining, and expansion of the number of sectors a promising research area for future research.

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How Do External Shocks Affect the Economic Efficiency of Companies with Foreign Direct Investment?

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Abstract

This study aims to assess the effectiveness of export and import activities of domestic companies with foreign direct investment during external shocks. This research is relevant because the impact of spillover effects of foreign direct investment on domestic companies and economic uncertainty after the sanctions and the outbreak of the pandemic was ambiguous. The empirical base contains about 170,000 observations of 18,799 operating companies with a foreign capital share of at least 10% in 2012–2020, obtained from the Ruslana database – Bureau Van Dijk. For the purposes of the study, the companies are grouped by the industry and their roles in international trade. Efficiency assessment is conducted using data envelopment analysis (DEA), accounting for the spillover effects from foreign direct investment. The results of the study confirm that firms that trade in both directions demonstrate better performance. Next come the companies focused only on export or import. Companies that are not involved in international trade are the least efficient (hypothesis 1). Industries that benefit from foreign direct investment inflows include the more capital-intensive sectors (hypothesis 2). External shocks have a negative impact on the efficiency of companies with foreign direct investment (hypothesis 3). This understanding has important implications for long-term economic growth and the recovery of the Russian economy after the current external shocks.

Keywords: foreign direct investment, export, import, technical efficiency, DEA, spillover effects, panel regression analysis, sanctions, COVID-19 pandemic, external shocks

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Introduction

The Russian economy had not fully recovered from the sanction crisis yet, therefore the unexpected spread of COVID-19 was an additional powerful and damaging shock, which inevitably resulted in a dramatic drop in international trade and reduction in cross-border foreign direct investment (FDI). So, it is extremely important to understand how external shocks have influenced the performance of Russian companies with FDI involved in international trade. Besides, in spite of substantial evidence of a higher efficiency of multinational enterprises, the data on the spillover effects of FDI is ambiguous. Thus, a better understanding of the mechanisms that allow foreign presence to improve or impair domestic companies' performance during external shocks through generated vertical and horizontal effects is required. The ambiguous nature of influence of foreign direct investment's spillover effects, as well as economic and geopolitical uncertainty caused by external shocks account for the relevance of this study. This understanding is of significant consequence for the performance of companies with foreign direct investment that operate amid tough sanctions and the COVID-19 pandemic and for long-term economic growth and the general recovery of the Russian economy.

The purpose of this study is to assess the spillover effects of FDI and dealings in foreign trade on the performance indicators of Russian companies with FDI against the background of external shocks. One of the main questions is whether domestic companies' performance improves along with the increase in foreign direct investment and participation in international trade. How does this influence change when exposed to sanctions and pandemic?

Thus, we pose the problem of calculating the corporate technical efficiency indicator and of using these calculations as the basis for conclusions on the influence of FDI's side effects with regard to the industry-related specific nature and the dependence of involvement in international trade on the productive capacity of domestic companies with FDI amid external shocks.

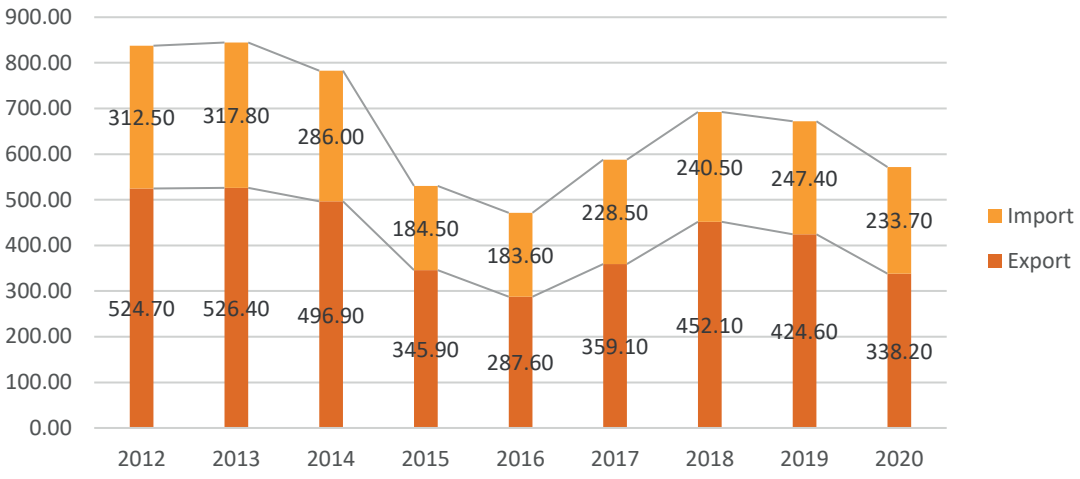
The paper continues the study of the influence of spillover effects of FDI and involvement in international trade on the performance of domestic companies with FDI during external shocks on the basis of studied domestic and foreign papers.

The empirical base comprises about 170,000 observations of 18 799 operating companies with a foreign capital share of at least 10% in 2012–2020, obtained from annual financial reporting offered by the Ruslana database – Bureau Van Dijk.

This paper substantiates a better performance of companies with foreign FDI as compared to firms operating in the domestic market; besides, companies involved in both export and import show a greater productive capacity than net exporters or importers. Mainly capital-intensive economy sectors stand to benefit from an FDI inflow. Corporate performance declines during external shocks.

External shocks have inevitably influenced the level of international trade of the Russian Federation. The dynamics of Russian export and import in 2012–2020 shows a decrease in Russia's external turnover from $837.2 billion in 2012 to $571.9 billion in 2020 (by 31.7%). At the same time, the visible trade balance was positive for the whole researched period. According to the Federal Customs Service [1], Russia's export and import indicators (Figure 1) peaked in 2013 ($526.4 billion and $317.8 billion respectively). The scope of external trade was reduced significantly in 2014–2016 due to 2014 economic sanctions against Russia and countermeasures, which changed the volume of exports and imports as well as the industry- and country-related structure [2].

Figure 1. Dynamics of exports and imports of the Russian Federation for 2012–2020, billion US dollars



Source: Compiled by the authors according to the Federal Customs Service of Russia.

As the Russian economy recovered in 2018, the export and import turnover increased to $452.1 billion and $240.5 billion, respectively. COVID-19 decreased the turnover to $338.2 billion and $233.7 billion. External turnover with the European Union, which is Russia's largest economic partner, was reduced notably from 41.6% in 2019 to 38.5% in 2020, amounting to $59.4 billion in terms of value, mainly due to a decrease in exports by 27.6% (the rate of curtailing of EU imports is significantly slower – 7.6%). The three leading partners are China, Germany and the Netherlands.

According to the Central Bank of the Russian Federation, the largest amount of FDI fell on 2013 and equaled $69.2 billion [3]. In the following two years, FDI in the Russian economy decreased ten-fold after the sanctions against Russia were implemented. However, in 2016 FDI grew almost four-fold, which may be due to the deferred demand effect and expectations of an economic and political upturn. As a result of the toughening of sanctions in 2018, foreign investment decreased again almost to the level of 2015. When the amount of FDI was restored in 2019, the pandemic outbreak caused its more than three-fold reduction. The number of investment projects was reduced almost to the 2014 level (141 projects in 2020 and 125 in 2014) [4]. The three leading investor countries in 2020 were Germany, China and the USA. The following Russian industries were the most attractive ones in the studied period: wholesale and retail (23.7% of all foreign direct investment), manufacturing (21.4%), in particular, metallurgical production (7.2%), production of food (4.3%), coke and refined petroleum products (2.5%). Mineral extraction accounted for 17.6% of FDI.

Thus, external shocks such as sanctions against Russia, the COVID-19 pandemic and economic and political uncertainty caused by them had a negative impact on Russia's external turnover, significantly decreasing the volume of export and import with the largest trading partners, as well as on the country's investment attractiveness. Thus, the issue of influence of foreign direct investment and involvement of domestic companies in international trade gains more relevance.

Literature Review and Research Hypotheses

Numerous economists are convinced that FDI and involvement in international trade raise productivity. It was substantiated theoretically that an increase in export leads to productivity gains, i.e., due to economy of scale. Competitive pressure is also intensified. It has been caused, in particular, by obtaining foreign direct investments through vertical and horizontal channels that comprise transfer of knowledge, manufacturing techniques and management methods, access to new, high quality or cheap resources. The increased competitive pressure prompts domestic companies to improve their efficiency. Companies unable to cope with intensified competition are forced out of the market.

Thus, based on theoretical and empiric research of the influence of foreign direct investment and involvement in international trade on performance of domestic companies, we put forward the following hypotheses in this paper:

H1. Companies engaged in both export and import are the most efficient ones. They are followed by the companies focused on either export or import only. The least effective are the companies that are not involved in international trade.

Paper by C. Sharma and R.K. Mishra [5] studies the interrelation between engagement in trade and performance indicators of Indian companies, and concludes that exporters, importers and traders involved in both export and import are more effective than other market players. H. Kasahara and B. Lapham [6] also write about the higher productivity of exporters and importers compared to domestic companies that are not involved in any trade. E. A. Fedorova et al. [2] confirm that companies engaged in export and import are the most effective ones, followed by importing companies, and then – by exporting companies. The enterprises not involved in international trade are the least effective. M. MuûLs and M. Pisu [7] think that the firms engaged both in import and export are the most productive ones, followed in descending order by the ones involved only in import, the ones involved only in export and non-traders.

H2. The industries that benefit from the FDI inflow comprise sectors that are more capital-intensive.

The general concept of FDI is based on the fact that the main investment motive is the relative advantages of the region and industry including, inter alia, the location of labour-intensive enterprises in the countries with low-cost labour. However, a number of researchers contest this notion. According to paper by J. Ran et al. [8], the greatest effect from FDI inflow is observed in capital-intensive economic sectors, such as chemical, oil and nonferrous metal industries, transport and electronics. D.E. Kuznetsov studied the interrelation between capital intensity of industries and foreign direct investment and found out the following dependence: there are more foreign investors in capital-intensive industries than in labour-intensive ones [9]. P. Antràs and S.R. Yeaple conclude that the trend of intensive multinational activity in certain industries has a strong correlation to connection between capital and labour in such industries, and that the relative significance of multinational corporations in economic activity is higher in capital-intensive commodities [10].

H3. External shocks have a negative impact on the performance of companies with FDI.

Since the Russian economy is export-oriented, one should take into consideration that sudden changes in the domestic and international political and economic environment will result in serious exogenous disturbances. E.A. Zapadnyuk asserts that the "influence of an external factor on the economic system is shocking (destructive and creative) only if it results in a destruction of structural ties of economic cohesion" [11]. Based on this speculation, we can define two external shocks for Russia within the studied

period: sanctions against Russia and the unexpected and quickly spreading COVID-19 pandemic.

A recent research study by Z.Wong et al. considers the influence of FDI on the efficiency of Chinese firms under the COVID-19 conditions [12]. The results confirm a positive influence of FDI on productivity of firms, however, in the absence of external shocks. E.A. Fedorova et al. estimated the influence of sanctions on the performance of importer companies and reached the conclusion that political uncertainty had a negative impact on the productivity of importing firms [2]. According to the research by S. Zarbi et al., the average efficiency of Iranian ports evaluated using data envelopment analysis (DEA) decreased after the imposition of sanctions [13]. N. Vujanović et al. also studied the spillover effects of FDI during crisis [14]. The dynamic panel analysis of data at the company level shows that the crisis impact stops the learning process due to spillover effects if companies face problems with access to external resources.

It is important to note that in scientific literature the evaluation of FDI's influence on the effectiveness of domestic companies during a crisis is controversial. According to the research by A. Bykova and C.M. Jardon, foreign capital significantly reduces the negative effect of an economic decline [15].

Research Methodology

Spillover effects may be applied to measure the influence of FDI on the effectiveness of domestic companies. Spillover effects of FDI may exert their influence through a range of channels. First, domestic firms may benefit from FDI available in the same industry. This results in intra-industry or horizontal spillover effects. Second, there may be spillover effects of foreign investment companies engaged in other industries. This results in interindustry or vertical spillover effects. This type of effects is often accounted for by the relations between the buyer and supplier and, consequently, may be targeted at upstream industries (reverse spillover effects) or downstream industries (direct spillover effects).

The following formulas are used to measure spillover effects:

$$HORIZ_{jt} = \frac{\sum_{i,i\in j, FS_{i,j,t}\geq 0,1} FS_{i,j,t} FA_{i,j,t}}{\sum_{i,i\in j} FA_{i,j,t}}; \quad (1)$$

$$FORW_{jt} = \beta_{kj,t} HORIZ_{jt}; \quad (2)$$

$$BACK_{jt} = \beta_{jk,t} HORIZ_{jt}. \quad (3)$$

Variables are described in Table 1.

Table 1. Description of variables

Variable	Description	Source
$HORIZ_{jt}$	Horizontal spillover effect	Calculated by the authors
$FORW_{jt}$	Vertical direct spillover effect	Calculated by the authors
$BACK_{jt}$	Reverse vertical spillover effect	Calculated by the authors
$FS_{i,j,t}$	Share of foreign capital in company i in industry j at time t	Ruslana database
$FA_{i,j,t}$	Value of non-current assets of company i within the time period t in sector j	Ruslana database
$\beta_{kj,t}$	Share of production output in industry k consumed by industry j within the time period t	The Leontief input-output model
$\beta_{jk,t}$	Share of production output in industry j consumed by industry k within the time period t	The Leontief input-output model

Source: Compiled by the authors.

In order to calculate the β coefficient, we use the Leontief input-output model in the same way that Fedorova et al. [16].

We insert variables in the extended Cobb-Douglas production function and estimate the following empirical model, which will be analyzed using the panel regression analysis:

$$\ln(Q_{it}) = \eta_0 + \eta_1 \ln(FS_{it}) + \eta_2 \ln(TA_{it}) + \\ + \eta_3 (NumEmployees_{it}) + \gamma_1 \ln(HORIZ_{it}) + \\ + \gamma_2 \ln(BACK_{it}) + \gamma_3 \ln(FORW_{it}) \quad (4)$$

where Q_{it} – revenue of company *i* for the time period *t*;

TA_{it} – total assets of company *i* for the time period *t*;

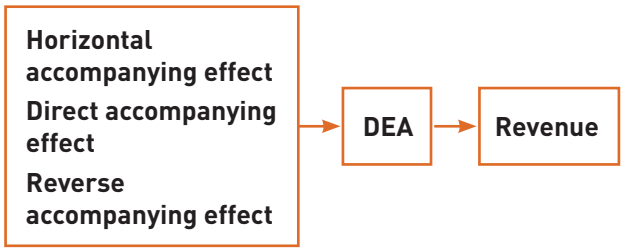
$NumEmployees_{it}$ – number of employees of company *i* for the time period *t*.

The effectiveness of domestic companies with FDI is estimated using the technical efficiency indicator of companies and applying the data envelopment analysis (DEA). It is a nonparametric method of measuring homogeneous

decision-making units (DMU) on the basis of several inputs and outputs, which provides an opportunity to compare companies by the efficiency of resource usage during the manufacturing of products with regard to technology. This methodology was proposed for the first time in 1978 by American scientists A. Charnes, W.W. Cooper and E. Rhodes [17] . They premised it on the ideas of M.J. Farrell set forth in a 1957 article.

The DEA is used quite frequently in scientific papers to analyze productive efficiency. For instance, M. Mirmozaffari et al. [18] apply data envelopment analysis (DEA) to measure productivity and effectiveness of pharmaceutical companies during the COVID-19 pandemic. In 2018 B.N. Rath [19] applied DEA to study the difference in growth of the total factor productivity (TFP) between manufacturing and service firms in India. S. Zarbi et al. [13] used data envelopment analysis to estimate the efficiency of Iranian ports under sanctions. In paper by E.A. Fedorova et al. [20], DEA is used to analyze the technical efficiency of companies from the defense industry complex.

Figure 2. DEA adjusted for FDI spillover effects



Source: Compiled by the authors.

Calculating corporate performance relying on research paper [2], we use the DEA model with accompanying spillover effects (Figure 2) in order to show the influence of FDI on performance of domestic companies. Corporate performance is measured as a ratio of corporate revenue (output parameter) to the following resources (input parameters): horizontal, vertical direct and vertical reverse spillover effects.

All calculations are made using the R program package.

Empiric Research Base

The empiric research base consists of 169,191 observations of 18,799 Russian companies with FDI in 2012–2020. They comprise 13 360 companies trading in the Russian market, 2464 – net importers and 174 – net exporters, as well as 2801 companies engaged in both export and import. In order to form this sample, we used the annual financial reporting data from the Ruslana database offered by Bureau Van Dijk. The data set contains information on the presence of foreign ownership in percent of shares held by foreign investors, corporate revenue, value of total assets, non-current assets, number of employees and export and import dummy variables (they take on a value of 1 if companies are exporters/importers, 0 – if they are engaged in the internal market only).

The information array has been processed according to the following criteria:

1) The company is operating as at the date of data collection;
2) There are at least 8 employees;
3) The foreign capital share is at least 10%.

The descriptive statistics for the information array are shown in Table 2.

Table 2. Descriptive statistics

Index	FS	TA. mln RUB	NumEmpl	FA. mln RUB	OR. mln RUB
count	150.432	150.432	150.432	150.432	150.432
mean	0.67	1.864.08	185	1.327.8	2.244.54
std	0.41	9.699.54	914	8.797.9	16.670.72
min	0.1	2.34	8	0.1	0.14
25%	0.1	27.60	17	10.5	15.86
50%	1	147.48	78	157.5	106.81
75%	1	757.63	85	625.2	636.12
max	1	639.669.56	66.728	783.334.9	983.470.67

Source: Compiled by the authors.

See the share of companies in the basic industries adjusted for the degree of their involvement in international trade in Table 3.

Table 3. Share of companies with FDI by industry, adjusted for the degree of involvement in international trade (2012–2020)

Industry	Total number of companies	Companies operating in the internal market, %	Exporters, %	Importers, %	Companies involved both in export and import, %
Agriculture, hunting, forestry and fishing	212	66.5	3.8	13.2	16.5
Mineral extraction	340	64.7	4.1	11.5	19.7
Power supply, gas supply and water supply	84	85.7	1.2	4.8	8.3
Chemicals and chemical products	244	36.5	2.5	17.2	43.9
Machinery	409	44.5	1.0	18.6	35.9
Transport equipment	197	29.9	0.0	14.2	55.8
Health care and social work	139	84.9	0.0	12.9	2.2
Hotels and restaurants	443	84.0	0.2	13.1	2.7
Wholesale	5035	55.2	1.2	22.1	21.6
Retail	847	74.6	0.0	13.9	11.5
Food, beverages and tobacco	291	43.0	1.4	10.7	45.0
Textile and textile goods	136	75.0	0.7	8.1	16.2
Construction industry	1080	89.7	0.1	5.5	4.7

Source: Compiled by the authors.

An overwhelming majority of companies with FDI in the considered industries are not engaged in international trade. A rather uniform distribution of companies operating in the internal and international markets is observed in the machinery, food, beverages and tobacco manufacturing, and the wholesale sector. Production of chemicals and chemical products as well as transport equipment are the leaders in the global market. The share of importers in the sample is generally very small, and in some industries there are no importers at all.

Table 4. Assessment of the impact of FDI on company revenue

Group	Companies operating in the internal market		Exporters		Importers		Companies involved both in export and import	
R^2	0.29		0.28		0.8262		0.36	
Constanta	0.86 (0.053)	***	1.9 (0.473)	***	2.47 (0.116)	***	3.45 (0.106)	***
Share of FDI	–0.01 (0.009)		0.17 (0.078)	*	–0.11 (0.014)	***	–0.04 (0.009)	***
Total assets	0.51 (0.003)	***	0.54 (0.034)	***	0.55 (0.008)	***	0.60 (0.007)	***
Number of employees	0.69 (0.005)	***	0.56 (0.045)	***	0.68 (0.011)	***	0.38 (0.008)	***
Horizontal spillover effect	–0.39 (0.056)	***	–0.25 (0.478)		–1.15 (0.102)	***	–0.75 (0.074)	***
Reverse vertical spillover effect	0.64 (0.025)	***	0.80 (0.178)	***	0.70 (0.035)	***	0.56 (0.025)	***
Direct vertical spillover effect	–0.32 (0.026)	***	–0.88 (0.245)	***	–0.29 (0.051)	***	–0.41 (0.042)	***

Note: *, **, *** – significance level of 10%, 5% and 1%.

Source: Compiled by the authors.

Research Results

See the results of panel regression (random effect model) in Table 4.

According to the obtained results, the amount of total assets and number of employees are of great significance for all companies. The share of foreign capital is positively most significant for importers, less significant for companies involved in export and import, and even less significant for exporters. The share of FDI turned out to be insignificant for companies operating in the internal market. The horizontal spillover effect has a negative impact on all groups, but at the same time is of greatest significance for importers and of no significance for exporters. A negative tendency is indicative of a reduction in revenue for the companies of the same industry when FDI increases. It may be caused by the so-called crowding-out effect [21], when the competition rising as a result of attracting FDI may harm domestic companies, at least in the short term, reducing their market share and production volume. The reverse vertical spillover effect is indicative of a positive tendency which reveals a positive influence of FDI on the companies pertaining to the industries upstream in the value chain. For instance, as a result of foreign investment in extractive industries, domestic companies obtain access to new or less expensive intermediate resources, which raises their productivity. Besides, this effect is of greatest significance for net exporters and importers. The direct vertical spillover effect turned out to be negatively significant for all companies, which is indicative of a negative influence of FDI inflow on companies from downstream industries. This may mean that domestic companies have no acquisition capacity when foreign companies transfer technology and knowledge. Thus, the results of panel regression show a dubious influence of FDI side effects on productivity of domestic companies.

We divided the sample into four groups in order to verify hypotheses H1 and H3: companies operating in the internal market; companies engaged in export only; net importers; companies involved in international trade as both exporters and importers. Applying the DEA methodology, we calculated the technical efficiency coefficient, where 0 represents ineffective companies, 1 – the most effective ones.

According to the obtained results (Table 4), the companies involved in both export and import are significantly more effective over the entire period. Net importers come second, then – net exporters and the companies not engaged in international trade are the last.

Table 5. Evaluation of the technical efficiency of companies with FDI, adjusted for spillover effects

Companies with FDI	2012	2013	2014	2015	2016	2017	2018	2019	2020
Companies operating in the internal market	0.1825	0.1808	0.1774	0.1828	0.2977	0.3365	0.2536	0.3161	0.2016
Exporters	0.1982	0.2037	0.1941	0.2011	0.3272	0.3689	0.3066	0.3751	0.2035
Importers	0.2095	0.2111	0.2002	0.2142	0.3454	0.3871	0.3602	0.4340	0.2257
Companies involved in both export and import	0.2651	0.2790	0.2540	0.2801	0.4142	0.4498	0.4559	0.4911	0.2677

Source: Compiled by the authors.

The lowest efficiency indicators were noted in 2014 due to FDI outflow from Russia after the imposition of sanctions. Adaptation of Russian companies to operating amidst a sanction-induced crisis, an active import phaseout policy, as well as the large FDI in the Russian economy in 2017 contributed to an increase of efficiency of companies with FDI in all four groups.

However, the COVID-19 outbreak had a negative effect on the productivity of the studied companies. As a result of restrictive measures aimed at the containment of coronavirus all over the globe, the companies' efficiency decreased on average by 44% as compared to the previous period and almost reached the 2014 level. The pandemic produced the least impact on the companies not engaged in international trade (–36%), which is explicable from the point of view of the global supply chain disruption.

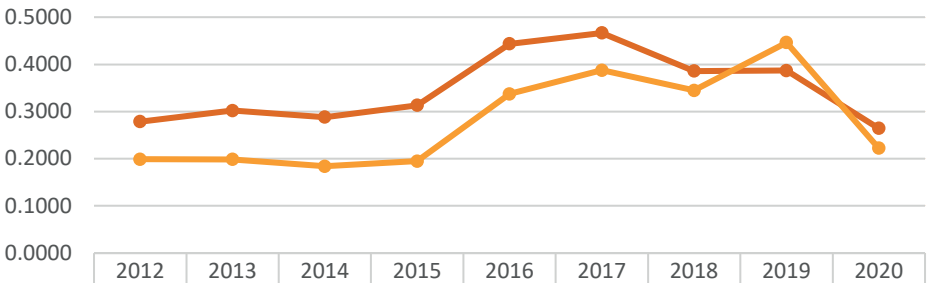
Thus, the results of the DEA model adjusted for spillover effects confirm hypothesis H1 and conform to the earlier studies about the influence of involvement in international trade on efficiency of domestic companies with FDI [2; 5; 6].

The obtained results also conform to papers by S. Zarbi et al. [13] and E.A. Fedorova et al. [2] and confirm hypothesis H3 about the negative influence of external shock on performance efficiency of companies with FDI.

In order to verify hypothesis H2, we defined the most and the least capital-intensive industries in the Russian economy. As per research by O.I. Dranko [22], the following activities have the highest capital input-output coefficient in the Russian economy: financial business, immovable property, agriculture, transport and communications, mineral extraction, health care, power supply and fishing. The least capital-intensive industries are manufacturing, hotels and restaurants, construction industry, trade and education. Thus, we determined two groups of Russian economic sectors: capital-intensive and labour-intensive ones.

As we see in Figure 3, in 2012–2020 the efficiency of capital-intensive economic activities was higher except for 2019. In 2012–2015, the average growth rate for the industries from this group was higher by 0.1016 (4.75%). Starting in the following year, the efficiency of labor-intensive industries grew quicker, and in 2019 this growth exceeded the indicators of the capital-intensive sector of the Russian economy.

Figure 3. Evaluation of the effectiveness of companies with FDI in capital-intensive and labor-intensive industries



	2012	2013	2014	2015	2016	2017	2018	2019	2020
Capital-intensive industries	0.2788	0.3022	0.2883	0.3134	0.4438	0.4668	0.3859	0.3869	0.2644
Labor-intensive industries	0.1990	0.1985	0.1841	0.1947	0.3374	0.3875	0.3448	0.4463	0.2222

Source: Compiled by the authors.

See the results of the DEA analysis with regard to industry affiliation in in Appendix A. The health care, chemical and chemical product, and transport equipment manufacturing sectors were the most efficient capital-intensive industries on average in the studied period. The leaders among labor-intensive industries were the food, beverages and tobacco, hotels and restaurants, retail and wholesale sectors.

In 2014 due to a decrease in Russia's investment attractiveness as a result of economic sanctions, a reduction in efficiency in both groups was observed. Besides the following capital-intensive industries suffered most of all: transport equipment (–8.1% as compared to the previous period); power, gas and water supply (–8.0%); mineral extraction (–7.4%). In labor-intensive industries the greatest decrease took place in the wholesale (–10.1%), textile and textile goods (–4.1%), food, beverages and tobacco (–2.7%) sectors.

2016 was favorable for all the studied industries and entailed a significant efficiency growth among domestic enterprises (by 41.6% in capital-intensive industries and 73.3% in labor-intensive ones). The reason for such growth was a significant (almost four-fold) increase in FDI due to the restoration of Russia's investment attractiveness and a decrease in economic and political uncertainty. It is important to note that the additional 2018 sanctions package had a negative impact on productivity.

Company efficiency decreased even more due to the pandemic. Besides, labor-intensive industries suffered more (indicators were halved in comparison to 2019). The largest drop in efficiency occurred in wholesale and retail (–56.1 and –50,2% respectively), then – in the leather, leather goods and footwear (–41.0%), food, beverages and tobacco (–37.4%) manufacturing sectors. Efficiency of the hotel and restaurant business was reduced by 27.6%. Construction industry (–17.4%) and textile industry (–10.8%) suffered the least of all.

The rate of decrease of capital-intensive economic activities in 2020 was 31.7%. Efficiency of the chemical industry (–49.4%) and agriculture (–37.1%) was almost halved. In the machinery and transport equipment manufacturing sector this indicator fell by 32.6 and 22.4%. The efficiency decrease rate of power companies equaled 27.0%, in mineral extraction – 24.2%), and in health care and social services –16.0%.

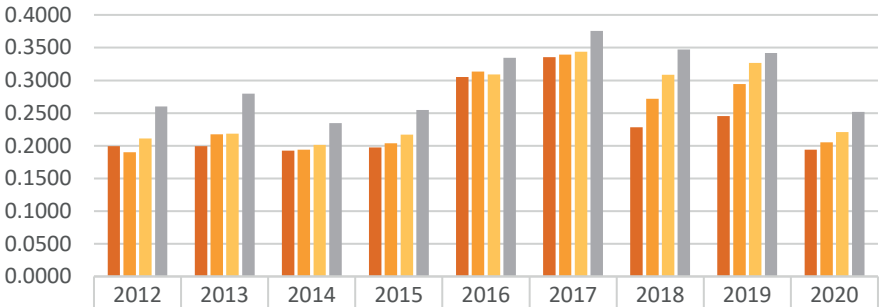
Thus, the results of our research concur with the conclusions made by J. Ran et al. [8], P. Antràs, S.R. Yeaple [10] and D.E. Kuznetsov [9] and confirm hypothesis H2 regarding the greater efficiency of capital-intensive industries with FDI as compared to labor-intensive ones.

We are now going to consider the influence of FDI availability on capital-intensive and labor-intensive industries with regard to the involvement of Russian companies in international trade using a range of Russian industries as an example.

The results of the DEA for the economic activity of mineral extraction and quarrying (Figure 4) is on average higher for the companies involved in both export and import. They are followed by the companies engaged only in export or import, with importers being more efficient than exporters. The companies oriented to the internal market show the lowest productivity indicators. All companies demonstrated an insignificant decrease in efficiency during the sanctions crisis and the coronavirus pandemic. However, in 2020, the companies engaged in international trade suffered most of all, unlike the companies operating inside Russia.

Over the entire period in question, exporting companies were the least efficient ones in the chemical industry (Figure 5), while companies involved both in export and import were the most efficient ones. Importers' indicators were higher than those of the firms not engaged in international trade. The greatest drop in efficiency took place in 2020. It affected both the companies operating in the internal market and the ones involved in international trade. The efficiency of the latter demonstrated a greater decrease (on average by 0.2575 vs. 0.1969 for the companies not operating in the global market).

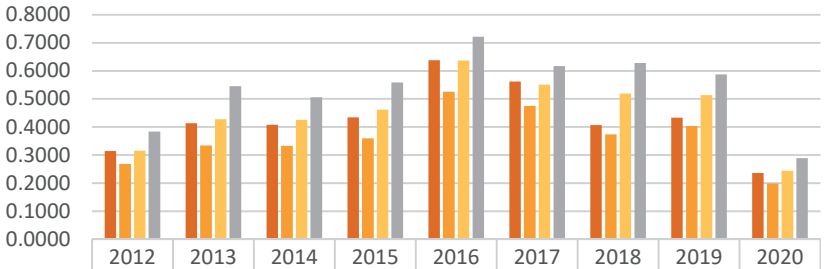
Figure 4. Efficiency of companies with FDI engaged in mining and quarrying



	2012	2013	2014	2015	2016	2017	2018	2019	2020
Companies operating in the internal market	0.1994	0.1993	0.1924	0.1975	0.3051	0.3355	0.2285	0.2454	0.1942
Exporters	0.1903	0.2176	0.1941	0.2036	0.3134	0.3394	0.2717	0.2942	0.2052
Importers	0.2112	0.2184	0.2013	0.2168	0.3092	0.3438	0.3088	0.3266	0.2209
Companies engaged in both export and import	0.2601	0.2798	0.2348	0.2545	0.3346	0.3754	0.3470	0.3418	0.2519

Source: Compiled by the authors.

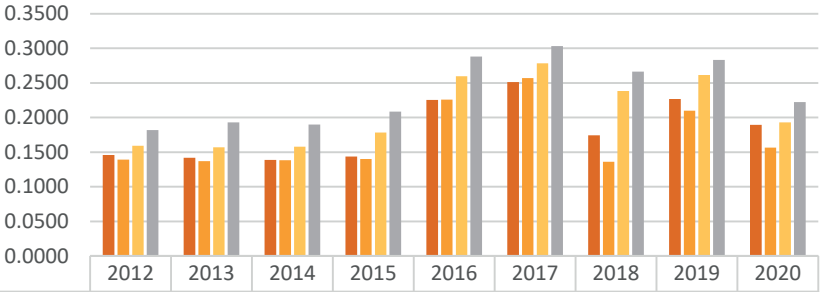
Figure 5. Efficiency of companies with FDI engaged in the production of chemicals and chemical products



	2012	2013	2014	2015	2016	2017	2018	2019	2020
Companies operating in the internal market	0.3142	0.4136	0.4078	0.4342	0.6382	0.5620	0.4070	0.4333	0.2364
Exporters	0.2677	0.3341	0.3335	0.3600	0.5261	0.4751	0.3733	0.4034	0.1991
Importers	0.3154	0.4281	0.4256	0.4623	0.6367	0.5514	0.5194	0.5137	0.2433
Companies engaged in both export and import	0.3833	0.5455	0.5063	0.5591	0.7221	0.6170	0.6283	0.5874	0.2895

Source: Compiled by the authors.

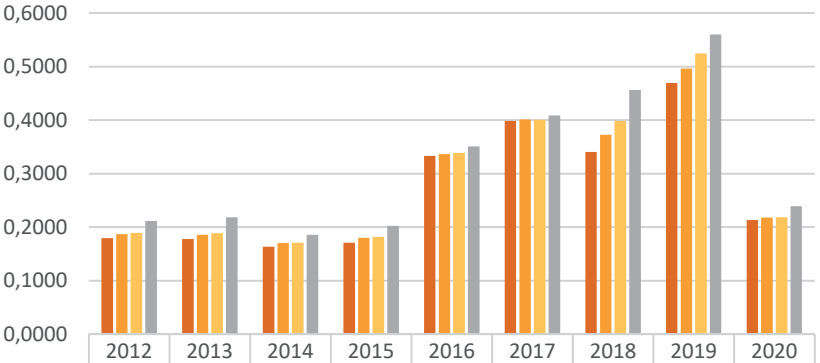
Figure 6. Efficiency of companies with FDI in the construction industry



	2012	2013	2014	2015	2016	2017	2018	2019	2020
Companies operating in the internal market	0.1460	0.1421	0.1387	0.1436	0.2253	0.2514	0.1743	0.2267	0.1893
Exporters	0.1392	0.1369	0.1384	0.1401	0.2260	0.2572	0.1360	0.2097	0.1567
Importers	0.1592	0.1571	0.1581	0.1782	0.2597	0.2785	0.2384	0.2616	0.1930
Companies engaged in both export and import	0.1818	0.1930	0.1898	0.2084	0.2883	0.3034	0.2665	0.2833	0.2222

Source: Compiled by the authors.

Figure 7. Efficiency of companies with FDI in wholesale trade



	2012	2013	2014	2015	2016	2017	2018	2019	2020
Companies operating in the internal market	0,1795	0,1777	0,1636	0,1710	0,3330	0,3981	0,3405	0,4696	0,2135
Exporters	0,1868	0,1858	0,1705	0,1801	0,3366	0,4016	0,3726	0,4967	0,2177
Importers	0,1895	0,1889	0,1711	0,1820	0,3389	0,4008	0,3983	0,5245	0,2187
Companies engaged in both export and import	0,2118	0,2187	0,1858	0,2026	0,3506	0,4086	0,4563	0,5599	0,2393

Source: Compiled by the authors.

The DEA analysis of the construction industry (Figure 6) showed that companies involved both in export and import were the most efficient ones over the whole period. Importing companies were less successful. Firms operating in the internal market come third. Exporters turned out to be the least productive. We would like to note that in 2018 the efficiency of exporting companies hit a record low value for the studied period (0.1360).

In the wholesale sector (Figure 7), productivity of all four groups of domestic companies with FDI was at almost the same level, meanwhile, the companies engaged both in export and import showed a slightly better result. In 2014–2017, there was a general growth in efficiency of all companies at approximately the same rate. However, in 2018 companies engaged in international trade evidently took the lead. Just like in most industries, companies involved both in export and import, net importers and net exporters were the most efficient. Companies operating in the internal market show less productivity. Companies engaged in international trade suffered a greater negative impact of the coronavirus pandemic.

According to the above results, in 2012-2020 the most efficient companies in the industries in question were companies with FDI involved in both export and import simultaneously. Exporters and importers come second and third, respectively, and companies operating in the internal market are in the last place, except for the manufacturers of chemicals and chemical fertilizers. In these sectors, such companies are in the second place.

All four groups show an insignificant drop in efficiency in 2014–2015 due to sanctions and Russian counter measures, which entailed an outflow of foreign direct investment. However, in 2016–2017 as a result of an increase in FDI in the Russian economy in all industries and in the observed groups of companies in particular there was a significant rise in efficiency succeeded by another reduction after a toughening of the existing sanctions and implementation of new ones in 2018. The COVID-19 pandemic in 2020 had an even greater negative impact on the efficiency of companies with FDI.

Summarizing the obtained results, we can make the following conclusions (Table 6):

The spillover effects of foreign direct investment are concentrated in the companies immediately involved in trade and do not affect all domestic companies in industries with FDI. At the same time, the companies involved in export and import are the most efficient ones, net importers come second, net exporters are slightly less productive, and companies not engaged in international trade are in the last spot;

Capital-intensive industry sectors benefit more from the inflow of foreign direct investment;

Efficiency of companies with FDI decreases when exposed to external shocks.

Table 6. Analysis of the research results

Hypotheses	Research methodology	Results
H1. Companies engaged both in export and import are the most efficient ones. They are followed by the companies focused only on export or import. Companies that are not involved in international trade are the least effective.	DEA accounting for spillover effects	(+) Confirmed
H2. The industries that benefit from FDI inflow are from more capital-intensive sectors		(+) Confirmed
H3. External shocks have a negative impact on performance of companies with FDI		(+) Confirmed

Source: Compiled by the authors.

Thus, the results of our research confirm the suggested hypotheses and may be of use for top managers of Russian companies, shareholders, members of the Board of Directors, as well as government officials, specialists of financial and analytical services and other concerned parties.

Conclusion

In this paper we analyzed the role of involvement in international trade for the successful operation of domestic companies with FDI using almost 170,000 observations based on financial reporting of 18,799 operating companies with an at least 10% share of foreign capital in 2012–2020 taken from the Ruslana database (Bureau Van Dijk). For this purpose, we have assessed the efficiency of companies with FDI, accounting for the degree of their involvement in international trade; the influence of foreign direct investment on companies' productivity with regard to the specific industry-related nature; the change in technical efficiency due to external shocks. We applied data envelopment analysis (DEA), taking into consideration FDI's spillover effects and using panel regression analysis as the research methodology. The research results confirm that companies engaged in both export and import showed the greatest productivity, importers are slightly less efficient;

they are followed by exporting companies, and companies operating only in the internal market have the lowest efficiency indicators.

Capital-intensive industries of the Russian economy benefit more from an FDI inflow. At the same time, the results of wholesale and mineral extraction fully confirm hypothesis 1, while in the chemical and chemical product manufacturing and in the construction industry domestic companies not engaged in international trade came second after those involved both in export and import, and were more efficient than net exporters and importers in the whole studied period.

The influence of external shocks turned out to be negative for all four groups in the considered industries. In 2014 there was a dramatic drop in efficiency of companies with FDI caused by introduction of economic sanctions against Russia, deterioration in relations with the West, increased geopolitical risks, oil price drop and rouble devaluation. The intensified sanctions in 2018 again caused an outflow of FDI and, as a result, a decrease in productivity of companies with foreign capital. The COVID-19 pandemic outbreak was comparable in its significant negative impact on indicators in all groups, besides, the negative impact was greater in labor-intensive industries of the Russian economy.

Thus, the hypotheses suggested in the research were confirmed, while the obtained results are of theoretical and practical importance for future generations, and may be of use for domestic companies in their search for possible ways of enhancing their efficiency and competitive performance by means of attracting foreign capital and entry into the international market. They may also be useful for government officials seeking to develop a set of additional measures aimed at support of domestic companies, improvement of investment attractiveness of the Russian economy and overcoming the negative influence of external shocks, such as political and economic sanctions against Russia and the unexpected COVID-19 pandemic, which is quickly spreading across the planet and destroying the structural ties of the global economic system.

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Appendix A

Evaluation of the effectiveness of companies with FDI by type of economic activity

		2012	2013	2014	2015	2016	2017	2018	2019	2020
Capital-intensive industries	Agriculture, hunting, forestry and fishing	0.1481	0.1489	0.1608	0.1998	0.2899	0.3341	0.2299	0.2788	0.1754
	Mineral extraction and quarrying	0.2123	0.2181	0.2018	0.2112	0.3118	0.3445	0.2628	0.2757	0.2091
	Power supply, gas supply and water supply	0.3385	0.3345	0.3079	0.3149	0.4694	0.5074	0.3538	0.3694	0.2696
	Chemicals and chemical products	0.3436	0.4720	0.4522	0.4920	0.6720	0.5822	0.5226	0.5140	0.2600
	Machinery	0.2603	0.2567	0.2508	0.2740	0.3948	0.4501	0.3999	0.3917	0.2641
	Transport equipment	0.3223	0.3509	0.3225	0.3559	0.5163	0.5810	0.5493	0.5124	0.3976
	Health care and social work	0.4835	0.4885	0.4568	0.4784	0.6271	0.6287	0.4318	0.4192	0.3523
Labor-intensive industries	Hotels and restaurants	0.2857	0.2757	0.2698	0.2823	0.4142	0.4572	0.3115	0.3410	0.2469
	Wholesale	0.1887	0.1892	0.1701	0.1804	0.3382	0.4010	0.3786	0.5015	0.2202
	Retail	0.2173	0.2126	0.2085	0.2304	0.3577	0.3930	0.3286	0.4556	0.2270
	Food, beverages and tobacco	0.3927	0.3969	0.3861	0.3910	0.5887	0.5781	0.5421	0.5249	0.3288
	Textile and textile goods	0.1738	0.1710	0.1639	0.1630	0.2468	0.2687	0.1835	0.2376	0.2120
	Leather, leather goods and footwear	0.2525	0.2509	0.2465	0.2452	0.3341	0.3556	0.2165	0.2522	0.1488
	Construction industry	0.1484	0.1453	0.1422	0.1486	0.2302	0.2554	0.1821	0.2313	0.1910

Source: Compiled by the authors.

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Influence of Mezzanine Financing on the Corporate Financial Profile

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Abstract

Due to global changes in the global economy, the importance of financing and building an optimal capital structure is increasing. Rapid changes in the exogenous environment and the investment climate lead companies to revise their financing strategies.

Currently, there are many financial instruments that provide cash inflow, but have certain restrictions. The tool that allows to eliminate them is the mezzanine.

However, the existing literature on mezzanine financing does not fully cover this financing method.

The novelty of this research lies in determining the financial profile of the borrower company that utilizes mezzanine financing, and in studying the impact of the mezzanine on the market value of a company's equity and its value.

Econometric analysis confirms that mezzanine financing is more often chosen by companies with a less attractive financial profile, based on ROA, EBITDA – CapEx cash flow, and beta. In addition, the interconnection between a company's life cycle and its desire to attract a mezzanine loan is revealed. Econometric and empirical analysis allow us to conclude that the market situation, managerial methods within the company and the operational strategy increase the chances of the effective use of the mezzanine.

Keywords: mezzanine financing, corporate market capitalization, econometric analysis, case study, nonfinancial analysis

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Introduction

Due to a volatile economic environment, the issues of financing and developing the optimal capital structure of companies acquire the highest relevance. In view of significant changes in the external environment and investment climate in Russia, the current financial policy and corporate financing strategies may not meet the challenge of the external environment, thus resulting in a deterioration in company performance and subsequent bankruptcy.

At present there are a lot of instruments that may provide an influx of funds, but all of them have certain limitations, which should be taken into consideration by companies when performing their operations. However, there are instruments that allow to eliminate these restrictions. The mezzanine, considered in this paper, is one of such instruments. The number of deals related to mezzanine financing in 2019–2021 increased more than twice – from 117 in 2019 to 317 in 2021, which is indicative of an interest on the part of large and medium-size companies. The number of transactions grew from RUB 251 billion in 2019 to RUB 837 billion in 2021.

The existing scientific literature offers insufficient coverage of the issues related to mezzanine financing. The purpose of this paper is to analyze the impact of procuring mezzanine financing on a company's future financial profile and its market value. The study is novel in that it defines the financial characteristics of a typical company that raises mezzanine financing, assesses its influence on the market value of equity capital and reveals the key conditions for an efficient application of funds obtained as a result of such financing. The main research methods comprise econometric analysis, comparative analysis, case study, financial analysis of a company and the dynamics of various indicators.

The paper includes three sections. In the first section, we perform a theoretical analysis of mezzanine financing, its advantages and drawbacks, and other alternative instruments based on scientific papers and literature by foreign and Russian authors. The second section presents an econometric analysis of several issues of mezzanine and classic financing instruments. The logistic model confirms the hypothesis that companies with a less attractive financial profile are more prone to issue a mezzanine instrument based on the coefficients preceding the Net income margin, ROA, Dividend dummy, EBITDA flow minus CapEx, corporate beta and Q Tobin indicators. We revealed a relationship between a company's life cycle stage and a drive for procuring mezzanine financing. It is confirmed by the coefficient preceding a company's Revenue CAGR, Q Tobin and beta. The classic linear model shows that in case of mezzanine financing, the share of issue in the total corporate debt, the amount of raised funds and the ratio of issue to company value have a positive impact on company value, while the coupon rate and life of an instrument have a negative impact. In the third section, the case study of actual transactions confirms the results of econometric analysis. It has been found out that a favourable market situation, highly qualified management and an optimal strategy enhance a company's chances of an efficient application of mezzanine financing.

1. Literature Review and Theoretical Analysis

Mezzanine Financing and Its Types

Mezzanine financing originated in the 1980s in the USA. The concept of mezzanine financing is one of the most advanced and flexible ones and companies use it all over the globe in developed financial markets (it is still gaining momentum in emerging markets).

When banks cannot provide financing for a company or a project because a company fails to meet the requirements and there is a high non-repayment risk, a company needs alternative financing sources [1]. Mezzanine financing [2] is hybrid financing that combines ordinary debt and equity capital. Mezzanine is used when a company/project needs financing, but it cannot raise funds in a standard way in the debt market by placing debt securities (bonds), obtaining an ordinary bank loan or placing shares in the equity capital market. In other words, mezzanine financing [3] is raised to implement a large project for which a company typically lacks internal funds. An enterprise turns to a bank and obtains up to 70% of the necessary amount. provided 30% is its own funds[1].

Generally, mezzanine is obtained to finance business growth or expansion to various markets in order to settle M&A, LBO or restructuring transactions, stock redemption, project financing due to lack of internal funds or in case of elevated risks of company bankruptcy.

Transaction parties. In this type of transactions, as elsewhere, there is a party providing funds for a company, or the lender. Besides, there is another party that accepts such funds and tries to use them. In this case, the lender accepts a part of equity risk in order to get a potential yield of 25–30%. The latter is always the borrowing company, while the former may include investment banks, hedge funds, mezzanine financing funds, or a private equity fund.

We should also distinguish two types of providers or lenders that provide financing [4]. The first type comprises banks and other financial institutions, mezzanine funds and institutional investors, while the second one includes PE funds that provide mezzanine financing to their portfolio companies to launch an IPO or to sell internally.

In the majority of transactions, payments consist of the following two parts [1]:

- payment of interest on the mezzanine loan;
- revenue from sale of shares by the lender (the lender assumes a risk and participates in corporate operations and growth; the transaction is structured by means of options and warrants).

[1] The percentage indicated in this paragraph is estimated.

Let us consider the following mezzanine financing forms:

- credit mezzanine characterized by the interest being paid at the end of its period – financing with the option of paying interest at the end of its period;
- warrant[2] credit mezzanine – financing by means of an instrument that makes the borrowing bank a partner and allows it to participate in the growth of shareholder value;
- equity mezzanine financing in the form of preferred shares – structuring of financing through the repurchase of newly issued preferred shares with guaranteed dividends;
- equity mezzanine with call/put options – repurchase of ordinary shares where a client has buyback obligations with a guaranteed return.

S. Sazanov et al. defines other mezzanine forms [1]:

- financing secured by the stock of a company that owns physical assets;
- financing characterized by the "non-public" participation of an investor who purchases a share in the borrower's company, but assumes no responsibility to the company's lenders;
- financing secured by issue of convertible bonds that provide for fixed interest payments and repayment of principal debt at the end of the financing period, at the same time offering investors an opportunity to purchase shares of the borrowing company at a predetermined conversion price instead of repaying the principal debt;
- financing secured by the issue of preferred shares of the borrowing company, which grant pre-emptive rights to participate in profit-sharing and liquidation value sharing as compared to owners of other company shares.

There are numerous classifications of mezzanine financing, but all of them describe the two main models in one way or another. The first model entails lending characterized by interest and debt "body" payment at the end of the financing agreement's validity period, the second model provides for additional issue of securities by the company or conclusion of option contracts in order to lock the transaction profit at previously stipulated terms.

1.2. Advantages and Drawbacks of Mezzanine Financing

So how do advantages and drawbacks of such financing manifest themselves? Paper [5] highlights several principal advantages. First, it is an opportunity to attract funds not just for large companies, but also for companies that face difficulties in raising financing due to problems of securing a loan/confirming their ability to make payments in the future. Besides, the costs of primary mezzanine debt servicing are significantly lower than those of issue of shares or bonds (listing, roadshow, advertisement etc.). One of the main advantages is the ease of getting financing in comparison to issue of shares, bonds or obtaining an ordinary bank loan.

At the same time, mezzanine financing has a range of drawbacks, such as a higher required return for a prospective investor for the risk he assumes, transfer of a part of the shares (if the transaction provides for it) and a probable loss of control over the company.

Paper [5] names the reduced burden on cash flows during the financing period (a flexible approach to making the payment schedule), ease of obtaining in comparison to a standard bank loan, distribution of risks between the transaction parties among the main advantages of mezzanine financing. Its drawbacks include the high cost for the company, major risks for the investor/lender, loss of capital by the company owners that forces them to give up control, increase of interest payments due to a more long-term use of borrowed funds. Mezzanine investors risk losing their investments in case of a company's bankruptcy.

Paper by L. Nijs [6] studies advantages and drawbacks of mezzanine financing.

Table 1. Advantages and drawbacks of mezzanine financing

Advantages	Drawbacks
Significant financial support of internal project implementation	More expensive than an ordinary loan
Improvement of the balance structure and creditworthiness	The money is granted for a limited period, unlike equity capital
Consolidation of capital without dilution of the shareholders' share	More stringent requirements for company operation transparency
Non-taxable interest payments	
Greater entrepreneurial freedom for the company	

Thus, positions of different authors are somewhat alike and somewhat different. Some authors speak of a low cost of such financing in comparison to the initial costs of raising funds using ordinary instruments, others note the large costs due to the high return required because of the elevated risk for the investor who grants a mezzanine loan.

[2] Warrant is a derivative financial instrument that allows to have an additional return on a transaction from the value of business growth.

Underlying instruments. The following instruments are the underlying instruments of mezzanine financing:

- preferred shares;
- convertible bonds;
- warrant-linked bonds;
- options.

A preferred share is a share that confers no right to manage a joint-stock company to its owner, but grants privileges such as preferential payments. A convertible bond is a bond that accords its owner the right to exchange such a bond for an ordinary share under certain conditions. A warrant-linked bond is a hybrid of two instruments (ordinary bonds and warrants). This instrument allows the investor to buy company securities (in this case – bonds) over a certain period at a certain price which, as a rule, is lower than the market price. An option is one of the most well-known derivative financial instruments. In case of an option, a share or a bond may be the underlying asset (there are currency options as well). It entitles the owner to purchase/sell the underlying asset after a certain time period (expiration date) at a predetermined price.

Comparison tables with alternating financing sources. S. Sazanov et al. [1] compares mezzanine, bank loan and direct investments. In his opinion, mezzanine may be used in almost all cases described in the abovementioned papers, except for joint company buyout with a direct investment fund. Table 2 shows the advantages of this instrument over other sources of financing for an enterprise [6].

Table 2. Methods of Financing of Business Development

Event	Financing method		
	Bank loan	Mezzanine financing	Direct investments
Working capital financing	+	+	
Business expansion/ Capital investments	+	+	+
Lombard financing	+	+	
LBO		+	+
M&A		+	+
Joint company buyout with a direct investment fund			
Manager buyout		+	
Buyout by one of the owners		+	+
Owner's partial cash out		+	+
Investment project for companies using the simplified taxation system		+	+

According to L. Tetrevova [5], the following financing instruments are the most attractive:

- passive participation, which means raising large amounts of financing (especially for small companies unable to issue securities) through passive investors who make no claims to active participation in corporate operations through management decisions. It generally suits companies of any size and imposes no restrictions upon the borrowing company as to additional covenants;
- preferred shares allow to attract a large capital and reduce the debt burden at the same time, thus providing a certain advantage for companies with a large debt/EBITDA ratio. They suit large companies, but do not provide the same extent of freedom as passive participation;
- ordinary shares suit medium-size and large companies, but impose certain limitations, i.e., an opportunity for the investor to participate in corporate operations;

- a subordinated loan suits companies of any size, but the amount of raised capital is limited. It also suits companies that cannot issue securities for some reason. It does not stipulate for the lender's opportunity to make management decisions and provides tax benefits.

Thus, mezzanine financing may be defined as the optimal way of raising capital for companies of any size and for any needs (whether it pertains to the purchase of a rival company or to its international expansion).

1.3. Areas of Mezzanine Financing Application

There are three main objectives of obtaining mezzanine financing. Each of them is substantiated by hypotheses. Econometric, comparative analysis and case study methods have been used to confirm or reject these hypotheses.

The first objective is to increase company value, which may be achieved by the purchase of a new related business (horizontal differentiation), development of new markets or purchase of a business unrelated to the core business (conglomerate).

The hypothesis stating that company value depends on optimal capital structure (econometric analysis (EA) was proven by J. Marszalek [7] using regression trees. He analyzed the dependence of the date of bond redemption and the period to its conversion, and reached a conclusion that this type of bonds helps to achieve the optimal capital structure, which has a positive influence on long-term values. The hypothesis proposed by O. Karpenko and T. Blokhina [8], according to which an increase in company value depends on the plans to issue convertible instruments (comparative analysis (CA), stated that an issuer was granted additional capital to use for investment purposes or to decrease the probability of a company's bankruptcy. A. Olivier et al. [9] asserts that the date of callable bond redemption plays a greater role in company performance than the date of redemption of non-callable bonds (case study). As per A. Abhyankar and A. Dunning [10], convertible bonds are most attractive for rapidly developing companies with an unstable financial status (econometric analysis (EA). However, an increase in the company value does not depend on the plans of issue of convertible bonds and the redemption date, which contradicts the previous two hypotheses.

The second objective consists in providing financing for large projects, for example, the establishment of a new business unit or the development of a new product. Thus, according, to hypothesis proposed by A. Czajkowska [4], mezzanine is more effective when an ordinary loan (case study) cannot be obtained, while as per hypothesis set forth by S. Sazanov [1], mezzanine is an important alternative financing source for large and medium-sized companies (CA). They prove that when an ordinary bank loan is inaccessible, mezzanine financing becomes attractive, since it is much easier for the company to obtain due to the absence of numerous restrictions (such as bank covenants), on the one hand, but on the other hand, it is much more expensive. Hypotheses proposed by J.-I. Yoo and E.-B. Lee [11], J.C. Stein [12] and L. Tetrevova [5] have been validated by comparing mezzanine to alternative financing sources. They state that convertible bonds have more advantages in terms of financing than issue of shares and ordinary debt securities (case study); mezzanine is more favourable than raising funds through ordinary debt and equity capital (CA); and that combinations of project and mezzanine financing may be more efficient for project financing than these instruments applied separately (EA).

The third objective is to achieve the optimal capital structure [13]. Thus, for companies with heavy debt, placement of ordinary or preferred shares is one of the few ways of raising funds without increasing debt. D. Kazmierczak [14], W. H. Li [15] and J. Marszalek [7] put forward the following hypotheses to substantiate this objective:

- optimal capital structure is achieved by issuing convertible bonds;
- callable convertible bonds are issued by companies with a lower ROA;
- companies are more willing to issue ordinary bonds than convertible ones;
- all companies try to reduce the probability of bond conversion.
- All the above-mentioned hypotheses have been confirmed by econometric analysis. These models create the basis for econometric analysis carried out in the following section.

2. Research methodology, econometric analysis

2.1. Data Description

The main purpose of econometric analysis is to determine the financial standing of the companies that decide to raise mezzanine financing. In order to solve this problem, we cooperated with a mezzanine financing expert to select a set of indicators for which we needed to collect data. For all indicators described below, we present a mean value for the three years preceding the start of mezzanine financing usage. First, we selected one set of financial status indicators, then we expanded it in the course of an in-depth study.

The primary analysis indicators are as follows:

1) revenue growth – a general indicator of corporate business operations over three years;
2) average EBITDA margin, EBIT, Net Income – these indicators allow to trace business profitability at several levels in comparison to revenue, respectively;
3) ROE (Return on equity) is a ratio of net income to equity capital that shows profitability of corporate capital;
4) ROA (Return on assets) is a ratio of net income to all corporate assets that represents efficiency of a company's asset use to generate profit;

5) EBITDA – CapEx – cash flow less capital expenditures, which shows the amount of funds available to the company before taking financial obligations into consideration;
6) EBITDA/Interest is a ratio that shows whether the company has sufficient profits to pay interest;
7) Q-Tobin is a ratio of company's market value to its replacement asset value that shows whether the company is underestimated or overestimated;
8) Total Debt/Equity is an indicator that shows the evaluation of financial leverage and equity capital ability to cover all outstanding debt obligations;
9) Net Debt/EBITDA is an indicator of corporate leverage that shows the number of years a company needs to settle its debt if the net debt and EBITDA remain unchanged.

Additional indicators include the following:

1) Total asset turnover – the asset turnover ratio shows the number of days required for asset turnover with the current level of proceeds;
2) CapEx/Total assets is a ratio of capital expenditures to the mean volume of company assets;
3) Beta is an indicator that shows the interrelation between a systematic risk and expected return on assets;
4) Coupon rate is an annual income of an investor in possession of a bond;
5) Dividend Yield is a coefficient that represents the amount of dividends paid by the company annually relative to stock price;
6) Dividend Dummy is a binary variable that reflects a company's dividend payouts.

When the list of financial indicators was determined using the Capital IQ analytical platform, we selected a dataset of financial indicators of the companies that issued mezzanine instruments and ordinary bonds in 2000–2022.

In order to define financial indicators that influence company decisions on mezzanine financing, we built a classic linear regression.

Descriptive Statistics

Descriptive statistics of companies that issued mezzanine instruments and ordinary bonds is presented in Table 3.

Table 3. Descriptive data statistics

Variable	Number of observations	Mean value	Standard deviation	Minimal value	Maximum value
Revenue Cagr	10.698	0.1426843	0.4628762	–1.976431	19.03343
EBITDA margin	10.777	–0.2645232	18.21164	–1244.917	1.832809
NI margin	10.777	–0.477214	20.35136	–1495.405	32.90036
ROE	10.76	0.035131	0.8110236	–50.32527	10.04037
ROA	10.77	0.015003	0.1185521	–2.508596	2.08468
Asset turnover	10.985	0.0060094	0.0060094	0	0.071242
CapEx/total assets	10.76	0.0573549	0.0573922	0	0.5942256
EBITDA – CapEx	10.985	847.0555	2987.904	–14,064.68	38582
Total debt/ total assets	10.76	0.3387827	0.1830465	0	1.771294
Q-Tobin	10.76	1.128425	4.003874	0	362.9334
D/E	9.696	1.121363	2.139755	0	109.1696
Dividend yield	11.243	0.0162133	0.0207334	0	0.2992307
Net debt/EBITDA	10.868	3.315545	27.87122	–1,197.893	1,705.048
EBITDA/interest	10.762	38.69965	999.9005	–15,608.79	78,261.61
Beta	10.97	0.9064686	0.6186393	–10.61568	4.22836
Coupon rate	10.216	0.0389504	0.0293433	0	0.16
Dividend dammi	11.243	0.5197011	0.4996339	0	1

Source: *Capital* IQ.

Approximately 40% of this sample consists of mezzanine instrument issues, the rest of the sample comprises examples of issue of ordinary shares. In the course of further regression building this will allow to determine which financial indicators have the greatest impact on a company's decision-making on the issue of mezzanine. Then we used the companies' market capitalization indicator over five years in order to determine the effect of mezzanine financing.

After the initial analysis of the sample's average ratios, one may note that in case of a positive cumulative average annual growth in the previous three years, the mean marginality values of EBITDA and Net Income are negative, which indicates certain operational difficulties in companies. Besides, one may observe that the ROE mean value (about 3.6%) is below average in all industries. It is significantly lower than the mean value in all industries and ranges from 10 to 13%. However, it should be noted that the mean value of the EBITDA – CapEx flow takes on a positive value; the mean value of EBITDA/Interest = = 38.7x. This means that on average companies' EBITDA is sufficient for interest payouts. Besides, the average leverage (D/E) of companies in this sample amounts to 1.12. Consequently, the average debt load is not so large.

The next stage of research entails building a logistic and linear regression and interpreting the obtained data in order to accept or reject the hypotheses.

Empirical Analysis

The first objective of empirical analysis is to determine the influence of financial indicators on the probability of issue of mezzanine instruments. In order to solve it, one has to build a logistic regression. As a result, we will form an understanding of the financial profile of companies that use mezzanine financing. The authors of paper [11] carried out a similar empirical analysis in order to evaluate the enhancement of investment opportunities by raising mezzanine financing. However, we expanded the set of indicators and used the generated hypotheses to achieve an altogether different goal. As long as there are two scenarios in the sample – issue of a convertible bond (mezzanine instrument) and ordinary bond – the use of a logistic regression seems optimal.

On the basis of the mezzanine instrument sphere analyzed above, two hypotheses have been put forward to address unexplored issues before building a logistic regression.

H1: Convertible bonds are issued by companies with a less attractive financial profile as compared to issuers of ordinary bonds.

H2: Issuers of convertible bonds have fewer growth opportunities than issuers of ordinary bonds.

The studied logistic regression model where a dummy variable with the parameters of 0 – issue of a mezzanine instrument and 1 – issue of an ordinary bond is an independent variable is as follows:

$$\text{Ln}\ [p/(1-p)] = \beta_0 + \beta_1\text{Revenue\_growth} + \beta_2\text{Total\_asset\_turnover} + \beta_3\text{ROE} + \beta_4\text{ROA} + \beta_5\text{Ebitda\_margin} + \beta_6\text{Totaldebt/Equity} + \beta_7\text{Ebitda-Capex} + \beta_8\text{Ebitda/Interest} + \beta_9\text{Capex/Total\_assets} + \beta_{10}\text{Net\_debt/Ebitda} + \beta_{11}\text{Beta} + \beta_{12}\text{Q-tobin} + \beta_{13}\text{Coupon\_rate} + \beta_{14}\text{Dividend\_yield} + \beta_{15}\text{Dummy\_dividend} + \beta_{16}\text{Net Income margin} + \beta_{17}\text{Total debt/Total assets} + \varepsilon,$$

where p in this case is the probability of issue of a mezzanine instrument. Based on the results of the built model, pseudo-R^2 amounted to 27%, however, in order to ultimately verify the adequacy of the developed model and applied sample for the logistic regression, we performed the chi-squared test and Hosmer-Lemeshow goodness-of-fit test (Table 4).

Table 4. Chi-squared and Hosmer-Lemeshow goodness-of-fit test

Variable	Chi-squared test	Hosmer-Lemeshow goodness-of-fit test
Number of observations	9,346	9,346
Number of groups/covariance matrices	7,629	10
Chi^2	13,479.4	205.02
p-value	0	0

The chi-squared test results are indicative of a normal level of data adequacy. For instance, the number of observations and number of covariation groups are not particularly close, confirming that this test is rather accurate. The results of the Hosmer-Lemeshow goodness-of-fit test also confirm adequacy of this model.

See the results of the developed logistic regression in Table 5.

Table 5. Results of logistic regression

Variable	Coefficient	Standard deviation	z	p>|z|
Revenue Cagr	–0.9089938	0.1269724	–7.16	0.000
EBITDA margin	–0.0903942	0.0978064	–0.92	0.355

Variable	Coefficient	Standard deviation	z	p>|z|
NI margin	0.6164126	0.1563201	3.94	0.000
ROE	0.0227867	0.0321762	0.71	0.479
ROA	2.423588	0.4707016	5.15	0.000
Asset turnover	5.784607	4.789286	1.21	0.227
CapEx/total assets	0.6669391	0.630926	1.06	0.290
EBITDA – CapEx	0.0002032	0.0000175	11.59	0.000
Total debt/ total assets	2.353959	0.1996201	11.79	0.000
Q-Tobin	–0.116596	0.0153788	–7.58	0.000
D/E	0.0190041	0.0192718	0.99	0.324
Dividend yield	1.840811	1.87524	0.98	0.326
Net debt/EBITDA	0.0001585	0.0010792	0.15	0.883
EBITDA/interest	–0.0001893	0.0000815	–2.32	0.020
Beta	–0.572886	0.0591948	–9.68	0.000
Coupon rate	42.6273	1.389099	30.69	0.000
Dividend dummy	1.02352	0.072505	14.12	0.000
Offering amount	0.0003947	0.0000735	5.37	0.000

Source: Authors' calculations.

The logistic model confirms the statistical significance of the majority of presented financial indicators at a 1% significance level. This suggests that after primary analysis at least hypothesis H1 is not rejected yet, however, it may be defined more precisely. EBITDA/Interest was at a 5% significance level. The indicators of business profitability and efficiency (EBITDA margin, ROE, Asset turnover), as well as the leverage indicator (D/E) were statistically insignificant. It means that not all indicators are indicative of corporate financial performance and they may not influence the decisions on the issue of a mezzanine instrument in every instance.

Based on the signs that precede the coefficients, one may conclude that when corporate operations improve, i.e. the revenue, market capitalization (Q-Tobin) and EBITDA increase along with the beta value, a company is more likely to aim at issuing mezzanine instruments.

We may make the following conclusions on the basis of the obtained data. This set of financial characteristics is mainly typical of companies at the earlier stages of their lifecycle (youth and prime). Such companies grow rather rapidly, their market value is high and when these companies face a high risk, the correlation of their value to the market increases.

From the investors' point of view, such companies have a high credit rating when ordinary bonds are concerned. However, if a company demonstrates a growth potential that may be forecasted based on market fluctuations, participation in mezzanine financing will allow investors to profit off the growth of a company's shareholder value. The presence of an equity component in the mezzanine instrument provides for this opportunity. In view of the assumptions that companies are young and have a growth potential, hypothesis H2 should be rejected because in this case the result suggests the opposite: companies aiming to issue a mezzanine instrument often have growth potential.

An increase in the value of other financial indicators in this sample is more likely to become a signal for the company to issue ordinary bonds. Generally, hypothesis H1 is not rejected based on the first model, but needs a more precise definition. Thus, companies with a less attractive profile will issue convertible bonds, however, the following indicators will be considered the indicators of the attractiveness level: Net income margin, ROA, Dividend dummy, EBITDA – CapEx flow, Total debt/Total assets, as well as a company's beta because its growth increases the company's commitment to issue a mezzanine instrument. This issue is considered in more detail in the third section using the example of case analysis.

Defining the influence of mezzanine instrument issue on corporate market capitalization. After defining the financial

profile of the companies that decided to issue mezzanine instruments, it is necessary to perform an empirical analysis of the way in which the use of mezzanine may influence their corporate financial profile.

In order to solve this problem, two classic linear regressions are presented to demonstrate how mezzanine financing influences corporate market value. Market capitalization of companies five years after issue is the dependent variable in these models. A five-year period was selected on the basis of the assumption that a company will be unable to change its operations immediately after obtaining mezzanine financing using the raised funds, rather, it will need time.

The following indicators have been added in the current sample for linear regression models:

1) Coupon rate is the coupon rate for a convertible bond (the indicator has been used in the logistic regression);
2) Offering amount in this case is the amount of money raised by means of issue of convertible bonds;
3) Tenor period is the maturity term of an issued bond;
4) Offering amount to Market cap is a ratio of obtained funds to a company's market capitalization that helps to understand how critical the raised amount is;
5) Offering amount to Net debt is a ratio of the obtained funds to corporate net debt that allows to compare the corporate debt amount with the amount of raised funds;
6) Conversion premium is the difference between the convertible bond price and the market value of ordinary shares into which such bond may be converted;
7) Conversion ratio is a conversion coefficient that shows the number of shares into which a bond may be converted.

The linear regression model has been built for two situations: issue of an ordinary bond and a mezzanine instrument. It provides an opportunity to compare these situations and distinguish between the influence of an ordinary bond and mezzanine on a company's market capitalization. The model is as follows:

Market cap 5Y after = $\beta_{0+}\beta_1$Tenor + β_2Coupon rate + + β_3Offering amount.

After building the regression, we obtained the following results from the two scenarios (Tables 6 and 7).

Table 6. Convertible bond model data

MC5Yearsafter	Coefficient	Standard deviation	T	p>|t|
Coupon rate	–127,672.2	22,539.86	–5.66	0.000
Offering amount	.0876267	.0866445	1.01	0.312
Tenor years	–69.95156	86.21081	–0.81	0.417

Table 7. Data of the model for ordinary shares

MC5Yearsafter	Coefficient	Standard deviation	Z	p>|z|
Coupon rate	–606575.7	67252.06	–9.02	0.000
Offering amount	3.929689	.6591785	5.96	0.000
Tenor years	3315.133	243.921	13.59	0.000

The explanatory power of the model, i.e. R^2 in case of convertible bonds takes on the value of 0.0094 and in case of ordinary shares – 0.0352, which is below 10%. Based on this evidence, we may conclude that there are other factors that have a strong impact on a company's market value within five years.

It should also be noted that for the companies issuing ordinary bonds the ratios are significant at any level. It means that these parameters influence the market value during the selected period. However, in case of a mezzanine instrument, only the borrowing rate has any impact (at any significance level), besides, in this case the influence is smaller and has a smaller negative impact than in case of ordinary bonds. In order to refine this conclusion, we have considered the borrowing rates in detail (Table 8).

Table 8. Comparison of the borrowing rates of ordinary and convertible bonds

Variable	Number of observations	Mean value	Standard deviation	Minimal value	Maximum value
Coupon rate (mezzanine)	3.238	0.0244365	0.0245279	0	0.13
Coupon rate (ordinary bond)	7.978	0.0448411	0.0448411	0	0.16

Thus, we can see that in case of issue of convertible bonds the average coupon is less than in case of ordinary bonds because it is possible to convert bonds into shares. This fact explains the reasons for the difference in the extent of influence on company value.

The second model was built only for the convertible bond issue cases and has restrictive covenants in order to enhance accuracy. So, the sample comprises companies with bond maturity period under or equal to ten years. Besides, we excluded the situations when the conversion premium and the conversion ratio equaled 0 (Table 9).

The developed model is as follows:

Market cap 5Y after = $\beta_{0+}\beta_1$Tenor + β_2Coupon rate + + β_3Offering amount + β_4OA / MC + β_5OA / ND + + β_6Conversion premium + β_7Conversion Ratio.

Table 9. Results of the refined convertible bond model

MC5Yearsafter	Coefficient	Standard deviation	Z	p>|z|
Coupon rate	–133,301.9	23,878.47	–5.58	0.000
Tenor years	–1,341.522	409.4802	–3.28	0.001
Offering amount	1.41968	.2269948	6.25	0.000
Offering amount / Market cap	–3,692.917	607.6544	–6.08	0.000
Offering amount / Net debt	10.13027	5.748276	1.76	0.078
Conversion premium	–2.40e-06	.0000266	–0.09	0.928
Conversion ratio	–.0046534	2233.554	–1.25	0.211

The conversion rate and premium turned out to be insignificant at all levels. The positive influence of the issue's share in corporate debt is significant (at a 10% level). From the economic point of view this may be due to the fact that a company may use a part of raised funds to refinance the debt and reduce its debt level. The coupon rate is also significant at all levels, and we know that the converted bond rate is less than the ordinary bond coupon. This means that a smaller coupon rate offers the company an opportunity to use the saved amount to develop the company. We can also note from the viewpoint of corporate development that a large amount of raised funds expands a company's horizon of planning and implementation of investment projects. At the same time, the ratio of issue to a company's market value is negative. It is shown in the model that presents the risks of a company's insolvency.

According to the conducted empirical analysis we may reject hypothesis H2, which states that issuers of convertible bonds have fewer growth opportunities unlike issuers of ordinary shares. Hypothesis H1 is accepted, but with certain adjustments: it is confirmed for the following indicators: net income margin, beta, EBITDA/Interest, Q – Tobin and Dividend dummy.

Besides, we have revealed a correlation between the choice of an instrument of financing and the lifecycle stage [16]. We describe it in more detail in the final section.

3. Case Study

This section is dedicated to the study of the influence of mezzanine instruments on corporate operations based on two cases. The examination of these cases includes the analysis of the financial indicators of the borrowing company, as well as the qualitative characteristics of the situation.

Financial analysis implies an evaluation of the key elements of the corporate financial profile – dynamics of revenue, EBITDA, net income (substantiated by operating indicators of the borrowing company in kind), as well as debt load indicators – Net debt / EBITDA and EBITDA / Interest. It also refers to the econometric part of the paper concerning the distinctive features of borrowing companies (logit-regression) and the value of borrowing companies (the least squares method regression). Output with financial indicators is the result of financial analysis.

Consideration of the qualitative characteristics of the case allows to define the final result of a mezzanine deal, assess the

internal (management quality, strategy efficiency) and external (macroenvironment, market situation) profiles of the borrowing company. SWOT analysis sums up the research.

The first case is that of a company operating in the market of doors and tumbler plate locks. It offers an example of a company's distressed debt refinancing with option profitability calculated into the transaction.

Case 1

3.1.1. History of Transaction 1[3]

The key parties in the case are company X (borrower), mezzanine fund Y and several of the largest banks of the Russian Federation (top 100 of the banking system) that have concluded a refinancing agreement. Company X is one of the main participants of the lock and door market, it is the market leader with a 25% share and ranks among the TOP 3 of participants in the steel door market with a share of 1% (the market leader accounts for 3%). Company X develops rapidly and implements an aggressive investing policy of quick branch network expansion.

In 2012–2014 company X had two key lenders in its loan portfolio (hereinafter Bank 1 and Bank 2). In the summer of 2013, Bank 1 offered to refinance multiple small credit lines and buy out other banks' loans in order to provide a syndicated loan. In December 2013 company X was notified that all contractual relations should be broken off due to a management change in Bank 1. Consequently Bank 1 limited lending and forced Bank 2 to refinance and sell its debt to it. As a result of controversies between the cornerstone lenders company X lost access to current assets, which led to a default.

Under such circumstances company X considered two options: 1) turning to fund Y to conclude a mezzanine financing transaction; and 2) going bankrupt and selling assets in order to pay according to lenders' claims. Alternative financing sources were unavailable because of the company's insufficient credit quality. After the end of Q2 2015, a mezzanine financing transaction was made.

3.1.2. Nonfinancial Analysis of Case 1

Internal analysis of the market. A distinctive feature of the steel door and tumbler plate lock market where company X operates is its saturation. The market structure is subject to frequent changes; the leader's share ranges from 2 to 3%. It means that it is a highly competitive market characterized by frequent introduction of new equipment, search for new sales channels, development of a dealer network, optimization of business processes and operating costs.

First of all, it is necessary to note the market volume dynamics since 2012. Up to 2014, the market had been rather steady and demand amounted to 3.3–3.4 million units per year. In 2014 as a result of the import reduction policy the product volume decreased by 1 million units. In order to meet the market needs, domestic production volume grew annually by an average of 300,000 units up to the end of 2015, but in 2016 it fell by 11% due to contraction of demand. According to the DISCOVERY Research Group analytical agency, the steel door market in Russia in 2015 amounted to RUB 83.0 billion (maximum for 2010–2015), but it decreased to RUB 67.0 billion in 2017 due to a drop in population's solvency and a delayed effect of the sale of new buildings. 76% of the market in 2015 consisted of domestic manufacturers, with this share growing to 86% in 2019. Major market participants are Torex with a 16% market share, companies Le Grand (16% of the market) and Guardian (9% of the market).

The lock market is characterized by a high product differentiation, nevertheless the competition is not as strong as in the door market. At the same time, the lock market is related to dynamics of the steel door market because tumbler plate locks are complementary goods.

Let us elaborate on the product range and target users of these goods. Markets of this type are differentiated greatly in terms of products and are subject to rapidly updating trends due to frequent changes in the quality and safety regulations. As a result, companies have to change their strategy often, and to upgrade production facilities, thus improving the flexibility of the manufacturing process and to adapt actively to market trends.

There are two main market consumer segments: B2B and B2C. The volume of consumption by construction companies or B2B is significantly higher, however, this segment is less marginal because construction companies prefer the low cost of doors in the prejudice of differentiation.

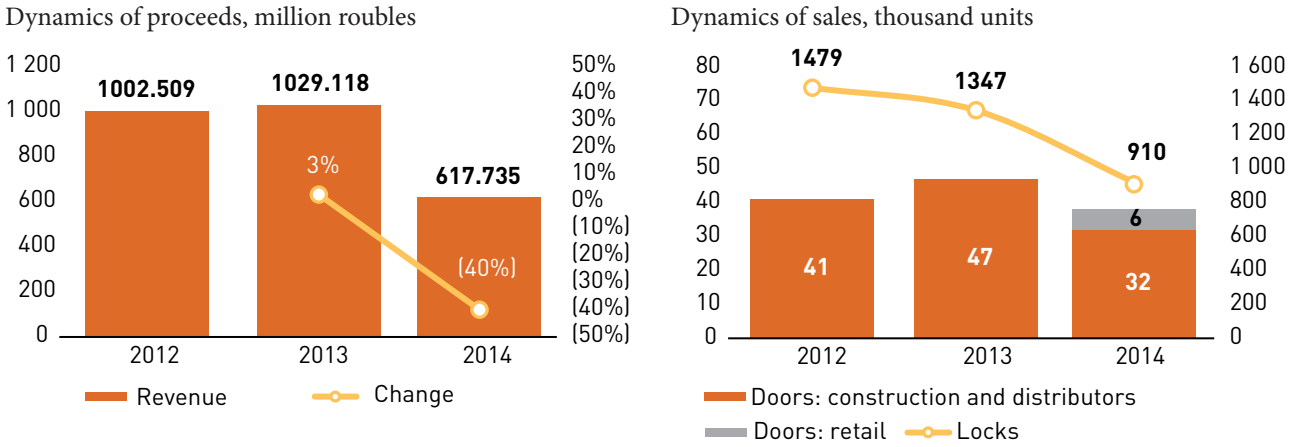
Internal analysis of the company. Company X is the apparent leader in the market of tumbler plate locks with a share of 25%, in the door market its share amounts to approximately 1% due to saturation and a highly competitive environment. At present, the company is in the "prime" stage of its lifecycle. It means that it has a well-defined structure, and each employee has a clear set of functions. The company controls a manufacturing cluster near Nizhny Novgorod and has been automating production since 2011. For instance, equipment that manufactures 20,000 doors per month without human involvement has been installed. The products include five different door model ranges with over 100 finishings.

Sales through distributors have been an important sales channel up to 2014, but later the company decided that it needed to focus on its own retail stores and a stable network of small distributors in order to ensure the best results. In spite of underuse of facilities, the company managed to preserve its growing profit margins up to 30% in 2014 due to its focus on profitable orders.

By 2015, company X managed to establish cooperation with a number of federal-level construction companies (similar to PIK) and to enter foreign markets. Nevertheless, development of B2B sales slowed down due to the ongoing legal defense of the company's assets after the default of 2014. Since the end of 2015, active TV marketing was carried out in order to increase sales.

[3] The information on the transaction is not public.

Figure 1. Dynamics of value and physical indicators of company X in 2012–2014



Source: Data provided by company X.

Company X needed significant funds in 2012–2014 in order to establish distribution channels, and it implemented an aggressive credit policy to finance its investment program. It resulted in a large debt on bank and lease payments amounting to RUB 1,082 million, which was followed by a mezzanine financing transaction conducted with fund Y.

After making the transaction, the company demonstrated positive dynamics of specific revenue per sales point, however, since the end of 2016 the company has experienced problems with door retail. They are related to a general market slowdown in the market, as well as to management problems (long time required to replace managers from Moscow and understaffing of sales personnel.) By mid-2017 the company failed to overcome the generally negative trends in retail in spite of a significant increase in the marketing budget. See 'SWOT analysis of company X in Table 10.

Table 10. SWOT analysis of company X

Strength	Weakness
• Market leader; • Product differentiation; • Recognized brand	• Large debt; • Capacity utilization of 40%; • Problems with expansion of the contractor base (legal disputes); • Weak management team
Opportunities	**Threats**
• Establishing relations with partners; • Gain in sales through new sales channels; • New marketing strategy	• Bankruptcy; • Loss of a market share

Company X is a leader of the lock and steel door market. Its brand is identifiable in the B2B and B2C segments; the company offers a differentiated range of products that satisfies the needs of a wide range of customers. At the same time, its financial standing is unstable due to an aggressive credit policy implemented in 2012–2014. A large debt load and unavailability of current assets have a negative impact on the company's financial indicators. A production decline at the time of turning to fund Y is indicative of possible problems and decreased yield in the future. In order to improve the situation, first, company X has to focus on its market strategy and change it, thus increasing sales and the number of sales channels. It is also necessary to settle legal disputes in order to create an image of a reliable contractor and to increase B2B sales.

The main threat for company X is bankruptcy due to a default to lenders. Besides, due to its incorrect financial and marketing strategy, the company faced the threat of loss of its market share, which may result in a decrease of its proceeds.

Thus, company X encountered difficulties that made it raise mezzanine financing in order to continue normal functioning. In order to improve the current situation, it is necessary to apply the ST (Strength-Threats) strategy to mitigate the threats by using the strengths. In order to implement this strategy, the following steps should be taken:

- change the market strategy and study new sales channels;
- reinforce management teams with new employees;
- use new modern promotion channel.

3.1.3. Financial Analysis of Case 1

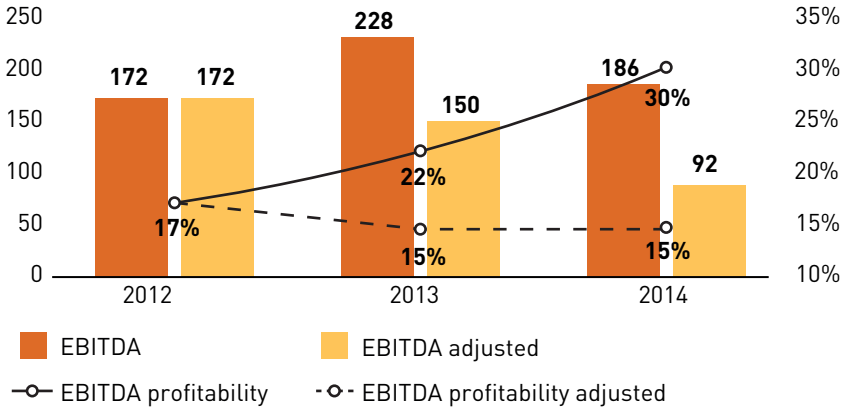
In 2012–2013 proceeds of company X remained unchanged, amounting to ~ RUB 1 billion due to the preservation of sales volumes with an insignificant rearrangement of the sales structure between the segments of doors and locks in kind and the preservation of the company's pricing policy. In the steel door segment the company's sales increased in 2013 by 15% as compared to 2012 due to a favourable market environment: 1) the number of

commissioned apartments in the Russian Federation in 2013 increased by 929,000 (+20% in comparison to 2012); 2) the share of domestic manufacturers in the Russian market grew from 56 to 58% due to a better quality of steel doors in comparison to foreign manufacturers mainly represented by Chinese contractors. In 2013, sales of company X showed a slowdown of 9% in the lock segment in comparison to 2012, when the situation was opposite: the share of domestic manufacturers decreased and the share of Chinese suppliers grew. In 2014 revenue fell sharply by 40% – down to RUB 618 million. Revenue dynamics are due to a significant drop in sales (–19% in the door segment and –32% in the lock segment), which was caused by the crisis of 2014. One of its consequences was the slowdown of commissioning of new buildings and deterioration in consumer demand for apartments. In its turn, it brought about a contraction of the door and lock market. The dynamics of these indicators are presented in Figure 1.

In 2012–2013 the financial result of company X as reflected by EBITDA amounted to ~ RUB 200 million. EBITDA margin was stable at an approximately ~20% level, and in 2014 in spite of a reduction in business volume, EBITDA margin grew to ~30% due to the focus on more profitable retail orders. Improvement in operating efficiency with regard to the unfavourable macroeconomic situation is indicative of high-quality crisis management and an ability to optimize branch operations quickly. Nevertheless, according to the data obtained during the financial due diligence review performed in order to conduct a transaction, an independent advisor proposed EBITDA corrections for 2013–2014. The advisor calculated the following amount of reserves for this period: 1) depreciation of inventory by ~ RUB 22 million due to no inventory movements over one year; 2) accrual of reserves for questionable debts of ~ RUB 56 million in 2013 and of ~ RUB 71 million in 2014. It should be noted that a classic understanding of EBITDA (Operating income + D&A) implies that this indicator is provided without deduction of non-cash income and expenditures (Schweser, CFA level 1). Nevertheless, it is common practice to leave non-cash income and expenditure items out of calculations for a more accurate statement of the cash flows received by the company. For this reason, corrections offered by the advisor should be incorporated into the EBITDA calculation.

At the same time the advisor's comments call attention to potential future problems of company X in the manufacturing process (in case of confirmed impossibility of using the inventory) and cooperation with contractors (if the contractors fail to fulfill their obligations to company X). See dynamics of EBITDA and adjusted EBITDA (with regard to the advisor's comments) in Figure 2.

Figure 2. EBITDA dynamics of company X in 2012–2014, million roubles



Source: Data provided by company X.

In the historic period company X had a high load of interest payments. Cash coverage ratio (EBITDA / Interest) in 2012–2014 was 2.0x–2.4x. There were no critical values for the cash coverage ratio, nonetheless, at 2.0x the interest load is high because half of the cash earned by company X is spent on interest payments. Table 11 represents the Income Statement of company X for 2012–2014 including the metrics described above.

Table 11. Historic financial results of company X

Company X, million roubles	2012A	2013A	2014A
Revenue	**1,003**	**1,029**	**618**
Change, %	X	3	(40)
Operating expenditures	(778)	(771)	(370)

Company X, million roubles	2012A	2013A	2014A
Other income and expenses	(52)	(108)	(156)
including inventory	–	(78)	(94)
Miscellaneous	(52)	(30)	(62)
EBITDA	**172**	**228**	**186**
EBITDA margin, %	17	22	30
EBITDA adjusted	172	150	92
EBITDA margin adjusted, %	17	15	15
Depreciation	(56)	(71)	(110)
Interest	(85)	(94)	(87)
Profit before income tax	31	(15)	(105)
Income tax	–	–	(0)
Net profit	**31**	**(15)**	**(105)**
Net profit margin, %	3	(1)	(17)

Source: Data provided by the financial advisor on the transaction.

In 2012–2014, the working capital of company X (before adjustments) showed growth due to an increase in corporate inventory. At the end of Q1 2015, inventory had grown by ~81% as compared to 31.12.2012. However, as noted above, revenue demonstrated opposite dynamics in the considered period. It is indicative of overstocking and inefficient management of warehouse inventory (also emphasized by the advisor). According to the management of company X, an increase in inventory is related to inventory buildup at regional warehouses implemented in order to develop its retail network. However, the advisor notes that it is impossible to confirm the correctness of comments because there are errors in warehouse inventory recording in the 1C system. In view of this, an inventory reserve was calculated in the amount of RUB 134 million as at 31.03.2015.

At the end of Q1 2015 accounts receivable decreased by 61% in comparison to 31.12.2013 since the company's operations were retargeted from the construction segment at contractors and sales through proprietary retail networks while reducing the sales to distributors. A reserve for distributors' accounts receivable was accrued (RUB 26 million as at 31.03.2015) because a significant share of contractors among distributors was insolvent. In spite of an almost twofold reduction in operating expenditures in 2014, accounts payable decreased by only 13% due to problems with external financing of operating activity. It resulted in a decline in the amount of purchased materials (steel, production materials) and postponing of days payable outstanding.

Thus, taking into consideration the adjustments offered by the advisor, working capital remained approximately the same since 2012 up to Q1 2015. It is in line with the dynamics of operational and financial indicators (Table 12).

Table 12. Working capital of company X

Company X, million roubles	2012	2013	2014	Q1 2015
Inventory	417	574	705	756
Accounts receivable	132	165	82	64
Advances paid	76	26	26	35
Miscellaneous	12	7	34	20
Current assets	**636**	**772**	**848**	**875**
Accounts payable	150	208	180	186
Advances received	19	44	67	64

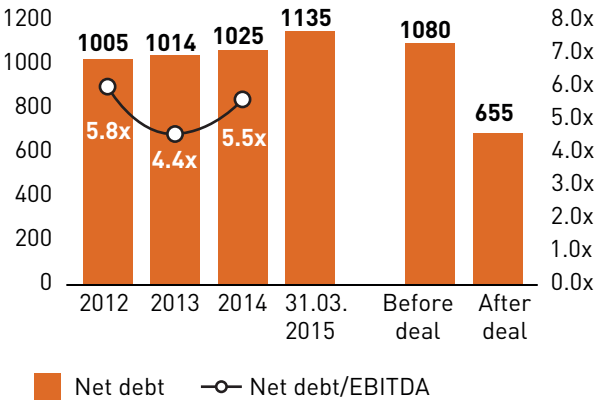
Company X, million roubles	2012	2013	2014	Q1 2015
Taxes and duties payable	85	87	84	100
Miscellaneous	4	14	16	9
Short-term liabilities	**257**	**354**	**348**	**358**
Net working capital	379	418	500	517
(–) inventory reserve	–	(56)	(127)	(134)
(–) provision for accounts receivable	–	–	(44)	(26)
Net working capital *	379	362	328	357
* taking into consideration advisor's comments				

Source: Data provided by the financial advisor on the transaction.

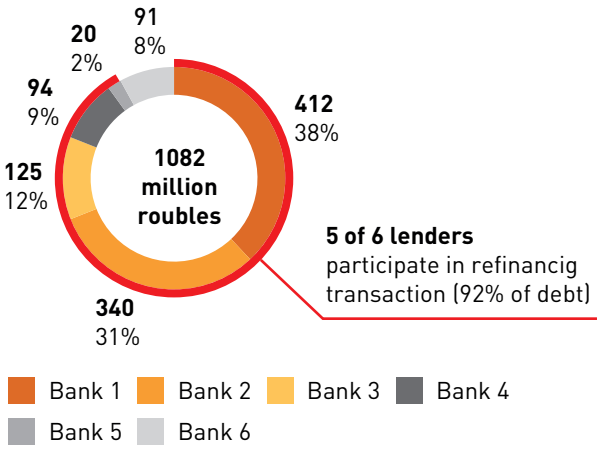
In 2012–2015 the aggregate debt remained stable, amounting to ~ RUB 1 billion. The debt load ratio Net debt / EBITDA was critically high - 5.0x–6.0x. It is indicative of significant solvency risks of company X. The aggressive credit policy conducted by company X aimed to finance an expansive investment program led to high leverage (Figure 3).

Figure 3. Debt dynamics and profile of company X in 2012–2015 and at the date of the transaction, million roubles

Net debt dynamics



Debt profile at the date of the transaction



Source: Data provided by company X.

At the date of the transaction, the loan portfolio of company X comprised six banks, three of them (bank 1, 2 and 3) were ready to sell receivables to a new lender at a total discount of RUB 427 million (49% of the initial amount of claims). Refinancing of liabilities to banks 4 and 5 was planned without a discount. Bank 6, which did not take part in refinancing in accordance with the preliminary agreement, was also present in the loan portfolio.

Summing up the financial standing of company X as at the date of the transaction, we should note the following:

1) The business volume of company X in terms of revenue demonstrated stagnation in 2012–2013 and negative dynamics in 2014 (–40%) in comparison to 2013. EBITDA margin was stable at ~20% and increased up to 30% in 2014, however, net income margin decreased gradually from 3% in 2012 to –17% in 2014. Thus, the case confirms the results of econometric analysis stating that companies with a low net income margin raise mezzanine financing. However, case data contradicts the results of logit regression, stating that companies with decreasing revenue tend not to conduct mezzanine transactions.
2) Deterioration in working capital management quality due to) disproportionate accumulation of the remaining finished products in order to develop a retail network and poor accounting; b) accrual of allowance for inventory and accounts receivable; c) postponing of payment dates of accounts payable due to cessation of credit line payments by one of the key lenders of company X;
3) low credit quality of company X in terms of EBITDA/ Interest (2.0x) and Net debt / EBITDA (5.5x) metrics. A large group of six lender banks also impedes the settlement of the insolvency and default problem.

Nevertheless, at the time of the transaction, company X had some advantages that allowed to make a favourable forecast concerning its financial state. First, company X planned to implement a new strategy that focused on a more marginal segment of its operations – retail sales and on a gradual shifting away from sales through distributors. In 2014 the implementation of this strategy already resulted in an up to 30% increase in profitability of company X. Second, by the time of the transaction, company X had established cooperation with a range of the largest construction companies in Russia and entered foreign markets by starting cooperation with a Finnish construction company. Considering the fact that these results had been achieved under the restrictions on raising working capital and legal disputes concerning the defense of corporate assets, the sales volume of company X in kind was expected to grow significantly after the transaction and the settlement of legal disputes and obtaining access to funds required to finance working capital. Third, the lock and door market where company X operates is fragmented, and the share of its largest participant does not exceed 3%. There is a large number of small local manufacturers that may potentially be replaced with large federal-level participants. At the end of 2014 company X ranked among the TOP 4 market participants based on revenue (~RUB 1 billion), while the revenue of the largest company in the industry amounted to ~ RUB 2.4 billion. Company management set an objective to cover 5% of the market in terms of quantity and 8% - in terms of cash.

Based on these suppositions we created a financial model of company X after the transaction. See the results in Table 13.

Table 13. Forecasted cash flows of company X at the time of transaction

Company X, million roubles	2012A	2013A	2014A	2015F	2016F	2017F	2018F	2019F	2020F
Lock sales, thousand units.	1,479	1,347	910	705	980	1,189	1,238	1,288	1,340
Door sales, units.	41,000	47,000	38,000	23,787	35,839	43,604	46,156	49,818	55,044
Retail	–	–	6,000	10,330	15,899	18,599	21,759	25,454	29,778
Construction companies	x	x	x	8,257	14,000	20,505	21,338	22,204	23,106
Distributors	x	x	x	5,200	5,940	4,500	3,060	2,160	2,160
Revenue	**1,003**	**1,029**	**618**	**766**	**1,161**	**1,451**	**1,637**	**1,862**	**2,139**
Locks	495	458	318	286	410	517	560	606	656
Doors	401	421	255	427	670	833	963	1,127	1,335
Retail	–	–	29	298	476	579	705	858	1,044
Construction companies	x	x	x	79	138	209	227	245	266
Distributors	x	x	x	50	57	45	32	23	24
Miscellaneous	107	150	45	52	81	101	114	129	149
Change, %	x	3	(40)	24	52	25	13	14	15
EBITDA	**172**	**228**	**186**	**79**	**221**	**332**	**434**	**543**	**660**
EBITDA margin, %	17	22	30	10	19	23	27	29	31
Cash flow from operations before %	x	x	x	(79)	165	280	354	416	311
Investment flow	x	x	x	(24)	(114)	(133)	(156)	(182)	(213)
CFADS	**x**	**x**	**x**	**(103)**	**51**	**146**	**199**	**234**	**98**
Paid interest	(85)	(94)	(87)	(51)	(139)	(144)	(124)	(94)	(72)
CFADR	**x**	**x**	**x**	**(153)**	**(88)**	**3**	**75**	**140**	**27**
Net liabilities	1,005	1,014	1,025	807	895	892	818	678	651
EBITDA / Interest	**2.0x**	**2.4x**	**2.1x**	**1.6x**	**1.6x**	**2.3x**	**3.5x**	**5.8x**	**9.2x**
Net liabilities / EBITDA	**5.8x**	**4.4x**	**5.5x**	**10.2x**	**4.1x**	**2.7x**	**1.9x**	**1.2x**	**1.0x**

According to the forecasts of fund Y, if the abovementioned suppositions came true, the company would increase door sales in kind by almost 1.5 times, leading to an almost twofold growth of revenue by 2020 (the last payments under the transaction). A significant reduction in EBITDA margin in 2015 was due to forecasts of a rise in steel and production material prices, which was partly balanced by the subsequent redistribution of sales to the retail segment. An allowance was made for capital expenditures aimed at the purchase and repair of a company's sales areas in order to develop the retail network. Due to the financing of an extensive innovation program, cash flows before interest payment (CFADS) fully covered the interest payable only in 2017. In the same year the company started paying off the debt "body" using the mezzanine loan. These payments were covered partially – CFADR in 2017 amounted to just RUB 3 million, while the amount of payments was RUB 94 million (the debt "body" was paid each quarter from Q3 2017 through Q2 2020 in the among of RUB 47 million). Nevertheless, the mezzanine fund anticipated this scenario –the mezzanine loan was slated for repayment from the operational corporate cash flow or through loan refinancing. In 2020, option payments were also accounted for under the transaction amounting to RUB 208 million calculated as a put option premium. Thus, the financial model forecasts showed a consistent improvement of the financial profile of company X after the transaction. As for the loan debt burden, Net debt / EBITDA decreased significantly from 10.2x in 2015 to 1.0x at the end of 2020, and cash coverage ratio increased from 1.6x in 2015 to 9.2x in 2020.

However, the initial suppositions of the financial model were not implemented and the financial results of company X were lower than expected. The financial model of company X in the middle of 2017, i.e. in two years after the transaction, showed that the cash flow forecast for company X changed for the worse (Table 14).

Table 14. Forecasted cash flows of company X in two years after the transaction (as at 30.06.2017) (million roubles)

Company X	2012A	2013A	2014A	2015A	2016A	2017F	2018F	2019F	2020F
Locks sales, thousand units.	1,479	1,347	910	806	684	553	580	603	628
Door sales, units	41,000	47,000	38,000	25,980	30,040	27,078	30,487	33,297	36,591
Retail	–	–	6,000	10,635	18,485	18,049	20,321	22,871	25,742
Construction companies	x	x	x	12,018	10,260	8,479	10,019	10,426	10,849
Distributors	x	x	x	3,327	1,295	550	147	–	–
Revenue	**1,003**	**1,029**	**618**	**878**	**1,307**	**1,359**	**1,526**	**1,744**	**1,997**
Locks (wholesale)	495	458	318	332	303	256	282	306	331
Doors	401	421	255	505	955	975	1,107	1,281	1,486
Retail	–	–	29	328	781	818	957	1,120	1,312
Construction companies	x	x	x	145	158	150	148	160	174
Distributors	x	x	x	33	16	7	2	–	–
Miscellaneous	107	150	45	41	49	128	138	157	180
Change, %	x	3	(40)	42	49	4	12	14	15
EBITDA	**172**	**228**	**186**	**136**	**149**	**(90)**	**(162)**	**(81)**	**12**
EBITDA margin, %	17	22	30	15	11	(7)	(11)	(5)	1
Cash flow from operations before %	x	x	x	54	331	2	(143)	(49)	(164)
Investment flow	x	x	x	(43)	(34)	(19)	(22)	(25)	(28)
CFADS	**x**	**x**	**x**	**10**	**297**	**(17)**	**(165)**	**(75)**	**(192)**
Paid interest	(85)	(94)	(87)	(61)	(124)	(113)	(119)	(124)	(136)
CFADR	**x**	**x**	**x**	**(51)**	**173**	**(130)**	**(284)**	**(198)**	**(328)**
Net liabilities	1,005	1,014	1,025	704	531	661	944	1,143	1,471
EBITDA / Interest	**2.0x**	**2.4x**	**2.1x**	**2.2x**	**1.2x**	**0.8x)**	**(1.4x)**	**(0.7x)**	**0.1x**
Net liabilities/EBITDA	**5.8x**	**4.4x**	**5.5x**	**5.2x**	**3.6x**	**(7.3x)**	**(5.8x)**	**(14.1x)**	**127.0x**

In 2015–2016, the revenue of company X exceeded the initial forecasts due to a successful switch to retail. In 2015, actual retail sales exceeded the forecasted indicators by 3% in kind and 10% in terms of value, in 2016 – by 16 and 64% respectively. A rise of the average sale price in the retail segment had a significant positive impact. An actual average sales price of one door in 2016 amounted to ~ RUB 42,000 (exceeding the forecasts by ~41%). Nevertheless, EBITDA margin in 2015–2016 decreased significantly due to a rise in overhead and business expenses. It was caused by increased retail expenditures: growth of labour remuneration payments due to an expansion in the number of sales outlets and recruitment of new employees (business coaches, group leaders), as well as growing advertisement expenses. In 2015–2016, overhead costs increased by 33%, and business expenses – by 75%.

One of the key drivers of the negative forecast were the problems related to door retail that have emerged since 2016. It was due to a general decline of the door market and management problems of the studied Group of companies. The forecast for the door market in mid-2017 was negative due to a growing market competition. A significant increase of the marketing budget in mid-2017 did not entail a gain in sales (underfunding of the marketing budget was stated as one of the main reasons for degradation of the retail results. In Q2 2017 retail of doors amounted to 4,500 thousand units (–13% as compared to Q4 2016).

There was also a significant sales slowdown in the lock segment due to a rise in the retail margin of lock products and a reduction in payment deferrals, thus causing an incremental downturn in lock sales. The market environment in the two years since the date of the transaction has also become more complicated due to strengthening of the position of Chinese companies, which offered lower prices, in the lock market. Judging by the actual results of the company for the two years, the financial model forecasts were revised significantly in the negative direction. Under the new circumstances company X would have only achieved a positive EBITDA by 2020, while it would have been impossible to pay interest and pay off the body of the debt.

Thus, mezzanine financing had a positive impact on the financial profile of company X immediately after the transaction due to the following: 1) access to funds to finance working capital and investment program; 2) writing off a significant part of the debt and consolidating debt with one lender instead of six; 3) postponing of the debt "body" payments (including put option payment).

However, over the long term the corporate financial portfolio changed for the worse for the following reasons: 1) negative trends in the lock and door market (market stagnation and increased competition); 2) corporate management's inability to organize the efficient functioning of retail outlets and an erroneous distribution of the market budget, which resulted in increased expenses. It should be noted that management of company X was initially considered ineffective, and an unfavourable market environment in 2017 aggravated the situation for company X even further. These conditions are unacceptable for a successful transaction (Rosenbaum, Pearl – Investment Banking).

Finally, negative factors outweighed the positive effect of raising mezzanine financing in 2015 and fund Y decided to launch a bankruptcy procedure of company X. In this case, the mezzanine loan obtained by company X just postponed its bankruptcy. So, mezzanine financing did not assist company X in overcoming financial difficulties over the long term.

Section 3.2 Case 2

3.2.1. Record of Transaction 2

Due to the restrictions on the data about the transaction, new designations for related information were introduced. Presumably, there are four main parties to this transaction. Bank A, its subsidiary company AB, holding C and shareholder D, which controls the holding and the subject of the case – company Z.

Bank A established company AB. D was a shareholder of holding C. Company AB was granted a loan of $10 million. The received amount was contributed to the authorized capital of company Z. Thus, a new shareholder AB emerged with a 3% share in company Z. Then a retroactive agreement was signed, which structurally resembled REPO – holding C undertook to purchase 3% of shares from company AB after the expiration of the mezzanine financing transaction.

The payment schedule under this transaction contemplated a target return for bank A. Besides, bank A financed the entire group of companies to support their operations and helping to boost production. In 2015, investments in company Z increased up to €40 million in the form of a loan extended to company AB, which forwarded the money to a company outside of company Z's sphere of operations. This company repaid the loan to bank A. Since the loan was granted to company AB, bank A increased its share of direct ownership up to 16%, and another 35% of shares was a guarantee for the entire transaction, providing control in case of a default.

3.2.2. Nonfinancial Analysis of Case 2

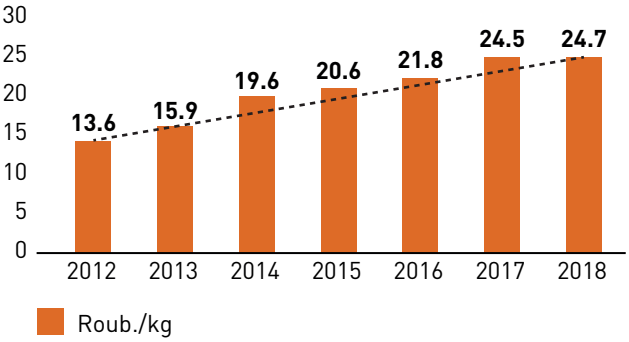
External analysis of the 2012–2018 market. Since the mezzanine financing transaction was concluded in 2013, let us consider the company's macroenvironment in 2012–2018. For a long time. the food market in the region has been developing rather unevenly. So, the growth rate of product manufacturing was low. The maximum annual increment in the production volume did not exceed 1.8–2%, the average increment rate was 0.4–0.5%. This was related to the limitations of the product's raw material base, and the country's climate since the fodder base and livestock population used further in the production chain depend on the weather.

In 2012 after a drop in production by 0.3% in 2011, the Russian market for this product recovered and even grew by approximately 3.5% in comparison to the previous year. At the same time, in the context of Russia's accession to the WTO and a crisis in the country caused by increased

expenses for livestock keeping that resulted in livestock reduction, foodstuff production volume in 2013 was at the minimum level since 2000 and amounted to 30.5 million. However, after imposing an import embargo in 2014 for various types of foodstuffs, domestic production share started growing, and amounted to 31.8 million tons by 2017. Since the end of 2013, the share of Russia's self-sufficiency in relation to this food product started growing, increasing from 76.5% in 2013 to 82.4% in 2017. The remaining part of the needs for this product was satisfied by import from Europe and the CIS (Belarus and Kazakhstan), although it should be noted that the share of CIS countries in the import grew from 40 to 80% after the embargo was introduced.

Foodstuff prices have increased gradually starting in 2012. The price changes were caused by the abovementioned factors – Russia's accession to the WTO, climatic changes, import embargo. Thus, the price of this food product grew from RUB 13.6 in 2012 to RUB 24.7 in 2018. Price dynamics are reflected in Figure 4.

Figure 4. Product price dynamics, 2012–2018



Summing up, it should be noted that the market is sufficiently saturated, with 1,300–1,400 manufacturers operating in it simultaneously. Besides, the number of manufacturers is increasing due to the government support of this industry. Moreover, the market is differentiated and has no apparent leader. 50 major manufacturers in 2015 covered approximately 4% of the market and their share grew slowly. Access to the market is restricted for many foreign participants.

Internal analysis of the company. Company Z has been in existence since the 2000s and is one of the largest manufacturers of food products in the Russian Federation. The company managed to become a successful manufacturer of foodstuffs after expansion and switch to a vertically-integrated structure. At the time of the transaction, the company was between the "prime" and "stabilizing" stages. The company has a well-defined structure, pre-set employee functions, but at the same time it is beginning to lose its flexibility, is not involved in international expansion and focuses on the expansion of the current coverage areas.

Company Z's business is grouped into three main subdivisions: grain growing, manufacturing of dairy products, cattle breeding and keeping. It is a vertically diversified organization that is successful at all levels of the supply chain (from the manufacturing process to the subsequent sale).

The company's main business driver is cattle breeding and keeping. In 2008–2018 its livestock population grew from 5,000 to 65,000. The manufactured products generate the main portion of corporate revenue; the volume of manufactured products has increased annually due to the growth in production capacity, as well as the improvement of the manufacturing process. It should also be noted that the company operates in only one country, which imposes certain restrictions. The company's main production facilities are located in Moscow, Saint-Petersburg, Ekaterinburg and Omsk. The company also operates in six other Russian cities for logistic purposes.

The company operates actively and develops rapidly, which is confirmed by its revenue dynamics that reflect an average annual growth of 35% in 2012–2019. The revenue indicator changed without any visible trend due to a serious debt burden. The corporate debt annually increased by an average of 20%.

Thus, it should be noted that the company's performance was possible due to an infusion of funds obtained from a mezzanine transaction, however, it influenced debt obligations that increased continuously. See the SWOT analysis of company Z in Table 15.

Table 15. SWOT analysis of company Z

Strength	Weakness
• Vertically integrated business; • High growth rates; • Market leader.	• Serious debt; • Weak marketing activity; • Operating in the market of one country.
Opportunities	**Threats**
• International expansion; • Production automation; • Scale effect.	• Termination of supply of imported fertilizers and fodder; • Great dependence on climatic and ecological environment.

First of all, it should be noted that the company is a vertically-integrated business – from manufacturing and rendering services to bringing the finished product to the consumer – which gives it a certain advantage over other market participants. The company was established long ago and is one of the key market players. Annual revenue increment rates characterize the company as a developing but unstable one, since the change in profit due to the annual growth of debt influences its financial profile. Besides, the company operates in the market of only one country and does not actively promote its brand. This entails a loss of opportunities, such as new customers and profit growth.

The company's potential opportunities are international expansion and reduction of manufacturing costs by means of automation and scale effect.

Climatic and ecologic conditions are the greatest threat for the company's normal functioning. So, the future revenue depends entirely on this factor, which is beyond control. It should also be noted that at the date of the 2013 transaction, geopolitical factors exerted their influence. Loss of suppliers of imported fertilizers and fodder halted the growth of financial indicators in 2015 because the company had to change suppliers.

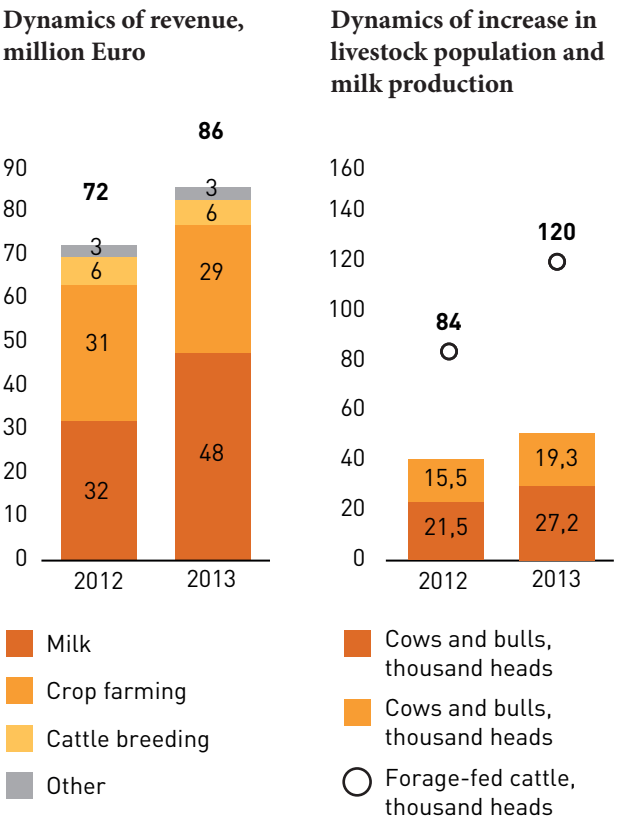
The company has to implement the WO (Weakness – Opportunities) strategy to preserve its leading position. It means mitigating the weaknesses using the existing opportunities. It is necessary to take the following steps to implement this strategy:

- automation and scale effect will help the company to reduce its current expenditures; the saved amounts may be used for marketing or repayment of the accrued debt;
- a new marketing strategy and international expansion will help the company to attract new customers, thus increasing the revenue and profit manifold;
- additional funds should be used to repay the debt in order to improve the company's investment attractiveness.

3.2.3. Financial Analysis of Case 2

According to IFRS reports, in 2013 the revenue grew by 19% in comparison to 2012 due to increase in revenue by 48% in the dairy segment, which is the company's key manufacturing segment. Against the background of stable prices in 2012–2013 (~14–15 RUB/l of raw milk), a growth in revenue in 2013 was caused by a significant increase in livestock population from 37,000 to 46,500 (25%). A 25% increase occurred in both segments: forage-fed cattle and cows and bulls. Growth of livestock population was caused by the implementation of the corporate strategy of increasing production capacities (in terms of milk production) in order to become the leader in Russia and Europe. Apart from the increase in livestock population in order to increase milk yield, the company invested its own funds in the modernization of milking systems and obtained government subsidies. The crop farming segment in 2013 experienced a 6% drop in revenue due to lower prices for cereal crops as compared to 2012. The revenue from the cattle breeding segment and other revenues were at the same level (Figure 5).

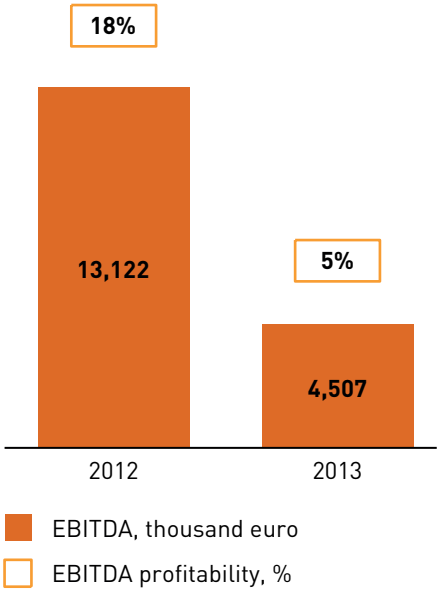
Figure 5. Dynamics of value and physical indicators, company Z in 2012–2013



Source: Data provided by company Z.

EBITDA dynamics were very different from revenue dynamics. In 2013 EBITDA equaled €4.5 million, decreasing by € 8.6 million (66%) in comparison to 2012. The root cause of EBITDA reduction was an increase in operating costs (+41%). All expenditures grew: 1) increase in livestock population entailed the growth of fodder expenditures (+45%), fuel and lubricants for milking systems (+37%), repair of milking systems (+20%); 2) expansion of owned lands (including crop land) by 16,500 ha (+9%) up to 192,500 ha entailed an increase in fertilizer (+78%) and pesticides (+58%) expenses. Growth in production volume caused a 26% increase in payroll costs. Thus, the company's operational problems were not the reason for the EBITDA margin decline. The reason was the production growth in the milk segment and the need to seed and cultivate agricultural lands, whose harvest (and consequently - the financial result) could be only sold the following year (Figure 6).

Figure 6. EBITDA dynamics, company Z in 2012–2013, thousand Euro



Source: Data provided by company Z.

In 2012 the interest payment burden with respect to the EBITDA of company Z was already critically low – 0.6x (regardless of interest revenue). After a drop of EBITDA in 2013, the cash coverage ratio decreased to 0.2x. It meant that the company could not pay interest from its internal funds. The corporate net income in 2013 decreased by ~3 times, net profit margin went down from 9 to 2%. See the company's actual financial results in 2012–2013 in Table 16.

Table 16. Forecasted cash flows of company Z at the date of the transaction (million Euro)

Company Z	2012A	2013A
Revenue	72	86
Change, %	x	3
Change of cost of ploughed lands	1	2
Change of cost of biological assets	19	35
Other income	16	18
Prime costs of materials	(32)	(46)
Payroll cost	(25)	(32)
Depreciation	(16)	(20)
Other expenses	(18)	(19)
EBITDA	13	5
EBITDA margin, %	18	5
Interest	(12)	(21)
Profit before income tax	5	3
Income tax	1	(0)
Net income	6	2
Net profit margin, %	9	2

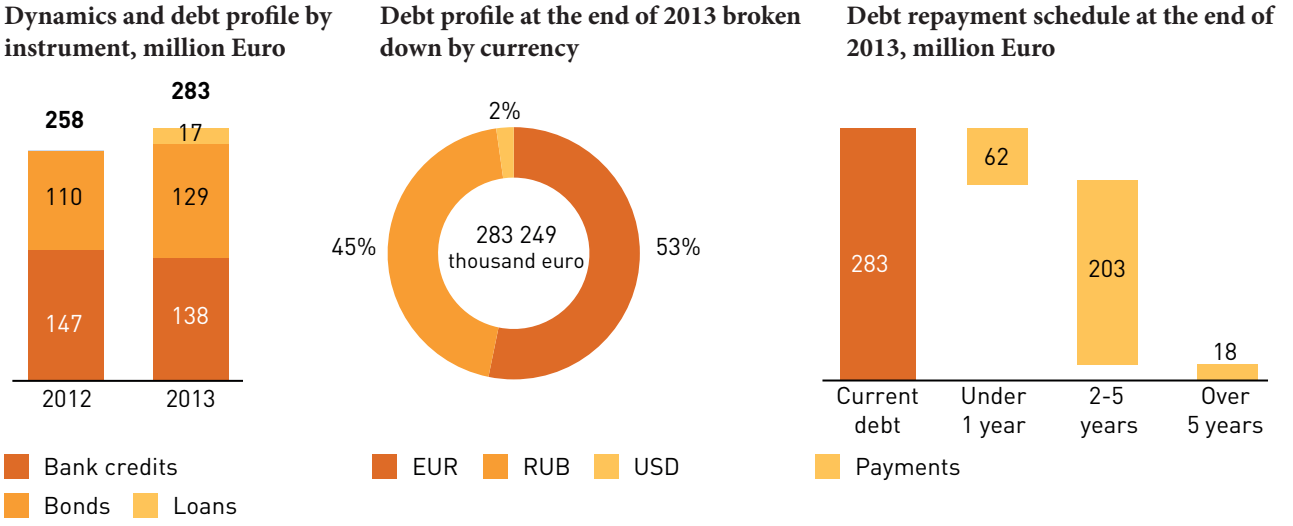
In 2012–2013, net working capital decreased insignificantly in spite of an increase in the company's business volume. It is mainly due to growth of accounts payable and advances received, which correspond to an increase in corporate operating expenditures for manufacturing and labour remuneration. The working capital dynamics are presented in Table 17.

Table 17. Working capital of company Z

Company Z, million Euro	2012A	2013A
Inventory	52	63
Advances paid	2	1
Accounts receivable	3	3
VAT payable	9	6
Miscellaneous	7	9
Current assets	72	82
Accounts payable	23	31
Advances received	1	6
Miscellaneous	11	13
Short-term liabilities	0	0
Net working capital	72	82

At the end of 2013 corporate debt amounted to €301 million, increasing by 13% in comparison to 2012. The company's debt consists of leasing liabilities and credit funds. Credit funds comprise bonded obligations secured by bank loans and other obtained loans. At the end of 2013 bank loans amounted to 49% of the debt portfolio (aside from leasing), bonds – 45%, other loans – 6%. 42% of the portfolio is nominated in roubles, 50% – in Euro and 2% – in US dollars. Considering the fact that the company operates in Russia and its cash flow is nominated in roubles, a large currency share in the portfolio poses a serious currency risk in case of rouble depreciation. In 2012–2013 in terms of the Net debt/EBITDA burden, the company had critical values of 20.1x and 66.4x, respectively. The debt portfolio comprises bank organizations, which conclude agreements with obligatory covenants (in particular, concerning the Net debt / EBITDA burden). In IFRS reports the company indicated that in 2012–2013 it broke such covenants, but obtained permission from bank organizations to continue its operations. It means that in spite of a serious debt burden, bank organizations believed that the company could repay its debt in future. See the main information on the company's loan portfolio in Figure 7.

Figure 7. Main debt indicators in 2012–2013



Source: Data provided by company Z.

Summing up the financial standing of company Z at the date of the transaction, the following should be emphasized:

1) The business volume of company Z in terms of revenue showed positive dynamics in 2012–2013 (+19%), however, in 2013 the EBITDA margin decreased significantly from 18 to 5%. Net income dynamics followed the EBITDA dynamics, dropping from 9 to 2%. Thus, this case confirms all the results obtained in the econometric part of the paper, namely, the fact that the financial profile of a company raising mezzanine financing demonstrates revenue growth and a decrease in net profit margin;
2) In 2012–2013, the company showed no significant changes in operating capital. In general, the change in expenditure items of operating capital was in line with production growth and an increase in operating expenditures;
3) It should be noted that the company did not merely have a significant amount of debt and negative credit metrics, but that such amounts broke all established covenants on the Net debt/EBITDA burden. For this reason, the company had to modify the terms of loan agreements and obtain permissions from credit organizations, which prevented the default.

Consequently, unlike case 1, the corporate financial portfolio was much more attractive in spite of the debt amount: 1) the company is a growing business that increased its revenue in the main segment by 48% in the previous year; 2) the company's transparency causes much less concern in comparison to case 1: the company issued shares that require a certain level of information disclosure including IFRS reports.

At the date of the transaction, the financial model of forecasted cash flows was as follows (Table 18).

Table 18. Company's forecasted cash flows in 2014–2019 (million Euro)

Company Z	2012A	2013A	2014F	2015F	2016F	2017F	2018F	2019F
Forage-fed cattle, heads	15,500	19,300	22,087	24,892	28,970	29,318	29,926	29,926
Cows and bulls, heads	21,500	27,200	27,710	29,870	31,350	32,508	31,284	31,284
Milk production, tons	84,000	120,000	153,860	177,559	204,133	220,303	223,915	226,213
Revenue	**72**	**86**	**97**	**99**	**109**	**122**	**125**	**128**
Milk	32	48	64	61	68	74	77	79
Crop farming	31	29	25	27	32	32	33	34
Cattle breeding	6	6	6	9	8	13	14	14
Miscellaneous	3	3	3	1	2	2	2	2
Change, %	x	19	13	2	11	11	3	2

Company Z	2012A	2013A	2014F	2015F	2016F	2017F	2018F	2019F
EBITDA	**13**	**5**	**19**	**21**	**29**	**36**	**37**	**38**
EBITDA margin, %	18	5	19	22	26	30	30	30
Operating flow before %	(11)	20	15	15	25	31	33	33
Investment flow	(45)	(38)	(42)	(31)	(18)	(10)	(9)	(9)
CFADS	**(55)**	**(18)**	**(27)**	**(16)**	**6**	**21**	**24**	**24**
Interest paid	(21)	(29)	(21)	(22)	(25)	(21)	(19)	(15)
CFADR	**(77)**	**(47)**	**(48)**	**(38)**	**(18)**	**0**	**5**	**9**
Net liabilities	264	299	323	282	275	259	239	215
Loans	266	301	325	284	276	260	240	216
Monetary funds	2	1	2	1	1	1	1	1
EBITDA / Interest	**0.6x**	**0.2x**	**0.9x**	**1.0x**	**1.2x**	**1.7x**	**2.0x**	**2.5x**
Net liabilities /EBITDA	**20.1x**	**66.4x**	**17.2x**	**13.1x**	**9.6x**	**7.2x**	**6.4x**	**5.6x**

According to bank forecasts, if the abovementioned suppositions are realized, the company would (the last payments under the transaction) increase the number of forage-fed cattle by 55% and milk production – by 89% by 2019. So, it would be possible to increase the revenue by 49% in comparison to 2013. The company's EBITDA margin in 2014–2015 remained at approximately the historic level (taking into consideration the expenses that increased previously in 2013). In 2016–2020 the margin grew to ~30% due to the economy of scale accompanied by revenue growth. The existing loans were serviced in accordance with the above-described payment schedule, and payments under REPO were made in full in 2016–2019. For the entire period of the CFADS and CFADR transaction, the company lacked the funds to repay the existing loans in full. Nevertheless, as mentioned above in the description of the transaction, the bank financed the company at the operating level. This enabled the company to borrow the funds required for stock buyback. In 2014–2019 the debt level remained unchanged, however, due to credit funds the business grew significantly in terms of revenue and EBITDA, producing a positive impact on the company's credit metrics. By 2019, Net debt / EBITDA amounted to 5.6x as compared to 66.4x. Cash coverage ratio also improved from 0.6x in 2013 to 2.8x in 2019.

The company's actual financial results exceeded the initial expectations included in the financial model. They were obtained from IFRS reports for the entire period of the transaction (Table 19).

Table 19. Data from IFRS reports of company Z for 2012–2019 (million Euro)

Company Z	2012A	2013A	2014A	2015A	2016A	2017A	2018A	2019A
Forage-fed cattle, heads	15,500	19,300	22,000	24,900	27,400	45,100	63,100	97,640
Cows and bulls, heads	21,500	27,200	30,700	32,850	34,900	52,420	69,960	84,570
Milk production, tons	84,000	120,000	153,700	179,600	220,000	297,000	484,000	759,000
Revenue	72	86	98	98	119	175	245	403
Milk	32	48	64	62	75	124	166	294
Crop farming	31	29	25	25	29	33	49	78
Cattle breeding	6	6	7	9	14	15	18	19
Miscellaneous	3	3	3	1	1	3	12	12
Change, %	x	19	14	0	21	47	40	64

Company Z	2012A	2013A	2014A	2015A	2016A	2017A	2018A	2019A
EBITDA	13	5	18	20	35	41	11	52
EBITDA margin, %	18	5	19	21	30	24	5	13
Operating flow before %	(11)	20	29	24	23	39	44	102
Investment flow	(45)	(38)	(40)	(66)	(40)	(159)	(392)	(344)
CFADS	(55)	(18)	(10)	(42)	(16)	(120)	(348)	(242)
Interest paid	(21)	(29)	(30)	(34)	(36)	(49)	(59)	(79)
CFADR	(77)	(47)	(40)	(76)	(53)	(169)	(407)	(320)
Net liabilities	264	299	280	302	414	565	832	1 244
Loans	266	301	282	307	416	579	845	1 248
Monetary funds	2	1	2	4	2	14	13	4
Net liabilities taking into consideration REPO	264	299	290	350	462	613	880	1 292
EBITDA / Interest	0.6x	0.2x	0.6x	0.6x	1.0x	0.8x	0.2x	0.7x
Net liabilities/EBITDA	20.1x	66.4x	15.3x	14.9x	11.8x	13.7x	75.2x	24.0x
Net liabilities / EBITDA taking into consideration REPO	20.1x	66.4x	15.8x	17.3x	13.2x	14.8x	79.6x	25.0x

In 2016–2019 corporate financial indicators significantly exceeded the indicators estimated in 2012–2014 due to increase of the company's production capacities. First, the milk segment made the most important contribution to the company's financial result. In 2018, the revenue in the segment amounted to ~ € 166 million, growing ~ 4-fold in comparison to 2013. This result is due to the increase in the number of forage-fed cattle to almost 100,000 heads (5-fold in comparison to 2013) and a rise in the milk price from 15.9 RUB/l in 2013 to 24.7 RUB/l in 2018. Second, the crop farming and cattle breeding segments also showed a manifold revenue growth. Growth of revenue in the crop farming segment is due to a 3-fold expansion of agricultural land used by the company from 193,000 ha in 2013 to 599,000 ha in 2019. The revenue of the cattle breeding segment increased 3.2 times because livestock population expanded 3.1 times.

The following should be noted in regard to the EBITDA financial result: 1) according to forecasts of the financial model, EBITDA margin in 2014 recovered to the historic level because expenses for agricultural land improvement did not grow (the size of owned land in 2014 remained unchanged); 2) in 2015–2016 the EBITDA margin was still growing due to efficient company management; operating expenditures were preserved at the level of 2014, while sales and revenues grew.

Nevertheless, in 2014–2019 the company was unable to pay interest and repay the debt "body" because of high capital investments that exceeded the values estimated in the financial model. It is due to a higher rate of growth of the cattle herd and the agricultural lands in use.

As for loan debt burden in 2015–2018, the Net debt/EBITDA (also taking REPO debt into consideration) and EBITDA/Interest metrics improved. It means that credit funds were used efficiently. However, the company continued investing in the expansion of production and could not pay interest and the debt "body" under the REPO loan. According to the materials we received in these circumstances the bank decided to withdraw from the transaction and notified the company shareholder about this decision. Therefore, in 2018 another bank refinanced the transaction, copying its structure in full.

Thus, in case 2 raising of mezzanine financing had a positive impact on the financial profile of company Z within the entire transaction period due to the following: 1) providing access to funds at the companies' operational level; 2) obtaining additional funds to finance an ambitious investment program; 3) a complicated transaction structure in which payment of interest and repayment of the debt "body" under REPO were actually carried out by the shareholder's affiliated companies, while the borrowing company was released from this burden.

Over the long term, the company also showed an improvement in credit metrics, however, it made no actual payments to the bank. It is characteristic of the companies at an early development stage due to expansion of their business and the need for continuous expenditures to further develop their business.

It should also be noted that in this case mezzanine financing had a positive effect on the market value of equity capital. According to the initial forecast, the equity capital value defined by DCF amounted to ~ € 27 million. After obtaining mezzanine financing and concluding the transaction, the company continued to ramp up production, and as at 2020 the equity capital value increased up to ~ € 480 million. So, the company converted initial growth opportunities using a mezzanine loan.

Thus, this transaction is an example of a positive influence of a mezzanine financing instrument, which finally enabled the borrowing company to significantly expand its business in kind and in terms of value and to improve credit metrics, thus increasing the corporate credit rating and opening prospects of further improvement (accompanied by a decrease of investment costs). It should be additionally noted that the influence of mezzanine financing on the capital market value was positive because the raised funds enabled the company to implement the investment program and cope with a serious loan debt burden.

Conclusion

Mezzanine financing is one of numerous market instruments of raising funds, which combines the characteristics of debt and equity capital. In the majority of cases, mezzanine is obtained in order to implement a large project, for which a company typically lacks its own funds or when the company is unable to get an ordinary bank loan. As compared to alternative financing sources, mezzanine is easy to attract, has a flexible payment schedule and an improved structure of balance and creditworthiness. However, it has some shortcomings, for example, a higher required return for a prospective investor to offset the risk he assumes, transfer of a part of the stock (if the transaction presupposes it) and a probable loss of control over the company.

The econometric analysis performed in the present paper enabled us to generate two hypotheses that answer the previously unresearched questions.

H1: Convertible bonds are issued by companies with a less attractive financial profile than issuers of ordinary bonds.

H2: Issuers of convertible bonds have fewer opportunities for growth unlike issuers of ordinary bonds.

Based on the obtained data, we may make the following conclusions. This set of financial characteristics is mainly typical for companies at earlier stages of their lifecycle (period of youth and prime). Such companies grow rather rapidly, their market value is high, and the value of high-risk companies correlates with the market in a stronger way

Hypothesis H1 was confirmed: convertible bonds are issued by companies that have a less attractive financial profile than issuers of ordinary bonds. Confirmed indicators of the financial profile attractiveness are Revenue CAGR, Net income margin, ROA, Dividend dummy, EBITDA – CapEx flow, Total debt/Total assets, Q Tobin, Coupon rate, EBITDA/Interest, as well as the company's beta since its growth increases the company's striving to issue a mezzanine instrument.

From the investors' point of view such companies have a high credit rating in case of ordinary bonds. However, if a company demonstrates a growth potential that may be forecasted based on market fluctuations, participation in mezzanine financing will enable investors to profit off the company's growing shareholder value. The presence of an equity component in the mezzanine instrument provides for it. If one assumes that companies may be young and have growth potential, one should reject hypothesis H2 because in this case the result suggests the opposite: companies aiming to issue a mezzanine instrument may have growth potential.

Besides, case analysis did not confirm the obtained conclusion that companies that tend to issue mezzanine instruments may be less mature. The case study revealed that using mezzanine financing instruments has a positive influence on the financial profile of a borrowing company (in terms of credit metrics), and the market value of equity capital provided that the following conditions are met: 1) a company's growth potential after the mezzanine transaction is concluded; 2) a favourable market situation; 3) highly qualified top management and an efficient corporate strategy.

In the paper we describe a typical company that raises mezzanine financing, evaluate its influence on the market value of equity capital and define the key conditions for an efficient application of funds provided in the framework of such financing.

The research was restricted by the amount of publicly available information on mezzanine financing transactions, multiplicity of the types of mezzanine financing and confidentiality of case study data.

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Analysis of the Investment Activity and Innovative Achievements of Venture Companies in the Context of the Chinese Government's Policy

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Abstract

For our research we chose Chinese GVC as representative data for global venture capital and studied the influence of the Chinese government on enterprise innovations through venture capital institutions against the background of the country's economic and social environment in 2016–2022.

In this paper, we apply regression analysis methods, aiming to study the impact of official venture capital data on the indicators of enterprises' innovation success and to solve the existing problems in related fields. Regression analysis shows that GVC is a significant driver of innovation and has a certain attractive impact on non-GVC. The study demonstrated that direct venture investment has a greater stimulating influence on corporate innovation than the state's implicit price subsidies. Topic studies showed that characteristic features of GVC were aligned with the China's China's macroeconomic development strategy in the investment field and that GVC was region-oriented.

Keywords: Chinese government, venture capital, innovative achievements

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Introduction

In March 2021 the principal goals of social development established for China's 14th five-year plan did not include a specific indicator of increase in investments in research and development (R&D) in the country as a whole, yet the average annual growth in R&D investment exceeded 7%. The target value of GDP growth was over 6%, indicating that an increase in R&D expenses was at least as large as GDP growth, and in the spring China started developing innovations. In 2021 China adopted a series of competition laws and many large internet providers were severely sanctioned. This had a major impact on all spheres of Chinese economy, in particular, it caused a dramatic drop in the Chinese stock market. One of the objectives of governmental market intervention was to prevent the influence of monopoly on the development of innovation in China. The Chinese government clearly assigns high priority to innovation.

Government venture capital is an important part of venture capital. Numerous scientists have studied the influence of GVC on enterprise innovation, yet the majority of research results demonstrate that the role of direct government venture capital is not as significant in investment as that of IVC or PVC. GVC also has a stimulating effect and a crowding-out effect, which have an inverted U-shaped relationship with an increase in the investment amounts, and there are problems that the government cannot alleviate by the lack of ability to assess value. These problems indicate that government bodies are not professional investment institutions. Managerial skills are not among the officials' strong points; therefore, the efficiency of government capital utilization is rather low. In this paper we chose Chinese state venture capital institutions as representative data for GVC, and examined the economic and social environment in the country in 2016-2022 as a background for the study of governmental influence on the innovative achievements of an enterprise through venture capital institutions.

Our goal is to determine the influence of GVC on innovative achievements, improve the knowledge system in this field, offer a new method for the study of the role of government venture capital to corresponding managerial staff and provide effective suggestions for solving the problems that still exist in related fields.

Literature Review

Venture Capital

First, the majority of studies revealed that venture capital plays a prominent part in promotion of innovation in companies. A. Romain & B. Potterie [1] studied the empirical data on the role of venture capital in technology innovation and arrived at the conclusion that venture capital was similar to corporate scientific research and made a significant contribution to the increase in the number of patents, surpassing the effect of corporate scientific research. Yuan Xinming and Zhang Haiyan [2] analyzed the mechanism of the impact of venture capital on innovative development and revealed that venture capital had a greater impact on corporate technology innovation than R&D investment. Zhang Jiefen and Guo Yujie [3] assert that venture capital in China has achieved a certain development level and exerts a significant direct positive influence on the country's scientific and technological innovation potential and economic advance. However, this is a limited effect.

Some studies showed that venture capital had no significant impact on innovation. So, D. Engle and M. Keilbach [4] studied the influence of venture capital on the innovation activity of German companies and discovered that the companies that had obtained venture capital showed higher growth rates, but failed to have significant changes in innovations and worked only at promotion of innovation. H. Lahra and A. Minac [5] used data on 940 companies from Great Britain and the USA for 2002–2004 and discovered that the influence of venture capital on development of corporate technology was insignificant and even negative. Venture capitalists were focused on deriving profit from the already existing technology, rather than obtaining patents and licensing. They assist companies in the use and lean optimization of the existing technology, but may subsequently stand in the way of developing new technology. However, studies showed that venture investment has a positive impact on corporate growth, i.e., commercialization, market share and size.

Empirical research by Yang Yun, Tan Xiangyang and Ran Yui (2019) [6], which used data of high-technology GEM companies for 2011–2016 as an example, showed that venture capital is less efficient in stimulating companies to essential innovation and is more efficient in promoting strategic innovation. Assuming that exogenous innovative opportunities do not change over time, Wang Ting (2016) [7] shows that venture capital in China may have a capital increasing effect on technology innovation, but does not contribute to innovation efficiency. Jun Wen, Di Yang and Geng-Fu Feng believe that venture capital has a positive influence on innovation in China only when investment is significant enough and exceeds the threshold amount. Venture capital may greatly reduce innovation opportunities for the enterprises that obtain investment if the investment scale is relatively small, especially in western provinces and provinces with a lower investment level after dividing the selected provinces into groups [8].

Government Venture Capital

There are three categories of research dedicated to the influence of government venture capital on non-government venture capital.

First, according to signaling theory, GVC produces an introductory effect on IVC or PVC. Jarunee Wonglimpiyarat [9] showed in the paper Government Programmes in Financing Innovations, Comparative Innovation System Cases of Malaysia and Thailand that government support encourages PVC implementation and R&D commercialization, and the government added it to the key strategy of national innovations and development. Besides, F. Bertoni and T. Tykvová [10] studied the question of whether

government venture capitalists (GVCs) are able to drive innovation in the emerging biotechnological industry and discovered that while GVCs have no significant impact on innovation, they may mitigate the influence of independent venture capitalists (IVCs) on inventions and innovation.

Second, when investment institutions have different capital and experience, venture capital influences corporate technology innovation in a different way. Due to the high-risk and long-term nature of investment in innovations, it is more difficult for investment institutions to reach a consensus on fund allocation to corporate innovation.

Third, according to the most widespread opinion, GVC and non-GVC do not merely have a cause-and-effect relationship; they are mutually supportive effects. Literature states that GVC and PVC support corporate innovation activity in different ways: the strong points of GVCs are attributable to their close connections with the government and privileged access to government resources. At the same time, GVCs have numerous weaknesses because they do not have an opportunity to identify projects and manage risks, as venture capitalists do. Therefore, such companies show a lower investment efficiency and decreased independence in decision making. They have to invest together with venture capitalists in order to reduce control risks and improve investment efficiency.

According to Xu Daishen [11], the interrelation between GVC and non-GVC is as follows: on the one hand, venture capital is focused more on innovative projects in order to gain economic benefits, while GVC is focused on strategic significance, long-term development and social benefits of innovative projects. On the other hand, along with financing, venture capital institutions render management services, market consulting services etc. Venture capital and government support of technology innovation influence each other, rather than cancel each other out. When choosing innovative projects, venture capitalists also account for market prospects and assess their commercial value, along with the economic benefits that they will get from them in future (Zi Lei You, 2018) [12]. Their combination may to a certain degree reduce uncertainty that arises due to long R&D cycles, strict technical requirements, a long product gestation period and a long period of return on investment, thus reducing the likelihood of losing viable innovative projects.

Venture capital and government support also have a mutually reinforcing signaling impact on technology innovation. Raising of venture capital means that projects possess innovation potential and allows the state to make a better assessment of their quality and invest government funds in an efficient manner. The interaction between the government and corporate venture capital significantly increases corporate investment in R&D and the number of patents. This indicates that they may be complementary in their support of corporate innovation and jointly provide active support of corporate innovative activity.

There are contradictory conclusions in literature on the influence of GVC on innovation: some research shows that GVC has a significant impact on innovation in companies, while others state that GVC does not have a pronounced impact on innovation, like IVC or PVC, and may even have an adverse effect on innovation.

Government investment is aimed at regulation of market failures, therefore GVC pays more attention to innovation projects that are of strategic significance, provide social benefits and fulfill social needs, but are in conflict with the profit-earning goals in high-tech industries, or in situations when certain industries cannot afford to impose particularly high requirements on capital.

Cui Lin in his paper The Impact of Government Venture Capital on the Performance of Entrepreneurial Enterprises (2018) [13] emphasizes that government venture capital increases start-ups' capacity for growth, but does not increase their profit. It also has a positive impact on the entrepreneurial market value. The reason for this is that government participation in industrial technology innovation mainly manifests in compensating for market failures and insufficient innovation dynamics occasioned by their specific character, rather than in an overconcern for the amount of profits on investment. However, an exceptionally large GVC, i.e. an overly large governmental share , may have a negative impact on innovation.

F. Bertoni and T. Tykvová show that GVC is not as significant a catalyst of innovation as IVC and PVC, and does not drive innovation [10]. Thus, we set forth the following hypotheses.

Hypothesis 1: Government VC promotes non-government VC investments.

Hypothesis 2: Government VC promotes innovation in invested companies.

Hypothesis 3: Government indirect venture capital (government subsidies) attracts more innovation than direct government venture capital**.**

Hypothesis 4: Government venture capital has a negative impact on return on assets

Data Analysis

Data Selection

In order to verify our hypotheses, we chose corresponding companies from Shenzhen GEM for regression analysis. Shenzhen GEM is a stock market different from the main-board market. Companies' public annual report data is available on Shenzhen GEM. Finally, for empirical analysis purposes we selected 140 companies with government venture capital and 179 companies without government venture capital listed on Shenzhen GEM in 2016–2020.

Description of the Variables

Dependent Variables

In order to explore whether government venture capital has a stimulating effect on innovation, we noted the innovative achievements of the listed companies with government venture capital.

We divided innovative achievements into two categories. The first category comprises the number of patents issued by the China National Intellectual Property Administration to listed companies each year, rather than the number of applications filed with this agency each year.

The second category includes internal research and development of publicly traded companies. According to the companies' public annual reports, internal research and development is expressed in monetary terms.

In order to link the number of issued patents and internal research and development, as well as describe all aspects of corporate innovative achievements, we have built an innovative index: 50% of issued patents and 50% of a company's internal research and development.

Apart from innovation, we also studied whether government venture capital exerts a positive impact on raising non-government venture capital.

Besides, government venture capital may also produce a certain influence on corporate operations. We have selected return on assets (ROA) as the indicator of results of business operations.

Independent Variables

When studying the role of government venture capital in financing innovation, the most important independent variable is the amount of investment in the sample of listed companies. According to the public annual report of a listed company, the share of shareholders is defined by the Statement of Joint-Stock Company. After assessing the shareholders. we obtain the number of both government and venture capital shareholders. The amount of government venture investment may be calculated by multiplying it by the authorized capital of the company (stated in the corporate balance sheet).

In the same way we may calculate the amount of investment of non-government venture capital. Non-government venture capital is the remaining venture capital that is not sourced from the government.

Besides, we also noticed the influence of interrelation between government and non-government venture capital on innovation.

Control Variables

We added control variables in order to improve our regression model.

R&D expenses play an important role in innovations, therefore we added them to the list of variables.

The share of personnel for R&D also has a notable impact on the enterprises' innovative achievements.

Government subsidies are defined by the policy pursued by the government to encourage the development of high-tech enterprises; therefore, they are also represented by a variable.

Control variables include total assets, operating income and the number of research and development personnel.

Besides, we also classify the selected sample industries into high-tech and non-high-tech categories, as presented in Table 1.

Table 1. Classification by industries

Classification of industries	Industries
High-tech	Information, biological medicine, machinery and equipment
Non-high-tech	Textile, metals, steel, food
	Real estate, transport, finance industry
	Agriculture and cattle breeding

The high-tech industry in the virtual variable equals 1, while the non-high-tech industry equals 0.
The results of variable selection are stated in Table 2.

Table 2. Variable definition

Variables	Name	Symbols	Description
Dependent	Innovative index	Index	0.5·Ln (1 + In-house R&D) + 0.5·Number of patents
	Amount of non-government venture capital	Ln (1 + NonGVC)	Natural logarithm of the amount of non-government venture capital:NonGVC = Participating interest of non-government venture institutions in capital · Equity capital
	ROA	ROA	Return on assets
Independent	Amount of government venture capital	Ln(1 + GVC)	Natural logarithm of the amount of government venture capital : GVC = Share in government venture institutions · Equity capital

Variables	Name	Symbols	Description
	Share of government venture capital	GVC%	Participation interest of non-government venture institutions in capital
	Joint influence of government venture capital and non-government venture capital	Ln (1 + GVC)· Ln(1 + NonGVC)	-
Control	Government subsidies	Ln(1 + Government subsidies)	Natural logarithm of government subsidies
	Number of research and development personnel	Number of R&D personnel	Number of research and development personnel in a company
	Total assets	Ln(1 + Total assets)	Natural logarithm of total assets
	Operating income	Ln(1 + Operating income)	Natural logarithm of operating income
	A combined effect of the share of personnel involved in R&D and investment in R&D	RD-staff ratio· Ln(1 + RDExpenditure)	–
Dummy	Industries	Dummy-industy	Dummy variables of the industry, if the industry is high-tech, the variable equals 1, otherwise it equals 0

Analysis Method

In this research we apply the multiple regression analysis method and stata statistical analysis software as an instrument for descriptive statistical analysis, correlation statistical analysis and multiple regression analysis of the basic sampled information, creation of conceptual models and verification of corresponding hypotheses.

Descriptive Statistical Analysis

Descriptive statistics is compiled on the basis of the innovative index, non-government venture capital, return on investment, government venture capital, combination of government venture capital and non-government venture capital, number and share of personnel involved in R&D, total assets, operating income, R&D expenses and of the total number of 319 companies listed in GEM in 2016-2017, as well as virtual variables. As a result of this analysis, we obtained the minimal and maximum values, mean value and standard deviation for each variable. See the results of the calculations in Table 3.

Table 3. Statistics of sample description

Indicator	N	Max	Min	Mean	Sd.
Index	1074	147.99	0	7.42	13.36
Ln(1 + NonGVC)	1074	22.59	0	5.92	8.41
ROA	1074	5.35	–116.58	–0.82	3.59
Ln(1 + GVC)	1074	21.83	0	4.86	7.99
Ln(1 + GVC)·Ln（1 + NonGVC）	1074	415.04	0	5.92	8.42
Ln(1 + Government subsidies)	1074	19.90	0	15.25	3.98
Number of R&D personnel	1074	3009	0	379.26	3.98
Ln(1 + Total assets)	1074	25.43	15.24	21.35	2.64
Ln(1 + Operating income)	1074	24.43	16.07	20.47	2.64
RD-staffratio· Ln(1 + RDExpenditure)	1074	15.45	0	3.98	2.88
Dummy-industy	1074	1	0	0.90	0.30

The above table describes the statistics for the complete sample.

Correlation Statistical Analysis

As a result of analysis, we obtained correlation ratios for each variable and ratio significance. See the results of the calculations in Table 4.

It shows that the correlation ratio between government venture capital and innovative index is positive and significant at a 1% level, i.e. there is a significant positive correlation between government venture capital and innovative index, which is a preliminary confirmation of hypothesis 2. The correlation ratio between non-government venture capital and government venture capital is positive and it is significant at a 1% level. It indicates that government and non-government venture capital correlate positively, but the issue of which of these factors influences the other needs further verification. The correlation ratio of government indirect venture capital (i.e. government subsidies) to the innovative index is also positive and is significant at a 5% level. It means that government indirect venture capital has a largely positive correlation with the innovative index. Table 4 shows that correlation ratio between corresponding variables and control variables is less than 0.8. So, it is concluded that there is no serious multiple collinearity between corresponding variables and control variables.

Table 4. Analysis of variable correlation

Variables	Index	Ln(1 + NonGVC)	ROA	Ln(1 + GVC)	Ln(1 + GVC)· ·Ln(1 + NonGVC)	Ln(1 + Government subsidies)	Number of R&D personnel	Ln(1 + Total assets)	Ln(1 + Operating income)	RD-staff ratio* Ln(1+RDExpenditure)
Index	1									
Ln(1 + NonGVC)	–0.010***	1								
ROA	0.007	0.030	1							
Ln(1 + GVC)	0.083***	0.294***	–0.05	1						
Ln(1 + GVC)·Ln(1 + NonGVC)	**–0.045**	**0.605*** **	**0.013**	**0.685*** **	**1**					
Ln(1 + Government subsidies)	0.070**	0.104***	0.007	0.056*	0.103***	1				
Number of R&D personnel	0.410***	–0.011	0.021	0.036	0.021	0.157***	1			
Ln(1 + Total assets)	0.030	0.076**	0.191***	0.090***	0.071**	0.486***	0.466***	1		
Ln(1 + Operating income)	0.022	0.073**	0.003	0.088***	0.071***	0.493***	0.420***	0.755***	1	
RD-staffratio·Ln(1 + RDExpenditure)	0.273***	–0.007	0.025	0.036	0.015	0.058*	0.492***	0.149***	0.121***	1

* Significant at a 10% level. ** Significant at a 5% level. *** Significant at a 1% level.

Multiple Regression Analysis

According to hypothesis 1, government venture capital has a positive impact on non-government venture capital (Table 5), therefore the regression equation is as follows:

Ln(1 + NonGVC) =
=α11 + β12Ln(1 + GVC)t + β13·Ln(1 + GVC)t – 1 + ε.

Table 5. Attractiveness of GVC for NonGVC

Ln(1 + NonGVC)	Coef.	Std.Err.	T	p
Ln(1 + GVC)t	0.213	0,56	3.78	0.000***
LLn(1 + GVC)t – 1	0.105	0.58	1.8	0.073*
Cons	4.47	0.34	13.17	0.000***

* Significant at a 10% level. ** Significant at a 5% level. *** Significant at a 1% level.

Table 6. Correlation between GVC and NonGVC

	Ln(1 + NonGVC)	Ln(1 + GVC)	Ln(1 + GVC)t – 1
Ln(1 + NonGVC)	1.000		
Ln(1 + GVC)	0.2970 0.000***	1.000	
Ln(1 + GVC)t – 1	0.2581 0.000***	0.7886 0.000***	1.000

* Significant at a 10% level. ** Significant at a 5% level. *** Significant at a 1% level.

Table 6 shows that government venture capital currently influences the attraction of non-government venture capital and is significant at a 1% level. In the previous period, government venture capital also influenced the attraction of non-government venture capital, but was significant at a 10% level.

The correlation ratio between government venture capital and non-government venture capital is currently 0.2970, while the correlation ratio with non-government venture capital in the previous period amounts to 0.2581 and their correlation ratio is significant at a 1% level.

After raising venture capital, the government sends signals to the external world demonstrating optimism and support of the project in order to attract non-government venture capital. Consequently, according to hypothesis 1, it is true that government venture capital has a positive impact on raising of non-government venture capital.

According to hypotheses 2 and 3, government venture capital has a significant influence on innovation, while indirect government venture capital (government subsidies) attracts more innovation than direct government venture capital.

Let us derive a regression equation:

Index = α21 + β22·Ln(1 + GVC) +
+ β23· Ln(1 + GVC)·Ln(1 + NonGVC)+
+ β24·Ln(1 + Government subsidies) +
+ β25·Number of R&D personnel +
+ β26·Ln(1 + Revenuefromoperation) +
+ β27·Ln(1 + Total assets) +
+ β28·(RD-staff ratio·Ln(1 + RDExpenditure)) +
+β29·dummy-industry + ε.

Table 7. Influence of government venture capital on innovation

	Index	Index
Ln(1 + GVC)	0.517*** (3.73)	
GVC%		74.048* (1.86)
Ln(1 + GVC)* Ln(1 + NonGVC)	–0.040** (–2.45)	–0.20 (–1.33)
Ln(1 + Government subsidies)	0.44* (1.82)	0.464* (1.85)
Number of R&D personnel	0.016*** (6.59)	0.017*** (6.6)
Ln(1 + Revenue from operation)	–2.70* (–1.85)	–2.528* (–1.68)
Ln(1 + Total assets)	4.09** (2.25)	4.111** (2.16)
RD-staff ratio· Ln(1 + RDExpenditure	1.14*** (2.62)7	1.206*** (2.7)
Dummy-industry	7.08** (2.36)	8.408*** (2.75)

	Index	Index
CONS	−49.72**	−54.544*
	(−1.78)	(−1.90)
F	0	0
R^2	0.4407	0.4236
Adj-R^2	0.4251	0.4071

* Significant at a 10% level. ** Significant at a 5% level. *** Significant at a 1% level.

As we see from Table 7, government venture capital has a significant influence on the innovative index with the ratio of 0.517. It is significant at a 1% level. It shows that government venture capital exerts a positive influence on corporate innovation, which confirms the initial hypothesis. Besides, the combined effect of government and non-government venture capital is significant at a 5% level, while the ratio equals -0.04. It means that government venture capital and non-government venture capital have a negative impact on innovation. In comparison to government venture capital, non-government venture capital attaches more importance to the earning power of enterprises than their capacity for innovation. Thus, we may also explain that the interrelation is negative.

As for hypothesis 3, although both direct government venture capital and indirect government venture capital (government subsidies) stimulate corporate innovation, Table 7 shows that the ratio of direct government venture capital equals 0.517, while the ratio of indirect government venture capital is 0.44; direct government venture capital is significant at a 1% level, and indirect government venture capital – at a 5% level. Therefore, we reject the initial hypothesis, since direct government venture capital exerts more influence on the innovative capability of enterprises than indirect government venture capital.

In addition to the above regression, we also conducted a stability test and replaced Ln (1 + GVC) with the share of shareholders in the government venture capital. It is apparent that government venture capital still promotes corporate innovation.

According to hypothesis 4, government venture capital has a negative impact on return on assets.

Let us derive the following regression equation:

$$ROA = \alpha 31 + \beta 32 \cdot Ln(1 + GVC) +$$
$$+ \beta 33 \cdot Ln(1 + GVC) \cdot Ln(1 + NonGVC) +$$
$$+ \beta 34 \cdot Ln(1 + Total\ assets) +$$
$$+ \beta 35 \cdot Ln(1 + Revenue\ from\ operation) +$$
$$+ \beta 36 \cdot Ln(1 + Government\ subsidies) +$$
$$+ \beta 37 \cdot (Number\ of\ RD\ staff) +$$
$$+ \beta 38 \cdot Ln(1 + debt) + \varepsilon.$$

Table 8. Influence of GVC on Return of Assets

ROA	Coef.	Std. Err.	T	P
Ln(1 + GVC)	−0.044	0.018	−2.49	0.013***
Ln(1 + GVC)*				
Ln(1 + NonGVC)	0.003	0.001	2.01	0.045**
Ln(1 + Total assets)	2.311	0.187	12.33	0.000***
Ln(1 + Revenue from operation)	−0.915	0.133	−6.90	0.000***
Ln(1 + Government subsidies)	0.012	0.030	0.40	0.688
Number of RD staff				
Ln(1 + debt)	−0.001	0.000	−1.43	0.154
Cons	−0.681	0.098	−6.95	0.000***
	−17.114	2.544	−6.73	0.000***

* Significant at a 10% level. ** Significant at a 5% level. *** Significant at a 1% level.

Government venture capital adversely affects return on assets. This result is due to the fact that government venture capital is more prone to invest in the projects that are of strategic significance for the country's macroeconomic development, are characterized by a long payback time and serious social side effects, and do not require the same return on investment as IVC and PVC. Therefore, the regression results show that the influence of GVC on return on assets is a side effect.

Conclusion

The paper studies the influence of venture companies on the direction of innovation and results of innovative activity of the Chinese government. The research produced the main empirical conclusions stated below.

First, government venture capital gives signals to the external world, influencing the number of non-government venture companies and attracting non-government venture capital. Government venture capital facilitates the attraction of more capital by enterprises, creates an investment platform and environment that play an important part in the implementation and support of IVC and PVC and is the key driver of innovation in high-tech industries.

Second, GVC significantly facilitates the promotion of companies' innovative results, which is characteristic of the current state of Chinese innovative development. The development of venture capital in China has started rather recently, and its mechanism needs improvement, since there are various problems related to implementation of venture capital in innovative projects. Therefore, the government has to play a leading role in creating a favourable environment for venture capital and provide sufficient financial support at the initial stage of venture capital development.

Third, the synergy between GVC and non-GVC has a significant negative impact on the results of innovations due to agency conflicts when government and non-government venture capital institutions have different strategic objectives of investment. This results in contradictory decisions and exerts a negative influence on the development of innovations. Besides, in accordance with China's national conditions, non-GVC prefers to invest in the enterprises at the stage of growth and maturity and in the enterprises that can generate significant profit from investment with a rather short payback time, while the GVC investment trend is more characteristic of the national development strategy. Therefore, a conflict of investment strategies between them is inevitable, and when a company utilizes both GVC and IVC or PVC, there will be a negative influence on its innovative results.

Fourth, regression analysis shows that both direct government venture capital and indirect government venture capital (government subsidies) promote innovation, but the significance of direct government venture capital is greater and the ratio is relatively larger, so direct government venture capital stimulates innovation more than indirect government venture capital.

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New Financial Tools in Sport: NFTs and Fan Tokens

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Abstract

In this article the authors consider the opportunities provided by digital assets and associated risks, their specifics for sports organizations, fan token allocation scheme, and finally provide relevant recommendations for Russian football clubs that were selected as the object of study due to the availability of the required data and the growing market. Research methodology involved the analysis of annual reports filed by football clubs and academic papers, as well as interviews with representatives of clubs and digital platforms. The authors analyzed the trading results of 47 foreign clubs, identified and quantified the factors that affect their returns. Based on foreign experience, authors provide suggestions for Russian sport clubs that are aimed at cooperation with digital platforms and issue of NFT tokens and NFT collections. Potential income from these instruments was estimated. It comprises two components: initial placement (ICO) and secondary market income. Suggestions and calculations provided by the authors could be applied in the development and implementation of digital assets by professional clubs from other sports and other sports industry subjects, i.e., equipment manufacturers, fitness clubs, sport facilities, etc. The authors specify a number of additional factors that can potentially affect fan profitability as items in need of further research.

Keywords: sports economics, sports finance, football economics, finance in football, digital assets in sports

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Introduction

The coronavirus pandemic and the subsequent financial crisis exacerbated the need for additional revenues in all sectors of the economy, which became especially tangible in the entertainment industry. For example, sustainable financing has always been one of the major problems for museums and galleries [1]. However, recent technological advances revealed new sources of revenue that include digital assets, such as NFT and fan tokens (collections), which play an increasingly important role. Non-fungible tokens (NFT) may be described as a new environment that allows to possess any digital assets and trade in them [2]. Some authors define NFT [3] as a unique, indivisible and irreplaceable cryptographic token, which is a digital or physical asset linked to the blockchain.

In its turn, the blockchain is "a distributed immutable ledger maintained and verified in the network of peer nodes" [4] or, in simpler terms, a common database available for everyone. Blockchain stores information on all previous transactions within the system. An attempt to take out a snippet of information destroys it, thus making the blockchain secure for data storage. Cryptocurrencies like bitcoin or ether are records in the blockchain. NFT functions in a similar way and, just like any cryptocurrency, it may be stored in a crypto wallet, used to conduct transactions, purchased and sold [5].

NFT tokens are created by smart contracts that transfer assets automatically according to specified rules (or programs) in order to perform operations between users [6]. Tokens are a certificate that confirms the unique nature of the code, and they are assigned to a certain user (purchaser, token holder). They cannot be exchanged or replaced with other tokens, however, one may exchange or sell them to another person within the platform.

The NFT concept was presented for the first time in 2012 by Bitcoin's Colored Coins [7], tokens that represent any type of physical assets, for example, immovables, motor vehicles and bonds.

In spite of a growing interest in digital assets, only a small number of studies is dedicated to NFT. P. Kireyev and R. Lin (2021) developed a CryptoKitties valuation structural model [8]. D.-R. Kong and T.-C. Lin (2021) dedicated their paper to the CryptoPunks popular NFT collection [9]. M. Nadini et al. (2021) [10] collected data on all NFT transactions in OpenSea up to March 2021. N. Borri et al. collected data that covers almost the whole universe of NFT transactions and provides a comprehensive view of this market [11; 12]. A series of papers describes the evaluation of digital assets (Demir et al., 2022; Dowling, 2022a; Dowling, 2022b) [13–15]. A separate line of research is cryptocurrency. For example, A. Simanovsky (2018) considers the economic nature of cryptocurrency, analyzes the risks related to its use in the economic turnover and consequences of various ways of its possible legalization [16]. M. Scharnowski et al. studied fan tokens in their paper (2021) [17]. It should be noted that there are also very few papers dedicated to the football economy in general (2018, 2019) [18; 19]. In particular, these include studies by I.V. Solntsev (2018, 2019) [18; 19] that consider financing models and approaches to the assessment of football club value.

Digital platform users may sell, exchange or collect tokens in their modern form. In the current format, NFTs were created in 2017 and gained popularity because of the CryptoKitties game (a game based on collecting similar to the digital version of Pokemon that entails breeding of virtual cats which may be exchanged or sold). This format quickly became widespread, and in 2021 virtual collections already appeared everywhere. For example, in December 2021 the Wikipedia online encyclopedia sold its first website version for $750 000 [20] as an NFT, while the Hermitage Museum sold NFT tokens of paintings for RUB 32 million [21].

Sports organizations, deprived of a significant part of their income due to the pandemic, also develop digital business rapidly by issuing fan tokens and NFT collections – not just to attract additional funds, but also to drive up fan loyalty by affording them an opportunity to influence management decisions and feel involved with the club. The first sports organization to release tokens was Juventus, when the club tried to monetize fan support in exchange for influence on management decisions in 2019.

Fan and NFT Tokens of Sports Organizations

The coronavirus pandemic significantly changed the revenue structure in the sports business. So, according to UEFA [22], revenues of European football clubs in 2020 reduced by 10.4%, from €23.0 to 20.6 billion. In percentage terms, revenue reduction rates were as follows:

- fare revenue – 23%;
- revenue from sale of rights – 14%;
- sponsorship and trading income – 8%;
- merchandizing – 1%.

At the same time, revenues from contracts with a naming sponsor, on the contrary, grew by 6% due to the agreements concluded before the pandemic.

Falling revenue made the clubs look for new sources of revenue, and they solved this problem by using digital assets. At the initial stage clubs managed to gain revenue by means of signing sponsorship contracts with blockchain platforms. These transactions are most common in the USA, Turkey and Italy. The reason for the popularity of cryptocurrency and blockchain platforms in Serie A is largely due to the ban on betting firms' advertising, which resulted in a significant drop in trading income [23].

Blockchain platforms ("cryptocurrency exchanges") are services that use smart contract technology in cryptocurrency in order to conduct transactions and that are created for purchase of digital assets (NFT, fan tokens) or cryptocurrencies. As a rule, platforms specialize in certain assets: cryptocurrencies (NFT (OpenSea), fan tokens (Socios)). Nevertheless, there are exceptions. For example, Binance, the largest cryptocurrency exchange, sells cryptocurrencies, NFT and fan tokens. The list of digital transactions of European football clubs is presented in Table 1.

Table 1. List of sports organizations that concluded sponsorship contracts with blockchain platforms or cryptocurrencies

Platform	Sports Organization
Plus500	Legia FC, Young Boys, Atletico, Atlanta, Brumbies Rugby Club
Bitget	Juventus FC, Galatasaray
Bitmex	Milan FC
DigitaBits	Roma FC, Inter FC, esports Team Dignitas
Crypto.com	World Football Championship, UFC, Serie A, the Italian Cup, Formula 1, Ice Hockey World Championship, esports organization Fnatic, Formula 1 team Aston Martin, HC Montreal Canadiens, basketball team Philadelphia 76ers, Paris Saint-Germain Football Club
Bybit	Esports organizations NaVi, Astralis, Virtus.Pro, Formula 1 team Red Bull
FTX	Major League Baseball, Formula 1 team Mercedes, esports organization TSM, Miami Heat basketball team, Washington Wizards, Washington Capitals hockey club, International Cricket Council (ICC)
Ankr	Sacramento basketball team
Learncrypto	Southampton FC
XBTO	Inter Miami FC
Coinjar	Brentford FC, Melbourne Demons (Australian football)
Dogecoin	Watford FC
Binance	Lazio FC, Porto FC, KHL, Formula 1 team Alpin
Socios.com	La Liga, about 19 NBA clubs, Legia FC, Manchester City, PSG, Arsenal, Aston Villa, Galatasaray, Roma, Atletico, Juventus, Barcelona, Apollon, Trabzonspor, Independiente, Novara, Young Boys, Istanbul, Sint-Truidense, Milan, Göztepe, Universidad de Chile, Fortuna Sittard, Valencia, Levante, Atletico Mineiro, Corinthians, Inter, Everton, Dinamo Zagreb, Alanyaspor, Samsunspor, Sao Paolo, Formula 1 teams Alfa Romeo and Aston Martin
NAGA	Sevilia FC
Floki Inu	Napoli FC, Cadiz, Kerala Blasters FC (India), Spartak
eToro	Bologna FC, Sassuolo, Udinese, Cagliari, Genoa, Sampdoria, Spezia, Hellas Verona, Salernitana and Arsenal
Tezos	Manchester United FC, Formula 1 teams Red Bull, McLaren, esports team Vitality and Misfits
Velas	Formula 1 team Ferrary

Source: Compiled by the authors.

However, sponsorship contracts are an indirect way for a sports organization to profit off digital assets. Leagues and clubs realized rather quickly that they can earn directly by issuing NFT tokens and collections. In Russia, such cases are still scarce. In the beginning of 2022, the Sochi hockey club issued NFT tokens at the Opensea marketplace. Two events were "digitized": the first press conference of Andrey Nazarov as the head coach of Sochi and a fight between David Rundblad and Gleb Zyryanov.

Fan tokens provide three opportunities for their holders [24].

Participation in decision making. For example, token holders may use an application to choose the music played after a goal is scored, colour of the team bus, and the range of merchandise (Table 2). As a rule, fans' decisions are made through polls on the blockchain platforms.

Remuneration. For example, an opportunity to win free tickets or T-shirts, to attend team practice.

Earnings. Some marketplaces (for example, Socios) offer an opportunity to trade tokens, turning them into a financial instrument.

Table 2. Examples of decisions made by fan token holders

Club	Decision influenced by fan tokens holders
Juventus FC	Fans chose the music played after a goal at the home stadium and the colour of the team bus
Milan FC	Fans voted for the team's official locker room slogan
Professional Fighters League (PFL)	Fans chose two fighters for one of the league fights
Galatasaray FC	Fans chose the entrance song for the players
Roma FC	Fans chose the player after whom a field was named in the club training center
Atletico FC	Fans chose the player to conduct an Instagram broadcast
Paris Saint-Germain FC	Fans chose a captain's band inscription

Source: Compiled by the authors based on [25; 26].

Fan tokens are issued based on cryptocurrency. Socios is a marketplace developed to integrate fans into sports and to monetize the interaction of sports organizations with fans through blockchain technology. In its turn, Chiliz is a payment and cryptocurrency platform used for blockchain services (including Socios). Chiliz' own token (CHZ) was used as the base currency used to purchase clubs' digital assets [27]. It means that prospective fan token buyers first had to obtain CHZ, and then could exchange them for fan tokens. One could buy or exchange tokens only in the Socios mobile application via a wallet where tokens are stored or at the Chiliz exchange, where tokens may only be exchanged for CHZ. By now tokens may also be purchased at other exchanges using cryptocurrencies other than CHZ. Apart from Socios, other suppliers entered the fan token market, first and foremost, Binance and Turkish suppliers Paribu and Bitci.

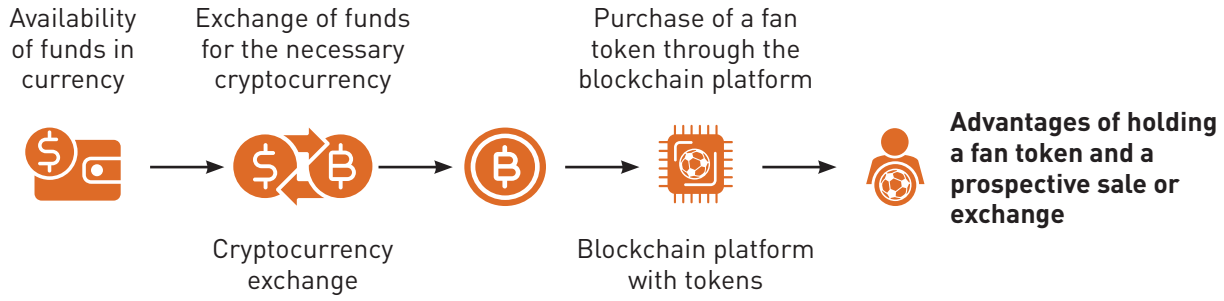
Fan tokens are issued as an initial offering similar to the initial cryptocurrency offering (ICO), which consists of the following stages:

1) Signing an agreement between the marketplace (for example, Socios) and the club.
2) Approval of the total number of prospective tokens in circulation.
3) Approval of the offer price. As a rule, the price of tokens is the same for each club in a certain region, and is usually set at one or two basic currency units (i.e. 2 euro, 2 US dollars, 2 pounds, 2 Swiss francs). For Turkish clubs the price is usually set at 10 Turkish liras.
4) Offering of a part of the total amount of tokens. The day of the offer is fixed and comprises two time intervals with a certain number of tokens offered during each. The first interval lasts 2 hours, the second – until all the offered tokens are sold. In the past it could last several minutes or several days. Nevertheless, Socios asserts that the final number of tokens available in the initial offer may be adjusted depending on demand, and may thus exceed the initially declared number. Each participant may buy a limited number of tokens (usually from 50 to 250 in both rounds), and this number is at least twice as large in the second round.

Each participant of the Socios marketplace may purchase fan tokens during the initial offer or at the secondary market at market prices. As a rule, there are several days between the offer and the first trading day at the Socios marketplace and Chiliz exchange. Trade in fan tokens at other exchanges, such as Binance, usually starts several days after the first trading day at the Chiliz exchange.

The general pattern of purchase, sale or exchange of a fan token is presented in Figure 1.

Figure 1. Pattern of fan token purchase



Source: Compiled by the authors.

The opportunity to trade tokens shapes the corresponding market that already has a pool of companies with the greatest capitalization. Only two companies from the TOP 20 in terms of capitalization are unrelated to football (Table 3). Table 4 consolidates the highest-capitalized organizations in other sports. It should be noted that the digital capitalization of these companies is extremely volatile, and on some days it may fluctuate by 50%. Additional capitalization data is provided by various marketplaces, thus additionally increasing the uncertainty. So, data from Table 3 may be used solely in real-time, and they should be brought up to date for decision-making purposes.

Table 3. TOP 20 of sports organizations in terms of crypto market capitalization that have issued fan tokens

No.	Sport	Club	Blockchain platform	Number of fan tokens in circulation, million	Overall issue of fan tokens, million	Capitalization (million $)
1	Football	Lazio	Binance	8.6	40	53.922
2	Football	PSG	Chiliz	3.22	20	50.664
3	Football	Manchester City	Chiliz	3.8	20	38.463
4	Football	Barcelona	Chiliz	3.5	40	33.474
5	Football	Porto	Binance	7.8	40	30.342
6	Football	Juventus	Chiliz	2.7	20	24.709
7	Football	Santos	Binance	4.5	30	22.022
8	Football	Galatasaray	Chiliz	3.901	10	19.661
9	Football	Inter	Chiliz	3	20	19.590
10	Football	Atletico Madrid	Chiliz	2.287	10	18.436
11	Football	Milan	Chiliz	3.244	20	18.362
12	Football	Trabzonspor	Chiliz	3.356	10	16.043
13	Football	Arsenal	Chiliz	4.054	40	14.270
14	Football	Roma	Chiliz	2.135	10	9.053
15	Football	Fenerbahche	Paribu	2.180	28	7.782
16	esports	OG	Chiliz	1.384	5	6.064
17	Mixed martial arts	UFC	Chiliz	2	20	5.340
18	Football	Flamengo	Chiliz	3.199	30	4.511
19	Football	Leeds United	Chiliz	0.983	10	4.218
20	Football	Göztepe	Chiliz	1.100	7	2.563

Source: Compiled by the authors based on the FanMarketCup data as at December 11, 2021.

Table 4. TOP 50 sports organizations in terms of crypto market capitalization that have issued their fan tokens (non-football clubs)

No.	Sport	Club	Blockchain platform	Number of fan tokens in circulation, million	Overall issue of fan tokens, million	Capitalization (million $)
1	Football	Argentine Football Association	Chiliz	1.325	20	2.001
2	Motorsports	Alfa Romeo	Chiliz	1.405	10	1.785
3	Motorsports	Aston Martin	Chiliz	1.405	10	1.476
4	Football	National team of Portugal	Chiliz	1.753	20	1.318
5	Esports	Navi	Chiliz	1.007	5	1.208
6	Tennis	Davis Cup	Chiliz	0.385	10	0.823
7	Esports	Team Alliance	Chiliz	1.008	5	0.725
8	Combat sport	PFL	Chiliz	1.044	5	0.723
9	Esports	Team Heretics	Chiliz	0.432	5	0.462
10	Esports	Team Vitality	Chiliz	0.560	7	0.402
11	Motorsports	Roush Fenway Racing	Chiliz	0.525	5	0.372

Source: Compiled by the authors based on FanMarketCup data as at December 11, 2021.

NFT tokens in sports may also include digital autographs, pictures, digital objects (for example, digital skates or a minifigure of a sportsman), video segments.

One of the examples is the Top Shot platform launched by the National Basketball Association (NBA) in July 2019. The fans may trade on the platform in moment tokens from NBA basketball matches in the form of NFT. The price of one token varies from several US dollars to $ 250,000. By March 2021, platform turnover amounted to $305 million. At the same time, the details of the agreement between Dapper Labs and NBA and the financial model are not disclosed, therefore it is impossible to calculate the financial result for the league. In other cases, leagues and teams earn royalty and small interest on each transaction in the secondary market.

Another large player in this market is the Sorare fantasy platform. In order to join, one has to assemble a team of five blockchain images. The players' images are sold in the Transfer Market using Ether cryptocurrency and/or a credit/debit card. Each player is ranked depending on the performance of purchased football players, bonus points, victories in global tournaments. Scarcity of assembled images and the real-life results of the selected players influence the winning. Spartak Moscow was the first Russian football club to join Sorare.

Apart from leagues and clubs, sportsmen also issue their own collections (Table 5).

Table 5. Sportsmen who have issued their NFT collections

Type	Sportsman	Sport	Card value
NFT cards in three categories (listed on Binance)	Konstantin Tszyu	Boxing	220 cards, card prices from RUB 10,953 to RUB 1,102,585
Collection cards (listed on OpenSea)	Khabib Nurmagomedov	Mixed martial arts	Card prices from $2,900 to $290,000 (starting price)
Crypto art cards (listed on OpenSea)	Floyd Mayweather	Boxing	11,111 cards, card prices start at approximately $20
Highlights cards (listed on WavesDuck)	Petr Yan	Mixed martial arts	Card prices start at $1,724

Type	Sportsman	Sport	Card value
Memorable moments collection (listed on Binance)	Oleksandr Usyk	Boxing	Card price start at $254
A unique card (listed on Lympo)	Alexandra Trusova	Figure skating	Card prices start at $11,022
A unique card (listed on Lympo)	Antanas Guoga	Poker	Card prices start at $87,263
Art cards with career highlights (listed on Blockasset)	Alexander Ovechkin	Ice hockey	2,000 cards, available only in the secondary market
A card with sportsman's autograph (listed on DraftKings)	Wayne Gretzky	Ice hockey	Card prices start at $12 to $1500
Art cards portraying the sportsman (listed on Ethernity)	Lionel Messi	Football	Card prices start at $80 to $1,000,000 [5]

Source: Compiled by the authors based on data from blockchain platforms where sportsmen's tokens are sold.

Digital asset buyers may receive certain bonuses. For example, holders of Oleksandr Usyk assets may receive the sportsman's professional boxing gloves, while Diamond card owners may practice with Usyk (Table 6). Sportsmen who place their cards in the Lympo platform divide their prizes into four levels of bets. It means that the greater the bet for the sportsman's card, the more bonuses a purchaser gets.

Table 6. Purchaser bonuses for buying a sportsman's card on the Lympo platform using Alexandra Trusova as an example

Bet for the NFT token	Bonuses received by the purchaser
$5,000–$15,000	A specially developed set of merchandise with the sportswoman's autograph
From $15,000 to $50,000	Previous-level bonuses plus a 30-minute phone chat with Trusova, a T-shirt with an autograph and a digital frame
From $50,000 to $100,000	Previous-level bonuses, sportswoman's skates and annual birthday video greetings from Alexandra
From $100,000	Presence at Trusova's practice, a Meet and Greet and previous-level bonuses

Source: Compiled by the authors based on the Lympo platform data.

Risks Related to Issue of Digital Assets

Initially, the issue of NFT tokens is an opportunity to formalize one's rights to a certain asset, allowing to create an unrepeatable "original version" that cannot be copied and which provides royalty (on many platforms even after the sale of a digital asset, the author gets a percentage of sale). However, in reality this new technology does not come laden exclusively with advantages. One of the main risks is related to the intangible nature of digital assets. As a matter of fact, an NFT buyer does not get a real image or the rights to it, he/she only gets a file link.

At present there are a lot of marketplaces and blockchains that allow to mine (tokenize [28]) NFTs, and copies of collections or individual works may be stored on each of them. For this reason, there is a risk of buying a counterfeit item that may simply disappear sometime in the future due to the violation of marketplace rules. Moreover, the purchased assets may disappear due to the specific nature of the blockchain. For example, when a person purchases an NFT, he/she gets a certificate with the file path. NFT marketplaces such as OpenSea, Rarible, Foundation, Nifty Gateway and many others do not store images. They only display the file with which the link you have purchased is associated. Therefore, if the server where the image's code snippet is stored is disconnected, the image may disappear.

Since practically anyone may create an unverified marketplace account and display the image being sold free of charge (in this case the marketplace commission fee will be charged after it is sold to another person), swindlers sell images that do not belong to them. The OpenSea market-

place has already blocked such copies and reimbursed the losses in the amount of $ 6.2 million to the holders, also limiting the number of tokens created by one user (not exceeding 50) [29].

Apart from that, NFT tokens are one of the mechanisms that propagate malicious programs which steal crypto wallets and engage in illegal mining. A code is embedded in the image of an NFT token that asks the victim to confirm the transaction, after which the criminal transfers the funds from their crypto wallet [30].

Finally, token-related transactions require a high degree of attention, including price formation and the structure of cryptocurrencies being used. For instance, a token from the Etherrock collection was sold for 444 wei instead of 444 ETH ($1 million). A wei equals one quintillionth of ETH, so 444 wei costs less than one cent, which is not even enough to pay the commission fee for the transaction in the Ethereum network. The transaction was conducted in less than a second: the moment the order appeared in the market, a special bot which monitors NFT prices purchased it [31].

Different countries attempt to mitigate corresponding risks. However, at present there is no such regulation, which actually bears an additional risk. Russian legislation does not describe the status of NFT tokens. At the beginning of 2022, the Bank of Russia issued a report where it offered to prohibit the issue, circulation and exchange of cryptocurrencies and organization of such transactions account. The regulator also considers it necessary to forbid the mining of digital assets and to start monitoring Russian citizens' cryptocurrency investments on foreign trading platforms. At the same time, the Russian Government approved a road map that proposed regulation, rather than prohibition, of cryptocurrencies, identification of clients, responsibility for illegal circulation of digital assets and development of cryptocurrency value assessment methods [32].

Another problem is environmental harm. The mining hardware [33] required to launch an NFT often consumes a lot of energy. In its turn, this results in carbon dioxide emissions into the atmosphere, increasing the greenhouse effect [34]. Aware of this problem, new platforms focus on energy consumption, emphasizing that they support the environment. For instance, the Tezos crypto platform entered into a partnership with Manchester United FC [35]. The club's press release states that it is glad to cooperate with one of the most environmentally sound blockchains that uses energy-efficient technology: Tezos reduces carbon emissions. This is in line with the club's objectives aimed at the support of environmental sustainability [36]. Tezos is, in fact, a more environment-friendly crypto platform compared to others. According to a PWC report, Tezos' annual electricity consumption is approximately 0.001 TWhr, Bitcoin – 130 TWhr, Ethereum – 26 TWhr. High energy consumption results in another problem – high cost of NFT issue and related transactions. As noted by [37], each NFT-related transaction is more expensive than an ordinary cash transfer because smart contracts require computing resources and storage for processing. Thus, the mining of an NFT token costs more than $60, while an ordinary NFT transaction may cost $60-100 each. High fees related to complex operations and high overload significantly restrict the propagation of the NFT technology.

It should be noted that fans do not always support the issue of fan tokens. For example, the fan association of the West Ham United football club opposed the club's plans to issue tokens, claiming that Socios.com tried to monetize fan participation, while it is obligated to do it for free. They even launched a campaign "Don't Pay to Have Your Say." Crystal Palace's fans acted in a similar way by hanging a banner "Morally bankrupt parasites Socios not welcome". This is the related to the fact that since 2016 clubs have to meet their fans in order to discuss business issues in accordance with governance principles of the Department for Digital Technology, Culture, Media and Sport. This fan participation is now specified in codes of practice of the English Football League and Premier League [38].

There is also a risk of fraud with NFTs. For example, a Sacramento basketball player De'Aaron Fox launched an NFT project SwipaTheFox. Fans bought a Fox token and a season ticket to his virtual club, where they could talk to the player in a Discord channel, play computer games with him and participate in a drawing of merchandise. However, several months later the project was closed, token owners were not refunded, and the player said that he would get back to the project when he had more time [39].

Financial and other regulators are also concerned with potential risks related to fan tokens. For instance, on June 9, 2021 the Thailand Securities and Exchange Commission mentioned fan tokens directly in its notice that prohibited digital exchanges to render services related to certain tokens or cryptocurrencies [40].

Besides, the Advertising Standards Authority – the regulating body of Great Britain ruled on December 22, 2021 that the British football club Arsenal London ran a misleading advertisement without a clear statement of risks related to purchase of tokens. The regulator was especially concerned with the fact that to purchase a fan token one could just buy another cryptocurrency [41]. Finally, taxation of remuneration nominated in cryptocurrencies and, in particular, in fan tokens raises concerns [42].

Evaluation of Potential Income of Russian Clubs from Digital Assets

In this paper the authors attempt to assess the potential income of the leading clubs of the Russian Premier League (RPL) (Table 7) from placement of digital assets. Fan tokens provide an opportunity to profit both off the initial coin offering (ICO) and off the secondary market. Taking into consideration the fact that tokens are placed at a fixed price, it is first necessary to substantiate the volume of the issue.

The volume of placement of digital assets is largely defined by the fan base calculated based on the popularity rating of Russian football clubs on the Championat.com portal [43].

This rating is premised on monitoring of fans from 2001 to 2017 and compiled on the basis of a comprehensive system analysis of regional and federal poll data, media measurements, internet resource statistics and other field-specific studies that characterize the number, proactive attitude and club preferences of football fans. Unfortunately, there are no similar studies in terms of the number of applied criteria.

In the calculations presented in Table 7 we used the data of only the largest RPL clubs, which had been added to the sample. The value in the "Fan base" column is calculated as a ratio of the number of fans of a certain club to the total number of fans of the clubs added to the sample.

The median value of tokens in circulation (calculated on the basis of FanMarketCap open source data) with European clubs was used as the placement volume for Spartak FC, which has the largest fan base in Russia. We used a proportional value for other Russian clubs.

Then, based on the assumption regarding the token value of 2 euro, we deduced the initial (in case of ICO) club capitalization. According to unofficial data, the club gets about 70% of the price as royalty from the initial placement of tokens at the Socios marketplace. See the calculation results in Table 7.

Table 7. Club's income from the initial offer of digital assets at the Socios marketplace

	Fan base, %	Potential token sales in the fan base, pc.	Capitalization in case of ICO (at a rate of 2 euro/token), euro	Club's income from ICO if the club's royalty is 70%, euro
SpartaK FC	33	3,443,956	6,887,912	4,821,538
Zenit	27	2,794,438	5,588,876	3,912,213
CSKA	20	2,099,605	4,199,210	2,939,447
Lokomotiv	7	725,043	1,450,087	1,015,061
Krasnodar FC	7	709,938	1,419,877	993,914
Dinamo	6	634,413	1,268,826	888,178

Source: Compiled by the authors.

Then the authors calculated daily earnings in the secondary market. After an analysis of interviews with representatives of clubs and trading platforms [44–46], we revealed four factors that influence token price changes:

1) Stadium utilization in % (season 2021/2022).
2) Players' transfer fees.
3) Gained points (as at April 8, 2022).
4) Social media followers (Instagram, Facebook, Twitter, TikTok, YouTube).

Values of adjusted initial offer price were calculated in several stages.

1) Based on the data of 47 foreign clubs, we calculated profitability since the placement of tokens whose median value equaled 86%.
2) Using the above factors, we adjusted profitability as follows: a club from the sample with the maximum value for each factor is assigned the coefficient of 1, the rest of clubs – proportionately to the maximum value. Then we multiplied this coefficient by the median profitability value (86%). After obtaining the resulting profitability we calculated the renewed token price and capitalization as at a certain moment of the season (taking into consideration the fact that the number of tokens in circulation is unchanged). The calculations are presented in Table 8.

Table 8. Calculation of token price change

	Transfer fee, million euro		Stadium utilization, %		Gained points		Subscribers, million persons		Total change of price, %	Resulting price of the token, euro
	X	K	X	K	X	K	X	K		
Spartak	118	0.72	13	38	27	0.55	6.02	0.91	11.7	2.23
CSKA	105	0.64	20	58	43	0.88	2.87	0.43	12.2	2.24
Krasnodar	85	0.52	21	61	36	0.73	0.93	0.14	2.8	2.06

	Transfer fee, million euro		Stadium utilization, %		Gained points		Subscribers, million persons		Total change of price, %	Resulting price of the token, euro
Zenit	165	1.00	22	65	49	1.00	6.62	1.00	55.8	3.12
Dinamo	105	0.64	34	100	46	0.94	1.05	0.16	8.1	2.16
Lokomotiv	87	0.53	19	56	37	0.76	1.85	0.28	5.3	2.11

X – quantitative value of each factor; K – adjustment coefficient.

Source: Compiled by the authors.

On the basis of open source data, one may presume that in the secondary market clubs may earn 25% of the platform's commission fee, which amounts to 10% of the turnover or 2.5% of 1 euro per transaction.
Clubs' daily income was calculated as a product of the adjusted capitalization and 2.5%. In order to obtain the total value for a season, this value was multiplied by 300 days (the part of the season when games are conducted minus the summer and winter break: most of the income on a digital asset issue is earned within the period when clubs' sports results produce the greatest impact on the amount in circulation and the persons interested in purchasing digital assets are focused on them to the maximum extent). The calculations are presented in Table 9.

Table 9. Calculation of capitalization and potential daily earnings

	Current capitalization (after adjustments) in euro	A club's daily earnings in the secondary market, euro	Annual earnings in the secondary market in euro, 300 days (calendar club season)
Spartak FC	7,696,857	1,697	509,186
CSKA	4,709,815	1,039	311,578
Krasnodar	1,459,336	322	96,542
Zenit	8,708,841	1,920	576,134
Dinamo	1,371,935	303	90,760
Lokomotiv	1,527,241	337	101,035

Source: Compiled by the author.

At initial offering Spartak FC had the largest capitalization, however, considering its low sports results during the season, the token price (and consequently, capitalization) did not change dramatically. At the same time, capitalization of Zenit FC grew significantly due to superiority of the considered factors. Thus, we may assume that in case of an increase in the number of fans, attendance and utilization of stadiums as well as an improvement of sports results or reduction in the platform's commission fee the clubs will earn more.

Adopting Fan and NFT Tokens in Russian Sports

The performed evaluation shows that digital assets help Russian clubs to diversify revenues and, which is more important in the long-term, to assure their fans' loyalty. It proves the significance and relevance of the topic of this paper and allows the authors to formulate the following suggestions for clubs on the development and issue of NFT and fan tokens:

1) Make a list of unique elements for collection with regard to the scarcity and uniqueness criteria, including (but not limited to) additional bonuses for buyers – fan engagement (a special club outfit, game tickets, VIP services related to communication with sportsmen and access to closed stadium zones).
2) Choose a partner (platform) based on the following criteria: chance to cooperate with Russia under the current restrictions; observance of sustainable development principles; relevant experience (preferably in Eastern Europe); providing access to the maximum number of investors.
3) Coordinate the issue of fan tokens in advance with fan associations in order to avoid possible objections related to the sale of communication and loyalty instruments that the club has to provide free of charge.
4) Elaborate the list of bonuses and opportunities provided to the buyers of fan tokens. Free tickets, a chance to talk to sportsmen and other instruments are already rather widely used. The key aspect that could certainly interest any sports fan is the chance to

influence team composition and replacement during the game. However, one can hardly expect these options because of the position of the coaching staff which is responsible for the final result. Moreover, the collective intelligence of fans is unlikely to provide the expected efficiency. Thus, clubs will have to look for a balance between the need to attract fans with a new product and provide a proper level of independence in taking management decisions.

The results of the research show that in spite of all challenges and risks related to NFT tokens, the potential benefit from their use prevails. At the same time, Russian sports companies are not engaged in extensive cooperation with representatives of this sphere. Among other things, it is due to a hard peg to cryptocurrencies, whose legal status is undefined. The global restrictions imposed on Russia may have a multidirectional impact: on the one hand, access to international platforms for Russian players may be denied, on the other, cryptocurrencies may be a way out in the sphere of international settlement operations. In any case, organizations of the Russian sports industry should be more attentive to promising digital assets and develop corresponding instruments. The following encouraging lines of effort may be distinguished:

1) Sponsorship. Russian sports clubs and leagues (considering the number of fans and market volume, they are predominantly football clubs) could offer sponsorship cooperation opportunities to crypto exchanges if the country's cryptocurrency market is properly regulated.
2) Issue of fan and NFT tokens. The largest platform Socios.com has already announced the issue of a fan token with Spartak FC, however, there are no details regarding the dates and terms of issue. Besides, there are no obstacles for the clubs in creating their own NFT tokens and issuing them at Binance, OpenSea or other marketplaces. This was what Veles FC did [47]. Veles' revenues have not been declared officially, but may be assessed at approximately RUB 80,000 for a collection of eight cards (based on the RUB 10,000 value of cards on Binance).
3) Creation of its own platform with game mechanics and NFT objects. This may be relevant in case of a contract created by the author of similar successful projects – the best example in the market is Dapper Labs, creator of NBA Top Shot and a new NFT project for La Liga. The majority of NFT tokens are sold at the OpenSea marketplace, which is the largest marketplace for creators of such products. Other notable marketplaces include Lympo and Binance.

Limitations and Lines for Future Research

From the methodological point of view, the main restriction was the small number of studies on digital assets in general and specifically on their application by sports organizations. Another serious problem was the absence of official data required for an accurate assessment, including data on revenues of the clubs that have issued fan tokens and on exact marketplace conditions, for example, percentage of payments and commission fees. Alternative approaches to such studies include interviews with representatives of exchange marketplaces, clubs and federations, as well as an analysis of annual reports of the clubs that use digital assets widely. At the same time, one has to take into account that this requires an analysis of foreign experience, yet under the current circumstances it is problematic, as is the application of such experience by Russian organizations. Taking into consideration the continuing trend towards digitalization, one may hope that the number of studies in this field will increase, thus enhancing the methodological base. An important limitation is the absence of a clear position concerning corresponding regulation. Russian legislation does not contain the definition of a non-fungible token or NFT, and all tokens issued at foreign marketplaces are outside of the jurisdiction of the Russian legislation.

A range of factors that affect the change in token profitability was used in this research, and it may be expanded by the following indicators:

- stadium utilization percentage;
- government regulation of cryptocurrency settlements (expert evaluation: existence and development of laws and regulations that regulate the issue of cryptocurrencies in the country);
- fan token market regulation by sports leagues and federations (expert evaluation: existence and development of the regulations which limit this type of activity);
- number of days since the date of tokens' issue;
- number and relevance of fan votes in marketplace applications;
- purchasing power on a certain crypto market (number of tokens in circulation, evaluation of statistics on daily token issue).

The results of the research show that Binance marketplace, unlike Socios, is more efficient in terms of token sales. It may be related to its availability and popularity in other spheres unrelated to fan tokens: here a user may purchase not just sports organizations' tokens, but also other digital assets that have been issued by companies from other industries. In its turn, Socios is a specialized marketplace for sports assets that requires additional registration. Another advantage of Binance for Russia may be its initial adaptation in the Russian language. Risks and challenges related to fan token issue in various marketplaces and by clubs of various countries and monetary valuation of the effects produced by digital assets at the government level and level of individual sports industry organizations is another prospective line of further research. Finally, under present-day conditions, the development of offers for creating a Russian marketplace that offers NFT operations looks especially relevant.

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