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The Impact of Currency Risk on the Value of Firms in Emerging Countries

Abstract

This study is dedicated to estimating the impact of currency risk on the cost of equity in Brazil, Russia, India and South Africa. Our contribution to the literature is that we have obtained evidence on the pricing of exchange rate risk in developing countries, which at the time of writing is quite scarce. This scarcity is one motivation for our research, which is dedicated to BRICS capital markets, though with the Chinese stock market excluded since it is heavily regulated. The aim of this research is to determine whether in emerging countries stock markets currency risk is a significant factor that influences the cost of equity capital in a company.

Changes in the value of exchange rates can impact the cash flows of a firm and its exposure to risk, and hence, the value of the company. In our research we will discuss the influence of exchange rate movements on the value of firms through their impact on the cost of equity. Specifically, we investigate whether companies that report substantial currency gains or losses have to pay a higher required rate of return on equity. Furthermore, in this study we make an attempt to estimate currency risk premia for exposure to appreciation and depreciation of currency separately, and try to identify possible differences.

For each country, three analytical models that extend the Fama-French Three Factor Model (by incorporating currency risk) are estimated. We use an equal-weighted portfolio approach to identify currency risk factors. These factors are estimated either by using information about the ratio of currency gains to sales, or the magnitude of covariation between equity returns and exchange rate changes. In the second case appreciation and depreciation of domestic currency against the US dollar is considered separately.

The results indicate that in Russia, firms which report substantial currency losses pay a positive risk premium, while in Brazil, India and South Africa companies with significantly positive or negative currency gains pay a lower required return on equity than firms with almost zero currency gains. Finally, we attempt to explain the estimation results using a sectoral breakdown of product exports for each country of the data sample.

Keywords: exchange rate exposure, cost of equity, currency markets, stock returns, emerging markets

JEL classification: G12, G32

Introduction

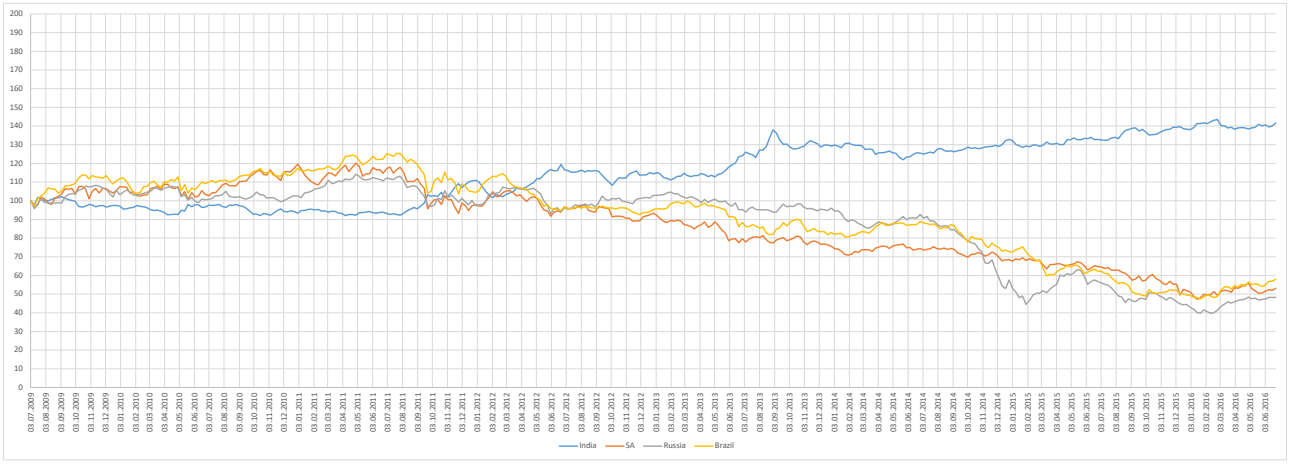
The impact of upward or downward exchange rate movements on stock market performance (and vice versa) has important implications in terms of risk management, trading and hedging strategies for international portfolios. Changes in the value of currency influence stock prices since they alter the cash flows of domestic companies and affect their competitiveness on international markets. The stock market also impacts the exchange rate market due to the fact that changes in stock prices alter the attractiveness of domestic assets and consequently leads to inflows or outflows of capital. For this reason, it is extremely important for international investors, top management of companies, and policy makers to understand the relationship between stock prices and exchange rates. Moreover, recently, currencies of developing countries experienced a period of great pressure. During 2014-2015 the Russian ruble depreciated against the US dollar by 118%, the Brazilian Real by 66%, and the South African Rand by 43%. We can see that fluctuations in the nominal exchange rate (Figure 1) in Russia are similar to those in Brazil and South Africa but different to India. According to Morgan Stanley, the currencies of Brazil, India, Indonesia, South Africa and Turkey were the five most fragile currencies as of August 2013 [1]. Two years later the list was extended: the Brazilian Real, Colombian Peso, Chilean Peso, South African Rand, Peruvian Sol, South Korean Won, Thai Baht, Russian Ruble, Singapore Dollar, and Taiwan Dollar were named the "fragile ten" [2]. Still, it is not obvious in which cases this depreciation represented a significant currency risk. Indeed, only unexpected currency value changes can be referred to as currency risks. In addition, in certain countries, currency risk might not be priced. For example, Morgan Stanley analysts believe that securities in South Africa and India were not substantially harmed by currency depreciation as of December of 2013 [3].

The first question that arises in this regard is what kind of currency movements should be considered to be exchange rate risk. Adler and Dumas point out that a substantial depreciation or appreciation of a currency does not, by itself, represent a risk. Exchange rate risk is present only if currency changes are unexpected. The second question is how much exchange risk does a firm bear, i.e. how exposed to currency risk is a specific firm? Adler and Dumas define currency exposure as "sensitivity to the future, real domestic currency (market) value of any physical or financial or financial asset to random variations in the future domestic purchasing powers of these foreign currencies" [4].

What determines a firm's exchange rate exposure? First, companies with international operations are exposed because currency movements affect their cash flows. Bodnar and Martson mention three types of such operations: exporting goods, using imported materials in the production of goods, and producing goods abroad. Using a simple model, they show that a degree of currency risk exposure is different for exporters, importers and international companies. Pure exporters are the most exposed, while pure importers are exposed less because expenses are usually lower than revenue. International firms are the least exposed companies due to the fact that they both produce and sell abroad. Consequently, they are operationally hedged [5].

Bodnar, Dumas and Martson demonstrate a less obvious channel through which fluctuations in exchange rates impact an exporting firm: they influence an exporter's competitiveness, as compared to companies who both produce and sell abroad. Consequently, the cash flows of an exporting company change not only because of the conversion effect, but also due to changes in its market share and profit margin. The latter effects happen because the depreciation or appreciation of a currency affects prices only partially [6].

Figure 1. Nominal exchange rate in Russia, Brazil, India and South Africa (US dollar)[1]



[1] Note: 03.07.2009 = 100.

Source: Thomson Reuters Datastream.

Companies which operate in domestic markets only are also exposed to exchange rate risk. Aggarwal and Harper point out that domestic firms indirectly compete with firms which work abroad. They also compete with international companies directly. Furthermore, changes in the value of foreign currencies impact foreign demand for domestic goods. As a result, the domestic prices of these goods change [7].

All the sources of currency risk exposure described above are operational ones. Adler and Dumas mention two more drivers of firms' exposure. First, exchange rate movements can influence the value of short- and long-term monetary assets and liabilities. Second, currency fluctuations can lead to changes in the residual value of physical assets or their replacement value [8].

Still, even if a firm is exposed to exchange rate fluctuations, it does not necessarily mean that investors would require a risk premium. If currency risk is perfectly diversifiable, then exposure to that risk does not affect firm's cost of equity. To answer the question of whether currency risk is priced, one needs to test an asset pricing model which somehow incorporates exchange rate risk.

This study is dedicated to the question of whether currency risk is priced in four emerging markets: Brazil, Russia, India and South Africa. The results obtained herein have important implications for the top management of the companies which operate in these markets. They demonstrate whether currency risk should be taken into account in the risk management process and in the valuation of a company's projects (or the whole business).

This paper is organised as follows. In the first section we review empirical studies which are dedicated to exchange rate exposure and pricing of currency risk, and which give a summary of the approaches, methods, and results of studies of interest. In the second section we outline the methodology of our research. In the third section we present the results of our estimation and discuss them. In addition, we provide a robustness check of the significance of these results. Finally, in the conclusion, we present a summary of the overall research.

Literature review

When one incorporates currency risk into an asset pricing model, two considerations should be addressed: how sizable the exposure of the asset is, and what the price of currency risk is (and, indeed, whether it is priced at all). Usually these two topics are treated in empirical literature separately: the researcher either addresses exposure and its determinants in detail or he concentrates on the existence of a currency risk premium, and exposure is only an intermediate step. In our research, we focus on the pricing of currency risk. However, determining exchange rate exposure is a necessary and important step, consequently, we review both branches of literature.

First of all, we would like to note that research results highly depend on the approach that a researcher uses. The approach used in the first studies of exchange rate exposure was static: it assumed that exposure does not change over time. Using this static approach and the simple basic model we described earlier, Jorion found that only 5% of international companies in the USA were significantly exposed to currency risk during 1971-1987 [9]. This result is not consistent with economic reasoning. So, in later studies researchers tried to modify Jorion's approach, explain why Jorion gained such a result, and obtain conclusions consistent with economic reasoning.

For example, Bartov and Bodnar hypothesise that investors systematically make mistakes when they respond to exchange rate changes, so securities prices need time to adjust. They analysed US companies with large foreign currency adjustments negatively correlated with growth in exchange rates between 1978 and 1989. The authors ran a pooled panel regression of abnormal equity returns on changes in exchange rates (both contemporaneous changes and changes which were lagged for one period) and found that the coefficient in front of lagged changes is significant [10]. Doidge, Griffin and Williamson also came to the conclusion that the relationship between equity returns and lagged exchange rate changes is significant for US companies (they analysed a period from 1975 to 1990). However, for other countries, this relationship is not present [11].

Several researchers suggest the existence of a nonlinear relationship between equity returns and changes in exchange rate. Koutmos and Martin examined possible asymmetries in this relationship. The authors analysed sector portfolios in Germany, Japan, Great Britain and the USA between 1992 and 1998. 40% of portfolios were deemed to have significant exposure and 40% of significant exposures turned out to be asymmetric [12].

In the article by Aysun and Guldi, the authors tested quadratic and cubic relationship between equity returns and exchange rate changes, and modelled with different coefficients for periods with different magnitudes of exchange rate volatility, and a nonparametric model. Aysun and Guldi analysed 5 developing countries and the USA between 1995 and 2006 and came to conclusion that the percentage of exposed firms grows significantly if one uses a nonlinear model instead of the usual linear model [13]. Analysing German firms through the period from 1981 to 1995, Bartram also concluded that allowing for nonlinear exposure leads to a higher percentage of exposed firms [14].

Some researchers hypothesise that it's the static approach that leads to implausible results. Chaieb and Mazzotta found that currency risk exposure is time-varying in their analysis of equity returns of US companies between 1973 and 2005, using a conditional model where exposure varies with changes in business cycle indicators [15]. Evidence of time-varying exposure and the fact that allowing for it leads to a higher percentage of exposed firms is present in several other articles [16-18].

As for determinants of exchange rate exposure, first of all, the degree and direction of exposure is different for firms from different sectors [19-21]. Secondly, there are several factors that consistently tend to have the same effect in

various studies. Doidge, Griffin and Williamson found that the level of exchange rate exposure is higher for firms with a higher percentage of foreign sales and lower for larger firms [11]. Similar results are found in other studies [22-24]. However, sometimes size is not significant [14] and rarely even has a positive impact on exposure [25]. The impact of company size on exchange rate exposure can depend on the market where the firm operates. For example, Jeon, Zheng, and Zhu claim that in emerging markets larger firms have higher exposure because of their global connections, while in advanced economies small firms are more exposed since they have fewer opportunities to hedge [26].

Moreover, there is not yet enough evidence of the impact of many other proposed determinants of exposure. Aggarwal and Harper note that there is a positive relationship between the level of exposure and financial leverage (market-to-book equity ratio), and a negative relationship between level of exposure and asset turnover [7]. Agyei-Ampomah, Mazouz and Yin also find that financial leverage increases the level of exposure of firms in Great Britain, but find an opposite result for the impact of market-to-book ratio [18]. In contrast, He, Ng analysed the exposure of Japanese international companies and found that higher financial leverage leads to lower exposure. This is explained by the fact that firms with high financial leverage are less likely to risk the financial stability of the firm and prefer to hedge currency risk [27].

A firm's technical characteristics are not the only factors influencing the exposure of a company. Managerial incentives also play a crucial role in determining the exchange rate exposure of a firm. For example, Francis, Hasan, Hunter, and Zhu use the sensitivity of managers' compensation to stock price changes (delta) and to volatility of stock returns (vega) to find out whether top management's incentives influence exposure to currency risk. Previously, it has been shown that a higher delta increases the risk-aversion of managers while a higher vega leads to higher tolerance of risk. Indeed, Francis et al. foundnd that delta reduces exposure to currency risk whereas vega increases it [28].

Moving on to the second branch of literature, one of the first studies dedicated to pricing of exchange risk is an article by Jorion, where he tested a local CAPM with exchange rate risk and an APT model with exchange rate risk using US data throughout the period from 1971-1987. According to Jorion's findings, currency risk premia are insignificant, i.e. currency risk is perfectly diversifiable and is not priced by investors. However, the author himself notes that his approach is static and the assumption of constant beta-coefficients and a constant risk premium might be impractical in reality [19].

A similar static local CAPM-based approach was implemented by Bailey and Chung who analysed Mexican data from 1986 to 1994. The authors did not find evidence for an unconditional currency risk premium, however, they state that there exists indirect evidence of time-varying exchange rate risk premia [29].

Nevertheless, not all studies with a static approach fail to detect significant currency risk premia. Vassalou tests a static international CAPM using data on 10 countries from 1973 to 1990. She constructed 2 indices based on 9 exchange rates: a 'common component' index and a 'residual exchange' rate index. Also the model is extended by including inflation risk. As a result, she concluded that in 6 out of 10 countries at least one type of exchange rate risk is significant [30].

Dynamic and conditional approaches turn out to be successful in terms of finding a significant risk premium. Dumas and Solnik tested both static (unconditional) and conditional international CAPMs using data from Germany, Japan, UK and the USA from 1970 to 1991. In an unconditional model currency risk is insignificant while in a conditional model currency risk is significant [31].

Krapl and Giacotto estimate a conditional international CAPM using US data from 1978 to 2011 and came to the conclusion that currency risk premium is significant. Interestingly, they also state that for cash flows received in the near future, the currency risk premium is positive while for cash flows received in the longer term, the exchange rate premium is negative [32].

Unlike the previously discussed researchers, Doukas, Hall and Lang base their study on the Fama-French Three Factor Model. They also include several macroeconomic variables as explanatory variables. The exchange rate risk factor is estimated on the basis of the "Eurodollar interest rate compounded by the Yen variation relative to the US dollar". The authors analysed the Japanese market throughout the period from 1975 to 1995 and conclude that currency risk is priced. However, when they tested this statement, they did not estimate and test premia for significance, but used indirect tests [33].

Francis, Hasan and Hunter estimated the Fama French Three Factor Model and added in two currency factors: one based on changes in major partners' currency index, and another based on changes in the currency index for other important trading partners. In the analysis, US data from 1980 to 1999 was used. Both currency risk premia turn out to be significant and time-varying [17].

Azher and Iqbal estimated the Fama French Three Factor Model, and extended it by including not only local market risk factor, but also a world market risk factor, and included changes in the bilateral exchange rate of domestic currency against the US dollar as the currency risk factor. They estimated this model for Pakistan's equity market over the period from 1993 to 2013 and find negative significant currency risk premium [34].

Kolari, Moorman and Sorescu tested the Four Factor Carhart model using US data from 1973 to 2002. They estimated the currency risk factor based on the difference in returns between firms which are exposed to exchange rate changes and those which are not (exposure is measured as a sensitivity of returns to changes in the exchange rate). The researchers found a significant negative risk premium [35].

Du and Hu redid the analysis of Kolari, Moorman and Sorescu, but used different portfolios in their analysis. Firstly, they redid the analysis with industry portfolios. Secondly, they estimated the exposure of firms in more robust ways (they excluded outliers, or used a longer estimation window, or used the least absolute deviations regressions). In all these cases, significant currency risk premium is seen to disappear [36].

Apergis, Artikis and Sorros estimated a local CAPM, Fama-French Three Factor Model and a Carhart Four Factor Model, adding a currency risk factor constructed in the same manner as in the article by Kolari, Moorman and Sorescu. German data from 2000 to 2008 was used, but the currency premium is not directly estimated. However, the authors state that currency risk is a pricing factor since the model's error (intercept) is reduced when the currency factor is added [37].

In another article, Du and Hu offer an alternative way to estimate firms' exposure to currency risk. They regress changes in cash flows normalised by assets on changes in currency value and treat this coefficient as currency risk exposure. Analysing US data from 1980 to 2008, the authors tested a Carhart Four Factor Model without a high-minus-low factor, but with a currency factor, and concluded that currency risk premium is significant and usually positive [38].

Alternatively, one can try volatility of exchange rate as a base for a currency risk factor: it could be either a change in volatility or the difference in returns of currency volatility between sensitive and insensitive firms. Du and Hu use US data from 1973 to 2010 and estimated CAPM and Carhart Four Factor Model with a currency volatility risk factor. The authors failed to obtain a conclusion of a significant currency risk premium [39].

An interesting approach was introduced in the study by Armstrong, Knif, Kolari and Pynnonen. They extended the Fama-French Three Factor model by adding changes in exchange rate and cross-products of Fama-French factors and changes in exchange rate. Using US data from 1975 to 2008, the authors concluded that changes in the exchange rate influence sensitivities of assets to market risk, but a separate currency risk premium is not significant [40].

Methodology

In this research, we extend the Fama-French Three Factor Model [41] by adding currency-risk factors. To estimate the resulting risk premia, we use a portfolio approach to reduce the impact of the specific risks of each company on empirical results. Risk premia are estimated using a two-step Fama-MacBeth procedure [42]. Also, we use weekly (as opposed to monthly) returns due to the shortness of the period which is available for analysis.

The main question is how to construct the currency risk factors that we incorporate in the Fama-French Three Factor Model. Considering the limitations of data on most of the emerging markets, there are two ways to do this.

We can use currency gain information from income statements, and we can use the level of covariance between a company's stock returns and its currency returns. Using these two approaches, we estimate three models that extend the Fama-French Three Factor Model by adding currency risk factors.

Firstly, we form the currency risk factor on the basis of the difference between companies which have a relatively high absolute value of a currency gains-to-sales ratio, and companies with low absolute value of this ratio. The intuition behind this is that no matter whether company gained or lost because of exchange rate fluctuations, the fact that it is exposed to changes in currency value signals that the company is risky. Pertinent to this point is the fact that realised exposure is quite substantial relative to the size of a company's operations. Assuming investors cannot perfectly diversify a company's currency risk, he or she will demand a higher expected return. We call the corresponding risk factor "exposed minus zero" (EMZ) and incorporate it into the Fama-French Three Factor model (Model 1):

$$\mathbb{E}\left(r_i - r_f\right) = \beta_i \mathbb{E}\left(r_m - r_f\right) + s_i \mathbb{E}\left(SMB\right) + \\ + h_i \mathbb{E}\left(HML\right) + e_i \mathbb{E}\left(EMZ\right), \quad (1)$$

where r_i is return on asset i, r_f is risk-free rate of return, r_m is return on market portfolio, $\mathbb{E}\left(SMB\right)$ is size premium (expected difference in return on small and big companies, "small minus big"), $\mathbb{E}\left(HML\right)$ is value premium (expected difference in return on value stocks (high book-to-market) and growth stocks (low book-to-market), "high minus low"), $\mathbb{E}\left(EMZ\right)$ is currency premium (expected difference in returns on stocks exposed to currency risk and not exposed, "exposed minus zero").

To estimate this model, firstly, we calculate risk factors in the manner used by Fama and French [41]. To do this we need to construct 8 portfolios: 2 equal groups by absolute value of currency gain-to-sales ratio (as reported in financial statements for the year ended before period begins), 2 equal groups by size (measured as market capitalisation just before the period begins), 2 equal groups by book-to-market equity ratio (measured as the book value of equity to market capitalisation at the end of the year which ended before the analysed period begins). Then we intersect these groups. Afterwards, we calculate risk factors SMB, HML, EMZ:

$$SMB_t = \frac{\sum_{i=1}^{4} r_{it}^{small}}{4} - \frac{\sum_{i=1}^{4} r_{it}^{big}}{4}, \quad (2)$$

$$HML_t = \frac{\sum_{i=1}^{4} r_{it}^{high}}{4} - \frac{\sum_{i=1}^{4} r_{it}^{low}}{4}, \quad (3)$$

$$EMZ_t = \frac{\sum_{i=1}^{4} r_{it}^{exposed}}{4} - \frac{\sum_{i=1}^{4} r_{it}^{not\ expozed}}{4}, \quad (4)$$

where r_{it}^{small} is the return on one of four portfolios considered small at time *t*, and the other variables are self-explanatory.

After we calculated all the risk factors, we proceed to dependent variable calculation, used in estimation of our first model. To do it, we form 20 new portfolios. First, the sample is divided into 5 equal groups based on the absolute value of the currency gain-to-sales ratio. Second, each currency group is divided into 4 equal groups based on book-to-market value. Overall, we have 20 portfolios and their returns are used as dependent variables in further estimation of Model 1.

Secondly, there is a possibility that investors treat companies which have a highly positive currency gain-to-sales ratio and those with a highly negative currency gain-to-sales ratio differently. Perhaps it is considered that only negative currency gain is a bad signal. Whether a company has a positive or negative currency gain depends on a lot of factors: the direction of exchange rate change, and whether the company has a "long" or "short" position in the currency. Moreover, it is not only the nature of the firm's business which determines whether position is "long" or "short", but also the exact actions taken by a company's management. Therefore, it is impossible to see what stands behind positive or negative currency gain without a deep analysis of a firm's business. Nevertheless, investors might naturally interpret negative currency gain as a worse signal as compared to positive currency gains.

So, the second model is based on adding two currency risk factors to the Fama-French Three Factor model. One factor is calculated as the difference between firms that have highly positive currency gain-to-sales ratio and those companies with this ratio close to zero ("positive minus zero", PMZ). The other factor is calculated as the difference between firms that have a highly negative currency gain-to-sales ratio and companies with this ratio close to zero ("negative minus zero", NMZ). The model looks as follows (Model 2):

$$\mathbb{E}\left(r_i - r_f\right) = \beta_i \mathbb{E}\left(r_m - r_f\right) + s_i \mathbb{E}\left(SMB\right) + \\ + h_i \mathbb{E}\left(HML\right) + ep_i \mathbb{E}\left(PMZ\right) + en_i \mathbb{E}\left(NMZ\right) \quad (5)$$

To estimate this version of an asset pricing model we construct 12 portfolios: two equal portfolios by size, two equal portfolios by book-to-market ratio and three equal portfolios by a currency gain-to-sales ratio. Then, we intersect these groups and calculate risk factors as follows:

$$SMB_t = \frac{\sum_{i=1}^{6} r_{it}^{small}}{6} - \frac{\sum_{i=1}^{6} r_{it}^{big}}{6}, \quad (6)$$

$$HML_t = \frac{\sum_{i=1}^{6} r_{it}^{high}}{6} - \frac{\sum_{i=1}^{6} r_{it}^{low}}{6}, \quad (7)$$

$$PMZ_t = \frac{\sum_{i=1}^{4} r_{it}^{positive}}{4} - \frac{\sum_{i=1}^{4} r_{it}^{zero}}{4}, \quad (8)$$

$$NMZ_t = \frac{\sum_{i=1}^{4} r_{it}^{negative}}{4} - \frac{\sum_{i=1}^{4} r_{it}^{zero}}{4}. \quad (9)$$

Afterwards, we construct 20 new portfolios to calculate the dependent variable used in estimation of Model 2. Firstly, the sample is divided into 5 equal groups based on the value of currency gain-to-sales ratio. Then, each group is divided into 4 equal groups based on book-to-market value.

Finally, a completely different approach is to use the extent to which company's returns and currency returns covary. Based on the article by Koutmos and Martin, we estimate the exchange rate exposure of a company using the following model [18]:

$$r_{j,t} = {}_j + {}_{j,market} r_{m,t} + {}^{+}_{j,currency} r^{+}_{c,t} + \\ + {}^{-}_{j,currency} r^{-}_{c,t} + {}_{j,t}, \quad (10)$$

where $r^{+}_{c,t}$ is change in exchange rate (domestic currency per US dollar) multiplied by a dummy variable which takes value 1 if currency return is positive (currency depreciates) and $r^{-}_{c,t}$ is the change in exchange rate multiplied by dummy variable which takes value 1 if currency return is negative (currency appreciates), other variables are self-explanatory. Here we allow currency risk exposure to be asymmetric (since it has been shown in the literature that exchange rate exposure is indeed asymmetric), and neither the Russian nor the Brazilian market is an exception [43]. Exposure is estimated over 115 observations before each of the 6 periods end.

We use a bilateral exchange rate because effective exchange rates are not available on a weekly basis. Among all bilateral exchange rates we use the exchange rate of domestic currency against the US dollar because the US dollar is the currency which is most often used in international trade contracts, at least when it comes to companies from emerging markets. For example, in Brazil the percentage of international trade contracts with the US dollar used as the transaction currency is 80-90% [44].

The question is whether the relationship between currency exposure and risk as perceived by investors as linear or not. On the one hand, it seems that any kind of exposure to the exchange rate changes poses a risk. Both exporters and importers (or companies with debt denominated in foreign currency) are riskier than companies that are "immune" to currency risk. Therefore, investors should demand a risk premium for that. However, it should not simply be assumed to be the case, especially not the fact that investors demand the same premium for positive and negative currency gain exposure of the same magnitude.

So, to estimate our final model we form 36 portfolios. First, we divide our sample into 3 equal groups by curren-

cy beta plus (exposure to depreciation of currency) and into 3 equal groups by currency beta minus (exposure to appreciation of currency). We intersect these groups and get 9 portfolios. Then each group is divided in two equal ones based on size. Then again, each group is divided in two equal ones based on book-to-market value. Here we do not divide our sample independently because the limited amount of companies available might result in many empty portfolios. The model appears as follows (Model 3):

$$\begin{aligned}&\mathbb{E}\left(r_i - r_f\right) = \beta_i \mathbb{E}\left(r_m - r_f\right) + s_i \mathbb{E}\left(SMB\right) + \\ &+h_i \mathbb{E}\left(HML\right) + ep_i^+ \mathbb{E}\left(PMZ^+\right) + \\ &+ep_i^- \mathbb{E}\left(PMZ^-\right) + en_i^+ \mathbb{E}\left(NMZ^+\right) + \\ &+en_i^- \mathbb{E}\left(NMZ^-\right)\end{aligned}, \quad (11)$$

$$SMB_t = \frac{\sum_{i=1}^{18} r_{it}^{small}}{18} - \frac{\sum_{i=1}^{18} r_{it}^{big}}{18}, \quad (12)$$

$$HML_t = \frac{\sum_{i=1}^{18} r_{it}^{high}}{18} - \frac{\sum_{i=1}^{18} r_{it}^{low}}{18}, \quad (13)$$

$$PMZ_t^+ = \frac{\sum_{i=1}^{12} r_{it}^{positive\ currency\ beta^+}}{12} - \frac{\sum_{i=1}^{12} r_{it}^{zero\ currency\ beta^+}}{12}, \quad (14)$$

$$PMZ_t^- = \frac{\sum_{i=1}^{12} r_{it}^{positive\ currency\ beta^-}}{12} - \frac{\sum_{i=1}^{12} r_{it}^{zero\ currency\ beta^-}}{12}, \quad (15)$$

$$NMZ_t^+ = \frac{\sum_{i=1}^{12} r_{it}^{negative\ currency\ beta^+}}{12} - \frac{\sum_{i=1}^{12} r_{it}^{zero\ currency\ beta^+}}{12}, \quad (16)$$

$$NMZ_t^+ = \frac{\sum_{i=1}^{12} r_{it}^{negative\ currency\ beta^-}}{12} - \frac{\sum_{i=1}^{12} r_{it}^{zero\ currency\ beta^-}}{12}, \quad (17)$$

Next we construct 18 new portfolios to calculate the dependent variable for the estimation of Model 3. First, we divide the sample into 3 equal groups based on the value of currency beta plus (exposure to depreciation of exchange rate) and 3 equal groups depending on the value of currency beta minus (exposure to appreciation of exchange rate). Then we intersect these groups to get 9 portfolios. Then again, each of 9 groups is divided into 2 equal parts depending on book-to-market value. Overall, there are 18 portfolios and their returns are used as a dependent variable series in estimation of Model 3.

To estimate each model, we use Fama-MacBeth procedure with a rolling window. To account for resulting autocorrelation we calculate Newey-West standard errors. The first step is to run a time-series regression for each portfolio used to calculate dependent variable. This regression is run over 115 observations (approximately two years):

$$\begin{aligned}&\left(r_i - r_f\right)_t = \delta_i + \beta_i \left(r_m - r_f\right)_t + s_i SMB_t + \\ &+h_i HML_t + \sum_{m=1}^{M} e_{mi} CF_{mt} + \vartheta_{it}\end{aligned}, \quad (18)$$

where $\left(r_i - r_f\right)_t$ is excess return on portfolio i over week t, $\left(r_m - r_f\right)_t$ is excess return on market portfolio over week t, SMB_t is SMB risk factor calculated before for week t, HML_t is HML risk factor calculated before for week t, CF_{mt} is currency risk factor number m calculated before for week t. The amount of currency risk factors and their meaning depend on the type of model that we estimate.

We estimate a system of 20 equations (18 in the case of Model 3), which take form (18) together, using a seemingly unrelated regression estimation method. Then the window is shifted by one week.

Overall, we get 251 estimates for each coefficient of each portfolio and use them in the second step. Here, for each window k we run a cross-section regression (overall 251 regressions):

$$\begin{aligned}&\overline{\left(r_i - r_f\right)_k} = \mu_k + \widehat{\beta}_{i\,k} \gamma_k^{MRP} + \widehat{s}_{i\,k} \gamma_k^{SMB} + \\ &+\widehat{h}_{i\,k} \gamma_k^{HML} + \sum_{m=1}^{M} \widehat{e_{mi\,k}} \gamma_k^m + \eta_{ik}\end{aligned}, \quad (19)$$

where $\overline{\left(r_i - r_f\right)_k}$ is excess return of portfolio i averaged over window k, $\gamma_k^{MRP}, \gamma_k^{SMB}, \gamma_k^{HML}, \gamma_k^1, \ldots, \gamma_k^M$ are correspondingly market, size, value and currency risk premia to be estimated.

Finally, we average estimates of premia from the previous step and check them for significance (using Newey-West standard errors).

Data and sample

In this research, we use company level data on firms which are traded in capital markets of Brazil, Russia, India and South Africa. All the data is obtained from Thomson Reuters Datastream. The research covers a period from July 2009 to June 2016. We do not use data from before then because in Russia and Brazil prior to July 2008 there were not enough liquid nonfinancial companies with all information that we need. The period from July 2008 to June 2009 is excluded because market indices were falling sharply during this period, which might affect the reliability of our results. Let us consider the data in table 1, which reports the amount of liquid companies in Russia, Brazil, India and South Africa. In Russia 117 liquid companies are included in the estimation sample for 2015, in Brazil – 116, in India – 303, and in South Africa – 128. The stock market of India is more developed and the number of stocks available for analysis is higher there. Also, table A1 presents a sectoral breakdown of Russia's liquid companies during the entire period from 2009 to 2015. The largest number of liquid companies in Russia's sectoral background for 2015 are 'basic materials' followed by 'utilities', and then 'industrials'. Table A2 presents a breakdown of Brazil's liquid companies during the period from 2009 to 2015. The largest number of liquid companies in Brazil's sectoral background are those of 'consumer goods', followed by 'industrials', then 'consumer services'. Table A3 presents a breakdown of India's liquid companies during the entire period from 2009 to 2015. The largest number of liquid companies in India's sectoral background are 'industrials', followed by 'consumer goods', and then 'basic materials'. Table A4 presents breakdown of South Africa's liquid companies during the entire period from 2009 to 2015. The largest number of liquid companies in South Africa's sectoral background are 'industrials', followed by 'basic materials', and then 'consumer services'.

Table 1. Liquid companies in Russia, Brazil, India and South Africa in 2015

Industry/Country	Russia		Brazil		India		South Africa	
	Number of securities	% of total	Number of securities	% of total	Number of securities	% of total	Number of securities	% of total
Oil & Gas	11	9%	9	8%	13	4%	4	3%
Basic Materials	32	27%	11	9%	46	15%	26	20%
Industrials	18	15%	22	19%	81	27%	44	34%
Consumer Goods	6	5%	28	24%	71	23%	13	10%
Health Care	5	4%	6	5%	30	10%	5	4%
Consumer Services	9	8%	18	16%	19	6%	21	16%
Telecommunications	6	5%	4	3%	5	2%	5	4%
Utilities	29	25%	16	14%	17	6%	0	0%
Technology	1	1%	2	2%	21	7%	10	8%
Total	117	100%	116	100%	303	100%	128	100%

Source: Thomson Reuters Datastream and authors' own calculations.

Table 2. Periods at the beginning of which portfolios are reformed

Period	Start	End
1	29.06.09	27.06.10
2	28.06.10	26.06.11
3	27.06.11	24.06.12
4	25.06.12	23.06.13
5	24.06.13	29.06.14
6	30.06.14	28.06.15
7	29.06.15	26.06.16

So, we have seven periods each starting from the last Monday of June. At the beginning of each period, we form portfolios used to calculate dependent and explanatory variables. The end of June is chosen as a starting point because at this moment all public companies manage to publish their annual reports and information from these reports is reflected in the prices of companies' shares. We use an equal-weighted portfolio approach for our estimations.

The yield-to-maturity for 3-month government bonds serves as a proxy for a risk-free rate. Market indices are used as proxies for market portfolios. In the case of Russia it is the MICEX index, in Brazil the BOVESPA index, in India the NIFTY 50, and in South Africa the FTSE/JSE All Shares index.

Before forming portfolios we need to select nonfinancial companies which are liquid enough during the period of interest. A company is considered to be liquid if during the period of interest it is traded on average at least two times a week and the average weekly trading value is at least 5 million Russian rubles (274 thousand Brazilian reals, 1.1 million South African rands, 4.9 million Indian rupiahs) as per July 2015 – June 2016 prices.

Empirical Results

The results of the estimation for Russia, Brazil, India and South Africa are presented in Tables 3, 4, 5 and 6, respectively. In general, in all tables the premiums of standard factors (market risk premium, size premium, and growth / value premium) are estimated imprecisely with this set of base assets. Ang shows that market risk premiums, size premiums and growth/value premiums might be insignificant during some periods [45].

In the case of Russia, a currency risk premium for positive exposure to depreciation of currency (exporters) is positive and significant in model 3. This is something one would naturally expect. Being exposed to currency movements, exporters are riskier than firms with no exposure and investors require a risk premium for that. What one would not expect is a negative risk premium attached for negative exposure to depreciation of the national currency. Negative exposure means that a company is an importer or has debt denominated in foreign currency. In addition, there is a significant negative risk premium for positive exposure of exporters to currency appreciation. Note that in both cases a company has a negative risk premium for exposure to unfavourable movements of exchange rate.

Table 3. Estimation results for Russia

	Model 1	Model 2	Model 3
Market risk premium ($r_m - r_f$)	0.00220	0.00610	-0.00010
	(2.0362)	(3.6601)	(12.6863)
Size premium (SMB)	0.00160	-0.00150	0.00130
	(0.7511)	(1.0686)	(0.7853)
Growth/value premium (HML)	-0.00040	0.00020	0.00050
	(0.2207)	(0.2638)	(0.2386)
Currency premia			
EMZ	0.00150		
	(0.1848)		
PMZ		0.00100	
		(0.3167)	
NMZ		0.00370	
		(0.6989)	
PMZ^+			0.0036***
			(0.2392)
PMZ^-			-0.00070
			(0.1844)
NMZ^+			0.00000
			(0.325)
NMZ^-			0.00150
			(0.2722)
Intercept	0.00100	-0.00140	0.00300
	(1.0233)	(1.8674)	(7.8789)

Note: Table reports risk premia. The first figure corresponds to weekly risk premium and the second one (separated by a slash, "/") corresponds to an annual risk premium. Figures in brackets are Newey-West standard errors. "***" determines coefficients which are significant at a 1% significance level, "**" – at a 5% significance level,"*" – at a 10% confidence level.

Table 4. Estimation results for Brazil

	Model 1	Model 2	Model 3
Market risk premium ($r_m - r_f$)	-0.00370	0.00620	-0.00410
	(9.972)	(18.8101)	(11.5672)
Size premium (SMB)	0.00120	-0.00040	0.00160
	(0.474)	(0.5855)	(0.6428)
Growth/value premium (HML)	-0.00040	0.00090	-0.00290
	(0.1186)	(0.2013)	(0.209)
Currency premia			
EMZ	-0.0016**		
	(0.0971)		
PMZ		-0.0023*	
		(0.2342)	
NMZ		-0.0031*	
		(0.3913)	
PMZ^+			0.00370
			(1.0031)
PMZ^-			0.00140
			(0.9099)
NMZ^+			-0.00230
			(1.4524)
NMZ^-			-0.00020
			(1.7032)
Intercept	0.00240	0.00060	0.00260
	(0.5459)	(1.1319)	(0.6228)

Note: Table reports risk premia. The first figure corresponds to weekly risk premium and the second one (separated by slash, "/") corresponds to annual risk premium. Figures in brackets are Newey-West standard errors. "***" determines coefficients which are significant at 1% significance level, "**" – at 5% significance level,"*" – at 10% confidence level.

In the case of Brazil, currency risk premiums based on currency gains value are negative and significant in both specifications (Model 1 and 2). It seems that investors require a lower expected return from companies which report nonzero currency gains. As we discussed previously, this might lead to expected return decreasing as uncertainty increases.

In the case of India different types of currency risk premia have different signs. Similarly to Russian stock market, the sign of a risk premium depends on whether the company wins or loses from exchange rate change. If the company is highly exposed to favourable changes in exchange rate, investors demand a substantial risk premia (0.29% per week if company is positively exposed to appreciation of currency, i.e. it is an exporter, and 0.27% per week if the company is negatively exposed to depreciation of national currency, i.e. it is an importer or has debt denominated in foreign currency). Being exposed to unfavourable exchange rate change leads to a lower expected return (-0.11% per week if the company is negatively exposed to appreciation of currency).

Table 5. Estimation results for India

	Model 1	Model 2	Model 3
Market risk premium ($r_m - r_f$)	-0.00170	0.00920	0.01930
	(1.6508)	(14.319)	(3.4055)
Size premium (SMB)	0.00290	0.00120	0.00010
	(0.3856)	(0.8152)	(0.3721)
Growth premium (HML)	0.00080	0.00150	0.00160
	(0.2157)	(0.26)	(0.2446)
Currency premia			
EMZ	-0.00090		
	(0.136)		
PMZ		-0.00220	
		(0.2656)	
NMZ		0.00110	
		(0.559)	
PMZ^+			-0.00070
			(0.0487)
PMZ^-			0.003**
			(0.2752)
NMZ^+			0.0027*
			(0.2947)
NMZ^-			-0.0011*
			(0.0554)
Intercept	0.0039*	-0.00350	-0.0096***
	(0.6307)	(5.8535)	(1.4841)

Note: Table reports risk premia. The first figure corresponds to weekly risk premium and the second one (separated by slash, "/") corresponds to annual risk premium. Figures in brackets are Newey-West standard errors. "***" determines coefficients which are significant at 1% significance level, "**" – at 5% significance level,"*" – at 10% confidence level.

In the case of South Africa, the currency risk premium based on currency gains to sales ratio is significantly negative. Separating companies with positive and negative currency gains does not change this result.

Moving to model 3, being exposed to currency depreciation leads to paying a significantly positive risk premium (0.147% in case of positive exposure). Risk premium for positive exposure to appreciation of domestic currency is insignificant, indicating that investors do not require a risk premium in this case. Having negative exposure to currency appreciation leads to paying a lower required return on equity.

Table 6. Estimation results for South Africa

	Model 1	Model 2	Model 3
Market risk premium ($r_m - r_f$)	-0.00170	-0.00310	-0.00570
	(0.9243)	(0.9888)	(3.0274)
Size premium (SMB)	0.00080	0.00250	0.00040
	(0.9269)	(0.478)	(0.5568)
Growth premium (HML)	0.00000	-0.00190	0.00020
	(0.1769)	(0.356)	(0.1747)
Currency premia			
EMZ	-0.0019*		
	(0.1551)		
PMZ		-0.0031***	
		(0.1826)	
NMZ		-0.00270	
		(0.3869)	
PMZ^+			0.0015**
			(0.0769)
PMZ^-			0.00000
			(0.0743)
NMZ^+			0.00030
			(0.0767)
NMZ^-			-0.00060
			(0.0807)
Intercept	0.0033**	0.0042***	0.0063***
	(0.3381)	(0.3815)	(0.8694)

Note: Table reports risk premia. The first figure corresponds to weekly risk premium and the second one (separated by slash, "/") corresponds to annual risk premium. Figures in brackets are Newey-West standard errors. "***" determines coefficients which are significant at 1% significance level, "**" – at 5% significance level,"*" – at 10% confidence level

Comparing the results which we obtained for different countries, firstly, it should be noted that when we proxy currency risk by currency gains-to-sales ratio, we obtain qualitatively different results for Russia and for three other countries. In Russia, if the company publishes negative or positive currency gains, it pays a higher positive return on equity. However, only a currency risk premium for positive exposure to depreciation of currency is significant in model 3. Similar results were received for South Africa. There is a significant currency risk premium for positive exposure to depreciation of currency in model 3. It is inadvisable to directly compare results for India and South Africa, though, because in India currency risk premiums in model 1 and 2 are not significant.

In Brazil, India and South Africa, firms with highly positive or negative currency gains face negative currency risk premia. Such a difference can be explained by the fact that during recent years Russia faced the most substantial currency depreciation among the countries analysed in this research. Since November 2014 when the Central Bank of Russia introduced the floating exchange rate regime, the volatility of domestic currency against the US dollar

increased significantly [46]. This change was initially perceived by businesses as a negative one since it makes results of international trade operations more uncertain and complicates doing business in general by increasing macroeconomic uncertainty [47]. Such events might be behind the substantially different attitude of investors towards currency risk.

Also, the difference between currency risk premiums in Russia, Brazil, India and South Africa can be explained by the difference in the exports of goods too. The following export product groups represent the highest dollar value in Russian global shipments in 2015: 'crude oil' (62.84%), 'metals' (9.6%), and 'chemicals' (5.23%) products. Brazil's exports are largely made up of 'vegetables' (18.73%), 'food products' (11.69%) and 'minerals' (9.11%). India's export of goods display the familiar pattern of significant proportions of 'stone and glass' (15.67%), 'textiles and clothing' (14.06%), 'chemicals' (12.38%) and 'fuels' (11.87%). South Africa's export of goods show the biggest share of total in 'metals' (12.19%), 'minerals' (10.98%), 'stone and glass' (17.64%), and 'fuels' (9.73%). So, we can explain similar estimation results in Russia and South Africa for model 3, and in Brazil and South Africa for models 1 and 2. We can also assume, based on data from table 7 that the mining industry is making a major contribution in product exports by Russia, Brazil and South Africa.

Table 7. Product Exports by Russia, Brazil, India and South Africa in 2015

Product group	Russia		Brazil		India		South Africa	
	US $ billion	% of total	US $ billion	% of total	US $ billion	% of total	US $ billion	% of total
Animal	3.21	0.93%	14.48	7.58%	9.36	3.54%	1.05	1.31%
Chemicals	17.97	5.23%	9.91	5.19%	32.72	12.38%	5.19	6.46%
Food Products	4.15	1.21%	22.34	11.69%	5.67	2.15%	3.50	4.35%
Footwear	0.17	0.05%	1.12	0.59%	3.11	1.18%	0.22	0.28%
Fuels	216.10	62.84%	13.75	7.19%	31.39	11.87%	7.81	9.73%
Hides and Skins	0.31	0.09%	2.37	1.24%	3.52	1.33%	0.39	0.48%
Mach and Elec	12.13	3.53%	15.01	7.85%	21.17	8.01%	7.88	9.82%
Metals	33.01	9.60%	15.27	7.99%	21.24	8.03%	9.79	12.19%
Minerals	3.06	0.89%	17.40	9.11%	2.44	0.92%	8.81	10.98%
Miscellaneous	14.08	4.09%	5.23	2.73%	7.12	2.69%	1.85	2.30%
Plastic or Rubber	4.80	1.40%	5.13	2.68%	7.42	2.81%	1.72	2.14%
Stone and Glass	8.89	2.59%	4.67	2.45%	41.42	15.67%	14.16	17.64%
Textiles and Clothing	0.68	0.20%	2.38	1.24%	37.16	14.06%	1.17	1.46%
Transportation	6.46	1.88%	16.24	8.50%	22.01	8.33%	10.22	12.73%
Vegetable	8.83	2.57%	35.79	18.73%	16.75	6.34%	4.37	5.45%
Wood	10.03	2.92%	10.03	5.25%	1.86	0.70%	2.14	2.67%
Total	343.91	100.00%	191.13	100.00%	264.38	100.00%	80.27	100.00%

Source: UN Comtrade and authors' own calculations.

As for the currency risk premia estimated using covariance between stock returns and currency value changes, no global picture emerges from our analysis. Such results might be interpreted as evidence of the complexity of currency risk impact on cost of equity, which represents one of the arguments in favour of exchange rate risk hedging.

Conclusion

This paper is dedicated to the estimation of currency risk premium in the stock markets of BRICS countries, (excluding China due to recent heavy market regulation). Generally, there are two channels through which currency movements affect the amount of cash flows of firms and, hence, their riskiness. The first one is indicated by the business operations of firms (export, import, producing abroad), and the second one is the value of assets and liabilities of firms. Both firms with international business operations and completely domestic firms are exposed to currency risk.

However, the exchange rate exposure of firms does not necessarily mean that currency risk is priced by investors. Generally, there are two classes of models which incorporate currency risk: CAPM-style models (mainly international CAPMs) and factor models (mainly the

Fama-French Three Factor model or the Carhart Four Factor Model with a currency risk factor, though rarely an APT model).

In this research we tested different specifications of asset pricing models, which are based on the Fama-French Three Factor model, and extended by adding several risk factors. In the study we used a portfolio approach and the Fama-MacBeth procedure with rolling window estimation. Given the limitations of data for the emerging markets studied, we used two methods to construct a currency risk factor. The first one is based on a currency gains-to-sales ratio, which companies publish in annual financial reports, and the second one is based on the magnitude of covariance between stocks returns and currency returns.

We conclude that currency risk is indeed priced and significantly impacts the cost of equity of a company in Brazil, Russia, India and South Africa. In Russia, investors demand a higher expected return on equity from companies which report substantial negative currency gains. In Brazil, India and South Africa both positive and negative currency gains are associated with lower expected return. In this case, higher uncertainty might mean lower expected returns.

Examining the difference between companies for which returns positively or negatively covary with exchange rate fluctuations, we find that in Russia companies which are positively exposed to the depreciation of a currency (for example, exporters) pay a positive risk premium. At the same time, firms which are substantially exposed to unfavourable (for them) currency movements have lower expected returns on equity than firms which are not exposed to changes of exchange rate. In India, we find the opposite evidence: companies with exposure to unfavourable movements of currency pay a positive risk premium while firms with exposure to favourable exchange rate changes face a negative risk premium.

In Brazil, the situation is different. In the case of exposure to depreciation of currency, both companies with positive and negative exposure have to pay a risk premium to investors. The evidence from South Africa is similar. In case of South African companies we find significantly positive risk premium for exposure to depreciation of currency.

So, we can identify similar estimation results in Russia and South Africa for model 3 and in Brazil and South Africa for model 1 and 2. We can also assume that the mining industry makes a major contribution in product exports by Russia, Brazil and South Africa.

Overall, we find consistent evidence in favour of the fact that currency risk is a significant factor that influences the cost of equity capital of a company. However, the exact impact of exchange rate risk on the cost of equity can be substantially different in various cases. The implied complexity of the relationship between currency risk and the cost of equity is one of the strongest arguments in favour exchange rate hedging of companies.

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Appendix

Table A1. Liquid companies in Russia

Industry /Start year	2009	2010	2011	2012	2013	2014	2015
Oil & Gas	13	15	15	15	16	14	11
Basic Materials	24	33	31	33	28	29	32
Industrials	12	18	17	14	15	15	18
Consumer Goods	11	14	11	10	9	9	6
Health Care	2	3	5	4	5	3	5
Consumer Services	8	12	12	14	10	9	9
Telecommunications	9	12	7	5	5	5	6
Utilities	43	55	47	33	29	27	29
Technology	1	3	1	1	1	1	1
Total	123	165	146	129	118	112	117

Source: Thomson Reuters Datastream authors' calculations.

Table A2. Liquid companies in Brazil

Industry /Start year	2009	2010	2011	2012	2013	2014	2015
Oil & Gas	5	5	7	8	10	10	9
Basic Materials	12	11	12	9	10	12	11
Industrials	16	13	23	21	20	23	22
Consumer Goods	21	24	29	31	33	33	28
Health Care	5	5	7	7	6	5	6
Consumer Services	5	6	8	10	18	17	18
Telecommunications	5	4	4	1	4	3	4
Utilities	11	10	12	11	10	14	16
Technology	2	2	3	2	2	3	2
Total	**82**	**80**	**105**	**100**	**113**	**120**	**116**

Source: Thomson Reuters Datastream and authors' calculations.

Table A3. Liquid companies in India

Industry /Start year	2009	2010	2011	2012	2013	2014	2015
Oil & Gas	11	12	12	11	12	12	13
Basic Materials	43	42	44	45	45	45	46
Industrials	75	78	80	81	82	81	81
Consumer Goods	65	67	66	65	66	70	71
Health Care	30	30	29	30	30	30	30
Consumer Services	16	19	19	19	19	18	19
Telecommunications	4	4	4	4	5	5	5
Utilities	11	16	16	16	15	16	17
Technology	20	20	19	19	21	21	21
Total	**275**	**288**	**289**	**290**	**295**	**298**	**303**

Source: Thomson Reuters Datastream and authors' calculations.

Table A4. Liquid companies in South Africa

Industry /Start year	2009	2010	2011	2012	2013	2014	2015
Oil & Gas	1	2	2	2	2	2	4
Basic Materials	28	30	31	28	29	29	26
Industrials	41	45	42	41	44	45	44
Consumer Goods	12	12	13	11	13	14	13
Health Care	3	4	4	4	3	5	5
Consumer Services	19	21	21	21	21	21	21
Telecommunications	4	4	3	4	4	5	5
Utilities	0	0	0	0	0	0	0
Technology	8	7	7	8	12	11	10
Total	116	125	123	119	128	132	128

Source: Thomson Reuters Datastream and authors' calculations.

Table A5. Product Exports by Russia in billion US dollars

Product group / year	2009	2010	2011	2012	2013	2014	2015
Animal	1.982	2.317	2.566	2.923	3.326	3.391	3.215
Chemicals	11.428	14.957	20.373	22.865	21.388	21.251	17.974
Food Products	2.394	1.833	2.354	4.139	4.946	5.186	4.152
Footwear	0.033	0.029	0.036	0.113	0.168	0.236	0.168
Fuels	190.171	260.668	346.530	368.853	372.036	346.119	216.101
Hides and Skins	0.207	0.259	0.331	0.503	0.609	0.416	0.309
Mach and Elec	8.200	7.796	8.635	12.169	13.843	14.184	12.134
Metals	32.071	38.535	42.921	44.405	40.846	40.429	33.014
Minerals	2.050	3.031	5.396	5.615	5.044	4.697	3.061
Miscellaneous	32.002	44.416	57.619	14.926	15.605	13.912	14.082
Plastic or Rubber	3.136	4.005	5.447	6.052	6.360	5.701	4.803
Stone and Glass	1.969	3.292	4.426	15.059	15.654	13.136	8.895
Textiles and Clothing	0.362	0.337	0.402	0.645	0.761	0.855	0.681
Transportation	2.715	3.195	3.183	6.542	7.563	6.012	6.459
Vegetable	4.908	3.417	6.427	9.683	7.972	10.430	8.826
Wood	8.168	8.981	10.346	10.273	11.145	11.878	10.035
Total	301.796	397.068	516.993	524.766	527.266	497.834	343.908

Source: UN Comtrade and authors' calculations.

Table A6. Product Exports by Brazil in billion US dollars

Product group / year	2009	2010	2011	2012	2013	2014	2015
Animal	11.225	13.526	15.215	15.363	16.631	17.528	14.483
Chemicals	8.077	10.222	12.180	11.498	11.087	11.431	9.914
Food Products	22.854	27.057	31.787	31.226	30.277	26.013	22.341
Footwear	1.481	1.653	1.504	1.292	1.269	1.244	1.119
Fuels	13.658	19.844	26.791	26.469	17.822	20.650	13.748
Hides and Skins	1.287	1.866	2.160	2.180	2.607	3.050	2.372
Mach and Elec	13.326	16.217	19.225	18.805	17.491	16.944	15.010
Metals	12.259	14.412	18.941	17.240	14.805	16.129	15.266
Minerals	15.052	31.558	44.994	34.012	35.883	29.186	17.405
Miscellaneous	4.859	6.024	7.497	8.191	7.200	7.211	5.226
Plastic or Rubber	4.452	5.342	6.611	6.113	5.608	5.533	5.128
Stone and Glass	3.142	3.954	4.685	4.957	5.128	4.754	4.674
Textiles and Clothing	1.896	2.265	3.013	3.397	2.376	2.545	2.379
Transportation	13.003	17.273	19.575	19.436	26.574	16.139	16.243
Vegetable	19.699	21.962	32.709	33.726	38.014	37.182	35.792
Wood	6.726	8.740	9.151	8.673	9.260	9.560	10.027
Total	152.995	201.915	256.039	242.578	242.033	225.098	191.127

Source: UN Comtrade and authors' calculations.

Table A7. Product Exports by India in billion US dollars

Product group / year	2009	2010	2011	2012	2013	2014	2015
Animal	2.840	4.262	6.328	6.869	10.265	11.046	9.358
Chemicals	17.057	22.121	27.074	31.046	34.856	33.389	32.722
Food Products	3.786	5.303	7.255	7.525	8.098	6.528	5.672
Footwear	1.693	1.867	2.343	2.288	3.020	3.316	3.114
Fuels	24.022	37.984	56.557	54.381	69.571	62.349	31.394
Hides and Skins	1.980	2.237	3.040	3.111	3.863	3.914	3.524
Mach and Elec	16.785	16.849	22.492	21.826	24.361	22.594	21.165
Metals	12.391	21.937	21.199	22.078	25.476	25.585	21.239
Minerals	6.854	8.042	6.518	4.928	4.426	3.347	2.444
Miscellaneous	10.163	7.146	17.528	6.597	9.720	5.704	7.116
Plastic or Rubber	3.579	5.314	8.065	7.715	9.273	8.266	7.422
Stone and Glass	33.980	34.136	51.968	45.218	46.794	43.581	41.418
Textiles and Clothing	21.913	27.128	33.374	32.683	40.191	38.598	37.162
Transportation	10.612	15.101	19.766	18.231	21.729	25.900	22.014
Vegetable	8.204	9.811	16.506	23.534	23.108	21.620	16.754
Wood	0.908	1.171	1.472	1.534	1.859	1.808	1.862
Total	176.765	220.408	301.483	289.565	336.611	317.545	264.381

Source: UN Comtrade and authors' calculations.

Table A8. Product Exports by South Africa in billion US dollars

Product group / year	2009	2010	2011	2012	2013	2014	2015
Animal	0.626	1.058	1.041	0.974	0.975	1.114	1.051
Chemicals	3.432	5.138	6.095	5.890	5.642	5.718	5.185
Food Products	2.412	3.702	3.761	3.756	3.948	3.967	3.495
Footwear	0.037	0.209	0.237	0.238	0.244	0.247	0.224
Fuels	6.048	8.883	11.386	11.280	10.154	9.404	7.808
Hides and Skins	0.157	0.248	0.333	0.322	0.480	0.441	0.388
Mach and Elec	5.267	8.041	9.667	9.573	8.980	9.103	7.882
Metals	8.808	13.443	13.903	12.127	11.631	11.987	9.786
Minerals	6.145	10.320	14.913	13.375	14.159	12.354	8.814
Miscellaneous	0.970	1.698	1.835	1.694	1.621	1.776	1.845
Plastic or Rubber	1.050	1.754	2.118	2.291	2.105	2.161	1.718
Stone and Glass	8.684	12.234	24.618	19.562	17.974	16.430	14.160
Textiles and Clothing	0.575	1.099	1.318	1.278	1.293	1.256	1.172
Transportation	5.453	8.628	9.547	9.799	9.069	9.646	10.217
Vegetable	2.703	3.821	4.599	4.530	4.733	4.766	4.374
Wood	1.498	2.355	2.586	2.135	2.056	2.220	2.144
Total	53.864	82.631	107.956	98.825	95.063	92.590	80.265

Source: UN Comtrade and authors' calculations.

Bankruptcy Risk Assessment in Corporate Lending Based on Hybrid Neural Networks and Fuzzy Models

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Bankruptcy Risk Assessment in Corporate Lending Based on Hybrid Neural Networks and Fuzzy Models

Abstract

The purpose of this article is the presentation of a novel and unconventional algorithm for bankruptcy risk management in banking technologies catered towards lending to legal entities (enterprises and companies). The challenges of assessing risk in this area primarily relate to the reduction of type I and type II errors when making decisions on the terms of lending (i.e. loan amounts and repayment parameters) on the ostensibly objective basis of a borrower's creditworthiness assessment.

As such, it is necessary to use a unified procedure to select appropriate economic indicators for any bankruptcy model in order to reduce the high degree of uncertainty and noisiness of publicly available databases, and to take into consideration the specific character of knowledge-intensive, high-tech and "green" manufacturing. In order to approach this challenge, a mix of various methods is presented in this article, including credit scoring, neural simulation, a fuzzy model description, fuzzy inference rules, and a fuzzy Pospelov scale.

The research results are as follows: the authors have developed an unconventional algorithm for diagnosing corporate bankruptcy stages. This algorithm is based on the application of a system-wide law relating to decreases in integrated system entropy, contrasted with the sum of entropies of the relevant collated subsystems. This algorithm has been tested on a series of experimental observations of 30 agricultural enterprises in the Sterlitamak District of the Republic of Bashkortostan. We have thusly assessed the financial condition of borrowing companies, while controlling for the probability of a wide range of indicators.

Using this algorithm, the authors decided not to apply the rigorous requirements of the classical 'least squares' method used in regression analyses. A switch to a neural simulation approach in this algorithm necessitated an evaluation of the adequacy of the obtained model on the basis of a Bayesian approach. On the basis of this research, the authors propose that a regularisation of bankruptcy models has been achieved.

Keywords: eype I and II errors, lending risks, scoring models, neural network, fuzzy Pospelov pentascale

JEL classification: C45, C58, G17, G33

Introduction

In loan transactions and subsequent operations (e.g. loan restructuring and management), if a legal entity is unable to repay the whole amount of the loan within the period stipulated in the agreement, accurate information regarding the stages of the borrower's potential bankruptcy may be of great importance. Such information could be obtained from mathematical bankruptcy models developed on the basis of standard accounting reports. Here one encounters the following problems:

1) an absence of a common or unified method of economic indicator (factors) selection for the bankruptcy model;
2) a high degree of uncertainty and noisiness in publicly available databases, preconditioned by the fact that in some cases it is to the borrower's advantage to "paint in bright colours" its financial and economic performance in the standard accounting reports (such unreliable databases are described by some model builders with reference to an "in-factors triad": that is, the presence of incertitude, inaccuracy, and incompleteness);
3) due to the rapid development of knowledge-intensive, high-tech and "green" manufacturing, the engineering and financial/economic processes of various enterprises acquire a specific corporate character which may prove useful in the identification of the company's status. This character is not fully described in the accounting standards, which can account for the development of the conditions where the abovementioned in-factors triad is characteristic of the available data.

In view of the above problems, the authors are motivated to develop suitable procedures to help solve the problems in assessment of bankruptcy risk for corporations and companies in Russia as well as abroad. Three primary approaches towards this development are described in the present article:

1) The integration of various methodological approaches into one algorithm, which, in accordance with the system-wide law of integrated system entropy decrease (resulting from the integration of interacting subsystems) initiates an emergent effect which improves algorithm [1]:

$$I(A_1, A_2) - I(A_1) - I(A_2) = \Delta I(A_1, A_2) > 0, \quad (1)$$

where A_1, A_2 refer to subsystems to be integrated; $I(A_1)$, $I(A_2)$ refer to the entropy of isolated subsystems which do not exchange information and material flow; $I(A_1,A_2)$ represents the entropy of an integrated system which is less than the sum of entropies of subsystems A_1, A_2 as a result emergence of additional links, and hence a reduction of the number of acceptable states of the integrated system (A_1, A_2); and $\Delta I(A_1, A_2)$ refers to useful information generated by integration (negentropy). The addition of such useful a priori information facilitates narrowing the scope of the search for solutions of ill-conditioned inverse problems of data interpretation (approximation), and hence the sought-after regularisation in approach [2].

2) The introduction in the bankruptcy model of qualitative factors along with quantitative ones, for example, on the basis of a fuzzy model methodology, and inference rules [3, 4].
3) The presence of attempts to assess the stages of advancing crisis in the bankruptcy model for companies and corporations and, when possible, attempts to make a time forecast of the bankruptcy stages for a specific instant in time t_0. The term "when possible" is used here because dynamic bankruptcy models with a continuous time variable t have not yet been developed in practice.

We know two method groups which, according to one effectiveness measure or another (e.g. by reference to the share of type I or type II errors in the bankruptcy risk assessment), prove to be functional in the model in trying circumstances of model building described above. These groups are:

- fuzzy model description and fuzzy inference rules methods;
- neural simulation methods.

The present article generalises and develops bankruptcy models [1] on the basis of the system law of entropy balance exemplified by correlation (1), and offers an unconventional algorithm by combining the neural network method for bankruptcy prediction with a fuzzy bankruptcy stage assessment method.

Review of Literature

W.Beaver [5] is considered to have provided the foundation research in this particular area. He was looking for a way to create a unique methodology for bankruptcy risk assessment on the basis of companies' financial indicators. The basic premise of his research in this sphere was the idea that company insolvency may be assessed on the basis of the cash flow model.

From the beginning, Beaver's method comprised an analysis of 14 indicators, but eventually the list was shortened to the following six:

- ratio of cash flow to the total debt amount;
- liquidity ratio;
- ratio of net profit to total assets;
- ratio of liabilities to total assets;
- ratio of working capital to total assets;
- the difference between current assets and liabilities.

By comparing values obtained for companies which have undergone bankruptcy procedures and those which have not faced financial difficulties, Beaver identified the following regularity: for five years before bankruptcy, the mean values of the above six indicators declined significantly in subcritical companies, while they have stayed unchanged in reliable companies.

Bayes also identified the optimal values for each parameter he studied by minimising type I and II errors. Thus, in his approach, the indicators of a particular company are compared to guideline values and a conclusion is made on the enterprise's financial stability and bankruptcy probability in various time horizons (e.g. between one year and five years).

It should be noted that this method holds a unique position in the financial science, as Beaver was among the first to offer an accessible approach to the use of financial indicators for bankruptcy prediction. Not least among the benefits of this approach are its simplicity, and the fact that by using it the author managed to correctly predict bankruptcy in 78% of cases.

However, a range of restrictions in such an approach should also be noted. First, the indicators in various countries and industries may differ distinctly, as well as the indicators for the companies at different life cycle stages. Second, some indicators may be of more importance than others when predicting bankruptcy, depending of course on the individual company.

E. Altman [6] improved Beaver's approach. He applied a multivariate discriminant analysis to a selection of industrial companies, half of which had undergone bankruptcy procedures. Consequently, when comparing the values of the selected indicators for sub-selections, Altman obtained critical values which may be used to place a company into one or another risk group.

According to Altman's methodology the main indicators that influence bankruptcy are as follows:

- ratio of working capital to total assets;
- ratio of undistributed profits to total assets;
- ratio of operating income to total assets;
- share of the market value of equity in the overall liabilities;
- ratio of revenue to total assets.

In Altman's approach, each indicator is assigned a certain value which is included in the general assessment (*Z-score*) of a company's financial standing. On the basis of the absolute value of the obtained assessment, a conclusion is made about the company's reliability. The results of E. Altman's approach turned out to be more impressive in comparison with Beaver's method, because it was revealed to predict bankruptcy in 90% of cases.

The drawback of this approach is that it is difficult to apply it to companies whose shares are not quoted on securities markets, as well as for companies from non-production sectors. It should, however, be noted that later Altman developed a modification of the initial model which helped to assess bankruptcy probability for non-public companies and non-production enterprises.

E. Deakin [7] offered to combine Beaver's and Altman's approaches. He analysed a series of British companies which had undergone bankruptcy in the latter half of 1960s. Deakin sought to utilise the 14 financial indicators offered by Beaver, and he also used the multivariate discriminant analysis method in a similar way to Altman. This model predicted over 90% of corporate bankruptcies. The importance of the research consists in the fact that for the first time it showed the influence of the type of independent variables distribution. Deakin was the first to raise the topic of the necessity of normal distribution of independent variables in order to make a correct prediction. It had been previously ignored.

In subsequent years a series of research papers was published in which the authors stated their variations of the approach offered by Altman. J. Ohlson [8] was among these researchers. He added his own selection of variables into the series used by Altman and was the first to use the logistic regression method in bankruptcy prediction.

His model was comprised of nine variables. In comparison to the *Z-score* model, Ohlson included the company size logarithm, adjusted for inflation. This is due to the fact that small companies may be more exposed to bankruptcy risks. He also added an indicator showing the net profit change. Finally, there are two dummy variables in Ohlson's model which reference whether a company's liabilities exceed its assets and whether the company has been suffering losses for two years in a row.

Ohlson used a selection of 2,163 companies to test this method: 105 enterprises which went into bankruptcy in the period of 1970 to 1976 and 2,058 companies which did not encounter such difficulties. By some estimates, this method predicts companies' insolvency in more than 90% of cases.

The models described above divided enterprises into two groups: bankrupt ones and financially sound ones. L. Gilbert [9] offered an alternative methodology, which divides companies into three groups: reliable companies, failed and liquidated companies, and companies facing financial difficulties which carried on business. The selection for testing the model comprised 304 companies which demonstrated sustainable results between 1974 and 1983, the same number of companies experiencing financial difficulties within the same period and showing a negative net profit for three years, and 76 enterprises liquidated because of their inability to address their financial liabilities. The authors tested two models: the first one used a selection of bankrupt companies, and the second one used data about failed companies which carried on business. In both cases, the financial variables were taken from E. Altman's [6] research.

The empirical verification of the methodology showed rather good results: the precision of the first model was 88.5%, and the second one proved successful in 90.8% of cases. However, after a change in the selection of companies examined (the first model was tested using a selection of surviving companies and bankrupt companies and the second one using bankrupts and reliable companies) the predictive power of the models was reduced significantly, to less than 70%.

The abovementioned approaches to the bankruptcy assessment may be placed into the numerical methods

category. In spite of all the advantages of such models, they may yet leave out a series of qualitative characteristics which are difficult to measure in figures. As such, alternative models are sometimes used which approach financial indicator assessment methodologies from the subjective point of view.

For example, according to one such approach applied in the UK, the following indicators (among others) are assessed:

- a negative cash flow from operations over several consecutive periods;
- the amount of excessive overdue accounts payable;
- too frequent use of short-term financing to fund long-term projects;
- a constant deficit in terms of working capital;
- a steady tendency towards growth of debt in the capital structure.

On the one hand, such an approach takes into consideration the specific character of a certain enterprise and considers the array of factors which influence a company's financial standing. On the other hand, assessment of such parameters may be excessively subjective.

The last decade of the past century may be considered to have set off a fresh wave of papers dedicated to bankruptcy prediction, inasmuch as the researchers started to widely use new statistical and mathematical methods of prediction, in contrast to the first papers on this topic, which predominantly used approaches founded in discriminant analysis.

One of the methods which arguably diversified the researchers' mathematical apparatus was the neural network model – an artificial intelligence approach borrowed from neurobiology. One of the first studies in which the authors applied neural networks towards predicting company bankruptcy was the paper by M. Odom and R. Sharda [10]. In this article, the predictive capability of neural networks is compared to the most widespread method of bankruptcy prediction at the time – the multivariate discriminant analysis. The authors took Altman's papers as a basis of the company selection used for their research and added the data generated by the Monte Carlo method [6]. Variables used by Altman were taken as financial indicators. The authors used different approaches to neural network training and in all cases the results were more accurate than those obtained by the discriminant analysis approaches. The prediction accuracy of neural network models in various specifications reached up to 97%. It is worth emphasising that the neural network models surpassed other methods in accuracy of classification of failed companies, which is considered to be the most complex and important challenge in the field. The authors concluded that that predictive accuracy may be even higher when using a greater number of appropriate exogenous variables.

The use of neural networks to predict bankruptcy was well received by the academic community, and much research was carried out which described various aspects of use of that method for predicting and identifying the various levels of companies' bankruptcy status.

The paper by G. Zhang et al. [11] made a noticeable contribution towards the understanding of the operating principle and the effectiveness of neural networks. The authors of that research compared the effectiveness of the forecasts obtained by using logistic regression and neural network approaches. Various specifications of neural networks were tested during the research and cross-validation of the results was conducted using different data selections. Finally, the authors conclude by extolling the supremacy of the neural networks approach to bankruptcy prediction and the classification of companies as financially sound or potential bankruptcy risks.

With an increase in the number of papers dedicated to bankruptcy, the idea put forth by S. Cho et al. [12] seems logical. The main point of their paper is that the authors tried to improve the quality of obtained forecasts by taking into account the results of several prediction methods at once, in this case the discriminant analysis, logistic regression, neural networks and decision tree approaches. The results of these four methods were the input data for the neural network, which made a forecast on the companies' financial standing. In spite of the unconventional nature of the approach, the authors of this research failed to significantly improve the forecast precision.

Among the latest papers on bankruptcy prediction the article by S. Lee and W. Choi [13] is of interest. They conducted research using a selection of Korean companies. They compared the accuracy of bankruptcy predictions of Korean companies from various economic sectors obtained using artificial neural networks and discriminant analysis. Independent variables were chosen out of 100 financial indicators by *t*-test and correlation analysis. The authors then concluded that neural network forecasts are more accurate than those obtained by the discriminant analysis approach. This result stems from the neural networks' ability to capture in a better way the nonlinear links between independent variables and the fact of bankruptcy. The authors also emphasise that the models built specially for a certain sector give better results than universal models intended for several sectors.

In the majority of papers on corporate bankruptcy, the target of research is American companies. The number of papers analysing companies from Russia and other countries with emerging markets is significantly lower. One among them is the research conducted by E. Fedorova, E. Gilenko and S. Dovzhenko [14]. That paper is distinguished by the fact that its authors applied a multi-stage procedure for the selection of independent variables out of a wide range of financial indicators. Among those indicators are many which have been used before in various bankruptcy prediction models (western and Russian ones), as well as indicators recommended by the Ministry of Finance of the Russian Federation. The selected indicators were used as input data for two specifications of neural networks.

The paper by S.A. Gorbatkov, I.I. Beloliptsev, E.Yu. Makeeva [15] is also noteworthy. They compared the effectiveness of various sets of financial indicators in predicting bankruptcy in Russian companies which belong to the building sector using a neural networks model on the basis of the Bayesian approach.

The biggest number of articles considering corporate bankruptcy prediction in other developing economies is dedicated to Chinese companies, for example, see the research Y. Chen, L. Zhang and L. Zhang [16].

Hybrid Algorithm

This study presents a hybrid algorithm which is based upon the predictive effectiveness of the neural networks model [17]. However, the neural network does not by itself explain how the prediction result has been achieved, or which particular mechanism yields it. On the other hand, a fuzzy model of inference pertaining to the probability of bankruptcy risk uses human-understandable linguistic terms and explains which particular economic indicators (there are 16 of them in the model) reduce (or raise up) the bankruptcy risk for the analysed item. As per the stipulations of systems theory [1], an effective methodological combination induces a synergetic effect, which mutually strengthens the combined methods independently and in tandem.

The authors of the present study propose to divide the problem of solvency assessment of a large selection of enterprises into two sub-problems:

1) a group scoring assessment in the form of clustering (inside the generated clusters the enterprises are considered to be approximately uniform as regards their solvency);
2) an individual in-depth analysis of medium and large "problematic" enterprises following the results of clustering, (and alternatively, an analysis of individual enterprises carefully chosen from the clusters).

After solving both sub-problems, the obtained results are used in our hybrid comprehensive algorithm, which is tailored towards making decisions on lending procedure management, including the final stages of declaring the borrower bankrupt or debt restructuring.

Sub-problem 1 is solved using the universal neural network clusterisers [17] – Kohonen's self organising map. The resulting emergent effect is an opportunity for operational express-evaluation against a relatively large number of small borrowing companies.

Sub-problem 2 is solved by the unconventional hybrid fuzzy neural network algorithm described in detail below. The above-mentioned emergent effect produced by hybridisation consists of a combination of a rather high rate of correct detection of imminent bankruptcy (provided by the predictive neural networks model) and of a transparent mechanism of bankruptcy factor interpretations provided by the fuzzy description in regular terms (and applying Pospelov "grey" scale) [3, 18]. Therewith, anticipatory actions may be used to control the bankruptcy factors.

In the proposed hybrid algorithm, the system concept of entropy reduction in the general system (obtained by combining rationally interacting subsystems in accordance with (1)) is implemented as follows. The neural network predictive model of temporal series for each of the 16 indicators (factors) $\{x_i\}, i = \overline{1, n}$, with the added time factor $t \equiv x_{n+1}$, serves as subsystems of the bankruptcy risk assessment model A_1, while the fuzzy bankruptcy stages detection model serves as A_2. The following characteristics of the emergent (systemic) effect are present in and pertinent to the integrated system (A_1, A_2):

- the obtaining of fuzzy generalised assessments when detecting the bankruptcy stages of an analysed enterprise interpreted in the linguistic terms familiar to a lending expert;
- an opportunity to link the decisions taken in relation to the loan restructuring of the borrowing corporation to the generalised assessment of the bankruptcy stage.

This article considers two modifications of the hybrid algorithm (HA):

1) "a" – which is used in the fuzzy classifier of all indicators of $\{x_i\}, i = \overline{1, n}$ from the selected data;
2) "b" – which is the aggregation of all indicators into one generalised one $\mathrm{F}(x_i)$.

Description of the Proposed Hybrid Algorithm: Modification "a"

This version is based on a variables specification which is comprised of 16 indicators of $\{x_i\}$, $i = \overline{1, n}$ from the article by A.O. Nedosekin [3], which are easily calculated using publicly available accounting reports for PJSC.

Cluster 1 of the model variables specification – "profitability":

R1 – profit margin (ratio of balance sheet profit to sales revenue and non-operating income, %);

R2 – return on assets (ratio of net profit to the average book value of assets, % per quarter);

R3 – return on equity (ratio of net profit to the sum of capital and inventory (after deduction of shares repurchased), net of mission-oriented financing and receipts plus deferred revenue, % per quarter);

R4 – product profitability (ratio of sales profit to sales revenue, %);

R5 – return on current assets (ratio of net profit to the average asset value, % per quarter).

Cluster 2 of the model variables specification – liquidity and solvency:

L1 – quick liquidity ratio (ratio of current assets after deduction of inventory, value added tax on acquired assets and long-term receivables to short-term liabilities (except for deferred revenue), a non-dimensional value);

L2 – inventory cover ratio (ratio of company's own circulating assets, short-term loans and credits, and short-term liabilities, to the average inventory value, %);

P1 – current liquidity ratio (ratio of current assets after deduction of long-term receivables to current liabilities (except for deferred revenue), a non-dimensional value).

Cluster 3 of the model variables specification – economic activity:

A2 – asset turnover (ratio of sales revenue after deduction of value added tax, excise duty and other liabilities to the average asset value, quarterly, a non-dimensional value);

A4 – payables turnover (ratio of sales revenue net of business and management expenses to average accounts payable, quarterly, a non-dimensional value);

A5 – accounts receivable turnover (ratio of sales revenue net of value added tax, excise duty and other liabilities, to accounts receivable as of the end of the reporting period after deduction of the founders' debts as regards contributions to the charter capital as of the end of the reporting period, quarterly, a non-dimensional value);

A6 – inventory turnover (ratio of the cost of price to the average inventory value, quarterly).

Cluster 4 of the model variables specification – financial stability:

F1 – leverage ratio (ratio of long-term liabilities plus short-term liabilities [except for deferred revenue] to capital and inventory [after deduction of shares repurchased] – mission-oriented financing and receipts added to deferred revenue, a non-dimensional value);

F2 – equity-assets ratio (ratio of capital and inventory [after deduction of shares repurchased] – mission-oriented financing and receipts added to deferred revenue – to the sum of non-current and current assets, a non-dimensional value);

F3 – inventory coverage with own circulating assets (ratio of own circulating assets to inventory, a non-dimensional value);

F4 – net fixed assets index (ratio of non-current assets added to accounts receivable to capital and inventory [after deduction of shares repurchased] – mission-oriented financing and receipts added to deferred revenue, a non-dimensional value).

Out of 16 introduced indicators, the values of *F1* and *F4* are inverted in relation to all other parameters because as the quantitative levels of these parameters grow the company's financial standing declines and the bankruptcy risk level grows. Consequently, in order to observe the precondition of unidirectionality of all parameters it is necessary to reconstitute *F*1 and *F*4 as follows:

$$F1 \to F\tilde{1} = 1/F1; F4 \to F\tilde{4} = 1/F4\ . \quad (2)$$

In subsystem A_2 (i.e. the subsystem of the fuzzy model for identifying stages of bankruptcy), the authors used five levels ("granules") of fuzzy terms $T_j, j = \overline{1.5}$ of the bankruptcy risk indicator (these being VH – very high risk; HR – high risk; M - mean risk; L – low risk; and VL – very low risk [e.g. solvent corporations]), in accordance with the pentascale (Fig. 1) which represents an uncontroversial classifier – the Pospelov "grey" scale [1, 18]. This pentascale defines the rule of association (expression) of supports $\{u_i\}, i = \overline{1.16}$ with the considered term-set $\{T_{ji}\}$, where u_i is a crisp number which represents a standardised value for indicators $x_i = R1, R2, \ldots, F4$:

$$u_i = \frac{x_i - x_{i.min}}{x_{i.max} - x_{i.min}}; u_i \in [0;1]\ . \quad (3)$$

The degree of an expert's confidence in the membership of support u_i in the fuzzy term T_{ji} is given by the "membership function" $\mu_{T_j}(u)$ laid off as ordinate in figure 1. Trapezoid membership functions defined by four numbers a_1, a_2, a_3, a_4 were chosen.

In this case, all the neighbouring trapezia of the scale meet at the point of ordinate 0.5. It is then seen that the increment of the power of one of the qualitative indicators is fraught with a corresponding decrease (at the same rate) of the neighbouring qualitative attribute, and at the point $\mu = 0.5$ the maximum value for information fuzziness is achieved, and the neighbouring qualitative attributes within it have equal power (discernibility). In this case, the value of indicator u_i belongs to a "lower" linguistic level (term). In order to specify the variation ranges and, consequently, the steepness of the membership functions, the four numbers (a_1, a_2, a_3, a_4) in figure 1 were used.

Note the fact that there may be more complicated scales using 9 fuzzy terms with curvilinear trapezoid edges, as well as simpler scales with triangular membership functions. The authors of this article consider the pentascale in figure 1 as a "reasonable compromise" between the informativeness of the fuzzy classifier and its complexity.

Note the fact that for practical implementation of this hybrid algorithm, it is necessary to specify for each factor x_i the range Δx_i which defines the position of a corresponding fuzzy term T_{ji}, ($i = \overline{1.16}; j = \overline{1.5}$) in the X-axis after normalisation (3).

Here we need expert estimates.

Figure 1. Example of Pentascale

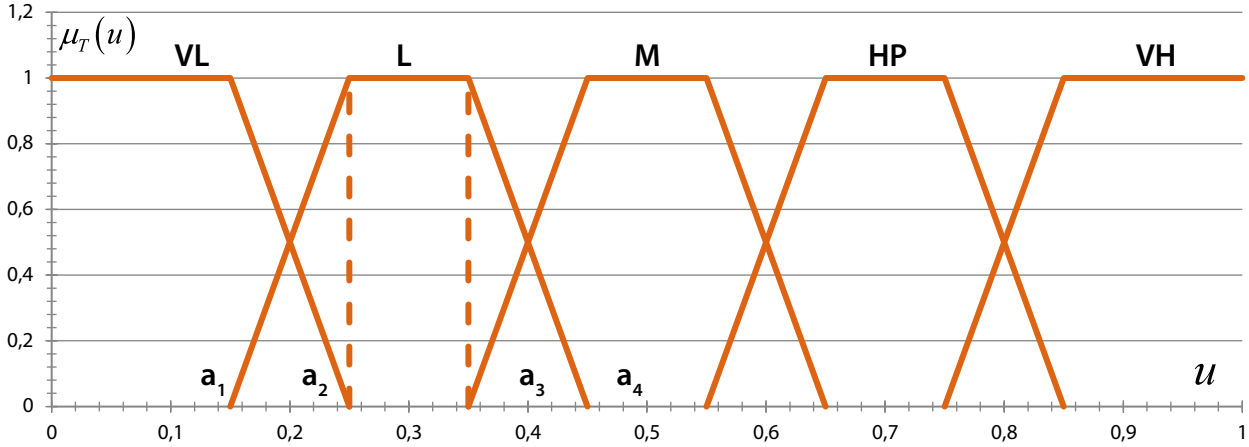

Table 1. Range of Values of Economic Indicators for Risk Level Groups

Risk level group	*L1*	*L2,%*	*P1*	*F1*	*F2*	*F3*	*F4*	*R1,%*
Very high risk (VH)	0.1–0.2	40–77	0.1–0.4	2.70–2.50	0.25–0.31	–2.00…–1.66	1.60–1.51	0–1
High risk (H)	0.2–0.6	77–144	0.4–0.8	2.50–1.70	0.31–0.54	–1.66…–0.33	1.51–1.18	1–5
Mean risk (M)	0.6–1.2	144–267	0.5–1.5	1.70–1.17	0.54–0.83	–0.33…0.92	1.18–0.83	5–16
Low risk (L)	1.2–2.0	267–454	1.5–2.4	1.17–0.90	0.83–0.93	0.92–1.84	0.83–0.56	16–27
Very low risk (VL)	2.0–2.2	454–580	2.4–2.8	0.90–0.50	0.93–0.95	1.84–3.50	0.56–0.20	27–30

End of table 1

Risk level group	*R2*, % per quarter	*R3*, % per quarter	*R4*, %	*R5*, % per quarter	*A2*, quarterly	*A4*, quarterly	*A5*, quarterly	*A6*, quarterly
Very high risk (VH)	–3.00…2.50	–4.00…3.33	0–1	–5.00…–4.42	0.06–0.08	0.40–0.50	0.60–0.70	1.0–1.3
High risk (H)	–2.50…–0.50	–3.33…–0.66	1–5	–4.42…–0.58	0.08–0.15	0.50–0.90	0.70–1.10	1.3–2.3
Mean risk (M)	–0.50–…+1.57	–0.66…3.17	5–15	–0.58…2.58	0.15–0.24	0.90–1.54	1.10–1.74	2.3–3.5
Low risk (L)	1.57–4.34	3.17–7.84	15–27	2.58–10.27	0.24–0.29	1.54–2.07	1.74–2.07	3.5–5.5
Very low risk (VL)	4.34–8.00	7.84–20.00	27–46	10.27–18.00	0.29–0.58	2.07–5.80	2.07–5.80	5.5–15

The authors used the convenient expert table 1 from [3] where an expert committee comprised of leading specialists involved in finance and credit was engaged in order to apply the pentascale in the classification of objects, and table 1 was developed for practical use.

The method of use of table 1 is very simple: if historical records exist for the abovementioned 16 indicators $x_i(t)$, then temporal series are calculated and predicted values are defined for all 16 indicators $\{x_{j,0}\}, j = \overline{1.16}$ for the planned period $t = t_0$ using the universal neural networks approximator [17]. In quantitative estimations we used the multi-layer perception (MLP) neural network with the back propagation (BP) learning algorithm.

For important objects of financing, the model was reinforced with the Bayesian neural networks regularisation algorithm. In this algorithm, the network architecture and activation functions of hidden layers of neurons [1] were varied using the Bayes group.

The predicted values $\{x_{j,0}\}, j = \overline{1.16}$ are inserted in table 1, and the value of fuzzy terms levels are defined for the present object, i.e. the "bankruptcy image" is recognised.

Results of Quantitative Estimations of the Proposed Algorithm of Version "a" Accompanied by an Analysis of all 16 Indicators

The example in table 2 is an approximation and prediction fragment of explicative variables x_i (16 criteria) for three quarters to come, for a large agricultural enterprise in the Sterlitamak District of the Republic of Bashkortostan (reference number 30 in the selection of 30 enterprises) [1].

In table 3, a part of the calculations is shown when a borrowing company gets into the range of financial indicators values which correspond to each value defined by experts (the intervals of getting into the range are colourised). As one can see in table 3, analysed enterprise number 30 pertains to the class of low bankruptcy risk, which has been proven by experimental observations in the manufacturing environment by an interdistrict tax inspectorate.

Let us remark that tables 2 and 3 help to "recognise the image" of advancing bankruptcy of an analysed corporation rather quickly and, what is important, they help to identify the indicators which need improvement using the terms an analyst understands. In the given example it is *L2* (inventory cover ratio). Consequently, in this paper's hybrid algorithm of bankruptcy risk assessment, the operation of the fuzzy classifier is indeed an effective addition to the neural network. This is a positive characteristic feature of modification "a" of the hybrid algorithm.

However, modification "a" has a drawback: it does not take into account the interaction of indicators with each other in case of the fuzzy bankruptcy risk classification which occurs in actual practice.

Table 2. Fragment of Prediction of Explicative Variables for Enterprise 30

Year, enterprise 30	Quarter	*L1*	*L2, %*	*P1*	*F1*	*F2*	*F3*	*F4*	…	*A6*
2006_03	1	0.402	264.99	2.563	0.751	0.799	1.35	0.509		1.555
2006_09	2	0.67	286.48	2.900	0.998	0.652	1.95	0.491		1.344
2006_12	3	0.63	278.15	2.838	1.385	0.722	1.485	0.484		7.835
2007_03	4	0.21	269.74	2.593	0.833	0.75	1.397	0.481		1.490
2007_06	5	0.42	278.18	2.642	1.222	0.74	1.282	0.553		1.331
2007_09	6	0.24	232.58	2.781	0.872	0.679	1.241	0.54		1.491
2007_12	7	0.236	278.25	2.120	1.327	0.754	1.182	0.508		13.976
2008_03	8	0.26	244.72	2.147	0.761	0.793	1.147	0.525		1.145
2008_06	9	0.311	257.79	2.922	0,624	0.702	1.178	0.529		2.364
2008_09	10	0.3	279.95	2.316	1.272	0.729	1.728	0.499		2.214
2008_12	11	0.28	270.49	2.548	0.953	0.789	0.205	0.52		11.649
2009_03	12	0.121	225.49	2.2824	0.713	0.862	1.155	0.518		0.749
Predicted values calculated using the neural networks models of temporal series	13	0.192	248.440	2.328	0.720	0.842	1.279	0.506		5.011
	14	0.179	246.061	2.293	0.646	0.867	1.269	0.519		5.100
	15	0.168	243.628	2.258	0.569	0.892	1.270	0.513		5.189

The abovementioned drawback of modification "a" of the hybrid algorithm is eliminated when it is complemented with aggregation of all considered indicators into one complex indicator $F(x_i), i = \overline{1.\ 16}$. As a result, we have modification "b" of the hybrid algorithm.

Description of Modification "b" Algorithm

Table 3. Interpretation of the Predicted Values of Indicators (membership intervals for the 13th quarter of analysed enterprise 30 are highlighted in a dark colour)

Risk level group	Very high risk	High risk	Mean risk	Low risk	Very low risk
*L*1	0.1–0.2	0.2–0.6	0.6–1.2	1.2–2.0	2.0–2.2
*L*2,%	40–77	77–144	144–267	267–454	454–580
*P*1	0.1–0.4	0.4–0.8	0.8–1.5	1.5–2.4	2.4–2.8
*F*1	2.70–2.50	2.50–1.70	1.70–1.17	1.17–0.90	0.90–0.50
*F*2	0.25–0.31	0.31–0.54	0.54–0.83	0.83–0.93	0.93–0.95
*F*3	–2.00…–1.66	–1.66…–0.33	–0.33…0.92	0.92–1.84	1.84–3.50
*F*4	1.60–1.51	1.51–1.18	1.18–0.83	0.83–0.56	0.56–0.20
*R*1, %	0–1	1–5	5–16	15–27	27–46
*R*2, % per quarter	–3.00…–2.50	–2.50...–0.50	–0.50…+1.57	1.57–4.34	4.34–8.00
*R*3, % per quarter	–4.00…–3.33	–3.33…–0.66	–0.66…+3.17	3.17–7.84	7.84–20.00
*R*4, %	0–1	1–5	5–15	15–27	27–46
*R*5, % per quarter	–5.00…–4.42	–4.42…–0.58	–0.58…2.58	2.58–10.27	10.27–18.00
*A*2, quarterly	0.06–0.08	0.08–0.15	0.15–0.24	0.24–0.29	0.29–0.58
*A*4, quarterly	0.40–0.50	0.50–0.90	0.90–1.54	1.54–2.07	2.07–5.80
*A*5, quarterly	0.60–0.70	0.70–1.10	1.10–1.74	1.74–2.27	2.27–5.80
*A*6, quarterly	1.0–1.3	1.3–2.3	2.3–3.5	3.5–5.5	5.5–15

The indicators in the fuzzy classifier using the pentascale (fig. 1) may be aggregated in two ways:

1) a double matrix-folding (i.e. a convolutional approach) method [3].
2) Mumdani's fuzzy inference method [19].

The double matrix-folding method resultant uses formula (4):

$$\Phi = \sum_{i=1}^{n} p_i \left(\sum_{j=1}^{5} \alpha_j \mu_{ij} \left(x_i \right) \right),\ i = \overline{1.16};\ j = \overline{1.5}. \quad (4)$$

Here weighting factors α_j of the inner sum according to index j are the so-called "junctures", i.e. the midpoints of the upper bounds of trapezia projected to the transversal axis of supports. For example, the junctures in fig. 1 form a vector

$$\vec{\alpha} = \left(0.075; 0.3; 0.5; 0.7; 0.925\right). \quad (5)$$

As a result of the fuzzy classification one can match each point in the definition interval of the supporting linguistic function X against vector $M_x = M_x(\mu_{1,} \ldots\ldots \mu_N)$, where *N* is the number of scale granules (in the described case *N* = 5); μ_j is the value of the level of the *j*-th membership function. Herewith for Pospelov "grey" scale the following condition is fulfilled

$$\sum_{j=1}^{n} \mu_j = 1. \quad (6)$$

For the outer sum in (4) as per index i the weighting factors $\{p_i\}$, $i = \overline{1,16}$ are Fishburn's or Saaty's weighting factors, which take into account the preferences of indicators arranged in order of decreasing preference; $\mu_{ij}\left(x_i\right)$ is the value of the membership function of the *j*-th qualitative level against the current value of the *i*-th indicator.

Fishburn's weighting scheme implements *OWA* (*Ordered Weighted Averaging*) – Yager operator.

In Fishburn's scheme, preferences in the hierarchy scheme change by 1when passing from one fixed hierarchical level to another. The weights decrease according to the weight arithmetic progression rule:

$$p_i = \frac{2\left(n - i + 1\right)}{n + 1},\ i = 1, 2, \ldots\ . \quad (7)$$

If there are no preferences among the indicators, the following corresponds to the indifferent weighting system:

$$p_i = 1/n i = 1, 2, \ldots, n. \quad (8)$$

In other words, according to Fishburn, preferences are expressed as a decrease by one of the rational fraction numerator of the weighting factor of a weaker alternative.

In order to define a set of Fishburn's weights for a mixed system of preferences (along with the preferences' indifference ratios which comprise the system), it is necessary to define rational fractions numerators r_i using the following recursion scheme:

$$p_{i-1} = \begin{cases} p_i, x_{i-1} \approx x_i \\ p_{i+1}, x_{i-1} > x_i; p_n = 1; i = n \ldots 2, \end{cases} \quad (9)$$

where $\approx$ – the equivalence sign; $>$ – the preference sign.

Then, the total value of obtained numerators is the common denominator of Fishburn's fractions:

$$K = \sum_{i=1}^{n} p_i. \quad (10)$$

The value of the composite indicator $F(x_i)$ obtained in accordance with (4) is further interpreted by the pentascale, i.e. affiliation of the value of $F(x_i)$ with one of some fuzzy terms is defined.

Due to the limited size of the present article, the indicators' aggregation algorithm according to Mamdani's fuzzy inference method is not described here. It can be found in detail in [19].

Conclusions

The authors proposed an unconventional algorithm for diagnosing corporate bankruptcy stages on the basis of a system-wide law of an integrated system (A_1 and A_2) entropy decrease in contrast to the sum of entropies of subsystems being united. Herewith, subsystem A_1 is represented by the neural networks predictive model of bankruptcy indicators (16 indicators by A.O. Nedosekin), and subsystem A_2 is represented by the fuzzy model of bankruptcy stages detection. The emergent (systemic) effect achieved in the integrated system (A_1, A_2) is manifested in the unification of the significant predictive power of neural networks with an illustrative interpretation of the obtained results in the form of linguistic terms which are understandable for analysts (formulated by way of fuzzy sets).

The offered algorithm was tried out on a series of experimental observations for 30 agricultural enterprises of Sterlitamak District of the Republic of Bashkortostan.

The offered algorithm gives a rather quick assessment of the borrowing company's financial standing with a controlled probability. In our example with the probability of 0.94, the bankruptcy risk assessment of enterprise 30 is in the range of "low – very low".

A valuable characteristic of this approach is the wide range of indicators which are part of the assessment. Taking into consideration their interrelation, which is typical for an economic unit, we get a rather broad picture of the assessment.

The offered algorithm imposes none of the strict requirements on the database which are present in the classical least squares method used in regression analysis. In the various least squares method modifications which change the abovementioned requirements very slightly, they are called 'prerequisites' of the least squares method. In particular, a prerequisite of the least squares method which is difficult to implement is the hypothesis of the 'normal law of distribution of computational accidental errors' over the model.

The focus on the neural networks method, free from such prerequisites, has its own drawback in our hybrid algorithm. In this case, there is no possibility to assess the adequacy of the obtained model based on a verification of statistical hypotheses about fulfillment of the prerequisites of the least squares method. However according to computing experiments, the model adequacy assessment may be founded on the basis of Bayesian approach [1]. As such, the regularisation of the proposed predictive model for each of the 16 bankruptcy indicators is achieved.

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Стратегический финансовый анализ корпораций санаторной специализации в условиях сезонности

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Стратегический финансовый анализ корпораций санаторной специализации в условиях сезонности

Аннотация

Цель исследования состоит в разработке нового метода финансового анализа, обеспечивающего решение стратегических задач развития финансовой устойчивости бизнес-структур, которые осуществляют свою деятельность в условиях выраженной сезонности внешней среды. Структурированный сезонностью отчетный финансовый период значительно затрудняет установление стоимости компании, оценку финансовых рисков и сдерживает инвестиционную активность в ключевой для региона Большой Ялты санаторной отрасли. Ограниченность классических методов проявляется в отсутствии аналитических инструментов, способных объективно обосновывать программируемое временное снижение финансовой устойчивости. Мобилизация финансовых ресурсов в соответствии со стратегической программой является обязательным условием поддержки конкурентного статуса в отрасли и регионе. Важна возможность методически разделять тенденции финансового состояния, присущие отдельным этапам в жизненном цикле организации, и временные колебания финансового состояния под воздействием сезонности.

Исследование заполняет методический пробел между положениями стратегического менеджмента и стратегического финансового анализа зарубежных и отечественных авторов. Первую часть методологической базы составляют положения школы конфигурации (в классификации школ стратегического менеджмента Г. Минцберга), которая предполагает управление на основе цепочки профилей («фирма-среда») и поэтапное достижение конкурентоспособности бизнеса. Вторая часть – это классификация типов финансовых кризисов фирмы отечественными авторами: капитала, прибыли, ликвидности. Данная последовательность была дополнена кризисами деловой активности и денежного потока, что легло в основу ранжирования финансовых коэффициентов в новой модели (по признаку опасности развития банкротства).

Методики финансового анализа устанавливают лишь входящие условия и несколько альтернатив трансформации финансового состояния. Для санаториев количество альтернативных вариантов из-за плохих и хороших сезонов может увеличиваться каждый год прогрессивно и требовать существенного пересмотра стратегии. Применение новой модели раскрывает поэтапную последовательность реализации стратегической программы корпорации в сложившихся условиях внешней среды и более определенно в части влияния сезонности.

Keywords: финансовая устойчивость, финансовая модель, финансовый риск, финансовый анализ

JEL classification: G32, G34, G17

Введение

Классические методы финансового анализа при стратегической оценке долгосрочной финансовой устойчивости потеряли действенность вследствие невозможности предвидения последовательности трансформации финансового состояния как механизма управленческих воздействий и результатов. Наиболее важным с точки зрения охвата объекта управления финансовым менеджментом финансовой среды корпорации выступает комплексная финансовая устойчивость. Состав данной категории включает практически все тематические группы показателей финансового состояния [1]. Однако их взаимодействие, сочетание в едином профиле, как и последовательности возникновения таких профилей, в литературе не встречаются. Чаще всего в методиках приводится несколько типовых ситуаций (в основном антикризисного управления) сложившейся структуры баланса и динамизма финансовых результатов, которые напрямую указывают на характер развития финансового состояния [2]. Соответственно предлагаются типовые методы их решения (увеличения прибыли и распродажи части активов для погашения обязательств). В наиболее разработанных подходах учитывается влияние внешней среды различного уровня. Однако как единый объект управления финансовая устойчивость не выделяется. Обобщенными объектами выступают капитал, прибыль, денежный поток [3].

Ближе всего к решению данной проблемы подошел автор концепции динамической оценки финансовой устойчивости А.В. Грачев. Устойчивость рассматривается им как свойство платежеспособности фирмы, характеристика его финансового состояния и вид динамической оценки. Особенностью является проверка достаточности собственных денежных средств на отчетные даты и за период для покрытия долгов и обязательств [4]. Последнее положение концепции аналогично концепции свободного денежного потока в оценке финансовой устойчивости Э.В. Исаевой [5]. Оригинальными являются положения методики анализа финансовой устойчивости организации в концепции ее жизненного цикла А.И. Попова [6]. Однако доминирующей целью для управления также остается достижение точки финансового равновесия, которое моделируется на основе критериев балансового соотношения капитала и имущества, денежных потоков [5].

Целевое состояние капитала и потоков подчинено одной идее – предотвращению развития рисков несостоятельности, что практически блокирует принятие стратегических решений [7]. Реализация стратегической программы заведомо вводит компанию в зону повышенного риска и максимального напряжения всех ресурсов [8].

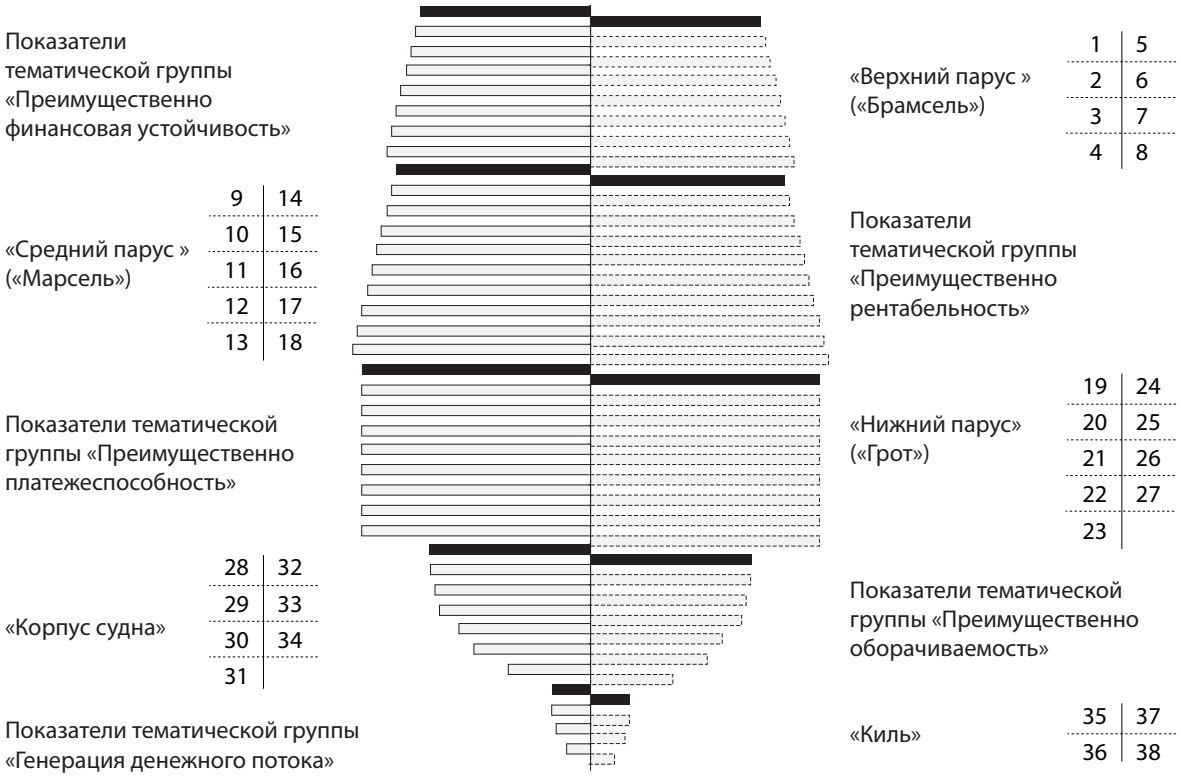
Сравнительная оценка действующих концепций и методик анализа финансовой устойчивости была осуществлена Л.А. Запорожцевой. Она первой установила критерий «целевой направленности», однако он выступает лишь как тактический аспект, связанный с антикризисным противодействием ухудшению устойчивости [11]. Важными в исследовании финансовой устойчивости являются научные результаты М.С. Абрютиной. В соответствии с ними два понятия – «финансовая устойчивость» и «платежеспособность» – близки, но не тождественны. Корпорация, будучи финансово устойчивой, может оказаться в определенный момент времени неплатежеспособной и наоборот [12]. Фактически этим автор ставит под сомнение постоянное улучшение финансовой устойчивости как основной ориентир ее развития. В таких условиях наличие модели, со свойствами которой согласовываются все целевые ориентиры аналитического обоснования и мониторинга реализации финансовой стратегии на всех уровнях управления фирмой, признается важным многими зарубежными авторами [14–16]. Центрирующая роль модели должна создать предпосылки формирования метода сквозного использования на всех процедурных этапах и использования стандартных форм отчетности [13]. Фактически необходимы знания в области реализации задач нового типа – достижения целевой финансовой устойчивости не моментно, а как процесса их смены, с учетом особенностей компании и среды. Цикличность сезонных производств значительно усложняет данную задачу [9]. Финансовый год санаториев в Крыму практически сжат в пять месяцев сезона, цены на продукт, как и на ресурсы, устанавливаются заранее, а спрос реализуется в реальном времени. На природные циклы накладываются циклы внутреннего развития самой корпорации [10]. Способности сопротивляться возможному кризису также имеют особенности и проявляются в различных эффектах, чье возникновение носит объективный характер.

Визуальная модель стратегической оценки финансовой устойчивости

Эмпирическим материалом для разработки методики послужили данные финансовой отчетности выборочных бизнес-структур санаторно-курортного комплекса Большой Ялты (10%-я выборка из 144 санаториев на начало исследования) и данные внешней среды регионального и макроэкономического уровней. Группировки санаториев по размеру собственного капитала и сложившемуся финансовому состоянию приведены в приложении (табл. П.1). Большинство из них являются хозяйственными обществами – акционерными обществами (АО) и обществами с ограниченной ответственностью (ООО), не представленными на фондовом рынке, их основные активы созданы в советское время и требуют серьезной модернизации с привлечением значительных инвестиций. Ранжирование показателей в структуре модели (сверху-вниз) произведено с учетом последовательности развития финансового

кризиса компании. Первый кризис - стратегический или капитала (оценивают на основе коэффициентов финансового риска, маневренности капитала и т.п.), второй - прибыли (показатели рентабельности), и последний - ликвидности (коэффициенты ликвидности и платежеспособности). На базе проведенного статистического анализа была построена визуальная модель-система оценки комплексной финансовой устойчивости в части внутренней среды санаториев (рис. 1). Данный профиль представляет собой систему финансовых коэффициентов (в группах), раскрывающих взаимодействие основных объектов финансового управления корпорации в развитии ее финансового состояния. Скорость реакции отдельных показателей легла в основу их градации в визуальной модели сверху вниз, с наиболее оперативной реакцией – на самом верху. Ориентирами при установлении уровней финансовых коэффициентов служили не критериальные границы, а их значения, которые складываются на наивысшей точке этапа зрелости компании, когда все стратегические направления наиболее сбалансированы между собой (стоимость-ликвидность-риск) и компания приносит стабильный высокий доход [17]. Набор показателей, закрепленных за определенным уровнем в разрезе специфичных областей в структуре модели, приведен в Приложении (табл. П.2). Все финансовые коэффициенты, включенные в модель, были оценены за два смежных временных периода (с 2004 по 2008 г. и с 2009 по 2016 г.).

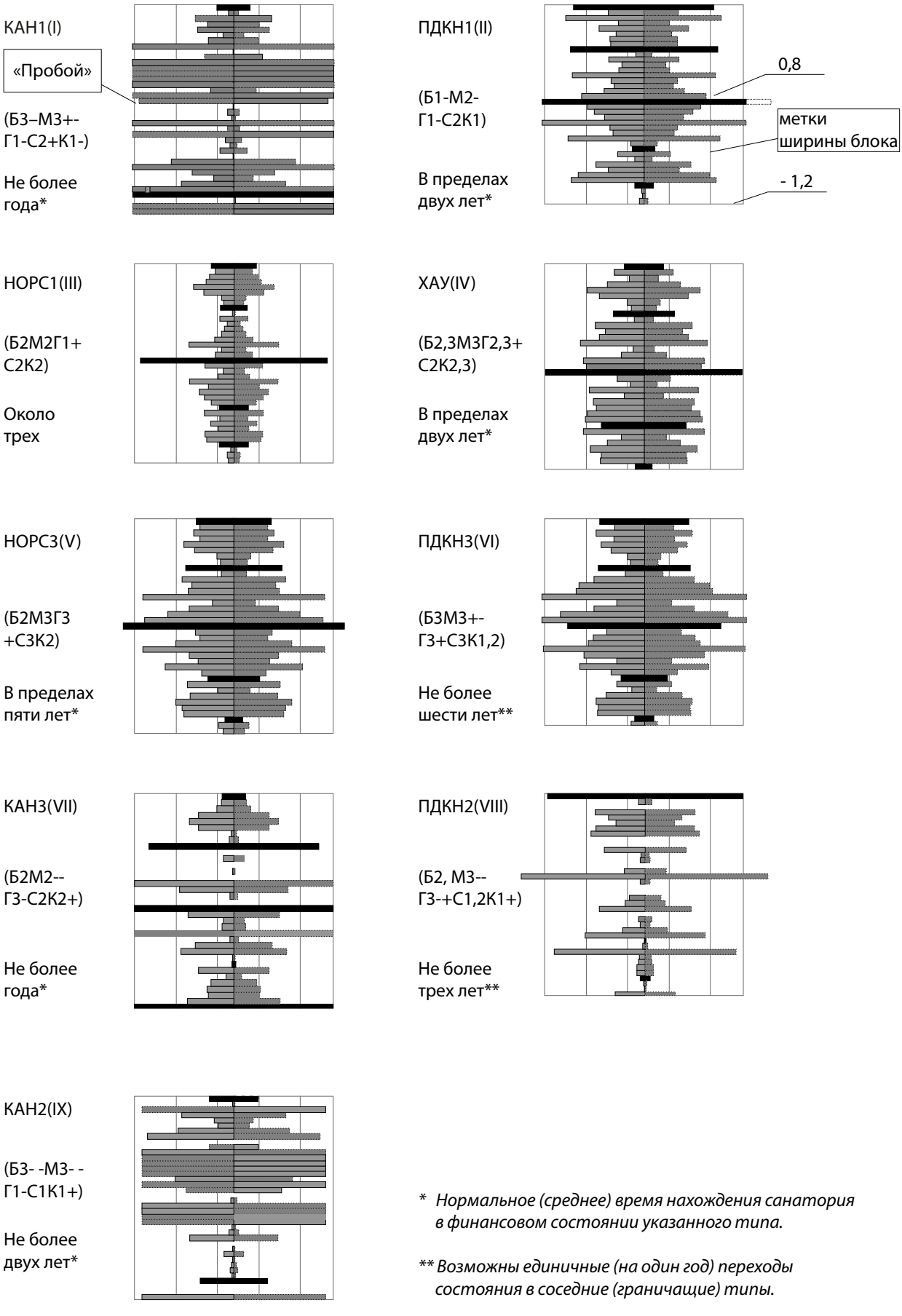
Рисунок 1. Структура визуальной модель-системы оценки стратегических типов финансовых состояний «фрегат» для санаториев Большой Ялты в нормированном положении стадии жизненного цикла организации (ЖЦО) «Юность»



Особенностью модели стало определение наиболее устойчивых групп коэффициентов к конъюнктурным колебаниям внешней среды – группы «Генерация денежного потока» и «Преимущественно оборачиваемость». Установление для их показателей низких уровней при постоянной тенденции падения означает наступление наиболее опасного кризиса – стратегических идей и инноваций и свидетельствует о переходе на невозвратную часть ниспадающей части ЖЦО. В целях придания визуальному профилю гармоничной формы парусного судна (фрегата) набор показателей был нормирован по уровням модели с помощью весовых коэффициентов, соответствующих верхнему сектору кривой ЖЦО на этапе «Расцвет» (наименее рискованном и привлекательном для инвесторов).

Закрепление отдельных профилей осуществлялось на основе ключевых финансовых характеристик стадий ЖЦО и стратегий И.В. Ивашковской [18]. Выделены три основных ширины блока: «узкий» – в пределах 0,2–0,4, «нормальный» – 0,4–0,8; «широкий» – 0,8–1,2. Выход блока за границы 1,2 считается экстраординарным явлением («пробой») и обозначен в первом ряду схем (рис. 2).

Рисунок 2. Визуальные профили оценки устойчивости внутренней финансовой среды «фрегат»-модели, соответствующие типам стратегических финансовых состояний санаториев Большой Ялты



* *Нормальное (среднее) время нахождения санатория в финансовом состоянии указанного типа.*

** *Возможны единичные (на один год) переходы состояния в соседние (граничащие) типы.*

Структура ЖЦО взята из работ И. Адизеса [20]. Все типы были разделены по группам: кризисные (КАН), предкризисные (ПДКН), нормальные (НОРС), хорошие (ХАУ). Система визуальных профилей оценки устойчивости внутренней финансовой среды «фрегат»-модели, соответствующих типам стратегических финансовых состояний санаториев Большой Ялты, приведена на рис. 2. Комплексный профиль формируется в двух оценках, первая часть представляет собой название профиля оценки внутренней среды четырех групп: кризисный, предкризисный, нормальный, хороший (с указанием персонального кода их девяти типов), и вторая состоит из обобщенных названий пяти профилей внешней среды (например, «предкризисно ПДКН2 (VIII)-нейтральный» тип) [21]. При формировании свойств модели использовались методические разработки комплексной оценки основных стратегических объектов финансового управления отечественных компаний [22]. Основными свойствами модели можно установить следующие:

- первыми на ухудшение среды реагируют показатели финансовой устойчивости, затем рентабельности и после этого платежеспособности, оборачиваемости, потоковые;
- размер капитала корпорации напрямую влияет на устойчивость к внешним негативным воздействиям среды – чем крупнее корпоративное объединение, тем позже происходит ухудшение финансового состояния (например, под воздействием глобальных экономических кризисов) и выход из кризиса;
- сезонность доходов санаториев связана с уровнем накоплений потенциальных клиентов (отдыхающих) и возникший глобальный финансовый кризис необходимо оценивать по моменту его возникновения (до, после «высокого сезона») и др.

Практически состояние внешней среды санаториев Крыма с 2010 г. можно считать посткризисным (пассивно-негативным), что соответствует макроокружению большинства европейских стран [23] даже несмотря на относительную экономическую обособленность полуострова.

Процедура применения «фрегат»-модели в целях стратегической оценки финансовой устойчивости сезонных компаний курортной сферы (на примере региона большой Ялты)

При построении новой процедуры в одной системе было увязано содержание процедурных блоков-этапов анализа финансового состояния компании с аналитическим содержанием этапов разработки и реализации финансовой стратегии И.А. Бланка. Разработанный на основе структуры системного анализа экономических объектов в новом виде этап экспресс-анализа представлен развернутой схемой (рис. П.1). **Вся процедура состоит из трех последовательных и взаимосвязанных этапов (экспресс-анализа, углубленного и мониторингового (оперативного)).** Для четкого определения спецификации задачи в предварительном анализе достаточно ограничиться следующей матрицей позиционирования (табл. 1).

Таблица 1. Карта установления предварительного аналитического задания на основе системы типов оценки финансового состояния с помощью «фрегат»-модели на перспективу[1] в рамках экспресс-анализа (при универсальном задании достижения и закрепления положения на вершине кривой ЖЦО)

Сложившийся в текущем периоде (последнем анализируемом) тип по отношению к стратегическому плану:	Прогнозируемые и целевые типы финансового состояния по «фрегат»-модели				
	–2[2]	**–1**	**Целевой**	**+1**	**+2[1]**
–2 (на 2 ранее в схеме типов)	СС***	К (У)**	СС*	СС*	СС***
–1	К (У)**	К (У)**	К (У)*	К (Т)**	СС**
Целевой	СС**	К (У)*	Без коррекции	К (Т)*	СС**
+1	СС*	К (Т)*	К (Т)*	К (Т)*	СС**
+2[1]	СС***	К (Т)*	СС *	К (Т)**	СС***

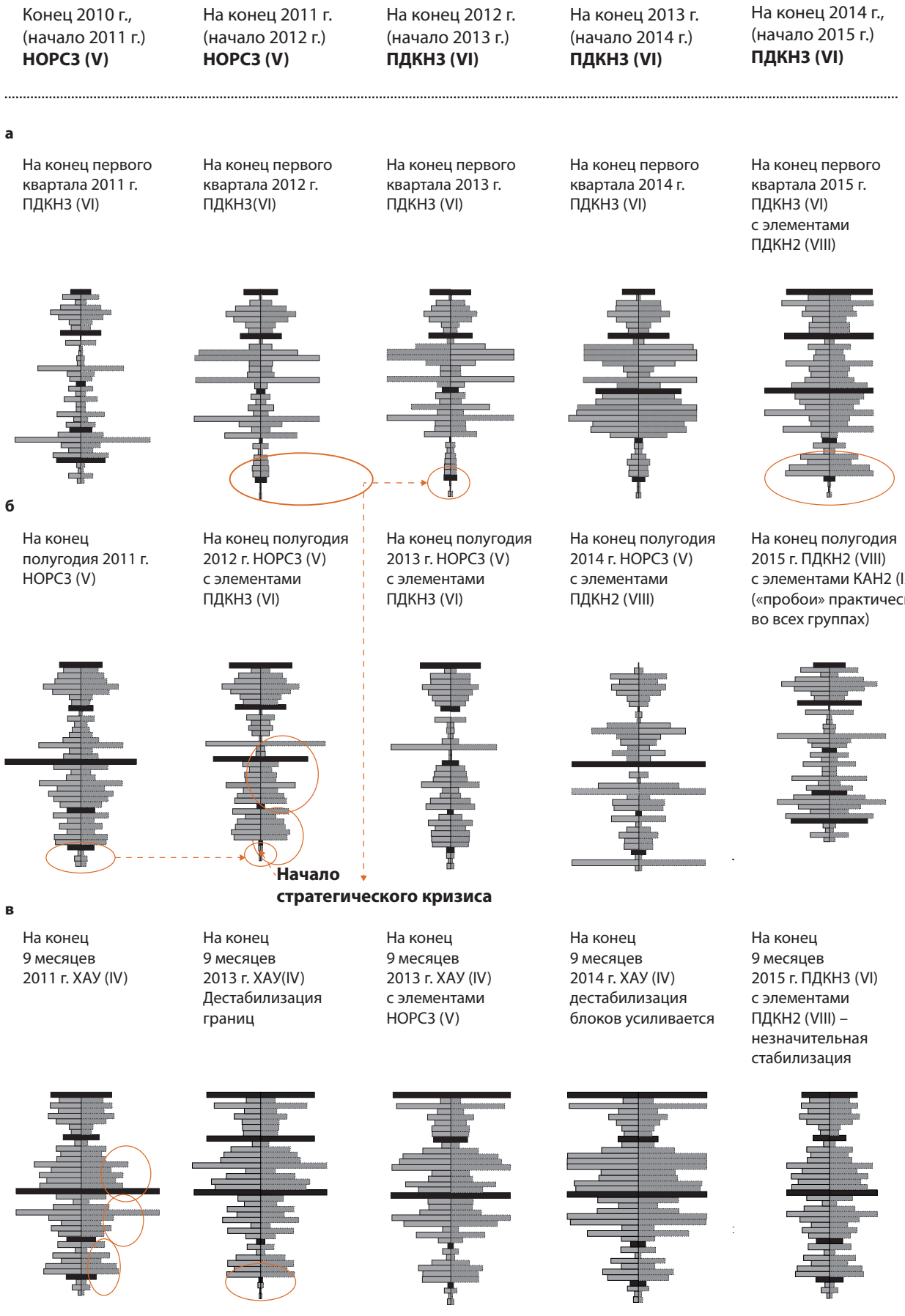
[1] Может колебаться от одного до трех лет в зависимости от длины и фазы действующего этапа прохождения компании по этапам ЖЦО;

СС – смена стратегии; К (У) – коррекция (ускорение); К (Т) – коррекция (торможение).

[2] Или в тех случаях, когда остается один тип предельный (первый и последний) по модели.

* Долгосрочно-толерантное задание. ** Оперативное задание. *** Срочное задание.

Рисунок 3. Профили внутренней среды модель-системы на конец первого квартала, полугодия и 9 месяцев отчетного периода в 2011–2016 гг. (санаторий «Ай-Петри»)



То есть, чем больше времени требуется для достижения конечного стратегического результата, тем менее жесткие требования предъявляются к ресурсной обеспеченности такого стратегического сценария [24]. Активные действия предполагают все кризисные типы. В классической методике существует только один тип кризисного финансового состояния – кризис конца жизненного пути фирмы, который предшествует банкротству и ликвидации [25]. Однако на ЖЦО таких кризисных (бифуркационных) точек качественной смены сущности организации существенно больше (по И. Адизесу). Классическая схема типов финансового состояния не отличает кризис роста от кризиса перезапуска, и в большинстве случаев приравнивает их к кризису финансовой несостоятельности завершения ЖЦО. Приведенный авторский перечень трех финансовых кризисов компании с закрепленными визуальными профилями (группы КАН) отличается от системы кризисов по этапам ЖЦО И.В. Ивашковской тем, что они, по мнению указанного ученого, могут возникать на различных укрупненных этапах и параллельно и обособленно, а для некоторых этапов отдельные из них не характерны. Традиционный анализ финансовой устойчивости (на основе наличия собственных оборотных средств) дает практически полярные оценки: у многих санаториев в начале курортного сезона складывается предкризисное или кризисное состояние, которое в конце сезона превращается в нормальное. На предварительном этапе анализа дерево целей формируется укрупненно, где целевыми установками выступают требуемые конечные и промежуточные типы СФС. Если к долгосрочным периодам прогнозирования требование точности составляет один-два года, то сезонные циклы проявляются достаточно ритмично и фактически включают 70–80% доходов и расходов санатория. Финансовый год трансформируется в сезон (5–5,5 месяца) со сжатыми сроками окупаемости затрат и это значительно повышает риски финансовой дестабилизации и затрудняет их коррекцию в течение текущего года. Агрессивный подход предполагает сразу строить прогноз с учетом активных мероприятий и в качестве прогнозного закрепляет более благоприятный квадрант-тип. При пассивном подходе прогнозным выступает вариант вероятного наступления в соответствии с обычными сроками движения СФС по этапам ЖЦО.

Реакция модели финансовой устойчивости на сезонные, коньюнктурные и стратегические факторы санаторно-курортного бизнеса

Первоначально необходимо оценить характер динамизма внутреннего профиля в соответствии с закономерностями развития отдельных этапов ЖЦО.

Нужно указать на существование двух типов ЖЦО в описании различных видов финансового состояния, идентифицируемых на основе внутреннего профиля модель-системы для компаний, имеющих исключительное конкурентное преимущество и обычных, такового не имеющих. Необходимым этапом исследования можно считать изучение особенностей поведения модель-системы в части профиля внутренней среды не только на конец отчетного периода, но и по отдельным сезонам в течение годового цикла. Сезонные колебания измеряются при помощи индексов сезонности, которые рассчитываются как процентное соотношение средних месячных уровней за ряд лет к общему среднемесячному объему реализованных услуг за весь расчетный период. Расчет для бизнес-структур, реализующих турпродукт в Крыму, приведен в табл. П.3. Как видно из табл. П.3, санаторный бизнес в Крыму работает в условиях ярко выраженной сезонности. Не являются исключением и санатории, попавшие в выборку исследования, например, АО «Ай-Петри» (данные представлены в табл. П.4), у которого около 65% годовой выручки приходится на «высокий сезон», т.е. на третий квартал. Новые типы устойчивости более дифференцированы и на внутригодовом отрезке времени (см. табл. П.4). Для раскрытия картины типичной трансформации финансового состояния внутри годового цикла ниже представлен динамизм развития внутреннего профиля «фрегат»-модели для санатория «Ай-Петри» за ряд лет (рис. 3). Состояние НОРС3 (V) (нормальное финансовое состояние после прохождения вершины ЖЦО) на начало 2011 г. (сложившееся к концу 2010 г., рис. 3а) ухудшается практически до профиля ПДКН3(VI – предкризисного, но с шансом трансформации до уровня хорошего), а затем восстанавливается с ростом доходов от высокого сезона к рубежу первого полугодия.

Влияние конъюнктурного ухудшения глобальной экономики приводит к ухудшению всех групп показателей (блоков) модели, но в различное время, что на визуальной схеме последовательно выглядит как волна последовательного сужения блоков (сверху вниз). Фактически тенденция ухудшения финансового состояния продолжалась и в 2015 г., лишь незначительно реагируя на повышение доходов от высокого сезона (рис. 3в 2015 г.).

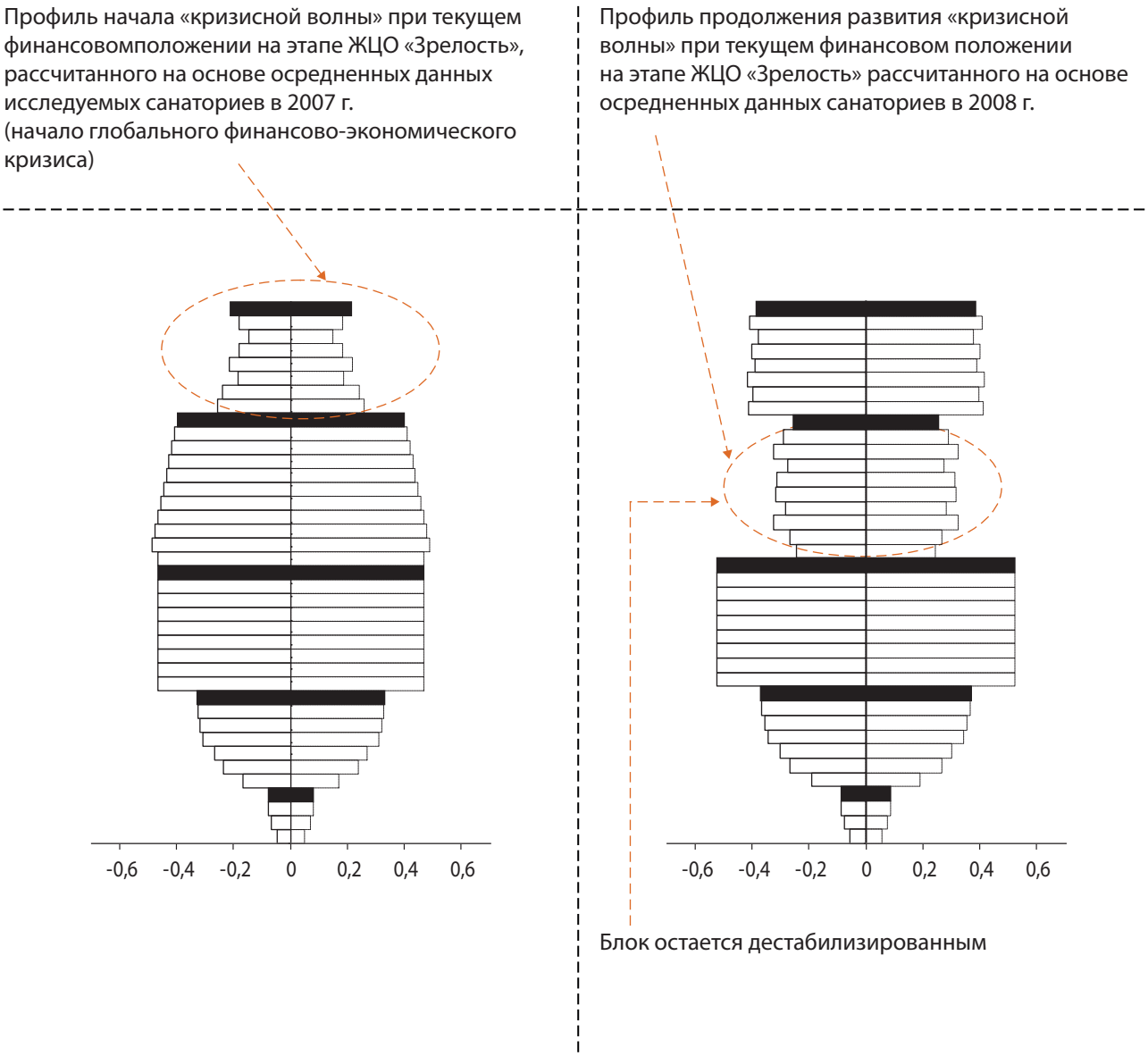
Кредиторская задолженность на конец 2015 г. выросла по сравнению с предыдущим годом почти на 16 млн руб. В этом же году санаторий был реорганизован. Уставный капитал зафиксирован в размере 30 млн руб. (100%-я доля – Республика Крым). В 2016 г. путем трансформации добавочного капитала (99,3 млн руб.) и дополнительных инвестиций уставный капитал увеличен до 224,722 млн руб. Прибыль (до налогообложения) в 2016 г. сократилась с 57,488 млн руб. (2015 г.) до 32,017 млн руб. в 2017 г. падение стабилизировалось и данный показатель составил 34,005 млн руб.[1]

[1] По данным: URL: https://www.rusprofile.ru/id/7466414

Сезонное улучшение финансового состояния проявляется даже у постоянно-убыточных санаториев, однако оно не ведет к установлению долгосрочной тенденции улучшения, что продемонстрировано на рис. П.2, составленного по данным санатория контрольной группы за 2015 г. (ООО «Дельфин-2001»). В таких случаях необходимая срочная санация чаще всего откладывается с ожиданием сверхуспешного сезона, который выведет санаторий из кризиса. Учитывая, что кризис давно перерос в стратегический – улучшения финансового состояния санатория не произойдут при любых условиях внешней среды. Влияние «кризисной волны» может быть принято аналитиками за наступление внутреннего стратегического финансового кризиса. Это происходит при совпадении начала кризиса ухудшения финансового состояния по внутренним причинам на фоне глобального экономического кризиса внутри отчетного периода (года).

Данный эффект обозначен как «кризисная волна» (эффект I) (рис. 4).

Рисунок 4. Движение «кризисной волны» по блокам внутреннего профиля «фрегат»-модели оценки финансовой устойчивости



Ухудшение финансового состояния в первом квартале обычно происходит на одну ближайшую ступень в системе стратегических финансовых состояний (временно наступает худший профиль). Такой эффект прослеживается по всем санаториям Большой Ялты по всем годам, в дальнейшем он упоминается как «эффект зимы» (эффект II). Разница в профилях на конец предыдущего года и первого квартала следующего года становится меньше и особенно при содействии ситуации ухудшения финансового состояния на конец года (уменьшается разброс в сторону ухудшения – система активнее сопротивляется наступлению кризиса). Данный эффект назван «сокращение предкризисной вариации стратегической финансовой устойчивости (СФУ)» (эффект III). Ситуация, при которой в одном профиле будут присутствовать блоки, характерные для следующего состояния в середине года, будут называться «эффект перелома» (эффект IV). Как видно из табл. П.4, санаторий «Ай-Петри» демонстрирует типичные проявления эффектов как в 2014 г., так и в 2015 г. В течение года положение, как правило, стабилизируется и постепенно улучшается, достигая пика на конец девяти месяцев года даже при стратегически ухудшающемся финансовом состоянии. Характерными для конца первого квартала являются высокая финансовая устойчивость (несмотря на входящее финансовое состояние) и низкая рентабельность всех видов (так как объем реализации в «низком сезоне» всегда на минимальном уровне). На рис. 3б достаточно заметна стабилизация финансового состояния под действием сезона. Полугодие захватывает два месяца сезона – май и июнь, когда продажи путевок выходят на высокий уровень. По профилю на конец шести месяцев можно судить о дальнейшем развитии продаж в высокий сезон для данного санатория и успешности его производственно-финансовой деятельности за весь год.

Особенность полученного метода (модели) состоит в универсальности его применения как инструмента анализа отчетности всего года, так и мониторинга состояния отдельных его периодов. Модель позволяет подготовить синергетические эффекты в развитии финансового состояния компании, программируя стратегические спады и подъемы в противофазе с колебаниями внешней среды и сильнейшими из них в работе санаториев Крыма – сезонности как целого комплекса специфических факторов. Наложение внутреннего спада в финансовом состоянии на негативную среду создает крайне опасный резонанс, последствия которого можно будет компенсировать лишь с наступлением следующего сезона. В этой связи перед менеджментом компании встает дополнительная задача старта проектов в сжатые сроки максимально выгодного начала сезона, что предполагает не только ускорение, но и в некоторых случаях целевое торможение акцентированной мобилизации ресурсов (например, при вводе номерного фонда нового корпуса санатория – для экономии условно-постоянных расходов).

В современных разработках сезонность оценивается статистическими индексами сезонности, чья природа не рассчитана на прямую характеристику финансового состояния санатория. Между тем сезонность предполагает не только рост доходов во время сезона (основа индекса), но и риски колебаний цен на ресурсы, ограниченное ценообразование и т.п. Дифференцированные цены объявлены на весь сезон реализации услуг, которые невозможно накопить как товар – основное отличие от цен и продукции сезонных агропромышленных компаний. Жизненный цикл организации практически разбивается на множество сезонов, чьи положительные или отрицательные финансовые результаты могут суммироваться вместе как в негативном, так и в позитивном смысле. В сезон и в межсезонье стоимость компании будет оцениваться по-разному и наличие метода, раскрывающего всю картину системного перехода от профиля к профилю финансового состояния в тактическом и стратегическом периодах, значительно проясняет условия внешнего инвестирования, перспектив развития доходов, стоимости активов и др.

Выводы

Положения наиболее прогрессивной школы стратегического менеджмента – школы конфигурации – представляют процесс стратегических трансформаций компании как постоянный поток смены профилей при росте капитала. Профилями выступают сложные конструкции (модели) системного единения внешней среды и внутреннего финансово-экономического содержания корпорации. Вопрос описания последней остается открытым. Внутренняя среда корпорации в характеристиках системного анализа – объект сверхсложной природы, включающий взаимодействующие элементы и подсистемы различного назначения (производство, маркетинг, финансы и др.).
В статье приоритет среди всех сфер фирмы закреплен за финансовой частью и соответствующей ее финансовой стратегией, которая в современных условиях приобрела роль исключительной, регулирующей все остальные.

Важнейшая стратегическая задача финансового управления – реальный прирост капитала – тесно связана с достижением устойчивого развития корпорации в будущем и обеспечением высокой конкурентоспособности ее продукта, деятельности в целом. Решение данной задачи без активной программы финансирования инновационной деятельности невозможно. Инновации стали условием устойчивости не только в наукоемких отраслях. Санатории все больше в своей деятельности используют капиталоемкие спа-комплексы (объединение нескольких бассейнов, саун, косметических залов и др.), без которых современный и конкурентный продукт отрасли не будет сформирован. Окупаемость упомянутых комплексов затруднена сезонностью, так

как они дополняют основные услуги проживания в санатории и в межсезонье практически не востребованы. Наличие сезонности усложняет задачу финансового планирования, особенно на стратегическую перспективу.

На передний план выходит задача наличия универсального инструмента управления финансовой сферой, позволяющего построить программу стратегического развития, увязывающую долгосрочные и сезонные цели. В таких условиях имеющемуся объекту оценки финансовой сферы компании – «комплексной финансовой устойчивости» из методологии финансового анализа недостает стратегических свойств, а именно возможности на ее основе моделирования и прогнозирования роста капитала как кумулятивного финансового результата сложения разных по результативности сезонов. Выход на ее оценку в отдаленной перспективе сталкивается с рядом проблем технического и методологического плана.

В техническом смысле требуется модель, которая способна переходить в своих оценках от текущих отчетных периодов к годовым (так как весь сезон, формирующий основной годовой доход, помещается в двух кварталах). Отчетность санаториев в отличие от западных корпораций недостаточно диверсифицирована (многие типы отчетов вообще отсутствуют) и в основном содержит финансовую информацию. Фактически использование модели информационно ограничено основными формами финансовой отчетности. В методологической характеристике финансовой устойчивости классического финансового анализа закреплен единственный приоритет – ее постоянное улучшение. Программируемое стратегическое падение показателей финансовой устойчивости оценивается как безусловное развитие кризиса и необходимо принятие санационных мер, несмотря на стратегические цели и задачи корпорации. Вследствие этого потребовалось разграничить финансовые кризисы по степени риска и причин его возникновения на временные конъюнктурные кризисы (в том числе сезонные), стратегические кризисы (первичного роста, перезапуска бизнеса, ликвидационные). Такая дифференциация стала предпосылкой более тонкого разграничения в финансовом анализе его инструментов (коэффициентов) в роли идентификатора каждого из кризисов для стратегического будущего компании. Установление низких уровней коэффициентов оборачиваемости и денежных потоков (с тенденцией ухудшения) выступает признаком скорого банкротства или реорганизации (ликвидации) компании.

С учетом приведенных условий была построена модель комплексной финансовой устойчивости стратегической специализации («фрегат»-модель), которая, в свою очередь. позволила раскрыть особые закономерности развития финансовой сферы компании как на внутригодовом отрезке времени, так и в отдаленной стратегической перспективе.

Заключение

Предложенный метод (модель) сочетает оценку внутренних закономерностей развития финансового состояния отраслевых компаний и воздействия целых комплексов факторов внешней среды. Среди последних наиболее важным является сезонность. Курортный сезон в финансовом плане вследствие объективного процесса развития общей конъюнктуры рынка – результат годовых денежных накоплений целевой группы отдыхающих, который на уровне отдельной компании реализуется с различной долей успеха. Для конкурентоспособных компаний практически любой сезон будет относительно успешным и не увеличит риск банкротства. Основой исключительного статуса выступает наличие инноваций, что, в свою очередь, требует инвестиционной программы, поддерживающей постоянный стратегический рост. Большинство санаториев Южного Берега Крыма такового не имеют. Данная ситуация – следствие многолетней недооценки важности проведения переоснащения, модернизаций и т.п.

Использование в управлении компанией новой модели и обоснование развития в виде цепочки сменяющихся профилей достаточно наглядно представляют будущее компании в финансовом плане. Игнорирование топ-менеджментом сигналов от блоков модели, отвечающих за стратегический кризис (коэффициентов оборачиваемости и денежного потока), приведет к переходу в неконтролируемое падение и к неминуемой ликвидации, что в случае с санаторием «Ай-Петри» было предотвращено путем принудительной внешней санации и значительных финансовых вложений средств государства. Необходимо было подготовиться к преодолению кризиса и начать реализовать санационные мероприятия не позднее 2011 г., когда в межсезонье появился первый предкризисный тип «фрегат»-модели. Для масштабных стратегических трансформаций у санатория было достаточно собственных ресурсов, а внешняя среда стабилизировалась после мирового финансового кризиса 2007–2008 гг. Социальные последствия чрезвычайных мероприятий искусственного выведения наиболее крупных и перспективных санаториев «Ай-Петри» и «Мисхор» из состава бывшего объединения «Ялта-Курорт» трудно оценить одномоментно. Оставшиеся санатории имеют еще более тяжелое финансовое положение и существовать обособленно от лидеров не смогут. В этой связи перспективы использования модели состоят в использовании для анализа консолидированной отчетности корпорации, обосновании ее внутренних интеграционных процессов в целях поддержки постоянной конкурентоспособности.
В дальнейшем на основе системы типов устойчивости модели возможна разработка новых показателей отчетности государственного управления с разделением причин убыточности отрасли вследствие окончания жизненного цикла санаториев либо их временных конъюнктурных затруднений при характеристике инвестиционного климата региона до и после сезона.

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Приложение

Таблица П.1. Сравнительная характеристика двух группировок исследованных санаториев Крыма по величине собственного капитала и уровню финансового состояния

№ п/п	Группы и их состав по критерию величины собственного капитала (млн долл. в 2008–2016 гг.)	Группы и их состав по критерию уровня финансового состояния (наличия собственных оборотных средств)
1	**Крупные** (свыше 10 млн долл.): «Гурзуфский», «Дельфин-2001»	**Абсолютно устойчивое:** «Гурзуфский», «Ай-Петри», «Киев»
2	**Средние** (от 5 до 10 млн долл.): «Ай-Петри», «Зори Украины», «Курпаты», «Мисхор», «Южный»	**Нормальное (устойчивое):** «Дельфин-2001», «Зори Украины», «Курпаты», «Мисхор», «Южный», «Орлиное гнездо»
3	**Ниже среднего** (менее 5 млн долл.): «Днепр», «Ливадия», «Украина», «Ясная Поляна», «Киев», «Орлиное гнездо»	**Предкризисное (кризисное):** «Днепр», «Ливадия», «Ясная Поляна», «Украина»

Таблица П.2. Финансовые показатели во внутреннем профиле «фрегат»-модели

Группы	Название коэффициента	Нормированные конечные данные
«Брамсель» – финансовая устойчивость (Б)	1. Соотношения мобильных и иммобилизованных средств	0,117
	2. Трансформации	0,210
	3. Автономии формирования запасов	–0,215
	4. Финансовой автономии	0,369
	5. Финансовой устойчивости	0,490
	6. Концентрация собственного капитала (СК)	0,402
	7. К6 (средний размер краткосрочных обязательств / средний размер капитала (ВБ))	0,245
	8. К6 (средний размер краткосрочных обязательств / средний СК).	0,194
«Марсель» – рентабельность (М)	9. ДК 16 (валовая рентабельность операционного потока)	0,262
	10. Рентабельность чистых активов	0,075
	11. Валовая рентабельность реализованной продукции (*RGPM)*	0,407
	12. Чистая рентабельность производства (*R*ПЧ)	0,387
	13. Рентабельность продаж	0,453
	14. Рентабельность собственного капитала (*ROE*)	0,529
	15. Маневренности СК	0,125
	16. Капитализации прибыли	0,281
	17. Операционная рентабельность реализованной продукции *ROIM*	0,653
	18. Рентабельность совокупного капитала (*ROA*)	0,420

«Грот» – ликвидность-платежеспособность (Г)	19. Абсолютной ликвидности	0,160
	20. Покрытия (общий)	0,078
	21. Соотношения дебиторской и кредиторской задолженности (КЗ)	0,060
	22. Рентабельности оборота	0,456
	23. Покрытия чистыми оборотными активами	–0,167
	24. Чистой прибыли	0,581
	25. Покрытия обязательств чистыми активами	0,201
	26. Критической ликвидности	0,223
	27. Доля кредиторской задолженности в заемном капитале	0,555
«Корпус судна» – оборачиваемость (С)	28. Оборачиваемость заемного капитала	0,146
	29. Оборачиваемость оборотных активов (ОА)	0,719
	30. Оборачиваемость денежных средств.	0,504
	31. Оборачиваемость совокупных активов	0,262
	32. Оборачиваемость производственных запасов	0,514
	33. Оборачиваемость СК	0,314
	34. Фондоотдача	0,288
«Киль» – потоки (К)	35. К4 (средний размер собственного оборотного капитала / средний размер ОА)	–0,186
	36. ДК1 (операционной поточности совокупных активов (капитала))	0,111
	37. ДК3 (операционной поточности оборотных активов)	0,114
	38. ДК 12 (поточность затрат производственной себестоимости)	0,092

Рисунок П.1. Содержание этапа системно-стратегического экспресс-анализа финансового состояния санатория в соответствии со структурой системного анализа (первый из трех этапов)

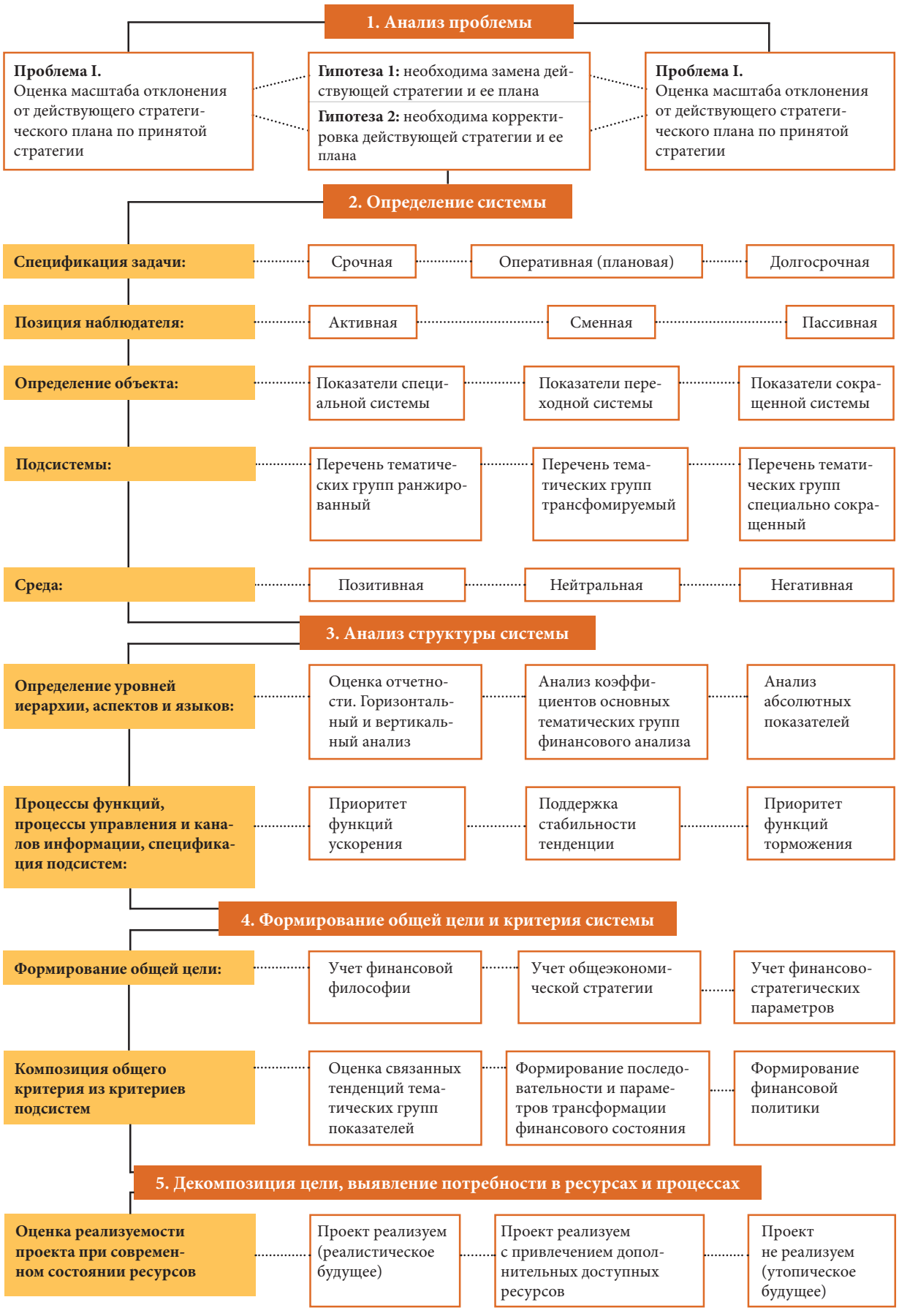


Таблица П.3. Индекс сезонности реализации турпродукта (выручка) в Крыму в 2013–2015 гг. (млн руб.)*

Период	2013 г.	2014 г.	2015 г.	y_t (среднемесячные уровни)	Индекс сезонности ($I_{сез}$, %)
Январь	90,3	68,1	87,8	(90,3+68,1+87,8)/3=82,1	$I_{сез}$=82,07/402,8·100=20,4
Февраль	40,7	22,5	33,8	32,3	8,03
Март	103,8	73,0	94,1	90,3	22,4
Апрель	210,4	132,0	171,7	171,4	42,5
Май	344,6	203,0	279,1	275,6	68,4
Июнь	750,2	420,0	560,0	576,7	143,2
Июль	1105,0	898,0	924,0	975,7	242,2
Август	1900,0	1102,0	1440,0	1480,7	367,6
Сентябрь	720,0	457,0	594,0	590,3	146,5
Октябрь	239,8	189,0	237,7	222,2	55,2
Ноябрь	221,2	139,7	210,9	190,6	47,3
Декабрь	160	98,3	180,6	146,3	36,3

*Рассчитано с использованием данных Министерства курортов и туризма Республики Крым (URL: http://mtur.rk.gov.ru https://rk.gov.ru/file/o_razvitii_turistskoy_otrasli_respubliki_krim_v_2015_godu.pdf?1.0.41).

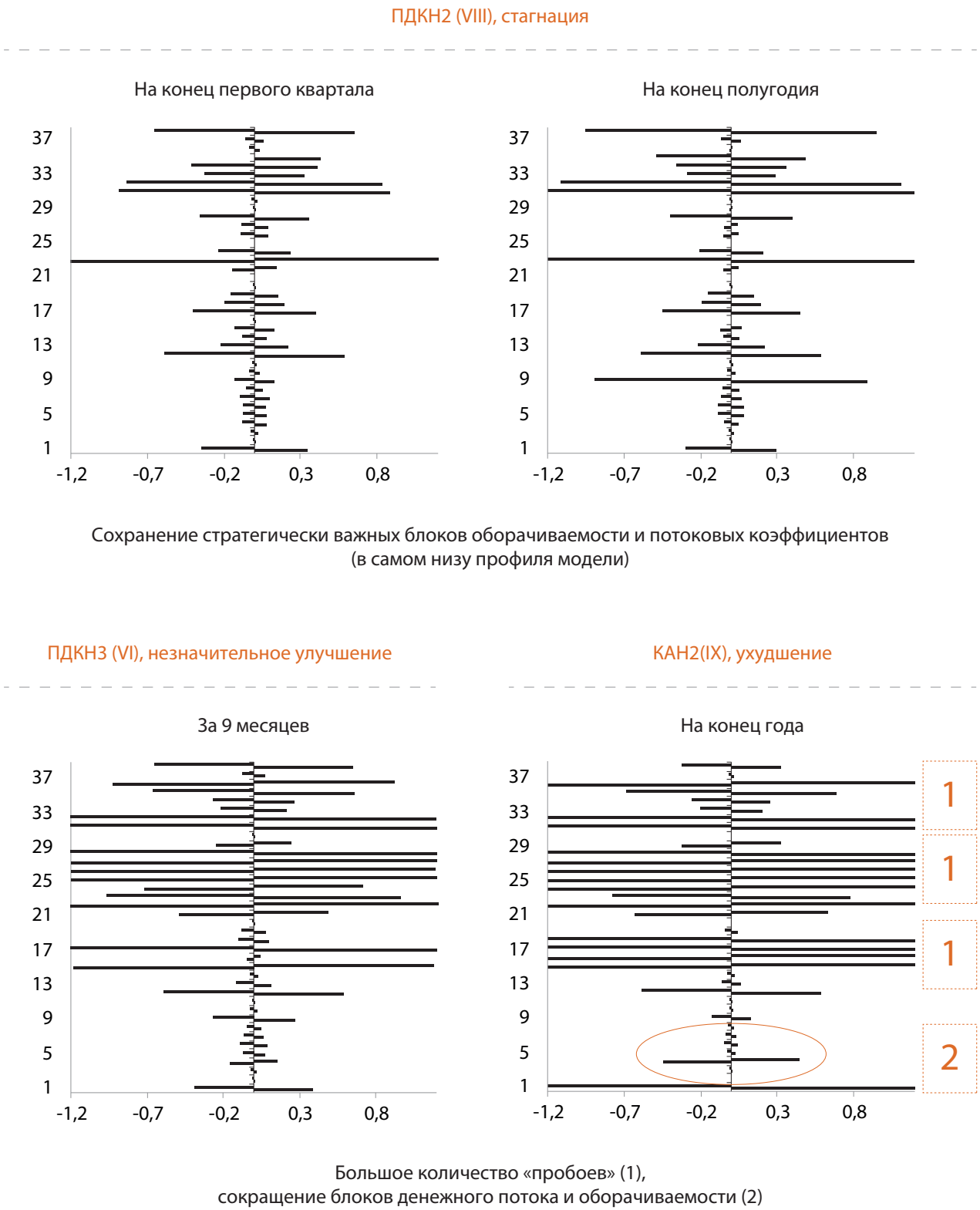
Таблица П.4. Проявление сезонности доходов на АО «Санаторий «Ай-Петри» в 2014–2015 гг.*

Показатель	Первый квартал 2014 г.	Полугодие 2014 г.	9 мес. 2014 г.	12 мес. 2014 г.	Первый квартал 2015 г.	Полугодие 2015 г.	9 мес. 2015 г.	12 мес. 2015 г.
Выручка от обычной деятельности, тыс. руб.	2676,8	34 812,2	173 229,8	208 042,0	3874,9	50 394,9	250 771,1	301 166,0
Финансовое состояние на основе наличия собственных оборотных средств	П[1]	П	Н[2]	Н	П	Н	Н	Н
«Фрегат»-модель	ПДКН3 (VI)	НОРС3 (V)	ХАУ (IV)	НОРС3 (V)	ПДКН3 (VI)	НОРС3 (V)	ПДКН2 (VIII)	ПДКН2 (VIII)

[1] Предкризисное финансовое состояние (в системе классических типов); [2] нормальное финансовое состояние.

По данным: URL: https://zachestnyibiznes.ru/company/ul/1159102038512_9103065479_GUP-RK-SANATORIY-AY-PETRI/

Рисунок П.2. Возникновение сезонного улучшения финансового показателя убыточного санатория контрольной группы (санаторий «Дельфин-2001», 2015 г.)



Strategic Financial Analyses of Sanatorium Corporations under Conditions of Seasonality

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Strategic Financial Analyses of Sanatorium Corporations under Conditions of Seasonality

Abstract

The purpose of this study is to develop a new method of financial analysis that aids the strategic development of financial sustainability in businesses operating in the context of pronounced seasonality. In this study, we consider the example of the sanatorium industry, which is a crucial industry for the Greater Yalta region. In this case, the seasoned reporting financial period can make it difficult to determine a company's value and to assess relevant financial risks, and can restrain investment activity in these businesses.

The limitations of classical analytical methods are apparent in the absence of tools available to objectively justify programmable temporary decreases in financial standing. However, such a strategic program is practically a prerequisite for maintaining competitive status in this particular region and industry, given the constant threat of recessions and the ubiquitous necessity for mobilisation of financial resources. It is important to be able to methodically separate those recurring trends of financial activities that are inherent in individual stages in the life cycle of such organisations from the temporary fluctuations in financial conditions created through the influence of seasonality.

This study aims to fill a methodological gap between the general provisions of strategic management studies and the strategic financial analyses of foreign and domestic authors. The first part of the methodological base relates to the provisions of the School of Configuration (as per the classification of the strategic management schools of H. Mintzberg). This approach involves management based on a chain of profiles ("firm-environment") and the gradual achievement of competitiveness. The second approach is related to the classification of the types of financial crises experienced by firms according to domestic authors, of which capital, profits, and liquidity are the paramount factors. This sequence of factors was additionally complemented by the inclusion of business activity and cash flow crises. The foregoing factors formed the basis for the ranking of financial ratios according to the new analytical model presented in this study, which is based on the central danger of bankruptcy. Methods of financial analysis establish only incoming conditions and several alternatives for the transformation of a business's financial state.

Sanatoriums may be faced with the situation whereby the number of alternative competing sources of respite or similar services available to their potential customers would increase progressively each year. A successive series of good or bad commercial seasons may easily require a substantial reappraisal of a business's fundamental financial strategy. The application of the new model presented in this study reveals a phased sequence of strategic implementation which is catered more specifically to the potential challenges of seasonality inherent to these corporations.

Keywords: financial standing; financial model; financial risk; financial analysis

JEL-classification: G32, G34, G17

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Влияние уровня оптимизма и уровня нарциссизма CEO на структуру капитала компании[1]

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Влияние уровня оптимизма и уровня нарциссизма CEO на структуру капитала компании

Аннотация

Цель исследования – оценка влияния оптимизма и нарциссизма CEO на структуру капитала компании. В основе методики исследования лежит текстовый анализ. База исследования включала финансовую и экономическую информацию по 225 российским компаниям. Для выявления уровня оптимизма анализировались обращения CEO в ежегодных отчетах компаний, для определения уровня нарциссизма – интервью CEO. В обоих случаях использовался метод «мешка слов», причем уровень оптимизма выявлялся на основе подсчета числа позитивных и негативных терминов на основе использования словарей, позволяющих оценить уровень тональность текста, а уровень нарциссизма – на основе соотношения числа местоимений первого лица единственного и множественного числа. Кроме того, для всех текстов рассчитывался индекс Ганнинга и степень равномерности распределения негативных и позитивных терминов по индексу Херфиндаля–Хиршмана. В качестве дополнительного индикатора уровня нарциссизма использовалось число фотографий CEO в отчете компании. Контрольные переменные включают процент женщин и размер совета директоров, возраст CEO, средний возраст членов совета директоров, возраст председателя, количество менеджеров в компании, срок пребывания на посту CEO и председателя, а также финансовые показатели компании. Влияние этих факторов на структуру капитала компании оценивалось на основе модели панельной регрессии. Было частично доказано влияние уровня нарциссизма и уровня оптимизма на принятие решений по структуре капитала компании. Наиболее значимым фактором, отражающим уровень оптимизма, оказалось число позитивных терминов в тексте, а уровень нарциссизма – число фотографий CEO.

Заметное влияние оказывает и индекс Ганнинга. Переменные, рассчитанные по индексу Херфиндаля–Хиршмана, оказались незначимыми, поэтому были исключены из модели. Результаты исследования показывают, что в дополнение к общим характеристикам CEO (пол, возраст, образование) при прогнозе финансовой политики компании целесообразно использовать факторы личностных характеристик. Оригинальность работы заключается в оценке влияния оптимизма и нарциссизма CEO на структуру капитала российских компаний и применении текстового анализа.

Ключевые слова: структура капитала, корпоративное управление, CEO, оптимизм, самоуверенность, нарциссизм, текстовый анализ, «мешок слов»

JEL classificatiuon: G32, M12, O16

Введение

Определение соотношения долга к собственному капиталу для компаний является одним из ключевых вопросов при принятии важных долгосрочных решений. Несмотря на то, что эта проблема достаточно распространена, выбор оптимального соотношения собственного и заемного капитала по-прежнему актуален. Достаточно большое количество исследований посвящено изучению влияния взаимосвязи между финансовым рычагом компаний и многообразием различных факторов, одним из последних направлений является анализ факторов корпоративного управления. Довольно значительное количество исследований посвящено оценке влияния характеристик CEO на финансовое состояние компании. В качестве составляющих характеристик в них использовались показатели: пол CEO [1–3]; размер совета директоров [4]; возраст управляющего [1]; срок пребывания на посту CEO и председателя [5] и др.

В нашем исследовании, кроме этих характеристик, мы рассматриваем малоизвестные характеристики, такие как уровень оптимизма и уровень нарциссизма CEO.

Обзор литературы и гипотезы исследования

Раскроем уровень оптимизма более подробно. В работе [5] ученые изучили поведенческие стимулы CEO крупнейших компаний и определили, что в принятии инвестиционных решений эффект чрезмерной самоуверенности менеджеров является одной из основных причин. Решение об определении структуры капитала выступает комплексным и включает анализ множества различных факторов, которые, в свою очередь, могут иметь высокую степень неопределенности. Решая именно такого рода задачи, людям может быть свойствен чрезмерный оптимизм. В работе [6] определили, что величина переоценки человеком собственных сил при решении неопределенных, сложных задач положительно коррелирует с уверенностью в том, что они лучше, чем среднестатистический человек. То есть, в этом случае эффект излишнего оптимизма или самоуверенности может определяться как переоценка собственных сил. В большинстве компаний существует пирамидальная структура; соответственно, до позиций менеджеров дорастают только лучшие из лучших, на высокие управленческие позиции назначают трудоспособных, уверенных в себе людей, имеющих ярко выраженные лидерские качества. Менеджеры осознают это и могут переоценить собственные силы, что приводит к принятию иррациональных решений, связанных с заемным капиталом.

На основе проведенного анализа научной литературы была сформирована следующая гипотеза исследования:

H_1 – чем выше уровень оптимизма CEO, тем больше доля заемных средств в структуре капитала.

Еще одним фактором, который оказывает влияние на структуру капитала компании, является так называемый нарциссизм CEO. Концепция нарциссизма появилась в литературе по психологии еще столетие назад [7]. Термин «нарциссизм» основывается на клиническом расстройстве, которое в [8] было описано как чрезмерное самолюбие, самовозвеличивание и склонность видеть других в качестве дополнения к собственному «я». Оно определяется как состояние, в котором индивидуум имеет раздутое чувство собственного достоинства и постоянно повышает самооценку. Нарциссисты обладают сильным чувством превосходства, воспринимают себя как очень умных и чувствуют большую уверенность в своих способностях, при этом стремясь доминировать над окружающими. Например, нарциссисты стремятся вести других и открыто демонстрировать свои высокие устремления. Нарциссистам не хватает эмпатии, они часто не имеют возможности осмыслить или разделить чужое душевное состояние или эмоции [9].

При этом необходимо отметить, что у ученых нет единого мнения относительно того, как влияет нарциссизм CEO на деятельность компании: положительно или отрицательно. В табл. 1 мы привели результаты исследований, в которых анализировалось влияние нарциссизма генерального директора на различные показатели производительности фирмы.

В результате исследований [10] было выявлено, что нарциссические тенденции у руководителей влияют на стратегическое поведение фирм. Нарциссизм руководителей воздействует на структуру капитала компании следующим образом: у очень нарциссического CEO имеется сильное чувство личного потенциала, что приводит к крайней уверенности, что, в свою очередь, снижает восприятие неопределенности и рисков, связанных с использованием заемного капитала. На основе проанализированной литературы была сформирована следующая гипотеза исследования:

H_2 – чем выше уровень нарциссизма CEO, тем больше доля заемных средств в структуре капитала.

В работе также будут проверяться контрольные переменные, такие как процент женщин, размер совета директоров, возраст CEO, средний возраст членов совета директоров, возраст председателя, количество менеджеров в компании, срок пребывания на посту CEO и председателя, количество неисполнительных директоров, рентабельность активов компании (*ROA*), рентабельность собственного капитала (*ROE*), налоги, прибыльность и стоимость компании.

Таблица 1. Обзор литературы

Исследование	Исследуемая зависимость	Мера нарциссизма	Выводы
Chatterjee and Hambrick [10]	Влияние нарциссизма CEO на стратегическое развитие компании и ее производительность	Известность фотографии CEO, известность главного исполнительного директора в пресс-релизах, использование CEO личных местоимений первого лица в интервью, а также денежное вознаграждение CEO	Нарциссизм руководителя не был связан с уровнем производительности компании. Нарциссисты имели тенденцию создавать более экстремальные и нерегулярные результаты, чем не-нарциссисты, но, в конце концов, нарциссы не получали систематически лучшую или худшую работу
Gerstner et al. [11]	Влияние нарциссизма CEO на премию за риск (компьютерные компании)	Известность фотографии CEO, известность главного исполнительного директора в пресс-релизах, наличное и безналичное вознаграждение CEO	Руководители-нарциссисты продемонстрировали большую склонность к риску по сравнению с менее нарциссическими руководителями; однако нарциссизм не был связан с премией за приобретение или рискованными расходами
Patel and Cooper [9]	Влияние нарциссизма CEO в 392 компаниях на результаты деятельности фирмы в начале экономического кризиса 2007 г. и в посткризисный период (производственные фирмы)	Известность фотографии CEO, известность главного исполнительного директора в пресс-релизах, использование CEO личных местоимений первого лица в интервью, а также денежное вознаграждение	Нарциссические руководители испытали большее снижение производительности в начале кризисного периода и более высокие показатели эффективности в посткризисный период по сравнению с менее нарциссическими руководителями
Resick et al. [12]	Нарциссизм 75 CEO и посещаемость болельщиков, процент победы в команде и независимый рейтинг влияния (команды бейсбольной лиги)	Выведено 8 индексов для измерения нарциссизма из контрольного списка *Gough Adjective*	Никаких существенных прямых эффектов не было обнаружено между нарциссизмом и эффективностью компании

Методология исследования

Текстовый анализ

Для многих ученых исследования в области влияния и оценки последствий эффекта чрезмерного оптимизма менеджера являются достаточно трудоемкими. Это обусловлено тем, что немногие менеджеры согласятся признаться в неких целенаправленных действиях, например, что завысили расходы на проект, так как это может негативно сказаться на их репутации.

В силу данной причины большинство исследователей прибегают к рассмотрению косвенных сигналов присутствия эффекта излишнего оптимизма менеджмента в их деятельности. К таким сигналам можно отнести: покупку акций компании, которой они управляют на собственные сбережения [13]; результаты собственных прогнозов и исследований [14]; прогноз собственных доходов и выручки [15]; интервью в СМИ и публикации ежегодных отчетов [16].

Эмпирические исследования предложили различные варианты измерения степени уверенности и оптимизма – от опроса до использования прокси-индикаторов на основе общедоступных данных. Множество исследований посвящены попытке проверить влияние оптимизма с помощью различных других переменных, например, деловой прессы. Впервые исследовать уровень оптимизма с помощью деловой прессы первоначально предложили в [17]. В российской литературе [18] был проведен эмпирический анализ взаимосвязи текстовых характеристик CEO letters и финансовых показателей деятельности компании. Предполагалось, что тональность обращений менеджеров, их длина и сложность оказывают влияние на формирование финансовых показателей компании, наличие ошибок в прогнозах финансовых показателей и среднегодовую стоимость акции компании. По результатам исследования была подтверждена гипотеза о связи текстовых характеристик CEO letter и стоимости акций компании. В ряде российских исследований также оценивалось влияние корпоративного управления на эффективность деятельности российских компаний [19].

При исследовании уровня оптимизма CEO мы воспользовались методами текстового анализа.

Текстовый анализ основан на автоматизированной обработке массивов неструктурированных текстов и позволяет решать широкий круг задач, связанных с классификацией, валидацией, унификацией, кластеризацией наборов документов. Исходными данными для текстового анализа служат тексты, предназначенные для чтения человеком и потому, как правило, не имеющие единой строгой структуры: новостные статьи, сообщения в социальных сетях, деловая документация, научные статьи и т.п. Как правило, для анализа отбираются документы одного типа.

Одной из ключевых задач анализа является преобразование текстовых документов в форму, пригодную для дальнейшей автоматизированной обработки. Среди методов такого преобразования наибольшее распространение получил алгоритм, известный под названием «мешок слов». Сущность «мешка слов» состоит в том, что каждый из текстов представляется как неупорядоченный набор входящих в него слов, обычно приведенных к их начальной форме. Преимуществами такого метода являются его простота и интерпретируемость, однако он подходит не для всех задач анализа. Так, выявление семантики текста на основе «мешка слов» затруднено: например, фразы «данное решение не представляется верным и противоречит принципам компании» и «данное решение представляется верным и не противоречит принципам компании» с точки зрения данного метода совершенно идентичны, хотя смысл у них противоположный. Вместе с тем «мешок слов» показывает хорошие результаты в задачах классификации и структурирования больших текстовых массивов. Например, очевидно, что новостная статья с частым вхождением слов «нефть», «баррель», «доллар», «процент», «добыча» относится к нефтяному рынку, а статья, в которой наиболее частыми являются слова «продукция», «производство», «животное», «молоко», «молочный», – к молочному животноводству.

«Мешок слов» также показывает убедительные результаты в анализе тональности (эмоциональной окраски) текста. Для решения подобной задачи необходимо использовать так называемые словари тональности. В них перечислены слова, которые, по мнению экспертов-составителей, имеют эмоциональную окраску. Так, слова «успешный», «отличный» или «победа» обычно имеют позитивную окраску, а «спад», «упадок» или «неудовлетворительный» – негативную. Преобладание позитивных или негативных слов позволяет оценить весь текст как имеющий позитивную или негативную окраску.

Помимо «позитивности» и «негативности», ряд словарей включают и наборы слов с другой эмоциональной окраской, например, «грусть» или «надежда». Существенное значение имеет то, на каком текстовом материале составлялся тот или иной словарь и для анализа каких типов текстов он предназначен. Например, существуют словари, нацеленные на анализ сообщений в Твиттере. Поскольку длина таких сообщений строго ограничена, в подобных словарях велика доля типичных для Интернета сокращений, жаргонных терминов и т.п. Вместе с тем такие профессиональные термины, как «стагнация» или «делистинг», в них отсутствуют. Поэтому в данной работе мы использовали словарь Loughran and McDonald Sentiment Word List (сокращенно Loughran and McDonald, или LM), который был специально разработан для анализа экономических текстов.

Используя метод «мешка слов» и словарь Loughran and McDonald, мы рассчитали число негативных и позитивных слов, а также общее число слов в интервью и CEO letters для каждой компании.

На основе текстового анализа мы вводим следующие характеристики оптимизма.

1) Уровень оптимизма

$$\text{Уровень оптимизма} = \frac{(\text{Позитивные слова} - \text{Негативные слова})}{(\text{Позитивные слова} + \text{Негативные слова})}. \quad (1)$$

Кроме того, для эмпирического анализа в части оценки семантической окраски текста в научной литературе часто можно встретить использование индекса Херфиндаля–Хиршмана (HI). Данный индекс показывает, насколько сконцентрирована определенная информация в тексте (позитивная/негативная) и позволяет определить, является ли значимым данный критерий.

2) Индекс Херфиндаля–Хиршмана, который рассчитывается по формуле:

$$HI_{pos} = \sum_{i=1}^{B} \left(\frac{\text{Позитивные слова}_i}{\text{Позитивные слова}_i + \text{Негативные слова}_i} \right)^2, \quad (2)$$

где B – количество частей, в которых анализируется распределение слов в обращении.

В нашем исследовании мы делили обращения CEO на пять частей, соответственно $B = 5$. Нами были отдельно выделены введение, основная часть и заключение. Основная часть также делилась еще на три дополнительные части, обычно в тексте такие части выделялись абзацами.

3) Уровень нарциссизма CEO определялся нами следующим образом.

1-й шаг.
Расчет коэффициента нарциссизма, который мы определили как отношение личных и притяжательных местоимений единственного числа и суммы личных и притяжательных местоимений единственного и множественного числа:

$$Nrcssm = \frac{\text{Местоимения единственного числа}}{\text{Местоимения единственного числа} + \text{Местоимения множественного числа}}. \quad (3)$$

При помощи текстового анализа и метода «мешка слов» нами были проанализированы интервью CEO на предмет наличия и количества личных и притяжательных местоимений единственного и множественного числа (см. табл. 2).

Таблица 2.
Словарь для определения уровня нарциссизма CEO

Местоимения единственного числа	Местоимения множественного числа
я, моя, мои, мой, меня, мне, мной, мною, моего, моему, моим, моём, моем	мы, наши, сами, нам, нас, нами, нашей, нашему, нашими, наша, нашем

2-й шаг. Каждая компания была проранжирована относительно появления фотографий CEO в годовом отчете. Мы предполагаем, что чем чаще фотография CEO появляется в отчете, тем выше степень нарциссизма у руководителя. Нами была составлена следующая система оценки: 4 балла – если фотография CEO была представлена в отчете больше одного раза и на нескольких страницах; 3 балла – если фотография CEO была представлена в отчете один раз и на одной странице; 2 балла – если фото CEO компании было представлено вместе с другим руководителем; 1 балл – если фотография CEO не была представлена в отчете.

Для увеличения глубины анализа текста многие исследователи дополняют семантические показатели характеристиками общей структуры текста. В научной литературе, посвященной текстовому анализу, часто применяется такой показатель как индекс доступности текста или «индекс туманности» (*Fog Index)*. Данный показатель отражает степень сложности текста с точки зрения понимания потребителем информации; другими словами, *Fog Index* отражает, насколько сложно понять читателю текст. В данном исследовании мы будем основываться именно на *Fog Index* для измерения уровня доступности текста, который рассчитывается по формуле:

$$Fog\ Index = 0,4 \times \left(\frac{\text{Общее количество слов}}{\text{Количество предложений}} + \frac{\text{Количество сложных слов}}{\text{Общее количество слов}} \times 100 \right), \quad (4)$$

где количество сложных слов – количество слов, содержащих более трех символов.

Существует общепринятая шкала степени сложности текста (табл. 3) [20].

Таблица 3. *Fog Index* – степень сложности текста

Fog Index	Характеристика текста
≥ 18	Невозможный для прочтения
14–18	Затруднительный для прочтения
12–14	Полное понимание текста
10–12	Приемлемый
8–10	Примитивный

Наша зависимая переменная – это структура капитала. Мы опирались на результаты работы [21], которые определяют структуру капитала двумя способами: кредитное плечо на основе балансовой стоимости (*BLVE*) и кредитное плечо на основе рыночной стоимости (*MLVE*).

В качестве объясняющих переменных были использованы: уровень нарциссизма CEO, уровень оптимизма CEO, легкочитаемость текста, степень неопределенности CEO, индекс Херфиндаля–Хиршмана, процент женщин среди управляющих, размер совета директоров, возраст CEO, средний возраст членов совета директоров, возраст председателя, количество менеджеров в компании, срок пребывания на посту CEO и председателя, количество неисполнительных директоров, рентабельность активов компании (*ROA*), рентабельность собственного капитала (*ROE*), налоги, прибыльность и стоимость компании.

В итоге в работе проверялись уравнения, которые имеют следующий общий вид:

$$Y = F(X_1 \ldots\ldots X_n), \quad (5)$$

где X_1 – размер совета директоров; X_2 – количество независимых директоров; X_3 – процент женщин в управлении; X_4 – количество менеджеров в компании; X_5 – количество директоров в составе совета директоров; X_6 – количество неисполнительных директоров в компании; X_7 – возраст CEO; X_8 – возраст председателя; X_9 – срок на посту председателя; X_{10} – средний возраст совета директоров; X_{11} – срок на посту CEO; X_{12} – доходность активов (*ROA*); X_{13} – рентабельность собственного капитала (*ROE*); X_{14} – прибыльность; X_{15} – налоги; X_{16} – стоимость компании; X_{17} – позитивные слова; X_{18} – *Fog Index*; X_{21} – фотографии CEO; X_{22} – местоимения множественного числа; X_{23} – степень неопределенности; X_{24} – местоимения единственного числа; X_{25} – коэффициент нарциссизма; X_{26} – негативные слова; X_{27} – общая тональность текста; X_{28} – индекс Херфиндаля–Хиршмана (позитив); X_{29} – индекс Херфиндаля–Хиршмана (негатив).

Анализ данных

Выборочная совокупность данного исследования состоит из относительных коэффициентов и абсолютных показателей, значения которых были получены благодаря ежегодной финансовой отчетности компании, а также информационных порталов.

В части исследования влияния уровня корпоративного управления нами была проанализирована вся доступная информация и выделены представленные коэффициенты корпоративного управления из информационной системы Bloomberg Professional, в части анализа уровня оптимизма, мы анализировали обращения CEO в ежегодных отчетах компаний, в части определения уровня нарциссизма – интервью CEO. Далее вся полученная информация была изучена на предмет факторов, которые уже освещались в научной литературе.

Эмпирическая база исследования состоит из 225 наблюдений, отобранных из 300 крупнейших компаний по капитализации в России за 2012–2016 гг.

Описательная статистика по показателям, использованным при построении данной модели, представлена в табл. 4.

Таблица 4. Описательная статистика

Переменная в модели	Стандартное отклонение	Среднее значение	Минимум	Медиана	Максимум
Структура капитала	0,23	0,55	0,16	0,53	1,77
Размер совета директоров	2,30	10,30	5,00	10,00	19,00
Количество независимых директоров	1,50	3,90	1,00	4,00	9,00
Процент женщин в управлении	18,40	22,60	0,00	22,20	68,01
Средний возраст членов совета директоров	6,43	51,05	39,09	50,39	68,09
Количество менеджеров в компании	4,03	10,31	1,00	10,00	25,00
Количество директоров в составе совета директоров	2,91	10,02	0,00	10,00	19,00
Количество неисполнительных директоров в компании	2,93	9,09	0,00	9,00	18,00
Возраст CEO	7,66	48,35	31,00	48,00	65,00
Возраст председателя	10,10	54,76	30,00	54,00	87,00
Строк на посту председателя	3,69	4,27	0,08	2,96	16,00
Срок на посту CEO	3,65	4,30	0,05	3,40	16,00
ROA	13,40	8,03	–70,04	6,83	42,00

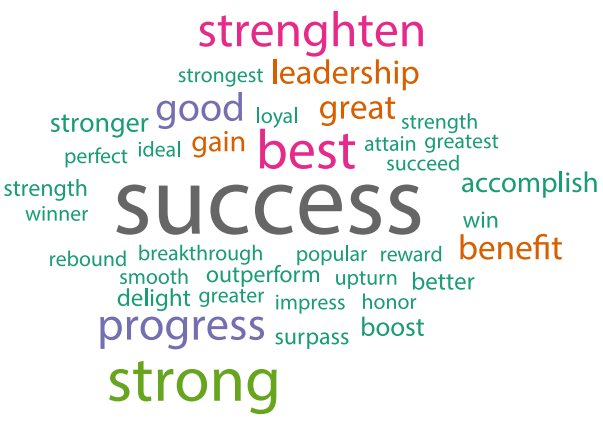
Переменная в модели	Стандартное отклонение	Среднее значение	Минимум	Медиана	Максимум
ROE	44,23	14,35	–194,40	16,04	80,69
Прибыльность	372 993,77	162 840,48	–750 279,78	2965,09	1 575 021,48
Налоги	134 108,55	36 680,08	–162 718,26	346,26	980 753,00
Стоимость компании	3 664 255,99	1 040 481,90	–8 209 163,04	12 135,50	25 135 919,42
Местоимения единственного числа	36,25	24,85	0,00	12,00	141,00
Местоимения множественного числа	66,54	93,62	1,00	82,50	265,00
Коэффициент нарциссизма	0,15	0,17	0,00	0,12	0,67
Степень неопределенности	19,41	24,50	1,00	19,00	80,00
Позитивные слова	5,77	8,93	4,00	8,00	26,00
Негативные слова	3,03	2,90	0,00	2,00	18,00
Общая тональность текста	0,40	0,46	-0,71	0,53	1,00
Индекс *FOG*	4,77	16,07	1,11	17,34	23,36
Индекс Херфиндаля–Хиршмана (позитив)	0,14	0,18	0,08	0,18	1,00
Индекс Херфиндаля–Хиршмана (негатив)	0,04	0,08	0,00	0,07	0,13

Как видно из табл. 4, у рассмотренных компаний в среднем наблюдается сбалансированная структура капитала, доли собственных и заемных средств находятся на одном уровне.

Что касается рассматриваемых показателей в части текстового анализа, можно отметить, что количество позитивных слов значительно превышает количество негативных. В среднем на текст приходится 8,9% слов с оптимистической окраской от общего количества, в сравнении с 2,9% с негативной.

Наиболее распространенные позитивные и негативные слова представлены на рис. 1–4.

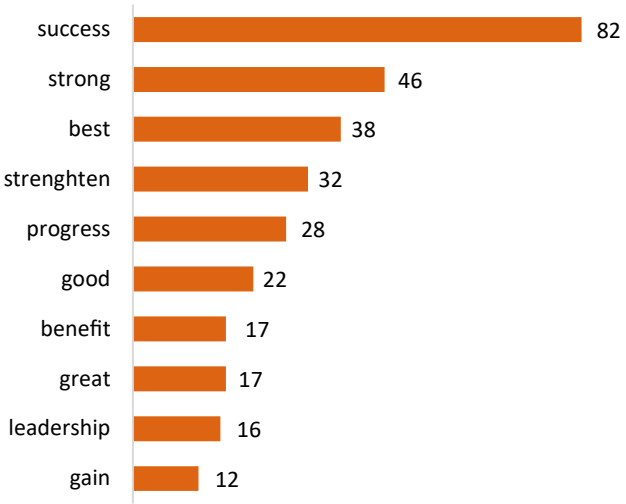
Рисунок 1.
Наиболее распространенные позитивные слова



Можно отметить, что самыми распространенными позитивными словами являются такие как: “success” – успех, “best” – лучший, “strong” – сильный, “strengthen” – сила, “progress” – прогресс. Данные слова имеют сильную положительную эмоциональную окраску и означают достижение высоких результатов. Таким образом, позитивные слова используются руководством для описания достижений и успеха компании.

На рис. 2 представлены топ-10 наиболее распространенных слов с позитивной окраской в тексте; эти слова занимают 60,5% от общего числа положительных слов.

Рисунок 2.
Топ-10 распространенных позитивных слов в обращениях CEO



Что касается отрицательных слов, можно заметить, что наиболее употребляемыми являются такие как “sever” – прекращать, “pleas” – обращение/просьба, “burden” – бремя, “divest” – отказываться, “loss” – убыток.

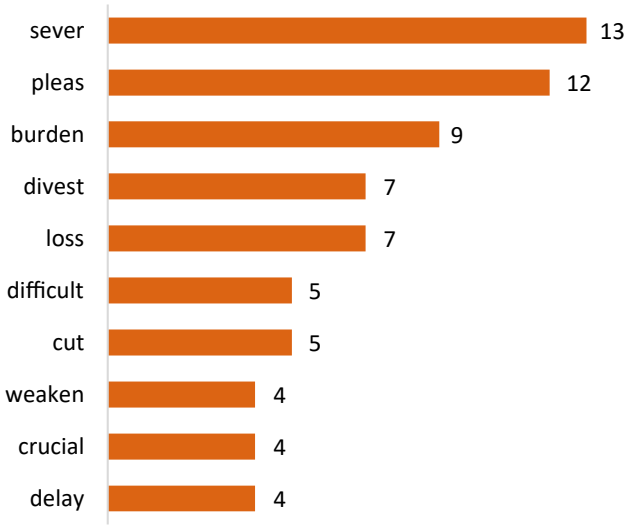
Данные слова используются при акцентировании внимания на ухудшении показателей и трудностях как в деятельности компании, так и экономики в целом.

Рисунок 3.
Наиболее распространенные негативные слова

Данные слова имеют промежуточное значение эмоциональной окраски текста между позитивным и негативным сигналами, тем самым смягчая отрицательное восприятия текста.

На рис. 4 представлен топ-10 наиболее распространенных слов с негативной окраской в тексте. Доля таких слов среди общего количества негативных слов составляет 40,1%.

Рисунок 4. Топ-10 распространенных отрицательных слов в обращениях CEO



Кроме того, анализируя табл. 4, можно отметить, что среднее значение индекса FOG находится на достаточно высокой отметке – 16,07. Это трактуется как то, что текст является затруднительным для прочтения. Такой результат можно объяснить тем, что большинство рассмотренных нами компаний представлены в электроэнергетической, нефтегазодобывающей, нефтеперерабатывающей, металлургической отраслях, в отчетах которых информация и факты рассмотрены более подробно и имеют определенную лексику. Заметим также, что среднее количество личных и притяжательных местоимений во множественном числе практически в два раза превышает их количество в единственном числе.

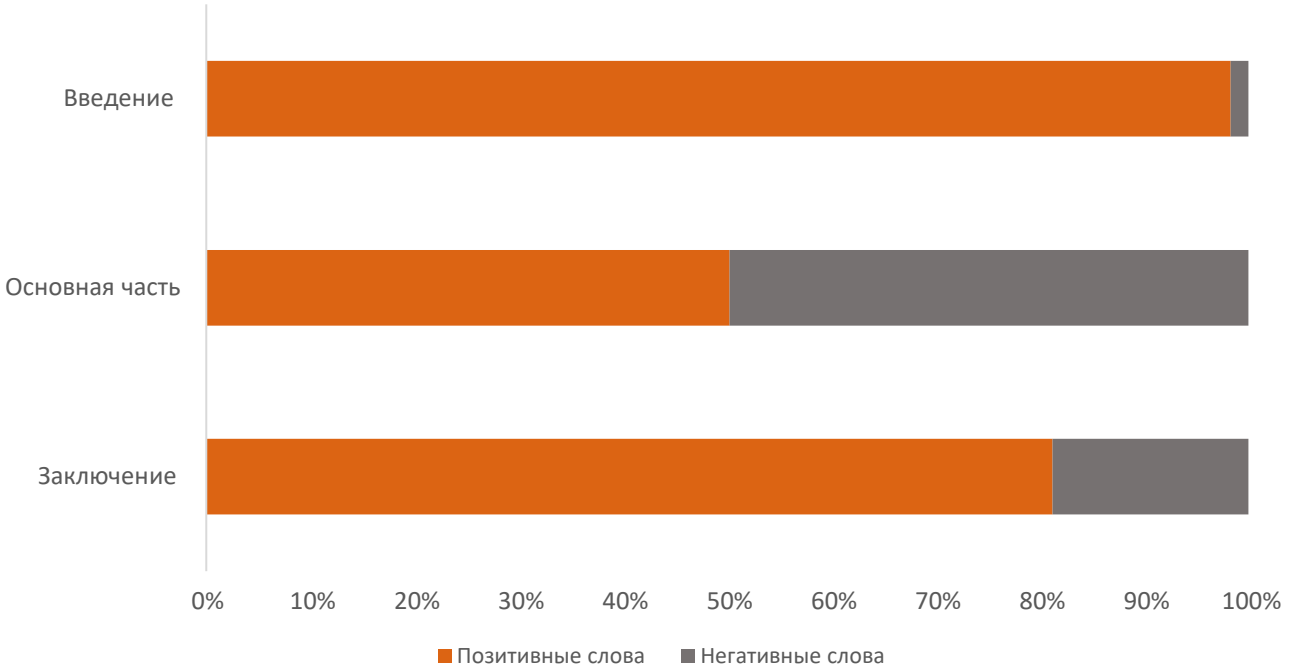
Исходя из данных табл. 4, можно сделать вывод о том, что в среднем количество негативных слов больше сконцентрировано в определенной части текста, о чем говорит значение индекса Херфиндаля–Хиршмана, нежели количество позитивных слов, рассеянных по всем частям текста. При этом, основываясь на данных табл. 5, которые отражают уровень концентрации позитивных и негативных слов в тексте, значение данного индекса находится в диапазоне 0,0–0,2. Соответственно можно утверждать, что рассматриваемым текстам не присуща концентрация позитивных и негативных слов в тексте; в среднем в нашей выборке они сильно распределены по тексту.

Таблица 5. Шкала значений индекса Херфиндаля–Хиршмана [22]

Индекс Херфиндаля–Хиршмана	Характеристика тональности
[0;0,2]	Высокое распределение (дисперсия) тона по тексту
[0,2;0,5]	Низкое распределение тона по тексту с частичной концентрацией в определенных частях
[0,5;1]	Тональность и эмоциональность сконцентрированы преимущественно в одной части обращения

Кроме того, основываясь на данных рис. 5, отражающего среднее распределение позитивных и негативных слов в каждой части анализируемых данных, можно сделать определенные выводы.

Рисунок 5. Среднее распределение позитивных и негативных слов в каждой части обращения CEO, %



Таким образом, можно отметить, что в среднем во введении и заключении больше концентрируются на позитивной информации, стараясь исключать негативные слова. Данные выводы полностью согласуются с результатами ученых, рассмотренных нами ранее.

Результаты исследования

Дальше мы рассмотрим результаты анализа влияния личностных качеств CEO. Нами была построена модель панельной регрессии, к коэффициентам корпоративного управления были добавлены также показатели, отражающие семантические характеристики текста (табл. 6).

Первый рассматриваемый нами коэффициент – оптимизм CEO, который мы определяли по эмоциональной окраске ежегодных посланий в отчете компаний. Переменными были слова с положительный окраской, слова с отрицательной окраской, а также показатель общей тональности текста, который определялся отношением суммы слов с положительной и отрицательной окраской к их разности. Проведенный анализ выявил, что значимым показателем являются только слова с оптимистичной окраской. Перед коэффициентом стоит положительный знак. Это позволяет сделать вывод о том, что связь прямая: следовательно, чем чаще CEO использует слова с оптимистичной окраской, тем больше значение коэффициента структуры капитала, а значит доля заемных средств выше, чем собственных. Результаты анализа согласуются с выдвинутой нами гипотезой, описывающей влияние уровня оптимизма как прямое. Однако не все рассматриваемые факторы оказались значимы, поэтому мы принимаем гипотезу частично.

Нами также был проведен дополнительный анализ обращений на уровень воспринимаемости читателем (*Fog Index*). По этому показателю можно утверждать о присутствии обратной зависимости, т.е. чем хуже воспринимаемость текста читателем, тем больше собственных средств в структуре капитала. Переменные индекса Херфиндаля–Хиршмана (X_{19} и X_{20}) оказались незначимыми, поэтому были исключены из модели.

Еще один показатель, рассмотренный нами в рамках анализа влияния личностных качеств CEO, – степень нарциссизма CEO. Используя гипотезу о том, что чем выше уровень нарциссизма CEO, тем больше доля заемных средств в структуре капитала, нами были отобраны показатели, которые могут отражать степень нарциссизма. Мы протестировали на значимость следующие факторы: количество местоимений единственного числа, множественного числа, составленный нами коэффициент нарциссизма, который рассчитывался как отношение местоимений единственного числа к сумме местоимений единственного и множественного числа в интервью CEO, а также количество фотографий CEO в ежегодных отчетах и степень неопределенности в ежегодных отчетах как величина, обратная понятию нарциссизм.

Таблица 6. Результаты оценки модели

Variables	*Estimate*	*Std. Error*	*t-value*	*Pr(>|t|)*
(*Intercept*)	1.670e+00	1.807e-01	9.246	2.75e-10
Размер совета директоров	−2,71E-02	1,22E-02	−2,21	0,0349
Процент женщин в управлении	−9,13E-03	2,60E-03	−3,512	0,00143
Средний возраст членов совета директоров	−1,02E-02	4,87E-03	−2,1	0,04426
ROA	1,77E-03	6,88E-04	2,570	0,01536
Прибыльность	−2,15E-07	6,86E-08	−3,128	0,00389
Налоги	4,59E-07	1,65E-07	2,789	0,00909
Стоимость компании	−9,09E-03	2,90E-03	−3,132	0,00385
Позитивные слова	8,61E-03	4,52E-03	1,91E+00	6,62E-02
Fog Index	−3,52E-02	1,05E-02	−3,36E+00	2,13E-03
Индекс Херфиндаля–Хиршмана(позитив)	−1.270e-01	9.383e-01	−1,35E-01	0.893656
Индекс Херфиндаля–Хиршмана (негатив)	−6.349e-01	5.923e-01	−1,072	2,97E-01
R-Squared		0,6595		
Adj. R-Squared		0,5574		
F-statistic		12.74		
p-value		3.119e-07		

Для оценки результатов нами была построена модель панельной регрессии, представленная в табл. 7.

Таблица 7. Результаты оценки модели

Variables	*Estimate*	*Std. Error*	*t-value*	*Pr(>|t|)*
(*Intercept*)	1,30E+00	1,46E-01	8,88	3,36E-09
Размер совета директоров	−4,78E-02	1,27E-02	−3,753	0,000931
Количество женщин в управлении	−6,52E-03	3,03E-03	−2,154	0,041065
Налоги	6,21E-07	1,63E-07	3,807	0,000812
Стоимость компании	−1,82E-02	2,44E-03	−7,462	8,16E-08
Фотографии CEO	5,85E-02	2,81E-02	−2,09E+00	4,73E-02
Местоимения множественного числа	4,28E-03	8,97E-04	4,77E+00	6,71E-05
Степень неопределенности	−1,82E-02	9.383e-01	−1,35E-01	0.893656
R-Squared		0,7947		
Adj. R-Squared		0,7373		
F-statistic		13,83		
p-value		3,44E-07		

Данная модель, как и предыдущие, оказалась качественной и значимой с коэффициентом детерминации, равным 0,79.

Протестировав все факторы, значимыми признали только количество местоимений множественного числа, количество фотографий в ежегодных отчетах и уровень неопределенности текста. Определяя зависимость между количеством фотографий в ежегодных отчетах и структурой капитала, мы пришли к выводу, что коэффициент имеет прямую связь, тем самым можно утверждать, что чем большее количество фотографий CEO размещено в ежегодном отчете компании, тем больше заемных средств использует компания. Кроме того, проанализировав зависимость между степенью неопределенности текста и структурой капитала, можно утверждать, что так как коэффициент имеет отрицательный знак, то связь обратная, следовательно, чем менее уверенный тон ежегодного послания, тем больше собственных средств в структуре капитала компании, что подтверждает нашу гипотезу о том, что чем выше уровень нарциссизма CEO, тем больше доля заемных средств в структуре капитала. Однако не все рассматриваемые нами факторы оказались значимы, поэтому мы принимаем выдвинутую нами гипотезу частично.

Вывод

В данном исследовании оценивалось влияние личных качеств CEO на структуру капитала для российского рынка с помощью текстового анализа CEO letter и интервью CEO, расчета индексов самоуверенности и нарциссизма. Несмотря на то, что гипотезы подтвердились только частично, мы считаем, что в дополнение к общепринятым характеристикам CEO (пол, возраст, образование и др.) при прогнозе финансовой политики компании, связанной со структурой капитала, можно использовать и факторы личностных характеристик CEO.

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The Influence of the Level of Optimism and the Level of Narcissism of the CEO on Companies' Capital Structure

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The Influence of the Level of Optimism and the Level of Narcissism of the CEO on Companies' Capital Structure

Abstract

In this paper, we aim to estimate how both CEO optimism and CEO narcissism levels influence the capital structure of companies. These factors are considered as aspects of a CEO's personality in psychological terms, as evidenced by (and in conjunction with) his or her public persona and business activity. We endeavor to estimate as accurately as possible the pertinent factors in this task by utilising qualitative and quantitative analytical approaches founded in linguistics and economic science.

The methodological approach is based on a textual analysis and a panel regression approach. CEO announcement documentation and annual reports are analysed to evaluate the relevant levels of optimism, while public pronouncements in CEO interviews are analysed to estimate the narcissism factor. Both approaches feature the "bag-of-words" model, which measures, among other things, word frequency and multiplicity. The level of the optimism is calculated according to the quantity of positive and negative terms utilised using context-specific dictionaries. To evaluate the level of narcissism, indicators based on the number of singular and plural pronouns are employed. Additionally, the Gunning fog index is computed for all the texts, to further evaluate technical communication proficiency and associated conscientiousness. The positive and negative terms distribution is estimated using the Herfindahl–Hirschman index (HHI). As an additional indicator of the narcissism levels, the total number of the CEO photos per report is calculated.

Additional variables considered include the percentage of women involved in the company's board, CEO age, the length of service of the CEO, the average age of the board, the quantity of the managers in the company, and the firm's financial indicators. The empirical base of this research is comprised of data relating to 225 Russian companies. By accounting for these variables, we aim to better estimate the influence of the estimated narcissism and optimism levels on decision making which affects the capital structure of these firms.

Our findings indicate that the total number of CEO photos included per report is one of the key factors linked with optimism levels. The Gunning fog index is notably important in this context. The variables calculated with the HHI were found to be insignificant, and thus excluded from the model. The results of the research show that jointly with the CEO general characteristics it is reasonable to estimate the CEO personality features. The originality of the paper is primarily founded in the evaluation of CEO optimism and CEO narcissism levels on the Russian companies' capital structure by the specific means of the advanced textual analysis utilized herein.

Keywords: capital structure, corporate governance, CEO, optimism, overconfidence, narcissism, text analysis, bag of words

JEL-classification: G32, M12, O16

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Are Sustainable Growth Indicators in Gas Market Companies Comparable? The Evidence from China and Russia

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Are Sustainable Growth Indicators in Gas Market Companies Comparable? The Evidence from China and Russia

Abstract

This study explores examples of sustainable growth in Chinese and Russian natural gas companies. The topic of sustainable growth has become a priority focus for studies in market development. Company growth encounters many obstacles, and any such study necessitates a multivariate analysis of interrelated financial and non-financial factors.

The authors aim to highlight two fundamental issues in this study. The first is the choice of those indicators which characterise company growth. The second is the identification of factors that have a sustainable impact on growth. Additionally, we try to answer the question: "Are the sustainable growth factors of Russian and Chinese gas market companies comparable?".

The primary purpose of this study is to analyse Chinese and Russian gas market companies' financial growth strategies using the 'Geniberg Z-matrix', as well as enhanced Financial Sustainability Indicators System indices by identifying which indicators have a greater influence on the Sustainable Growth Rate. The scientific novelty of this study is related to the process of constructing financial reports with a focus on sustainable factors, and the implementation of a sustainable financial growth matrix to the appropriate information of Chinese and Russian oil and gas companies.

Through this approach, a relationship between sustainable growth and energy companies' financial strategy was confirmed. Chinese and Russian gas companies' financial growth strategy was analysed by employing the Geniberg-Z matrix as well as enhanced Financial Sustainability Indicators System indices. We found that ROCE, WACC, ROL, and CG-Dummy influence Chinese gas companies' sustainable growth rate and recommended the implementation of an FSIS calculation. In the same way, ROCE, ROFA, CR, DOL, ROL influence Russian gas companies' sustainable growth rate, and we recommend an FSIS calculation. Evaluation results also show that Chinese and Russian gas companies are financially attractive and have stable results, but could improve their financial strategies from a sustainable growth perspective.

Keywords: Chinese gas market companies, Russian gas market companies, Sustainable Growth Rate (SGR), Geniberg Z-matrix

JEL classification: G32, F30, M21, Q01, Q40

Introduction

Nowadays, we pay much attention to the problems of justifying the choice of evaluation criteria and analysing the effectiveness of a company's methods. An approach based on the concept of sustainable growth is becoming increasingly popular. However, the debate about the importance of this concept and its impact on company efficiency continues apace. This is justified, in our opinion, for the following reasons: (a) all companies and industries are unique and have their own individual set of sustainable growth factors, which does not allow us to single out a "standard" set of sustainable growth factors; (b) there is no generally accepted methodology for assessing the impact of sustainability factors on companies' performance; and (c) many companies do not follow non-financial reporting according to GRI standards, which significantly complicates analysis and synthesis [1]. In this paper, we will try to fill this gap for the oil and gas industry.

The objective of the present study is to analyse the biggest Chinese and Russian gas market companies' growth for ten years and try to assess the impact of other criteria on sustainable growth. The research innovation (see Fig.1) of this study consists of an enhancement of finance management methodical tools (FSIS) brought to bear on Chinese and Russian gas market companies, and applied according to appropriate sustainable growth patterns. As a rapid growth of investment leads to rapid company growth, the critical task for Chinese and Russian gas companies concerns the analysis of the companies' sustainable growth. Different terms have been used by different authors to define companies' growth stages, but the stages through which each company passes remain more or less the same ensuring planning and securing the future growth should match company's financial capabilities [2].

'Gibrat's law' (as referenced in many prior studies) was not confirmed, so there was still a necessity of seeking the factors influencing companies' sustainable growth. The importance of that particular problem is that growth is a qualitative characteristic, but it must be measured somehow. We suggest a set of measures which have a greater effect on sustainable growth and a strong emphasis on a financially sustainable index system [1, 3, 4].

Figure 1. Research Scheme

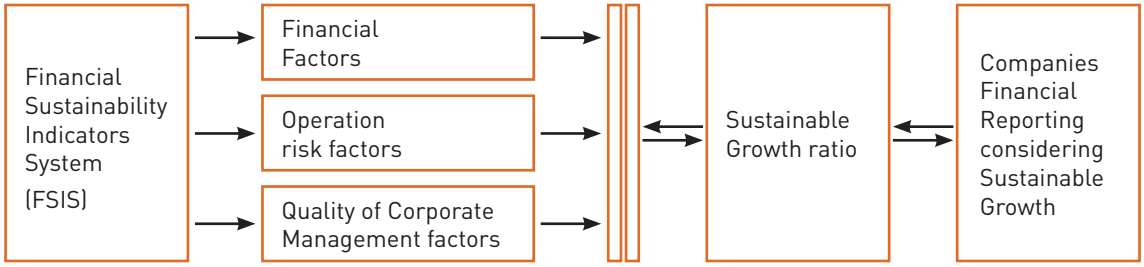


Figure 2. A look at Russian **(a)** and Chinese **(b)** petroleum companies and their shares of the national gas market, 2016. Data sources: Annual report of Gazprom/Novatek/Rosneft (2016), BP China, Annual Report of Sinopec/CNPC/CNOOC (2016)

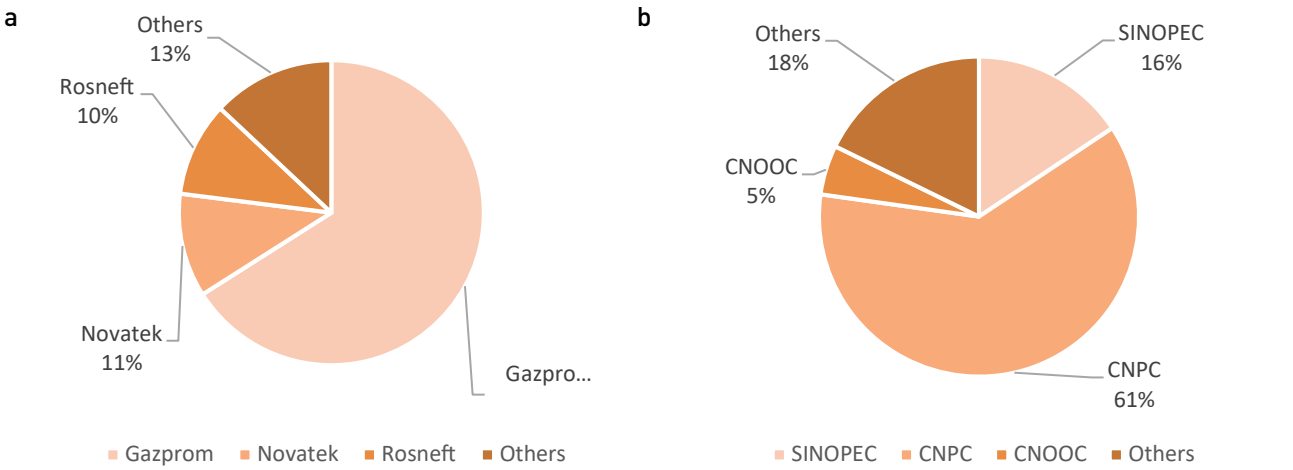
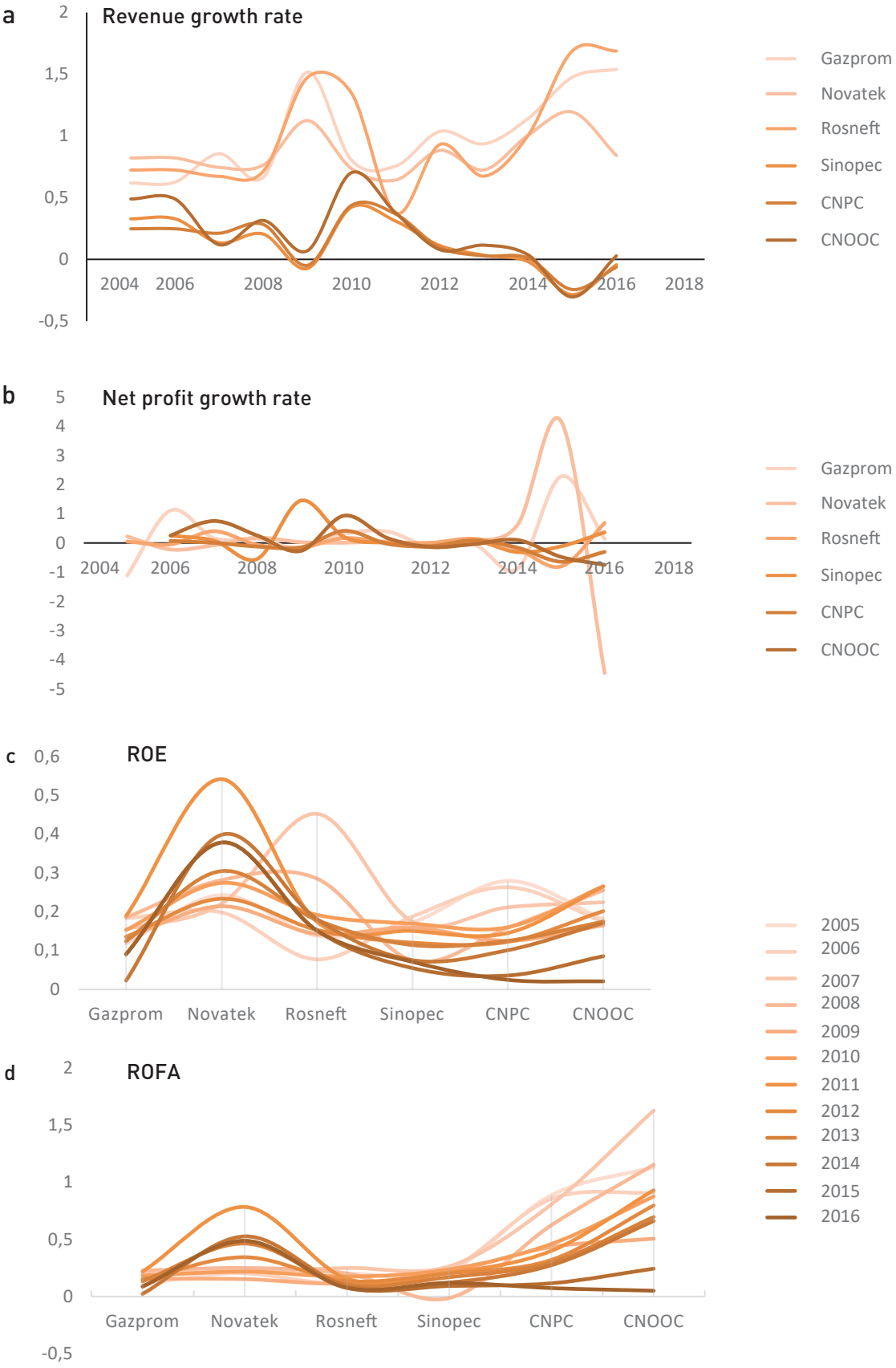


Figure 3. Chinese and Russian gas market companies' financial coefficients in dynamics: (a) Revenue growth rate, (b) Net profit growth rate, (c) ROE, (d) ROFA



For this purpose, we modified a Sustainable Growth Ratio (further referred to as SGR). According to the Financial Sustainability Indicators System (FSIS), inputted financial indices representing the present authors' point of view can help to improve a company's financial strategy very efficiently.

For this Study we considered the financial data from the biggest Chinese and Russian companies in the natural gas market. The study focuses on a ten-year period between the years 2005 and 2016. The leader in gas production among Russian companies is Gazprom, which holds the world's largest natural gas reserves, and holds shares in the global and Russian reserves amounting to 17 percent and 72 percent respectively. As of December 31, 2016, the group's domestic A+B1+C1 hydrocarbon reserves (according to the Russian Energy Ministry's standards) amounted to 36,443.9 billion m^3 of gas and 1,534.9 million tons of gas condensate. In 2016 Gazprom extracted 419.1 billion m^3 of gas, which represented a share of total global and Russian gas production amounting to 11 percent and 66 percent respectively [5]. The second largest Russian gas company is Novatek, with 67.8 billion m^3 of gas extracted in 2016, which constituted 10.5% of total Russian production [6]. Rosneft and Lukoil take the third and fourth places by market share, respectively.

The top three leaders in gas production among Chinese companies are CNPC, Sinopec and CNOOC, which hold the most substantial part of natural gas reserves in China, with total reserves amounting more than 80 percent of the national gas industry [7]. CNPC takes first place in terms of gas production, which accounts for more than 60% of gas production in China. In 2016, it was responsible for 541.9 billion m^3 of proven gas reserves in China. Its annual gas production totaled 98.1 billion m^3 , an increase of 2.6 billion m^3 ' year-on-year. By the end of 2016, CNPC operated 51,734 kilometers of pipelines for natural gas, accounting for 75.8% of China's total.

Fig. 3 shows the financial condition of these Chinese and Russian companies' revenue growth rate, net profit growth rate, ROE, ROFA in dynamics.

The second-largest Chinese gas company is Sinopec. In 2016, the newly-increased natural gas controlled reserves in Sinopec were measured at 288.1 billion m^3, and predicted reserves were 399.7 billion m^3. In the whole year, they produced 21.59 billion m^3 of gas, increasing by 894 million tons (a rise of 4.3%). Annual newly established capacity for natural gas was 3.64 billion m^3. CNOOC took third place by market share having produced 245 million m^3 of gas.

Literature review and hypothesis

There are three questions concerning financial strategy which influence decision making. These are, (1): which long-term investments should be executed (capital budgeting), (2): how the company will earn funds to finance (capital structure), and (3): how does the company manage its cash flow in carrying out operations day by day (working capital management) [8]. All of these questions directly reference the company's sphere of sustainable growth [9].

Usually sustainable growth is defined as the percentage of annual growth of sales that is in agreement with the company's established financial policies [10]. However, this definition has gone through many transformations over the last few decades, from revenue-oriented definitions to 'cost of company' definitions [9], as well as definitions involving social and environmental factors and similar implications [11-13]. According to the HBS1 study "The Impact of Corporate Sustainability on Organizational Processes and Performance", companies with a well-developed management culture focusing on sustainable growth achieve better results according to the following criteria: increase of share price (+2.7 percent); return on equity (+3,5%); and return on assets (+1.6 percent) [14]. In their studies, Hall (1987), Geroski (1997) have used the change of number of employees as an indicator to measure the growth of a company [15, 16].

Also, many researchers have paid attention to analysis of the corporate governance factor influence on sustainable growth [17-19]. However, the majority of authors reference the company's financial statements when examining growth criteria. For example, Singh Whittington (1975) examined the carrying value of net assets as a criterion of growth, Berry (1971) examined the book value of total assets, while Varaiya, Kerin, and Weeks (1987) looked at net profit. C. Joseph and George Miller, exploring the factors of growth pertaining to small business, pointed to steady annual increases in profits [20, 21]. Brush, Bromiley, and Hendricks (2000), Stuart (2000), and Geroski, Machin, and Walters (1997) (and many others scientists) looked at the growth of the company's increased revenues, both through organic development and through acquisitions in the core business of the company and beyond [3].

When considering financial growth, we consider increases in revenue from product sales, total assets, profit, equity, etc. [1, 22, 23]. But is financial growth sustainable or not? Nowadays, it is considered the most important question for every company [24, 25]. In order to describe a system of Financial Sustainability Indicators it is necessary to summarize the ideas of the research: main subject of study is the company' operation; a key characteristic of the functioning of the company is financial sustainability. Financial sustainability is widely interpreted as a condition of dialectical equilibrium in which the company is able to retain its quality in terms of dynamic environment and internal transformations and at the same time to ensure growth and the achievement of corporate goals. A key feature of a company's potential is the performance quality, which can be the basis of a sustainable growth strategy. The system of financial sustainability indicators (FSIS) includes organisational, market, operational and financial sustainability indicators. The system of indicators characterises the present condition of the company and prospects for improving the quality of its operating.

The system of financial sustainability indicators includes the following characteristics: quality of products/ services; quality of the company management; financial condition of the company (asset quality, resource potential, profit and profitability); and operating indicator (economic) risks. The core block of the represented system is a system of financial indicators. 'Financial condition' is not only a concept in classical financial analysis but also an instrument of sustainable growth in social and environmental spheres. In this indicator system, two components - product/service quality and management quality - are universal. Other operational risk factors, which take into account specific features of business, are considered in the block of indicators named "Operational risk". Among operating risks we suggest to consider a few types of risks: personnel risk, reputation risks, transportation risks, natural and environmental risks, political risks. Factors of managerial risks are included in a system of indicators named "Management quality"[26, 27].

This paper systematises the results of theoretical and empirical research devoted to the study of companies' sustainable growth and financial and non-financial indicators, which can influence sustainable growth. Previous research does not account for the interrelations between key corporate structures, each of which is related to energy return on investments, return on labor or environmental ratings concerning Russian and Chinese gas companies. But the main goal of this study is to examine the financial strategy of the six biggest Chinese and Russian natural gas market companies with an emphasis on analysing interrelations between financial and non-financial factors, in order to better understand how to improve sustainability. Therefore, we focus on the identification of how financial architecture patterns relate to energy, social and environmental factors among the examined companies and have formulated the following hypotheses:

Hypothesis 1. The Chinese and Russian companies operate in different countries, but a similar market share correlates with similar financial growth strategy results.

Hypothesis 2. *The Sustainability Growth Rates will pro*vide similar results and have a positive relationship with the supposed coefficients for the FSIS in Russian Companies: ROFA, CR, NPG, DER, WACC, RER, RDS, EROI, ER, and Corporate Government Dummy.

Data and Methodology

After considering all methodological instruments for financial sustainable growth evaluation, the research methodology we selected was the financial evaluation coefficient suggested by Higgins, as well as Ivashkovskaya's modified coefficients. Methods of research were used as general scientific methods of research (the analysis, synthesis, comparison, graphics), and special methods (statistical methods of the analysis, coefficient method).

Population and sample

This study considers the biggest Chinese and Russian natural gas companies' financial data. The study examines a ten years period between the years 2005 and 2016. Data was collected from the annual reports of the three biggest Russian gas market companies (Gazprom, Novatek) [5, 6, 28] and (Rosneft) [29], for the year 2016. The market share for these companies is 88.6% [31] of the total Russian natural gas market [31-32] (see Fig 2 (a)). Similarly, data was collected from the annual reports of the three biggest Chinese gas market companies Sinopec, CNPC, CNOOC [33-35] (see Fig 2 (b)).

Suggested set of Financial Sustainability Index System (FSIS) coefficients

In this research, we want to utilise the Financial Sustainability Indicators System (FSIS) and test which indicators have the most significant influence on sustainable growth. After previously analysing financial coefficients like ROA, NWCT, NWC, DOL, FL, CL, RG, ROE, ROCE, EBIT, ROL, and others, we decided to choose those few coefficients that we considered to be most suitable for testing in this case (see Tab 1, Appendixes 1-4).

Table 1. Russian Gas Companies' "sustainable financial and non-financial indicators" for testing influences on the Sustainable Growth Rate

System Dynamic Model Sustainable Growth areas	Financial Sustainability Indicators System (FSIS)	Financial Sustainability Indicators System (FSIS)-financial factors	Proxy	Calculation method
Economy	Financial factors	Sustainable Growth Rate	SGR	RM*AT*FL*R
		Return On Capital Employed	ROCE	EBIT/(Total Assets-Current Liabilities)
		Return on Fixed Assets	ROFA	EBIT/Fixed Assets
		Current Ratio	CR	Current assets/current liabilities

System Dynamic Model Sustainable Growth areas	Financial Sustainability Indicators System (FSIS)	Financial Sustainability Indicators System (FSIS)-financial factors	Proxy	Calculation method
Economy	Financial factors	Net profit growth	NPG	An increase of a company s net profit when compared to a previous quarter s net profit performance
		Net assets growth	NAG	An increase of a company s net assets when compared to a previous quarter s net assets performance. Net assets=Total assets-Total Current liabilities
		Operation leverage degree	DOL	% change in EBIT/% change in Revenue
		Weighted Average Cost Of Capital	WACC	WACC = rE × kE + rD × kD × (1 – T)
Environmental	Operational risks	ROL	ROL	Net profit/ number of employees× 100%
Corporate	Quality of the Company Management	Corporate Governance Variables	CGDummy	Increase/reduction in the membership of the Board of Directors

To calculate the SGR, we have chosen Higgins' sustainable growth index calculations [10]. The SGR formula is a valuable planning tool because it emphasises the relationship between the four factors described above and the SGR. It is also clear that if a company does not want to issue shares or change either its profitability, asset turnover, financial gearing or dividend policy, it shall have only one SGR [36]. An actual growth rate in sales different from the sustainable growth rate is inconsistent with a fixed financial policy and, like it or not, companies will be unable to maintain financial targets under these circumstances. An actual growth rate below the sustainable growth rate implies that the company has more than enough capital to meet its investment needs and calls for an increase in liquid assets, a reduction in leverage, or an increase in dividends [10].

Sustainable Growth Rate (SGR) Formula:

$$SDR = RM \times AT \times FL \times R, \quad (1)$$

where RM – Return on Sales,

AT – Asset Turnover

FL – Financial Leverage

R – Savings norm (1 – (Dividents/ Net profit))

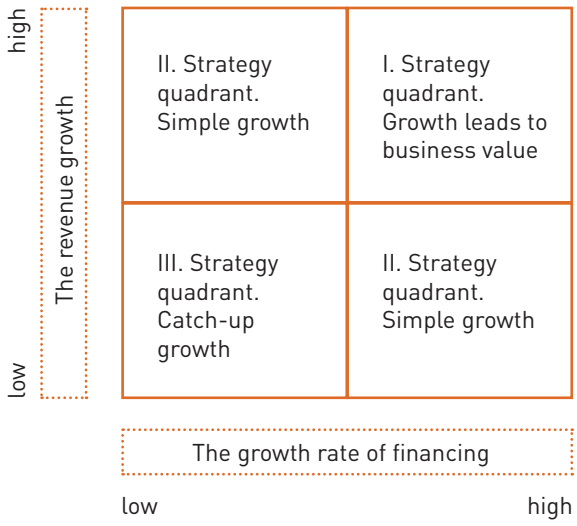
For Financial Strategy Growth evaluation

We consider the most comprehensive method for Russian gas companies' Financial Sustainable Growth Strategy analysis is the methodology referenced at [22, 32]. The main aspect of the theory of Ivanova, Geniberg, and Polyakova is the emphasis on a distinction between financial policy and funding [1], using the interrelation scheme of assets' profitability, products' profitability and the "Du Pont" model. Russian scientists developed the Z-matrix for financial strategy growth formation based on the BCG SGR. The Z-matrix consists of four parts and is-based on an assessment of the revenue growth rate and financing growth rate (Fig.3). The matrix is divided into four squares by an average SGR growth and G (revenue growth). The average tempo is calculated according to the geometric average tempo:

$$1 + r_{gm} = \sqrt[n]{\prod_{i=1}^{n}(1 + r_i)}, \quad (2)$$

where r_{gm} – average geometric growth,
r – growth rate per year,
n – number of years.

Figure 4. Z-matrix Financial Sustainable Growth Model



To build the Z- matrix (Fig.3.) we address 4 calculations:

1) $Revenue\ growth = AT \times PM$

(vertical axis of the Z matrix).

2) $Financial\ growth = FL \times Rate\ of\ savings$

(horizontal axis of the Z matrix). The product of these indices reflects the growth rate of the financing of the company (profit).

3) The average values plotted on the axes are the result of the average meanings of the RR and FR of 4 Russian gas companies.

The results may show the following [32]:

I. Strategy Quadrant. This implies growth, leading to increased business value. In this case, the company has excess capital. A typical financial strategy is growth through internal funding sources. The company's level of retained earnings grows more rapidly than the Equity Growth Rate. In this case, the company (through internal funding sources), can increase sales growth and assets, but at the same time there may be a risk that a rise in sales could lead to gross profit increase. However, according to financial theory this growth will require increases in assets for increasing production volume. The company typically has to increase inventory, receivables, and other assets.

II. Strategy Quadrant. This reflects simple growth. The company is focused on an aggressive sales policy, as there is a high rate of revenue growth in conjunction with a less strict financial policy. The company is profitable because of increasing assets. The company may carry out financing of various investment projects. If none of the investment options is acceptable, the company need not provide additional funding, The company can use all the accumulated profit for dividends.

III. Strategy Quadrant. This quadrant reflects catch-up growth. This implies deficient performance. A typical strategic focus in this case would be a company reinvention strategy or a withdrawal from the market (or market segment). The company may invest in order to improve their position in the market, to invest for recovering lost position, or to reduce the level of investments. As stated, the company may require reinvention and leave the market (or market segment) if it cannot subsequently achieve significant competitive momentum.

IV. Strategy Quadrant. This implies that growth is leading to increased profits. The strategy in this instance is aimed at attracting funds from external sources, either through various kinds of loans or by increasing share capital (issued stocks or bonds). Besides, the bond issue is the highest priority, as it promotes credit rating formation.

To build the matrix it is necessary to perform the following steps [32]:

1) Evaluate the Revenue Growth Rate. This is calculated using the index AT and PM. A product of these indicators reflects the Sustainable Growth Rate (Revenue). The results of this calculation delay value on the vertical axis of the Z- matrix.
2) Evaluate the Financing Growth Rate. This is calculated using the FL and R indicators. A product of these indices reflects the company's Financing Growth Rate (Profit). Calculation results delay value on the horizontal axis of the matrix.
3) Industry average values plotted on the axes of the matrix are set according to the Russian Federal State Statistics Service.
4) Determine Quadrant 1-4, and identify how the company needs to work with the appropriate financial strategy to develop more specific recommendations for the its financial management.

This approach allows us to estimate the value of the business terms using growth in revenue and funding. Depending on Z-matrix results, the company must invest in those areas that are most competitive. This analysis is an effective mechanism for the consideration of opportunities for further investment expansion or reduction. The Z-matrix results can help a company's leaders evaluate their business to compare the attractiveness of different areas of financial activities and to determine the direction of cash flow.

Hypothesis calculation

This study tests a number of variables.

Fundamental variables:

Fundamental variables refer to the basic independent variables in the analysis which are introduced as indicators of the company's growth. We have divided the fundamental variables into two further categories, those of financial and non-financial variables.

Financial factor variables: ROCE, ROFA, CR, WACC, NPG, NAG, DOL.

Operational risk factor variables (social, energy, environmental, etc.): ROL.

Non- fundamental variables:

Corporate governance was chosen as a variable to reflect the change in the total number of members of the Board of Directors for the first year:

$$CGdummy = \begin{cases} 1, if\ (a) \\ 0, if\ (b) \end{cases}, \quad (3)$$

where a – Board of Directors' members increase, b – other

To test this hypothesis, dummy variables were used according to the following regression model:

$$Y_i = a_1 + a_2 D_{2i} + a_3 D_{3i} + \beta X_i + u_i \ . \quad (4)$$

To test hypothesis 2, we constructed a regression model:

$$\ln y = b_1 \ln x_1 + b_2 \ln x_2 + b_3 \ln x_3 + c \ , \quad (5)$$

where y – SGR

$\ln$ – natural logarithm;

b_1, b_2, b_3, etc – coefficients

x_1, x_2, x_3 – dependence variable

(ROFA, CR, NPG, DERT, WACC, RER)

C – Dummy variable

The basic regression model is Russian scientist Irina Ivashkovskaya's model. For this research, the regression model was modified.

$$SGR = aROCE + bCR + cNPG + dNAG + \\ +eWACC + fROFA + gDOL + gCGDummy \quad , (6)$$

where *SGR – Sustainable Growth Rate, ROCE- Return on Capital Assets; ROFA – Return on Fixed assets, CR – Current ratio, NPG – Net profit growth, NAG – Net Assets growth; WACC – Average cost of capital, ROL – Return on Labour; CG Dummy – corporate Dummy*

Results

Hypothesis 1 results

We built a Financial Strategy Sustainable Growth Z-matrix for analysing financial strategy based on the concept of the sustainable growth model. The Z-matrix consisted of four parts, and was based on an assessment of the revenue growth rate and the financial growth rate. We can see that Russian gas companies' actual revenue growth is higher than SGR growth. In other words, companies ignored financial limitations and prefer to operate in high risk situations.

The results of the analysis of Russian gas companies via the Z-matrix confirmed Ivashkovskaya's research findings [9] that achieving sustainable growth was not only associated with profit growth. Fig. 5 shows that Gazprom's performance between 2005 and 2013 was mostly founded in the Q1 range. This means Gazprom's growth lead to a high business value. The company has a significant volume of capital. A typical financial strategy for Gazprom, in this case, is growth via internal funding sources. The company's level of retained earnings grows more rapidly than the growth rate of equity. In this way, the company can increase the growth of sales and assets. However, at the same time, there may be a risk, for example in the event that a rise in sales could lead to profit increase, while the growth also requires increases in assets for increasing production volume. For sustainable growth, Gazprom must increase assets, because additional sales requires more labour and other investments [32]. If companies are not able to increase their growth, it may be because they do not have a material base for this (limited production capacity, limited financial resources or limited qualified labour resources). An increase in assets is accompanied by the growth of funding sources, either internally (R indicator in the calculation of the SGR) or externally (by borrowing). We can see that Gazprom's 2014-2015 transfer to Q3 was characterized by a relatively deficient performance. However, from 2016, Gazprom again tries to move to the Q1 quadrant.

Figure 5. Company's Z-matrix trajectory results, 2005-2016; (a) Gazprom, (b) Novatek, and (c) Rosneft

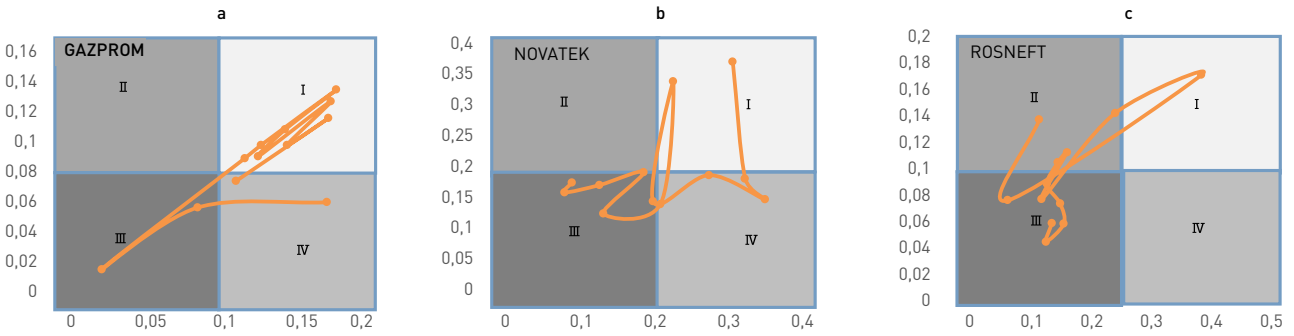


Figure 6. Company's Z-matrix trajectory results, 2005-2016; (a) CNPC, (b) Sinopec, and (c) CNOOC

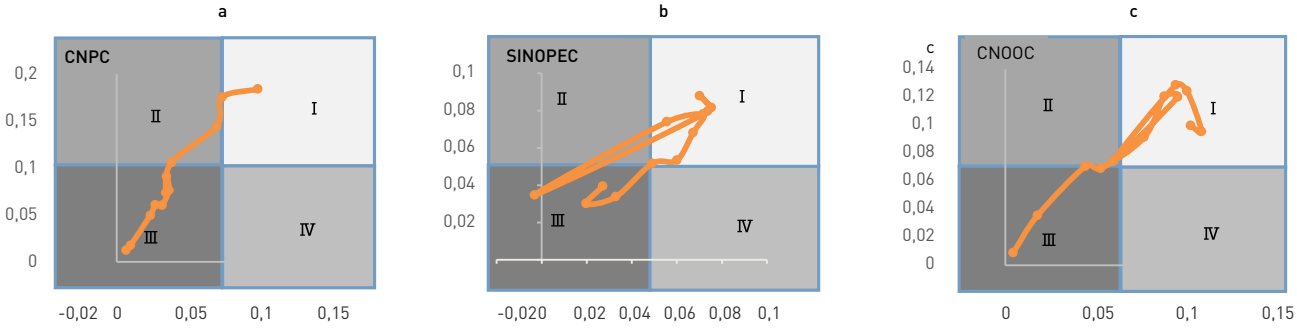


Fig. 5 shows that Novatek's growth was mostly founded in Q4. But from 2014, they were seen to be operating within the Q1 quadrant range. Lukoil, from 2005 till 2011 was at Q1, but from 2011 this changed to Q3 with a very low rate of performance. In 2015 the focus was at Q2 and the "simple growth" strategy, but from 2016 the company returned to Q1. As a result, currently, financial growth strategy recommendations for Novatek are the same as those for Gazprom. Rosneft was focused on Q3 for several years, but from 2016 Gazprom moved to another financial strategy point. Rosneft stays in Q2 "Simple growth". So, Rosneft focused on an aggressive sales policy with a high rate of revenue growth but with less focus on developing its financial policy. Rosneft has subsequently carried out financing for various strategic investment projects. If none of the investment options is acceptable, the company need not provide additional funding.

Analysis of the Z-matrix shows that the companies' financial strategies change from period to period, and in some periods (for example until 2011, see Tab.2) they have approximately the same strategy, and then start strong fluctuations within one company affect the whole sample. However, for the most part, they have passed in linear fashion from Q1 to Q2 or Q3, from Q2 to Q3. Notably, it is necessary to pay attention to Novatek, which since 2012 has moved initially to the second quadrant, and then to the third, but in 2014 returned to Q1. Consequently, we demonstrated that the SGR does not fully reflect the company's growth. So, maybe there are other financial and non-financial criteria (for example, environmental criteria [37] or energy efficiency criteria [38, 39]) that also have an impact on a company's sustainable growth.

The situation concerning Chinese natural gas companies does not appear to be quite the same. Analysis of the Z-matrix (Fig. 6) shows that companies' financial strategies are changing from period to period and in some periods (for example 2005-2008 and 2010-2012) they have approximately the same strategy as the Q1 model, meaning growth which leads to increased business value. In this case, the company has excess capital. A typical financial strategy would be to aim for growth through the use of internal funding sources. In this situation the company's level of retained earnings grows more rapidly than the Equity Growth Rate. Such a company can increase sales growth and assets through internal funding, but as previously described, there may be a risk in this situation, such as where a rise in sales can lead to a gross profit increase, which would require increases in assets to accommodate increasing production volume. The company would then typically have to increase inventory, receivables, and other assets. Indeed, that was a period of rising prices on energy resources. As the 2011-2012 year starts, one can observe strong fluctuations within one company which affects the whole sample. From 2014, all companies gravitate into Q3. A period of catch-up growth is then entered, which results in deficient company performance. Companies may invest in order to improve their positions in the market, to invest in recovering lost positions, and to reduce the level of investments. On the one hand, the companies are in a more stable position, which means external actions and internal shifts leave them less prone to unanticipated changes as they were in the previous state. On the other hand, Chinese companies must improve their financial strategies according to a sustainable growth point of view by moving to another financial growth strategy - either Q2 or Q1. For example, CNOOC during the period 2013-2015 was at Q2, which means the company was focused on an aggressive sales policy, resulting in a high rate of revenue growth and less focus on diversifying the financial policy. The company is profitable at this stage because of increasing assets, and may carry out financing of various investment projects.

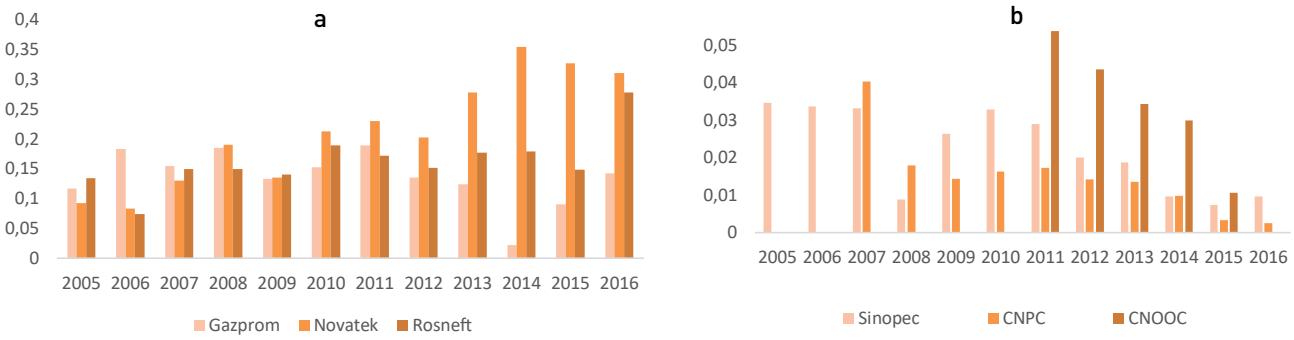
During the crisis of 2008, Chinese companies were actively developing oil and gas assets around the world in order to preserve their capital by transferring them into another form (this involved increasing reserves, resources and production capacity). These reserves and resources changed the financial structure indicators in a certain way, but had not yet reached proper sustainable growth levels of development. For example, when Chinese companies faced a relative crisis due to slow economic growth in 2014, certain companies suffered due to a particular exposure to non-tangible asset development.

Indeed, the international oil and gas business has seen the rise of national petroleum companies that have dramatically restricted access to hydrocarbon reserves for major international oil companies such as Exxon Mobil, Chevron, Shell and BP over the last ten years. Intense competition from national petroleum companies is apparent in global capital markets. For example, in the first half of 2012, PetroChina, Rosneft and Petrobras attracted more than $27 billion to the financial markets, while Exxon Mobil, Chevron, Shell and BP attracted about $10 billion. The Chinese national oil company (CNPC), since 2011, has invested in oil and gas assets around the world in the amount of approximately $100 billion. If we compare "supermajors" Exxon Mobil and PetroChina's oil reserves, Exxon Mobil is above the Chinese corporation. However, from the "total capital" point of view, PetroChina started 2014 with 1.2 trillion yuan (or $204.8 billion), whereas ExxonMobil held $180.4 billion. CNPC had the most liquid assets in cash for a total amount of $8.2 billion (or 51.4 billion yuan), which is almost twice as high as the free cash levels of the American competitor. By the results of 2014, even some top twenty petroleum companies completed the fiscal year with a loss: the net loss of Peproleo Brasileiro SA (Brazil) amounted to $7503.0 million. Petroleos Mexicanos (Mexico) – $36071.0 million, "Gazprom" – $3561.7 million. With regard to companies of average and small size, we can see the net loss based on the activities shown by Santos Ltd. (Australia) – $844.0 million; Lundin Petroleum AB (Sweden) – $252.2 million; Tullow Oil PLC (Ireland) – $276.7 million. Four Canadian mining companies augment this list. In the U.S. a net loss was recorded in twenty oil companies, among which are the

famous Anadarko Petroleum Corp. – $156.3 million, and Apache Corp. – $5060.0 million. CNPC confirmed that was the lowest level of the company's profits during the previous five years, after which CNPC announced its intention to reduce the operating costs by 9% to 266 million yuan in 2015.

With Chinese gas market companies' profitability at a low level, therefore, it is necessary to increase it by a more effective use of the available resources and reduction of expenses [31]. In turn, when faced with a decrease in net profit, Chinese companies nevertheless count on dividends. Concerning our financial analysis, companies can use the self-financing technique (i.e. internal funding), but that doesn't necessarily allow them to access the necessary expanded reproduction process and accretion of assets to accommodate sustainable growth. It may be stated that Chinese companies lag relatively behind in terms of financing, which is confirmed by the fact that the actual gain of sales volume is lower than the calculated SGR, as observable since 2014. Concerning the financing issue, the companies in question have not yet recovered from the 2014 crisis (see Fig. 7).

Figure 7. Sustainable Growth Rate calculation results (a) for Russian gas companies; (b) for Chinese gas companies



Financing could be carried out due to the attraction of the loan capital, but companies often do not opt for this approach, and conduct instead a deliberate strategy of financing. It is not necessarily a bad approach, because companies want to be stable and employ their resources deliberately. Since 2012, all examined Chinese companies maintained a stable structure of financing (ratio loan to own the capital), and Sinopec, despite insignificant profitability and other difficulties, could reduce external financial dependence by more than 35% (relative to 2012), if loan financing was reduced.

Now that there are difficulties with profitability for various reasons (prices, the markets, production costs) financing sources are limited. On the one hand, the level of dividend payments is the same as in the "good times", and some companies, on the contrary, do not decrease but increase dividends, but credits and other sources of loan are reduced. The level of financial dependence on loan sources in Russian companies is far higher, despite sanctions, as the companies find suitable means for the attraction of financial resources to ensure growth.

Russian and Chinese gas market companies' evaluation results show that companies are financially attractive, but companies outline conservative policies and sustainable growth outlooks in their annual financial reports. On the other hand, companies' financial performance suggest another situation because of an insufficient application of relevant indices. This situation reflects the inconsistency of existing sustainable growth approaches. Chinese and Russian gas market companies must improve their financial strategies according to a sustainable growth point of view by implementation of the FSIS during financial reporting, including FSIS KPIs that have influence on companies' sustainable growth.

Hypothesis 2 results

Unbalanced financial growth leads to resource deterioration and debt burden risks. That is why it is essential to know which financial indicators concerning sustainability have a more significant influence on the company's sustainable growth as a whole. We calculated a set of financial indicators through which Russia and China's three largest gas market companies' sustainable growth rates for the period 2005-2016 were determined.

Financial sustainable growth has been identified as the growth of a company's strategic and financial results with some key determinants. Evaluation of the regressions was carried out by using pooled regression models, with deterministic and random effects. The following evaluations were applied to gauge their influence on the SGR calculation: ROCE, ROFA, CR, NPG, NAG, DOL, WACC, ROL and CGDummy. A panel regression analysis result shows that SGR provides similar results and has a positive relationship with Russian gas market companies' supposed coefficients for FSIS: ROCE, ROFA, CR, DOL, ROL (see Appendix 1,3) and a panel regression analysis result shows that the SGR calculation provides similar results and has a positive relationship with Chinese gas market companies' supposed coefficients for FSIS: ROCE, WACC, ROL, and CGDummy (see Appendix 2,4).

The challenge for Russian gas companies is the undervaluation of assets. Thus, results of our study show that Russian gas companies should choose a strategy which leads to an increase in the value of assets. Russian gas companies tend to pay particular attention to social benefits for staff. An employee could ostensibly feel that the company's management takes care of personal needs and thus be motivated to work more efficiently [32].

Thus, a socially-oriented strategy for Russian companies should be continued because social responsibility leads to a sustainable financial growth increase. The same could be the strategy based on the discussions of the Chinese gas market companies' results. The best option, also, is to focus on a strategy which leads to a increase in the value of assets. As we see, at the Chinese companies, payments to staff have an impact on the company's steady growth, and, what is essential and very inherent for China, is that the corporate component has significant influence on China gas market companies' financial sustainable growth. China is a country with strong traditional management, and a corporate component is very essential in that country. Research results are important for the adequate design, formulation and application of financial policies for Chinese oil and gas companies as well as Russian companies that encourage social responsibility and conscientious corporate governance to improve company financial growth.

Discussion and Conclusion

It is obvious that the relationship between sustainable growth and gas companies' financial strategies must be closer and more interrelated. Non-financial factors and their influence on the Sustainable Growth Rate should become an essential part of financial system sustainability analysis. As a research result, recommendations about capital structure formation and development of a financial strategy which acknowledges companies' sustainable growth were defined. It was also illustrated that sustainable growth factors for Russian gas companies and Chinese gas companies are not identical. Chinese and Russian gas companies' financial growth strategy were analsed using the Geniberg Z–matrix, as well as enhanced Financial Sustainability Indicators System indices by identifying which indicators have a greater influence on the Sustainable Growth Rate. It was found that ROCE and WACC have a strong influence on Chinese gas companies' sustainable growth rate and are recommended for consideration as part of an FSIS calculation. It was discovered that ROL and CGDummy also have an influence on the Sustainable Growth Rate. ROCE, ROFA, CR, DOL also have an influence on Russian gas companies' sustainable growth rate and are also recommended for FSIS calculations. Additionally, ROL also has an influence on the Sustainable Growth Rate. Evaluation results show that Chinese and Russian gas companies are financially attractive and have stable results, but must improve financial strategies according to a sustainable growth perspective. As a result of this analysis, we identified the relevance of the Return on Labour ratio for both Chinese and Russian companies and the impact of a corporate governance factor on Chinese companies' SGR, which confirmed our assumptions. Consequently, the authors demonstrated that SGR does not fully reflect a company's growth. So, maybe there are other financial and non-financial criteria (for example, criteria concerning personnel [15, 16], environmental protection [40], social responsibility, energy efficiency or corporate governance issues which will have an impact on companies' sustainable growth. The authors believe that Chinese and Russia gas market companies should pay more attention to the social, environmental and economic determinants that will contribute to sustainable company growth.

Future Research

Sustainable financial growth is a potential area for future research projects and scientific investigative potential. It is debatable which factors have more influence on the SGR. However, companies must try to find a way to implement relevant indices that will influence such growth, and set them as companies KPI. The authors emphasise that a mere financial analysis of sustainable growth will not fully reflect the financial capabilities of such companies. That is why in this research we take into account non-financial indicators as a possible direction for further development of the financial sustainable growth theory. Concepts such as environmental protection, energy savings, and social factors may represent some significant non-financial factors which can influence the sustainable growth rate. Also, the central question that the authors would focus on in future related research is whether sustainable growth is optimal or balanced. That is, whether it is better that financial sustainable growth should be balanced - where all parts of the model must be equal – or if this "equal" model is not practically useful in our society because it is premised upon an unrealistic ideal of a corporations presence in the real world.

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Appendix 1
Hypothesis 2 regression results (Russia)

	(1)
VARIABLES	sgr
roce	-0.414***
	(0.120)
rofa	0.441***
	(0.0623)
cr	-0.0242*
	(0.0137)
wacc	0.00116
	(0.00292)
nag	0.0791
	(0.0491)
npg	0.00219
	(0.00589)
dol	0.0214*
	(0.0115)
rol	0.0113**
	(0.00469)
cgdummy	-0.00410
	(0.0161)
Constant	0.157***
	(0.0445)
Observations	36
Number of id	3

Appendix 2
Hypothesis 2 regression results (China)

	(1)
VARIABLES	sgr
roce	0.0766*
	(0.0446)
rofa	0.000208
	(0.0115)
cr	-0.00895
	(0.00553)
wacc	0.00991***
	(0.00370)
nag	0.0264
	(0.0279)
npg	-0.00858
	(0.00772)
dol	5.71e-05
	(6.04e-05)
rol	-0.000468*
	(0.000263)
cgdummy	0.00970**
	(0.00413)
Constant	-0.0264
	(0.0167)
Observations	36
Number of id	3

Appendix 3
Hypothesis 2 correlation results (Russia)

sgr sgr	roce 1	rofa	cr	wacc	nag	npg	
roce	0.148	1					
0.388							
rofa	0.6842*	0.6266*	1				
0	0						
cr	-0.3393*	-0.262	-0.274	1			
0.0429	0.123	0.106					
wacc	0.3588*	-0.0701	0.277	0.00320	1		
0.0317	0.685	0.102	0.985				
nag	0.217	0.111	0.0247	-0.00860	0.0654	1	
0.204	0.518	0.886	0.960	0.705			
npg	0.102	0.0238	0.0295	0.0234	-0.0431	0.224	1
0.555	0.891	0.865	0.892	0.803	0.189		
dol	0.185	0.3025*	0.151	0.0703	-0.125	0.246	0.136
0.280	0.0730	0.381	0.684	0.468	0.148	0.430	
rol	0.193	-0.3650*	-0.251	-0.152	0.121	0.00960	-0.0644
0.259	0.0286	0.141	0.377	0.481	0.956	0.709	
cgdummy	-0.00990	-0.218	-0.00120	0.0827	-0.0689	-0.4352*	-0.222
0.954	0.202	0.994	0.632	0.690	0.00800	0.194	

dol dol	rol 1	cgdummy
rol	-0.133	1
0.440		
cgdummy	0.0574	0.00990	1
0.739	0.954	

Appendix 4
Hypothesis 2 correlation results (China)

sgr	roce	rofa	cr	wacc	nag	npg	
sgr	1						
roce	0.234	1					
0.169							
rofa	-0.0956	0.5756*	1				
0.579	0.000200						
cr	-0.3377*	0.195	0.7556*	1			
0.0440	0.254	0					
wacc	0.5339*	0.270	0.0652	-0.186	1		
0.000800	0.111	0.705	0.278				
nag	0.165	0.3086*	0.5609*	0.3602*	0.245	1	
0.336	0.0671	0.000400	0.0309	0.149			
npg	0.175	0.5062*	0.3930*	0.164	0.228	0.3965*	1
0.306	0.00160	0.0177	0.338	0.181	0.0167		
dol	0.183	0.110	-0.0924	-0.123	0.0117	0.0592	0.6106*
0.286	0.522	0.592	0.475	0.946	0.732	0.000100	
rol	0.148	0.3917*	-0.235	-0.5443*	0.179	-0.135	0.0674
0.389	0.0181	0.168	0.000600	0.295	0.432	0.696	
cgdummy	0.4283*	0.00380	-0.2957*	-0.3416*	0.0805	-0.0841	0.144
0.00920	0.982	0.0800	0.0414	0.641	0.626	0.403	

dol	rol	cgdummy
dol	1	
rol	0.0803	1
0.641		
cgdummy	0.221	0.217	1
0.196	0.203	

Совершенствование инструментария оценки финансового потенциала отрасли электроэнергетики

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Совершенствование инструментария оценки финансового потенциала отрасли электроэнергетики

Аннотация

Влияние внешних и внутренних факторов на экономику компаний приводит к изменению финансового потенциала отрасли электроэнергетики и недостаточно полной оценке активности компаний ее электроэнергетики для повышения эффективности управления ресурсами, что обусловило актуальность проведения данного исследования. В качестве объекта исследования выбран вид экономической деятельности, который относится к производству, передаче и перераспределению электроэнергии для измерения финансового потенциала и поиска резервов повышения вклада в экономический рост страны.

Цель исследования состоит в оценке финансового потенциала отрасли как источника роста экономики, а также возможностей прогнозирования развития экономики в электроэнергетике.

В статье рассмотрены источники финансирования инвестиций в основной капитал в отрасли электроэнергетики в Российской Федерации, определена динамика параметров, воздействующих на уровень финансового потенциала компаний отрасли электроэнергетики, проиллюстрирована динамика стоимости инвестиций в денежном эквиваленте в соотношении с оборотом энергетических компаний. На основе проведенного исследования авторами разработаны модель гибкого развития и финансирования компаний реального сектора экономики (на примере компаний электроэнергетики) и методические рекомендации по формированию конкурентного механизма финансирования компаний электроэнергетики.

Новизна предлагаемой модели заключается в расширении возможностей по инвестированию в отрасль электроэнергетики как на региональном, так и на федеральном уровне и направлена на повышение финансового потенциала компаний – инициаторов проекта. Проведенный анализ позволил выделить четыре типа инструментов финансирования, которые рекомендуется применять для совершенствования деятельности компаний реального сектора экономики: инструменты государственно-частного партнерства, инновационного развития, государственной экономической политики и фискальные инструменты.

Практическая значимость разработанных методических рекомендаций заключается в том, что их адаптация к компаниям реального сектора экономики позволит усовершенствовать стратегическое управление финансовым механизмом аккумулирования потоков доходов таких компаний в долгосрочной перспективе и выработать модель гибкого планирования бюджета и оценки ключевых рисков, возникающих на всех уровнях экономического развития.

Ключевые слова: финансовый потенциал, электроэнергетика, реальный сектор экономики

JEL-классификация: E60, G32, Q40, Q41, Q48

Финансовый потенциал отрасли: теория

Финансовый потенциал отрасли можно рассматривать через призмы разных научных взглядов, большинство ученых использует совокупность терминов и понятий исходя из совокупности компаний. Так, в монографии [1, с. 15] дается следующее определение: «Финансовый потенциал следует понимать как некоторый уровень мощности, степень возможностей для обеспечения конкурентоспособности предприятия, обусловленные теми ресурсами, которые есть в распоряжении предприятия и способностью предприятия эффективно управлять данными ресурсами, т.е. их использовать и воспроизводить», а также приводится триадная шкала измерения уровня финансового потенциала (высокий, средний, низкий). Н.А. Сорокина считает, что «финансовый потенциал организации – это итоговая финансовая характеристика деятельности и одновременно стартовая оценка возможностей организации в ближайшем будущем, и влияние перечисленных групп факторов на финансовый потенциал существенно различается в зависимости от того, какую стратегию развития воплощает субъект бизнеса» [2, с. 15]. В статье Е.Ю. Макеевой и А.О. Бакуровой [3] отражено влияние финансового потенциала и прогнозирование его с использованием различных методов, а также определяется возможность прогнозирования банкротства компаний с учетом влияния различных внешних факторов.

Исследование направлено на то, чтобы выявить проблемы использования финансового потенциала компаний отрасли электроэнергетики и усовершенствовать процесс привлечения собственных, заемных и привлеченных источников финансирования для развития бизнеса, модернизации энергетической инфраструктуры, улучшения энергетической безопасности страны.

По нашему мнению, финансовый потенциал в исследуемой отрасли – это источник ресурсов электроэнергетических компаний, который аккумулируется в разделе «Капитал и резервы» бухгалтерского баланса (форма № 1). В структуре данного раздела одними из весомых элементов финансового потенциала выступают нераспределенная прибыль, уставный капитал и резервы компаний сферы электроэнергетики.

Эффективность финансового потенциала организаций электроэнергетики базируется на инвестиционной привлекательности российских компаний отрасли электроэнергетики для получения заемного капитала, которая в практике оценки корпоративных финансов определяется на основе соотнесения займов (суммы долгосрочных и краткосрочных обязательств) и собственного капитала, валюты (итога хозяйственного оборота) баланса.

Финансовый потенциал отрасли электроэнергетики раскрыт в научной литературе неполно, в ней практически не затрагивается природа происхождения финансовых ресурсов. В этой связи необходимо раскрыть категорию «финансовый потенциал отрасли электроэнергетики».

Финансовый потенциал отрасли электроэнергетики – наличие финансовых ресурсов компаний электроэнергетики, необходимых и достаточных для воспроизводства ресурсов топливно-энергетического комплекса, которые обеспечивают интенсификацию роста валового регионального продукта и оптимизацию стоимостной «цепочки добавленной стоимости» экологически чистых источников энергии как фактора энергетической безопасности отраслевой экономики.

В данном категориальном аппарате исследуется дефиниция «финансовые ресурсы компаний электроэнергетики», под которыми следует понимать совокупность накопленных денежных средств электроэнергетических предприятий, аккумулированных за счет различных источников финансирования и распределенных в инвестиционном портфеле отраслевых проектов посредством комбинации оптимальных элементов капитала: нераспределенной прибыли, резервного и добавочного капитала, амортизационного фонда и фонда развития энергетической промышленности, дивидендов на инвестированный капитал в уставные капиталы экономических агентов, страховых премий при осуществлении перестраховочных операций, доходов от аутсорсинга на рынке энергосбытовых услуг, иных собственных, привлеченных и заемных источников формирования имущества энергетического комплекса.

Финансовый потенциал отрасли электроэнергетики исследуется нами под углом зрения достаточности собственных и привлеченных, а также заемных источников финансирования, что предусматривает целесообразность конкретизации категорий «стоимость капитала» и «структура капитала». В ряде классических наук (финансы организаций, финансовый менеджмент, корпоративные финансы) под стоимостью капитала понимается цена как отдельно взятого элемента собственного капитала – обыкновенных акций, нераспределенной прибыли, амортизации внеоборотных активов, привилегированных акций или заемного капитала – банковского кредита, займа, финансовой аренды (лизинга), так и комплексного средневзвешенного показателя – цены капитала

$$WACC = \sum P_i \times Q_i, \quad (1)$$

где $WACC$ – средневзвешенная стоимость капитала (источников финансирования);

$\sum$ – сумма произведений цены и удельного веса источников финансирования;

P_i – цена капитала *i*-го вида, измеряемая в процентах или долях единиц;

Q_i – удельный вес капитала *i*-го вида (в процентах или долях единиц).

Рисунок 1. Динамика соотношения собственных и привлеченных средств в общем объеме инвестиций в основной капитал по коду деятельности ОКВЭД 2: (35) «Обеспечение электрической энергией, газом и паром; кондиционирование воздуха» в РФ в 2010–2017 гг.

Источник: данные *FIRA*.

В практике оценки финансового потенциала отрасли электроэнергетики применяются три вида капитала: акционерный (собственный), заемный (банковское кредитование) и привлеченный, удельный вес определяется путем пропорционального распределения каждого вида источника финансирования деятельности электроэнергетических компаний в итоговой величине совокупного капитала. Цена конкретного вида капитала определяется установленной суммой затрат на его обслуживание. Например, компания отрасли электроэнергетики взяла кредит на установку энергосберегающего оборудования (удельный вес которого по расчетам финансово-экономического отдела достиг 40% в общей структуре источников финансирования) под 19% годовых, следовательно, цена заемного капитала *Pi* равна 0,19, или 19%, а удельный вес *Qi* составит 0,4, или 40%.

Важным при оценке финансового потенциала является определение возможностей привлечения инвестиций и инвестиционного потенциала отрасли для реализации проектов по расширению, диверсификации и модернизации отрасли электроэнергетики.

Выбор источников финансирования инвестиционных проектов логично связывать с документами стратегического планирования на федеральном и региональном уровнях, планами по реализации отраслевых проектов компаний-конкурентов в связи с высокими рисками. Качество подготовки вводных параметров при принятии решений по формированию инвестиционного плана и подготовке финансово-экономической модели прогнозирования отрасли напрямую влияет на инвестиционную привлекательность отрасли и сценарные условия развития отрасли электроэнергетики в кратко- и среднесрочной перспективе. Валидация используемых данных по объекту инвестирования и параметры результативности компаний отрасли электроэнергетики позволят обеспечить прогнозирование долгосрочных показателей эффективности и сроков окупаемости.

Следовательно, на конечный результат, обусловливающий достижение требуемого уровня инвестиционной привлекательности проекта, воздействует рациональное принятие решений в области наполнения стратегических моделей финансовой информацией.

Таблица 1. Структура финансовых показателей по коду деятельности ОКВЭД 2: (35.11) «Производство электроэнергии» в 2013–2017 гг., тыс. руб.

Показатель	2012	2013	2014	2015	2016	2017	Изменение (+, –)
Валюта баланса, всего	3 750 374 889	3 564 913 522	5 049 555 235	5 736 072 504	6 091 373 417	6 709 061 995	2 958 687 106
Внеоборотные активы	2 567 982 509	2 553 484 150	4 112 059 879	4 446 696 230	4 420 439 437	4 932 034 059	2 364 051 550
Оборотные активы	1 182 392 380	1 011 429 372	937 495 356	1 289 376 274	1 670 933 980	1 777 027 936	594 635 556
Капитал и резервы	2 047 561 680	1 853 749 724	3 687 765 794	4 208 544 061	4 177 012 511	4 837 922 079	2 790 360 399
Задолженность по полученным кредитам и займам, всего	570 063 171	684 694 224	999 601 937	1 177 779 849	1 279 041 952	1 203 896 217	633 833 046
Структура баланса, %	100,00	100,00	100,00	100,00	100,00	100,00	–
Внеоборотные активы	68,47	71,63	81,43	77,52	72,57	73,51	5,04
Оборотные активы	31,53	28,37	18,57	22,48	27,43	26,49	–5,04
Капитал и резервы	54,60	52,00	73,03	73,37	68,57	72,11	17,51
Задолженность по полученным кредитам и займам, всего	15,20	19,21	19,80	20,53	21,00	17,94	2,74
Выручка (нетто) от продажи	1 593 682 405	1 590 420 949	1 837 204 113	2 020 699 277	2 312 087 751	2 487 029 873	893 347 468
Прибыль (убыток) до налогообложения	106 113 100	124 181 244	104 730 026	142 072 099	375 778 401	373 136 434	267 023 334

Источник: составлено авторами по данным *FIRA*.

Таблица 2. Структура инвестиций в основной капитал по коду деятельности ОКВЭД 2: (35) «Обеспечение электрической энергией, газом и паром; кондиционирование воздуха» в 2010–2017 гг., тыс. руб.

Показатель	2010	2011	2012	2013	2014	2015	2016	2017
Российская Федерация								
Собственные средства, направленные на инвестиции в основной капитал	198 087 892	299 249 739	315 242 150	356 517 048	371 520 908	385 209 713	416 755 900	494 550 785
Доля собственных средств, направленных на инвестиции в основной капитал к общему объему инвестиций, %	36,35	41,80	38,63	42,78	43,18	53,80	55,94	67,10
Привлеченные средства, направленные на инвестиции в основной капитал	346 808 003	416 702 806	500 838 940	476 776 396	488 830 116	330 842 711	328 212 999	242 505 667
Доля привлеченных средств, направленных на инвестиции в основной капитал к общему объему инвестиций, %	63,65	58,20	61,37	57,22	56,82	46,20	44,06	32,90
в том числе привлеченные средства:								
Кредиты банков, направленные на инвестиции в основной капитал, в том числе	47 598 732	66 316 272	70 371 762	93 419 092	101 267 678	42 003 053	55 959 609	46 480 321
Доля кредитов банков в привлеченных средствах, %	13,72	15,91	14,05	19,59	20,72	12,70	17,05	19,17
Бюджетные средства, направленные на инвестиции в основной капитал	31 353 553	28 119 705	30 013 324	23 893 556	45 274 472	36 730 890	29 141 357	18 353 119
Доля бюджетных средств в привлеченных средствах, %	9,04	6,75	5,99	5,01	9,26	11,10	8,88	7,57
Средства федерального бюджета, направленные на инвестиции в основной капитал	24 606 497	22 749 165	25 395 784	17 289 766	41 885 489	29 405 264	17 518 929	11 453 479
Доля ФБ в привлеченных бюджетных средствах, %	78,48	80,90	84,62	72,36	92,51	80,06	60,12	62,41
Средства бюджетов субъектов федерации, направленные на инвестиции в основной капитал	3 613 780	4 845 484	4 025 198	4 084 568	1 517 555	5 284 482	8 334 472	5 576 901
Доля РБ в привлеченных бюджетных средствах, %	11,53	17,23	13,41	17,09	3,35	14,39	28,60	30,39
Прочие привлеченные средства, направленные на инвестиции в основной капитал, тыс. руб.	259 623 940	302 563 530	375 696 350	313 095 895	252 447 186	216 391 457	197 092 610	156 216 568
Доля прочих привлеченных средств в привлеченных средствах, %	74,86	72,61	75,01	65,67	51,64	65,41	60,05	64,42
Заемные средства других организаций, направленные на инвестиции в основной капитал	8 215 925	19 688 077	24 584 761	45 297 528	64 628 405	20 855 538	34 712 786	21 154 212
Доля заемных средств других организаций в привлеченных средствах, %	2,37	4,72	4,91	9,50	13,22	6,30	10,58	8,72

Источник: составлено авторами по данным *FIRA*.

Финансовый потенциал отрасли: анализ

Таким образом, проведенное исследование выбора наиболее оптимального сочетания финансовых инструментов поддержки реального сектора экономики и стимулирования экономического роста в компаниях электроэнергетики направлено на устранение диспропорций в структуре выручки, капитала и других финансовых показателей развития отрасли (табл. 1).

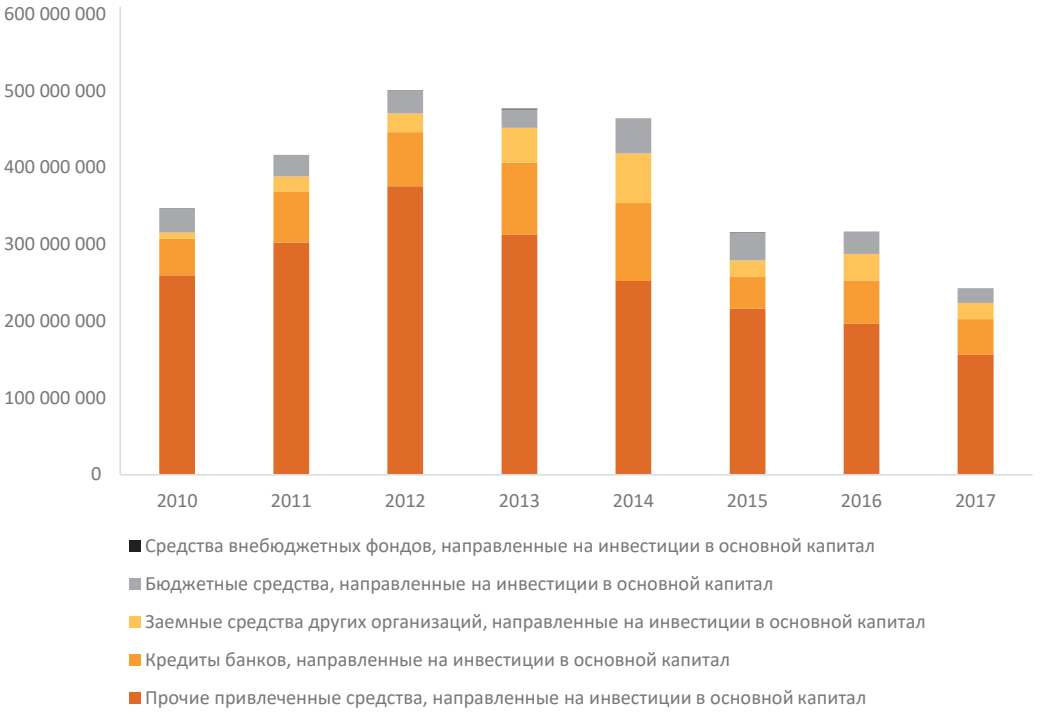
Наблюдается положительная динамика роста собственного капитала в структуре баланса в 2012–2017 гг., но при этом также растет и задолженность по кредитам и займам, что требует оценки структуры инвестиций в отрасли электроэнергетики. Кроме того, определение инструментов финансирования отрасли реального сектора экономики с учетом прогнозов потребностей в инвестициях в разрезе регионов, способствует долгосрочному росту эффективности развития реального сектора экономики и повышению инвестиционной привлекательности компаний электроэнергетического комплекса России.

Обратимся к анализу структуры инвестиций в основной капитал по коду деятельности ОКВЭД 2: (35) «Обеспечение электрической энергией, газом и паром; кондиционирование воздуха» в 2010–2017 гг. (табл. 2).

Согласно данным, приведенным на рис. 1, в 2017 г. объем собственных средств, направленных организациями на инвестиции в основной капитал по коду деятельности ОКВЭД 2: (35) «Обеспечение электрической энергией, газом и паром; кондиционирование воздуха», в целом по РФ составлял 494 550 785 тыс. руб. (на 77 794 885 тыс. руб. больше, чем в 2016 г.); привлеченных средств – 242 505 667 тыс. руб. (на 85 707 332 тыс. руб. меньше, чем в 2016 г.).

В течение всего отчетного периода 2010–2017 гг. в целом по РФ происходило постепенное увеличение собственных средств в структуре инвестиций в основной капитал по коду деятельности ОКВЭД 2: (35) при одновременном уменьшении объемов привлеченных средств. Так, если в 2010 г. на долю собственных средств приходилось 36,35% от общего объема инвестиций в основной капитал по коду деятельности ОКВЭД 2: (35), то в 2017 г. их доля составила 67,10%, увеличившись в целом за анализируемый период 2010–2017 гг. на 30,74%. Соответственно, доля привлеченных средств в общем объеме инвестиций в основной капитал по коду деятельности ОКВЭД 2: (35) уменьшилась с 63,65% в 2010 г. до 39,20% в 2017 г. Основным источником привлеченных средств, направленных на инвестиции в основной капитал по коду деятельности ОКВЭД 2: (35), в целом по РФ в течение всего анализируемого периода являлись прочие привлеченные средства, направленные на инвестиции в основной капитал (рис. 2).

Рисунок 2. Динамика соотношения источников привлеченных средств, направленных на инвестиции в основной капитал по коду деятельности ОКВЭД 2: (35) «Обеспечение электрической энергией, газом и паром; кондиционирование воздуха» в РФ в 2010–2017 гг., тыс. руб.



Источник: данные *FIRA*.

Сравнительный анализ данных по соотношению источников привлеченных средств, направленных на инвестиции в основной капитал по коду деятельности ОКВЭД 2: (35), показал, что в 2017 г. объем прочих привлеченных средств составлял 156 216 568 тыс. руб. (снижение по сравнению с 2016 г. составило 40 876 042 тыс. руб.), или 64,42% от общего объема привлеченных средств, направленных на инвестиции в основной капитал по коду деятельности ОКВЭД 2: (35)).

Выявлен волнообразный тренд динамики объемов инвестиций в основной капитал по виду экономической деятельности производство и распределение электроэнергии, газа и воды в целом по Российской Федерации, характеризующийся ростом с 2010 по 2013 г. и снижением в 2014–2016 гг. При этом рост инвестиций в анализируемом периоде 2010–2017 гг. отмечался у всех составляющих инвестиций основного капитала за исключением категории «инвестиции в прочее». Анализ показал, что в течение всего отчетного периода 2010–2017 гг. в целом по РФ происходило постепенно увеличение собственных средств в структуре инвестиций в основной капитал в отрасли электроэнергетики при одновременном уменьшении объемов привлеченных средств. Аналогичная тенденция по увеличению объемов собственных средств и снижению объемов привлеченных средств в общем объеме инвестиций в основной капитал прослеживается во всех федеральных округах Российской Федерации.

Финансовый потенциал отрасли: выводы и предложения

Реализация инвестиционных программ организаций электроэнергетики напрямую связана с потребностью в модернизации и расширении производственных мощностей, стратегические приоритеты развития отрасли определены на федеральном уровне, но в условиях влияния внешних санкций, низкой нормы прибыльности и дорогих источников финансирования требуется оценка структуры и конкурентоспособности рынка электроэнергетики. Проведенный анализ показал, что наряду с проблемой наличия иссякающих запасов нефти и газа российская экономика сталкивается с новой реальностью, для которой характерны факты нерационального и несбалансированного использования инвестиций в сфере функционирования энергетического комплекса страны. В связи с изложенным представляется, что в целях предупреждения фактов возникновения аварийности на объектах электроэнергетики, снижения рисков необоснованной системы тарификации и ценообразования на продукцию и услуги монополистов в сфере энергетики, повышения качества планирования инвестиций, целесообразно заблаговременно планировать и прогнозировать источники финансирования инвестиционных программ в компаниях энергетического комплекса.

Следует отметить, что натуральные показатели оценки, влияющие на финансовый потенциал отрасли электроэнергетики – передача, продажа и диспетчеризация энергоресурсов, определяют производственный потенциал компаний, а денежные индикаторы (стоимость капитала и выручка от продаж) характеризуют устойчивость пассивов энергетических компаний к различного рода финансовым деформациям. Таким образом, управляя натуральными, стоимостными и производственными параметрами функционирования энергетического комплекса на интегрированной основе, можно повысить финансовый потенциал компаний в перспективе.

Российские реалии указывают на возникновение ряда трудностей, которые заключаются в отсутствии «длинных денег» в реальном и банковском секторах. Кроме того, Россия находится в условиях новой экономической реальности, для которой свойственны факты падения объемов продаж на рынке углеводородов, влияние санкций, что требует внедрения новых драйверов экономического развития, для запуска которых необходимы НИОКР, диверсификация портфеля инвестиционных проектов и проектные команды способные эти проекты реализовать.

По нашему мнению, систематизированные в ходе исследования меры использования ресурсов банковского и небанковского секторов экономики ориентируют инвесторов в выборе гибких моделей управления финансовыми активами. Однако, как представляется, проблема дефицита источников финансового обеспечения энергетического комплекса нуждается в комплексном решении и не может быть реализована без выбора оптимальных инструментов финансирования реального сектора экономики.

В качестве перспективных источников финансирования, в том числе энергетического комплекса, предлагаются: проектное финансирование при строительстве новых энергоисточников, корпоративное кредитование долгосрочных инвестиционных проектов, перформанс-контракты, использование инструментов рынка «зеленого» финансирования. Вместе с тем рекомендуется учитывать, что использование того или иного источника финансирования имеет как положительные, так и отрицательные моменты, которые должны учитываться при разработке инвестпроектов.

Ключевым недостатком также является отсутствие методики оценки инвестиционной привлекательности отрасли электроэнергетики при огромном многообразии методов оценки применительно к организациям (фирмам): *cash-flow*, рейтинговые и интегральные, оценка ликвидности и финансовой устойчивости и ряд других.

Исходя из вышеизложенного, предлагается расширить существующие методики оценки инвестиционной привлекательности отрасли электроэнергетики (табл. 3) показателем удельного веса чистых активов в объеме финансового потока и методическими рекомендациями по формированию конкурентного механизма финансирования компаний электроэнергетики.

Таблица 3. Сравнение показателей инвестиционной привлекательности российских компаний электроэнергетики до и после внедрения новой методики

Методика оценки		Алгоритм расчета по новой методике
До внедрения	**После внедрения**	
Рентабельность капитала	Доля издержек в объеме прибыли	Отношение затрат и поступлений денежных средств
Рентабельность продаж	Удельный вес чистых активов в объеме финансового потока	Чистые активы по отношению к объему поступлений (по показателю финансового потока)
Оборачиваемость активов	Коэффициент ликвидности	Доля текущей стоимости оборотных активов в объеме кредиторской задолженности
Финансовый рычаг	Рентабельность чистых активов по критериям прибыли и чистых активов	Отношение прибыли к стоимости чистых активов

Источник: составлено на основе [6, 7].

Рисунок 3. Модели гибкого развития и финансирования компаний реального сектора экономики (на примере компаний электроэнергетики)

Источник: составлено автором на основе [4, 5].

Необходимо отметить, что предлагаемые методические рекомендации по формированию конкурентного механизма финансирования компаний электроэнергетики учитывают:

1) возможность одновременного финансирования нескольких инвестиционных программ.

Для российских компаний электроэнергетики в долгосрочной перспективе будет свойственно увеличение доли чистых активов в объеме финансового потока от реализации энергетических ресурсов. При этом расчет представленного коэффициента предлагается нами осуществлять посредством соотнесения чистых активов и объема выручки (операционных доходов, инвестиционных притоков) и иных положительных потоков, способствующих формированию долгосрочных финансовых преимуществ в сфере функционирования отрасли;

2) роль государственных органов исполнительной власти в вопросах регулирования минимальных границ инвестиционных вложений в отрасль электроэнергетики, направленные на устранение неоднородности инфляционных процессов при прогнозировании цен и снижении рисков государственного и частного взаимодействия при создании дополнительных инструментов финансирования.

Модели гибкого развития и финансирования компаний реального сектора экономики (рис. 3) с учетом лучшей зарубежной практики могут быть представлены в следующей форме организационных мер.

По нашему мнению, модель гибкого развития может быть направлена на расширение мероприятий по инвестированию в отрасль электроэнергетики как для регионов, так и на федеральном уровне, и на повышение финансового потенциала компаний – инициаторов проекта. Однако для этого требуется разработать комплекс мер по стимулированию инициатив как в электроэнергетике, так и в смежных отраслях экономики, направленных на решение задач энергосбережения и экологии.

В табл. 4 представлен разработанный авторами статьи формат методических рекомендаций по формированию конкурентного механизма финансирования компаний реального сектора экономики.

Таблица 4. Методические рекомендации по формированию конкурентного механизма финансирования компаний реального сектора экономики (на примере предприятий электроэнергетики)

Инструменты	Задачи по формированию конкурентного механизма финансирования			
Налоговые	Формирование инфраструктуры исследовательских центров, дополняющих существенные научные организации и университеты	Применение налоговых льгот, льготных платежей за единицу мощности произведенной возобновляемой энергии	Снижение налоговых платежей при реализации возобновляемой электроэнергии	Внедрение комбинированных форм государственного финансирования, в том числе: прямое субсидирование и грантовая поддержка
Государственной экономической политики	Методика независимой финансово-экономической оценки обоснованности процедур регулирования деятельности предприятий электроэнергетики	Формирование конкурентного внутреннего рынка научно-технических работ	Привлечение частных инвестиций из фондов страховых компаний	Совершенствование мер тарифного регулирования и квотирования для возобновляемой энергии
Инновационного развития	Методика экономической оценки программ развития предприятий электроэнергетики			
Государственно-частного партнерства	Финансовая кластеризация отраслевой экономики	Предоставление гарантий возврата вложенных инвестиций в масштабах реализации региональных и федеральных целевых программ по обеспечению внедрения генерирующих объектов	Совершенствование законодательной базы в части определения предмета контрактных отношений в рамках финансовой кластеризации	Перекрестное субсидирование в рамках государственно-частного партнерства сегментов кластера, создаваемого в интересах деятельности предприятий электроэнергетики

Источник: составлено авторами на основе [8].

Оценка данных табл. 4 позволяет выделить четыре типа инструментов финансирования, которые, по нашему мнению, следует применять для совершенствования деятельности компаний реального сектора экономики: инструменты ГЧП, инновационного развития, государственной экономической политики и фискальные инструменты. При этом одной из задач реализации фискальных инструментов финансирования электроэнергетики России является формирование инфраструктуры исследовательских центров, осуществляющих разработку и внедрение «прорывных» технологических проектов.

Ключевой задачей государственной экономической политики в сфере финансирования, на наш взгляд, является совершенствование мер тарифного регулирования и квотирования для возобновляемой энергии. Это позволит усовершенствовать механизм кругооборота энергетических ресурсов и повысить уровень финансовой безопасности энергетических компаний. В масштабах практики реализации ГЧП представляется необходимой организация мер по финансовой кластеризации отраслевой экономики.

Следует отметить, что для адаптации методических рекомендаций по формированию конкурентного механизма финансирования к компаниям электроэнергетики, по нашему мнению, необходимо использовать следующие методы оценки: эвристические, индексный и методы сравнительных оценок; компонентный и трендовый анализ, теорию игр.

Порядок адаптации методических рекомендаций состоит в расчете в два этапа.

1) На первом этапе производится комплексная (общая) оценка эффективности инвестиционной программы компаний электроэнергетики. Данный этап является промежуточным, обеспечивая информационно-аналитическую подготовку принятия решений о схеме финансирования.
2) На втором этапе аргументируется вывод о целесообразности привлечения соответствующего источника финансирования. При реализации второго этапа учитываются отраслевые документы, регламентирующие вопросы финансирования, структуры инвестиций и требований к инвесторам.

Таким образом, анализ и исследование потенциала отраслей электроэнергетики позволили установить характер взаимоотношений отраслевых компаний и частных инвесторов, государства и главных распорядителей бюджетных средств.

В рамках разработанной схемы подчинения частных и государственных структур определены критерии оценки и инструкции, алгоритмы адаптации методик формирования конкурентного финансового механизма. Это позволит, с одной стороны, достичь реализации задач государственной энергетической политики, и, с другой стороны, обеспечить удовлетворение потребностей инвесторов в оптимальном балансе между вкладываемым капиталом в проекты электроэнергетики и получаемой отдаче в виде долговременной чистой прибыли.

Кроме того, адаптация методических рекомендаций к компаниям реального сектора экономики с учетом оценки потенциального развития в долгосрочной перспективе предполагает использование стратегического управления конкурентными преимуществами финансового механизма аккумулирования потоков доходов для компаний электроэнергетики. При этом важно выработать рациональную функциональную структуру, модель гибкого планирования бюджета и оценки ключевых рисков, возникающих не только на микроуровне, но и на мезо- и макроуровнях экономического развития.

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Improving Tools for Assessing Financial Capacity in the Electric Power Industry

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Improving Tools for Assessing Financial Capacity in the Electric Power Industry

Abstract

This study is dedicated to estimating the impact of currency risk on the cost of equity in Brazil, Russia, India and South Africa. Our contribution to the literature is that we have obtained evidence on the pricing of exchange rate risk in developing countries, which at the time of writing is quite scarce. This scarcity is one motivation for our research, which is dedicated to BRICS capital markets, though with the Chinese stock market excluded since it is heavily regulated. The aim of this research is to determine whether in emerging countries stock markets currency risk is a significant factor that influences the cost of equity capital in a company.

Changes in the value of exchange rates can impact the cash flows of a firm and its exposure to risk, and hence, the value of the company. In our research we will discuss the influence of exchange rate movements on the value of firms through their impact on the cost of equity. Specifically, we investigate whether companies that report substantial currency gains or losses have to pay a higher required rate of return on equity. Furthermore, in this study we make an attempt to estimate currency risk premia for exposure to appreciation and depreciation of currency separately, and try to identify possible differences.

For each country, three analytical models that extend the Fama-French Three Factor Model (by incorporating currency risk) are estimated. We use an equal-weighted portfolio approach to identify currency risk factors. These factors are estimated either by using information about the ratio of currency gains to sales, or the magnitude of covariation between equity returns and exchange rate changes. In the second case appreciation and depreciation of domestic currency against the US dollar is considered separately.

The results indicate that in Russia, firms which report substantial currency losses pay a positive risk premium, while in Brazil, India and South Africa companies with significantly positive or negative currency gains pay a lower required return on equity than firms with almost zero currency gains. Finally, we attempt to explain the estimation results using a sectoral breakdown of product exports for each country of the data sample.

Keywords: exchange rate exposure, cost of equity, currency markets, stock returns, emerging markets

JEL classification: G12, G32

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Owners and CEOs of Startups: Evidence from Russia

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Owners and CEOs of Startups: Evidence from Russia

Abstract

In this paper, the authors focus on two primary governance mechanisms which can be considered as sources of support for startup companies: the company's ownership contingent and the company's management personnel. Based on descriptive statistics from a sample of 416 Skolkovo start-ups from the 'Nuclear' and 'Space' clusters, and a Start-up-Barometer survey of 300 IT-entrepreneurs, this work provides new insights into ownership and management characteristics of Russian startups and the interplay between these dynamics.

The Russian venture market presents an interesting case of an emerging market with a number of successful startups in a challenging economic environment. The supply of venture capital for Russian startups is restricted by the presence of sanctions and legal restrictions on the investments of financial institutions such as pension funds and banks. Therefore, similar to other developed and developing markets, the most significant source of investments for Russian startups is bootstrapping.

In this paper we show that startups with different characteristics attract different kinds of investors, which is reflected in the companies ownership structures. In particular, government development institutes are more interested in investing in nuclear-focused startups, while corporate investors tend to keep a higher level of control over startups compared to other investors. We also confirmed the presence of correlations between different types of owners: government development institutions, corporate investors, venture funds, and family members. Additionally, the size of equity share for all types of owners (except family members) was found to be negatively correlated with the CEO's share in the ownership structure.

Although the purpose of the article is descriptive, it motivates further research on the sources of support of startup growth, including relative importance of such sources and their effects on startup performance.

Keywords: startups, ownership, management, emerging markets

JEL classification: G32, M13, O32

Introduction

At the beginning of 2019, most of the biggest companies in Russia have already expressed their interest in investing in new technologies. Some companies (such as Rostec and Sberbank) have created special divisions which are responsible for searching for potential venture investments, others (such as Rzhd and X5 Retail Group) have invested money in funds managed by other parties. Moreover, according to a project of a strategy for venture capital market development announced by Russian Venture Company and the Ministry of Economic Development of the Russian Federation, the size of the market for financing venture capital projects is expected to grow by a factor of 10 to 2,7 trillion of rubles by 2030 [1].

However, do such equity investments provide value for such big corporations? According to recent studies by Rossi et al. [2], such investments should not be considered only as financial activities aimed at producing high returns, but also as incentives for strategic innovations for the investing companies. Furthermore, academic literature supports the importance of new technology firms for economic growth by increasing efficiency of economic activities, improving the employment situation, improving social mobility, and promoting competition [3, 4, 5]. Such evidence as to the benefits of startup activities for private and government entities motivates further research on the support of startup growth, including in the context of emerging markets.

In this paper, we are going to focus on two main features of startups which can be considered as sources of support: those characteristics exhibited by a startup's ownership, and those of the management structure. It should be mentioned that traditionally, debt financing plays an important role for new firms. According to Hirsch et al. [6] bank financing is significant for new ventures in France at the very beginning of the company's life, but its significance diminishes over time. Hanssens et al. [7] found that leverage ratios for a sample of Belgian startup firms were higher compared to the sample for all firm-year observations. In the study of Coleman et al. [8], 57% of the sample of newly-formed businesses in the United States used debt in their capital structure.

At the same time, according to the study of Minola et al. [9], financing of new technology-based firms is influenced by higher information asymmetry and correspondingly, equity financing for such firms occurs prior to debt. Indeed, according to Start-up-Barometer 2018 (organised by venture investor Alexey Solovyev in cooperation with the Internet Initiatives Development Fund and EY), in a survey of around 300 IT-entrepreneurs, 0% of startups in Russia were found to have used loans from banks as initial source of financing[10].

The academic literature on the management of startups as well as their ownership structure, especially in developed markets, is extensive; however, the question of the relative importance of these two sources of startup support on performance, as well as interaction between them, is yet to be discussed. In this paper we are going to provide new insights about the ownership and management characteristics of Russian startups and will analyse some correlations observed between these features.

Description of startups in Russia

The venture capital market in Russia is small in comparison with the venture capital market of developed and developing countries: in particular, according to research by Russian Venture Capital Association (RVCA) during 2017 there were 178 venture capital investments with a total volume of 125 million dollars in Russia (less than 0.1% of total volume of global venture capital investments, which totaled 155 billion dollars in 2017), while in the US in 2017 more than 83 billion dollars were invested in venture capital market. In China, the figure accounted for more than 40 billion dollars [11, 12].

The typical characteristics of financing for Russian startups also have some specific features which are more similar to developing countries than developed ones. Traditionally, the share of investments in the IT sector in terms of total venture capital investments is highest (in 2017 the share was 58% in Russia and 56% in Asia, as opposed to 46% in Europe and 40% in the US), while share of investments in healthcare and biotech is smaller (in 2017, the figure was 7% for Russia, 5% in Asia, 20% in Europe, and 25% in the US) [11, 12].

According to the research of Start-up-Barometer 2018 [10], the average Russian startup business has already existed for 3 years and is currently at the stage of the development of the product. 34% of startups that participated in the survey still do not have any revenue, while for 23% revenue is below 1 million rubles. Another interesting feature of a Russian IT startup is that the main source of financing is founders' capital. 71% of startups in the sample are financed from their own resources, while the second most popular source of financing is friends/family/or private non-professional investors.

In order to expand the selection of Russian startups, we also constructed our own sample of Russian startups from Skolkovo's Nuclear and Space clusters, which were participants in the Skolkovo innovation system in June 2018. Skolkovo's Space cluster startups are engaged in the development of telecommunication, navigation and geo-information products, space and aviation technologies, and those in the Nuclear cluster include startups which are engaged in the development of technologies based on nuclear science developments and related characterisation of materials.

In our data sample by the end of 2017, there were 207 startups in the Space cluster and 209 startups in the Nuclear cluster. The data about the main characteristics of the startups was manually collected using the 'Spark' system, which was established by Interfax, a major Russian news and information group. The descriptive statistics of the collected sample are presented in Table 1.

In the context of the topic of this paper, our data sample supports the point that ownership and management are

different sources of startup support, which are separate and distinct. In particular, in our sample, the average share of the CEO in the ownership structure is 43%. At the same time, the ownership structure of the startup from our sample is quite concentrated: the average top share holding amounts to 73%, while the top three share holdings account for 95% of ownership.

Most of these startups are located in Moscow and the Moscow region (including Skolkovo), accounting for 301 out of 416 startups. Additionally, 25 startups were situated in Saint-Petersburg, 13 in the Nizhny Novgorod region and 11 in the Novosibirsk region. It should be mentioned that those regions have been traditionally considered centers of scientific research since the Soviet period. Besides, according to The State of European Tech [13], Moscow holds seventh place among European cities in terms of the number of venture-backed companies

Moreover, as presented in Graph 1, there are notably less startups still in existence 4-5 years after founding. This means that most startups in our sample were established before 2013 or after 2014, which corresponds with the crisis period in the Russian economy observed during 2014 and 2015 (the age distribution of startups in our sample is presented in Graph 1).

Graph 1. Age distribution of startups of Skolkovo startups from Nuclear and Space clusters in 2017

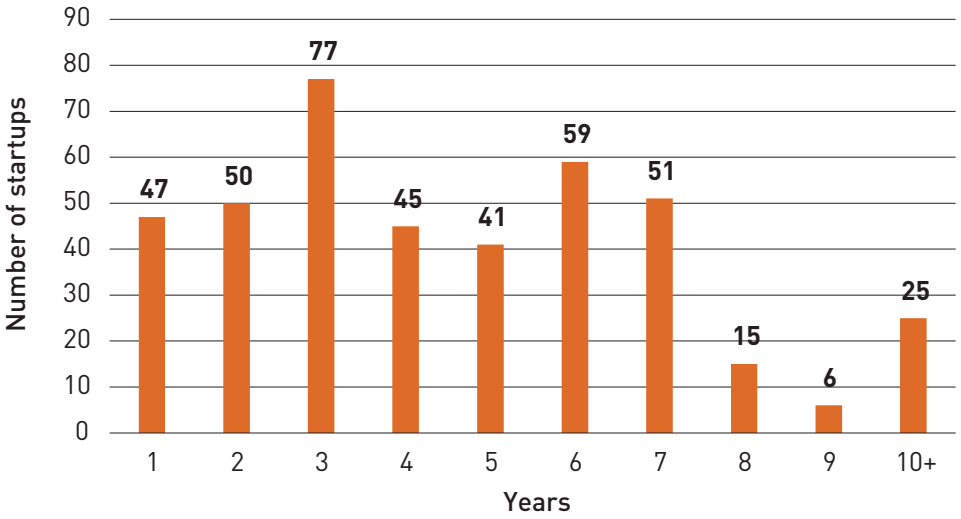

Table 1. Descriptive statistics of Skolkovo startups from Nuclear and Space clusters in 2017

	N	Mean	Median	Standard deviation	Max
Number of owners	416	2,4	2	1,77	10
Number of female owners	416	0,2	0	0,41	2
Biggest share	416	0,7	0,8	0,27	1
CEO share	416	0,4	0,4	0,40	1

Ownership structure of Russian startups

As it was discussed previously, revised pecking-order theory predicts that equity is the main source of startup financing (due to high intangibility of assets) and therefore results in high information asymmetry and scarcity of collateral. Indeed, the majority of papers about entrepreneurial finance focus largely on equity finance [14, p. 552]. Additionally, participation in the ownership structure gives investors an instrument of influence on the performance of the firm [15]. Therefore, the type of the owner that defines his or her strategy can have a great impact on the development of the company.

Entrepreneurs as founders and owners

As was discussed in the second part of the article, the initial source of funding for the majority of startups in Russia are the personal resources of the founders. According to Start-up-Barometer [10], the average founder of startup in Russia is a 30-32 year old male with a technical/engineering education who most likely has already had a negative experience of project failure or business closure.

The personality of the entrepreneur plays an extremely important role in the success of the newly founded ventures: both in terms of psychological traits and in terms of the skills and knowledge of the founder [16]. Moreover, this personality has an influence on the financing of the company in the future: for example, Banerji et al. [17]

demonstrated that the number of a founders' followers on LinkedIn is the strongest predictor of the amount of funds that will be raised by the new companies.

The Start-up-Barometer 2018 survey [10] showed that 69% of ventures were founded by two partners, while in our sample of Skolkovo startups from Nuclear and Space clusters, around 45% of startups were established by a single entrepreneur (with 18% having been founded by two entrepreneurs, and 11% by three entrepreneurs). Taking into account certain specifics of the space and nuclear industries, this discrepancy between the samples partially supports the findings of Kim et al. [18] (based on a sample of American entrepreneurs), that indicated founders with more venture-specific industry experience are less likely to engage and collaborate with other people during the early stages of the business.

In most startups from the Skolkovo sample, the initial founders still maintain a share in the ownership structure. Out of 416 startups, only 50 completely changed owners, while the rest of still maintained founders who have some control over the startup. However, according to the study by Wasserman [19] of 6,130 startups between 2005 and 2012, companies in which the founder has given up control are more valuable compared to those in which the founder is still in the CEO position or is in control of board of directors.

According to the dataset collected by Wasserman [19], the mean and median number of owners in American startups is equal to 2.7 and 2 respectively. This is similar to our dataset of Skolkovo startups: according to Table 1, the mean of number of owners in startups is 2.4, and the mean is 2.

However, the gender diversity situation in Russian startups is different from startups in developed markets. For example, only 15% of our Skolkovo sample (62 out of 416 startups) had at least one female owner and only 6% had woman CEO, which is significantly lower than the 42% share of female governance startups in the total population of innovative startups in Italy [20]. However, even in developed markets, the situation with gender diversity in startups is far from perfect. According to a recent survey for The State of European Tech [13], all-male founded teams received 93% of the investments in the European tech industry 2018.

Family and friends

According to the vast entrepreneurship literature, family and friends are a very significant source of startup initial funding, which provide the entrepreneur with moral support, mentoring, expertise and contacts [21]. Conti et al. [22] showed that money from friends and family can be considered not only as financial support but rather a signal about a startup, as friends and family members are supposed to have insider information about the company. Therefore, the owners of startups use family and friends' money to attract 'angel' business investments.

Family ownership can also have an influence on a startup's capital structure. For example, Schmid [23] showed that family-owned firms have lower leverage (based on a sample of German firms). Such results led authors to the conclusion that entrepreneurs and their families use more equity financing in order to improve control over the company.

However, according to Coleman et al. [8] the firms' and founders' individual characteristics also have an influence on the decision to use financing from such informal sources: for example, firms with high-growth prospects (as well as less educated entrepreneurs) were found to have more personal funding, especially in forms of loans from family and friends.

Taking into consideration the underdevelopment of Russian financial markets compared to developed countries, we can suggest that money from family and friends is expected to be one of the main sources of financing for Russian startups. Indeed, according to Start-up-Barometer 2018, money from such informal sources was the second most popular source of IT-startup funding in Russia (11% of the sample) after bootstrapping (71%). The results from the Skolkovo sample of Space and Nuclear startups showed that only 7% startups have family members in their ownership structure. However, given that there are still a lot of unsolved legal matters regarding the ownership of intangible assets (such as knowledge and managerial expertise) [24], the real share of family and friends in startup support could be higher.

According to Entis [25], 38% of US startups receive funding from family and friends, while 57% of startups were founded on entrepreneurs' personal money. However, we should keep in mind that such difference between a mix of personal and family/friends financing could be explained by institutional differences: funding by family and friends for Russian startups does not always involve legal arrangements. Therefore, the funding could be loaned to a startup founder as his personal debt which he/she invests in the business.

Corporate investors from industry

Although the majority of startups were founded by individuals, 25% of startups (105 entities) from our sample of Skolkovo participants were founded by or in cooperation with an industry company. In the later stages of a startup's life the level of participation of companies from the relevant industry in the startups increases: as of 2017, 31% of the startups had a company in its ownership structure with an average share of 20.6%, which makes such companies the main source of equity funding for startups (see Table 2).

At the same time, corporate investors also significantly benefit from investing in new technology ventures. According to Benson et al. [26], although corporate investors differ in their ability to derive benefits from venture capital investing, consistent engagement in such investments can improve the performance of a corporate investor by increasing returns alongside as well as increasing the R&D productivity of the company.

Table 2. Who is inside the ownership structure of a Russian startup in 2017?

	Number of startups with owner type in ownership structure	Mean	Median	St. dev.	Max
Company	129	20,6%	0%	0,362	100%
Government development institutes	76	7,1%	0%	0,193	100%
Family members	28	6,7%	0%	0,251	100%
PE/VC	13	1,5%	0%	0,104	100%

Additionally, it should be mentioned that becoming a Skolkovo participant has some advantages in terms of legal and tax issues for a young company. In particular, the status of a Skolkovo participant allows one to avoid income tax, VAT, as well as payment of customs duties, and gives an opportunity to apply for a grant. Therefore, such benefits can motivate big corporations to separate their R&D departments into a separate entity based in Skolkovo and can potentially explain the high amount of startups fully-owned by corporate investor, which is around 13% of our Skolkovo sample.

Besides this, alongside the corporate investors of Skolkovo startups, there are government-affiliated companies such as Rosatom State Nuclear Energy Corporation, The Roscosmos State Corporation for Space Activities, and the state corporation «Rostec» and their subsidies. However, taking into account the leadership of these state companies in the space and nuclear industries, their participation in the ownership structure of startups is in line with their strategic aims.

Government development institutes

According to the report published by the Federal Antimonopoly Service of the Russian Federation in 2016, government and government companies control around 70% of the Russian economy, and that creates monopolistic trends in the economy [27]. Therefore, the government of the Russian Federation is supposed to be the one of the main investors in all sectors, including technology and R&D.

Indeed, in 2017, 194 venture funds operated in the Russian market, including 54 funds with government capital, with a total volume of 888 mln dollars (22% of total volume of 4,071 mln dollars of VC funds in Russia) [11]. The sectors in which these fund investments are different compared to private fund investments. For example, in 2017, 66% of investments with government capital were made into the industrial sector, 23% to the IT-sector, and 11% to biotech startups. At the same time, only 2% of investments of private VC funds were made into the industrial sector, 5% into biotechnologies, while the IT-sector attracted 74% of the total investments of private VC funds in Russia.

Overall, currently there are many institutes providing government support for startup activities (which we are going to refer to henceforth as government institutes of development). These are government venture capital funds, public universities (including university incubators) and other development institutes which are aimed at filling the gaps left by market failures. In particular, such institutes are supposed to catalyse financing from private investors and create the necessary infrastructure for startups, including access to equipment.

Among the most active government development institutes which are focused on innovative technology (and involved in venture financing) are:

- Russian Venture Company (founded in 2006, government funding of 30 bn rubles) and Rusnano (founded in 2007, government funding of more than 300 bn rubles) both which operate as “funds of funds”;
- Skolkovo Innovation Centre (founded in 2010, government equity funding of more than 100 bn rubles) including Skolkovo City, and technoparks;
- Fund of Innovations promotion (FASIE) (founded in 1994).

Although the government funding of development institutes seems excessive, there are countries which invest in high-technology startups more heavily. For example, the Chinese national venture capital fund for emerging industries was established in 2015 and had government funding of 5,84 mn dollars [28]. By 2016 the Chinese government has set aside more than 320 bn dollars for investment in the technology sector [29].

In our sample of Skolkovo participants, 12% of startups were founded by or in cooperation with at least one institutional founder (a category in which we include government development institutions and private equity and private venture capital funds). However, if we consider not only the founding year of a startup, but the later stages of the life cycle of a startup the participation of government institutions increases: 19% of startups have institutional representation in the ownership structure.

Academic institutions represent an important group of government development institutes: for example, around

30% of business incubators are linked to universities [30], and are mostly designed for the support of students' ideas. As most of the universities in Russia are financed from the government budget, we consider them to be government development institutes.

However, although the quality of Russian university-linked business incubators and accelerators is comparatively good (according to UBI Global, 2 out of 20 top business incubators managed by universities are from Russia [31]), they are mostly focused on providing different kinds of support to startups (such as expertise and opportunities for networking) rather than direct funding. Therefore, we cannot track the significance of these entities in the ownership structure of startups. Indeed, according to Startup-up-Barometer 2018, only 2% of respondents obtained initial financing from accelerators [10].

University incubators are widespread not only in Russia, but in other developing and developed countries. Indeed, the youngest entrepreneurs are the ones who need the most support. A recent study by Azoulay et al. [32], based on a sample of 2.7 million founders showed that the average age of a successful startup founder is 45 years old, while people under 29 have the lowest likelihood to found a successful startup.

We should point out that according to Venture Barometer 2018 [33] (a survey of 88 venture investors), in 2017 44% of respondents considered government development institutes to be a potential source of funding for venture investments, while in 2018 their share decreased to only 15%. Government corporations were considered even less attractive: in 2018 only 11% of venture investors mentioned them in the survey, while the role of private capital increased from 2017 to 2018 [33, p. 10]. This may be a sign of a changing trend in the minds of the Russian venture industry: from confidence in government funding to hope for private investments.

Private equity and venture capital funds

Venture capital and private equity funds are considered to be one of the main sources of startup support. According to Davila et al. [34] support of venture capital in the form of funding gives a significant positive signal about a startup which can encourage its further growth. Fitza et al. [35] showed that venture capital "can bring legitimacy, prestige, governance expertise, social networks, management ability, and knowledge related to a start-up' s technological or market foundations." [35, p. 401].

However, results of the Start-up-Barometer 2018 (as well as descriptive statistics of our Skolkovo sample startups) showed that only 3% of startups in Russia had financing from venture funds. These figures are partially explained by the small size of the venture capital market. The total volume of venture investments in Russian startups represent less than 0.1% of the global total. Indeed, while the total volume of VC investments in Russia during 2015-2017 was around 400 mn dollars [11], there were 80 mega-deals of 500 mn dollars or more in China during the same period of time [36]. However, even in developed markets such as the US, only 5% of startups are funded by VC while the average size of such funding is bigger compared to other sources [25].

Additionally, while 3% of startups have venture capital financing (both in our sample of Skolkovo startups and in the sample of IT startups), 5% of these have funding from business angels, who are considered to be the most attractive investors for startups (85% of startups are interested in investments from high-net-worth-individuals and family offices). However, such investments are very difficult to track in comparison to the government development institutes and companies funding.

Venture Barometer 2018 [33] showed that along with a decrease in the attractiveness of government financing among venture funds themselves, Russian investors are becoming more interested in foreign financing. In particular, the share of venture capitalists interested in investments from foreign institutional funds increased from 3% to 13%, while the third most attractive group of investors consisted of institutional investors from Asian and Arabic countries: (32%).

However the trend also works the other way: according to the survey of Russian investors in Venture Barometer 2018, 57% of investors made new venture investments in other countries. This also influenced the Russian venture capital market as it decreased the supply of capital.

Taking into account the aforementioned statistics on the ownership structures of Russian startups, we can make several conclusions about specific features observed in the Russian market of new-technology venture financing. First, the Russian venture capital market represents a very small part of the global venture capital market, which motivates Russian venture investors to seek funding from foreign institutions and companies.

Second, government funding represents a significant source of support for startups in Russia compared to those in developed countries. However, we should keep in mind the differences in goal setting. While private investors are interested in financial returns from the investments, government development institutes support the startups which could potentially benefit strategic government interests. This also explains the active participation of government development institutes in particular sectors such as the nuclear and space industries.

Third, on the Russian financial market there are certain limitations for participation of pension funds, insurance companies and banks in new-venture financing, while in the European market up to 15.5% of funds committed to VC funds come from these types of investors [13]. However, in the project of a strategy for venture capital market development announced by the Russian Venture Company and the Russian Ministry of Economic Development, the share of pension funds, insurance companies and corporate investors' financing in total venture fund capital should reach up to 45%, while government's share should compose just 30% [1].

Fourth, underdevelopment of financial markets also promotes the appearance of a number of business angels on the Russian markets. According to Sakovich (the managing director of Skolkovo Ventures) currently there are more than 10,000 business angels in Russia, most of whom are top-managers and owners of SMEs [37]. This explains the much higher share of business angel financing in Russia comparing to developed markets (see Table 3).

Table 3. Main funding sources of Russian and US startups

Source of funding	% of US startups (2012)	% of Russian IT startups (2018)
Personal savings and loans	57%	71%
Family and friends	38%	11%
Venture capital	5%	3%
Angel investments	0,91%	5%
Banks	1,43%	0%

Source: Fundable.com, Start-up-barometer 2018

Fifth, the size of the crowdfunding market (which is another potential source of financing for startups in Russia) is small despite outperforming growth rates. In 2017 the total value of crowdfunding was 11.2 bn rubles, while P2P lending in China surpassed the threshold of 100 bn dollars in 2016 [38]. Therefore, the development of this segment can also potentially be a source of significant support for Russian startups.

Management of Russian startups

Management represents a different type of support which can significantly influence the performance of a firm, especially in young firms which have limited prior experience and expertise [39]. Moreover, top management can bring not only knowledge and networking opportunities, but in the case of a startup, it appears to be a decision-making body for the most important decisions of a firm, such as closing the company or deciding to sell to provide an appropriate exit for investors [40].

Therefore, the academic literature on the influence of top-management characteristics on firm performance is extensive. In particular, Barker et al. [41] found a positive relationship between firms' R&D spending and CEO characteristics (such as age, or previous careers in marketing and engineering). Telaia et al. [42] showed that there is a direct relationship between the ability of CEO to raise funds and his/her education, which gets stronger in cases where the CEO has anMBA degree. Stepanova et al. [43] confirmed that a higher share of independent directors has a positive correlation with higher R&D investments, as the presence of such directors mitigates the agency problem.

However, the data on top-management of startups is limited. Most of the journal literature focuses on founders' profiles rather than on CEOs. The roles of a CEO and founder require a different set of skills, behaviours and motivations [44] and in many cases they are represented by two different people, even in startups. In our dataset of Skolkovo startups, while 23% of CEOs (96 out of 416) had 100% ownership, 30% of CEOs (123) did not have any share in the ownership structure of a startup. Moreover, the average share of a CEO was equal to 43%, which also supports the idea that ownership and management should be analysed separately.

Regarding the CEO profile, our dataset showed that out of 416 startups only 27 had a female CEO, which correlates with the 5% figure for companies with female CEOs in the Fortune 500 list [45]. As there is no proven investor response to the appointment of a female CEO or CFO significantly different from those cases where males are appointed [46], such a share could possibly reflect the effect of career choice between man and woman.

The change of a CEO can reflect the changes in a firm's performance. For new ventures, the reason for top management change was often found to be connected with both low and very high growth of the business [47]. In our Skolkovo sample, 39 out of 416 startups replaced their CEO. 16 of this number were startups, and represented companies in the second and third years of establishment, with 7 startups in the seventh year, which can reflect that these years define the later stages of startup life. The correlation between the change of CEO and other firm characteristics will be considered in the next section.

Interaction between ownership and management characteristics

In the previous sections of this paper we described different ownership and management characteristics observed for Russian startups based on a sample of 416 Skolkovo startups in the Space and Nuclear clusters in 2017. We should keep in mind the existence of potential selection bias in our sample: all the firms have already had a status of 'Skolkovo participant', which already suggests the presence of government support, and all of the firms are potentially subject to survivorship bias, as they lived through 2017.

However, even accounting for these potential biases, in our sample it is possible to observe significant differences among startups with different owners in their ownership structure. We constructed 3 subsets from our initial sample: (i) startups with the presence of corporate investors in the ownership structure, (ii) startups with government development institutes in the ownership, and (iii) startups where the CEO also has a share in ownership. The descriptive statistics of these groups (including the whole sample) alongside the general or median characteristics of startups are presented in Table 4.

Compared to the rest of the sample, corporate investors tend to invest in startups from the space industry, while government development institutes are more interested in research and development in the nuclear

sector. Corporate investors, in contrast to government development institutes, are aimed towards taking control over startups: their median share in the ownership structure in the corresponding sample is 75%, whereas for government institutes the figure is only 33%. As such it may be stated that the ownership concentration in startups with corporate investors is significantly higher. Startups with a managerial ownership tend to be younger than the sample average, which is not necessarily surprising, as in the early stages of startup life these roles are played by the same person – generally the founder of the startup.

Table 4. Profile of a startup with median characteristics with different owners in the ownership structure (based on the sample of Skolkovo participants from Space and Nuclear clusters in 2017)

	All sample	Startups with corporate investors	Startups with government development institutes	Startups with managerial ownership
Number of observations	416	129	76	293
Share of startup from Space cluster	50%	51%	31%	49%
Established	2014	2013	2013	2014
Number of founders	2	2	2	2
Number of owners	2	2	3	2
Biggest share	76%	75%	51%	70%
CEO share	35%	20%	10%	52%
Share of corporate investors	0%	75%	0%	0%
Share of government development institutes	0%	0%	33%	0%

Source: Authors' own calculations

Ownership and management are two primary governance mechanisms for the firm, and different combinations of these governance mechanisms can be used in order to solve principal-agency conflicts in the business [48] as well as to enhance the firm's performance. In particular, Colombo et al. [49] showed the number of owner-managers positively influences firm performance, while Cui et al. [50] found that there is W-shaped relationship between managerial ownership and firm performance.

Although we cannot yet track the influence of different characteristics on performance due to the lack of financial indicators, Table 5 presents some particular insights between correlations of ownership with management characteristics with other related variables.

Managerial ownership was found to be negatively correlated with the participation of other investors in the ownership structure (especially corporate investors), which corresponds to the fact that in the early stages of startups' life cycles, most of the time the founder plays the roles of CEO and owner, a situation which changes as equity financing increases.

The binomial variable reflecting the change of CEO also has a negative relationship with CEO ownership, which indicates a strong interaction between management and ownership characteristics. Moreover, there is a positive and significant relationship between change of owner and change of CEO. This most likely indicates that new owners prefer to bring new management. However, surprisingly, we did not find a correlation between a change of CEO and the participation of government institutions, corporate investors, or venture funds.

Other management characteristics reflect the presence of female CEOs (binomial variable) which has a strong positive relationship with variables reflecting the number of women in the ownership structure of the company. However, female CEOs tend to have a lower managerial share.

Regarding the relationship between ownership characteristics, we noticed a number of strong correlations. As was stated previously, a positive relationship was found between family member ownership and the presence of PE/VC in the ownership structure, which supports findings of Davila et al. [34] about the signaling theory of friends and family support for institutional investors.

Additionally, ownership concentration is influenced depending on the different types of owners. While the presence of government development institutes tends to dilute ownership concentration, the presence of a corporate investor tends to increase the size of the biggest share. Moreover, the presence of government institutes or corporate investors has a positive relationship between each other which could potentially mean that such investors prefer to share risks between each other.

Table 5. Correlation matrix of ownership and management characteristics of Skolkovo participants from the Space and Nuclear clusters in 2017

	Number of owners	Number of women owners	Change of owner	Biggest share direct	CEO share	Woman CEO	CEO change	Family members	PE/VC share	Government development institutes share	Share of corporate investor
Number of owners	1,00	0,19	0,07	-0,78	-0,33	-0,03	-0,06	0,09	0,03	0,13	-0,15
Number of women owners	0,19	1,00	0,06	-0,19	-0,09	0,16	0,01	0,08	-0,03	-0,06	-0,16
Change of owner	0,07	0,06	1,00	-0,03	-0,04	-0,04	0,17	0,03	0,10	-0,12	0,00
Biggest share direct	-0,78	-0,19	-0,03	1,00	0,37	0,07	0,05	-0,12	0,01	-0,15	0,22
CEO share	-0,33	-0,09	-0,04	0,37	1,00	-0,07	-0,14	-0,03	-0,09	-0,29	-0,40
Woman CEO	-0,03	0,16	-0,04	0,07	-0,07	1,00	0,05	-0,03	-0,02	0,07	0,00
CEO change	-0,06	0,01	0,17	0,05	-0,14	0,05	1,00	0,05	0,00	0,03	0,07
Family members	0,09	0,08	0,03	-0,12	-0,03	-0,03	0,05	1,00	0,10	-0,07	0,04
PE/VC share	0,03	-0,03	0,10	0,01	-0,09	-0,02	0,00	0,10	1,00	-0,01	-0,02
Government development institutes share	0,13	-0,06	-0,12	-0,15	-0,29	0,07	0,03	-0,07	-0,01	1,00	0,13
Share of corporate investor	-0,15	-0,16	0,00	0,22	-0,40	0,00	0,07	0,04	-0,02	0,13	1,00

Conclusion

In this article, we decided to focus on the description of ownership and management characteristics of startups as factors which have an influence on company performance. However, both management and ownership features are significantly influenced by economic and institutional factors observed in the country.

In particular, legal restrictions about the participation of certain groups of investors in venture financing decreases the supply of capital and creates bias in the ownership structure. Underdevelopment of financial markets (including P2P platforms) lead to higher participation of government development institutes and business angels. Economic sanctions imposed by the US were also reflected in the startup environment: while in 2012 US VC funds financed around 50 rounds of Russian startups, in 2017 zero startups disclosed venture rounds with investors from the US [51].

Still, the Russian venture market is extremely interesting. Despite a challenging economic situation in the country, Moscow and St Petersburg were found to be No. 2 and No 9 cities for fast growing private companies in the Inc. 500 Europe list [52]. Moreover, Rodionov and Gusamov [53] observed higher returns from venture capital and buyout deals on the Russian market compared to other BRIC countries. There are several factors contributing to a good environment for startups and their investors. These include good technical education (as a part of Soviet inheritance), low salaries expenses for qualified workforce, a comparatively low tax burden and significant support from government institutions.

Although the main sources of equity financing in Russian startups are similar to the ones observed on the developed markets, Russian technology-firms have a unique set of ownership structure characteristics, which include higher participation of government institutions and corporate investors. As we expected in the beginning, the most important sources of funding are informal: bootstrapping and family and friends.

Moreover, we found evidence that startups with different characteristics attract different investors, which is reflected in their ownership and management structure. For example, space sector startups attract more corporate investors, while government institutes are more interested in firms from the nuclear sector. Startups with the presence of corporate investor in their ranks also tend to have a more concentrated ownership structure, while the presence of government investors has the opposite effect.

Additionally, we confirmed the relationship between different kinds of owners. In particular, we found that there is a positive relationship between the participation of corporate and government investors, which can reflect the close connection between government and corporate activities and indicate a risk-sharing pattern in the behaviours of such investors. At the same time, we found support for negative correlation between managerial ownership and ownership by companies and institutions. However, we should bear in mind that the use of correlations has a number of limitations, including the inability to find a causal relationship.

Overall, in our paper we aimed to show that the institutes of management and ownership play an important role in a startup's life at different stages of its development, although the mechanisms of these governance instruments differ. While this paper has a descriptive purpose, the comparison of these channels is an interesting topic for further research. In order to get robust results from the comparison of these sources, and in order to quantify the influence of different sources of funding, we need to include indicators of financial performance, enlarge our sample with different economic periods as well as add startups which were not subject to survivorship bias.

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Effective Boards of Directors: A New Approach

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Effective Boards of Directors: A New Approach

Abstract

The goal of this study is essentially twofold. First, it seeks to improve the efficiency of management in Russian companies through a revitalisation of perspectives on the makeup and activity of boards of directors. Second, it seeks to develop a motivation among controlling shareholders to strengthen the actual role of such boards in managing companies. This combined approach is intended to be applicable to both public and private companies.

The objective of this study is to search for ways to refocus on standard recommendations for international best practice regarding the work of boards of directors. These recommendations should consider best practices in terms of general company control and supervision, the in-depth study of key business processes, management innovations, technologies, and tools to promote new management approaches. A feature of this investigation will be the identification of ideas to ensure the best paths towards overcoming psychological barriers that impede the adoption of innovative and novel ideas by management.

This article provides a comparative analysis of the classic Anglo-US model of corporate governance (which features the role of boards of directors as the body exercising control and supervision over the company's activities and its management), with the Russian model. The Russian model is characterised by a structure which nominally replicates the practice of developed countries, whereby the real power rests with the controlling shareholders and management, with the boards playing a secondary role by approving the plans of the company activities and their results.

Given this situation, the boards of directors of Russian companies should prove their capability to contribute to the creation of economic value. Examples of essential management areas in which boards of directors should implement the function of management development are: strategic planning, creating and improving competitiveness, building up and developing the company's human capital, risk management, and internal control. This article suggests efficient practices and tools which can be used by a board of directors for management development.

Keywords: board of directors, controlling shareholders, management, business council, experience economy, company's risk culture

JEL-classification: G32, G34, M14

Introduction

In the present-day context, business process management has globalised. The format and processes relating to official company documentation which stipulate the functions of management bodies, and the legal norms governing such activities, have become increasingly unified. However, notwithstanding their formal resemblance, the actual work of management bodies of companies often varies greatly on an international level. Thus, the role of a board of directors in managing a public company varies in developed and developing countries. The model of the board, as a body monitoring and supervising the activities of the company and its management (as adopted from the practice of countries with developed markets), is fully duplicated in Russia from a legal viewpoint. However, in practice, the boards of directors play a much more modest role in the governance process in the vast majority of the Russian public companies. In actuality, real power rests with the controlling shareholders and management (which are often the same people), while the boards play a mostly secondary role, considering and officially approving the plans of the company activities and the results of their implementation. Such a situation is peculiar to most countries with emerging markets. However, in this article we will focus on the situation in Russia.

The discrepancy between the official powers of the governance bodies and their actual activities always creates serious risks and reduces management efficiency. Although, in order to eliminate or at least mitigate this gap, it is necessary to understand the causes of this discrepancy, and the causes of its persistence.

It may be fairly stated that a misunderstanding of these causes gives rise to the wrong methods for addressing them, and often serves only to exacerbate the problem.

Boards of directors: Principles of the classical model

In the Anglo-US model of corporate governance that dominates throughout the world, the right of the board of directors to exercise strategic management and control arises out of the ownership structure of public companies.

Western public companies tend to have a dispersed ownership structure. Most of these companies do not have a controlling shareholder, and very often do not even have a significant major shareholder (e.g. a shareholder owning more than 10% of shares, or even 5%). The volume of stock owned by managers is also rather small.

It is not surprising then, that in such a situation the board of directors is considered the appropriate body to represent the interests of all shareholders, and therefore has the right to control management, approve critical decisions, evaluate work, determine management remuneration, and decide on management replacement if the company shows unsatisfactory performance [1].

The dispersed structure of the share capital in such companies determines the mechanism for electing members of the boards of directors: it is arranged in such a way as to prevent the board's dependence on any one group of shareholders.

A large community of top managers from these countries is constantly replenished by people from all over the world, and thus results in a strongly competitive environment. This community may be described as possessing a very professional culture, based on the existing business infrastructure and the traditional modes of professional communication. In this respect, respected professional periodicals on management and corporate governance, affluent professional associations, management research centers, conferences, and leading world business schools all form foundational touchstones for the culture of professionalism [2]. The high level of competency within this community is confirmed by the large number of companies, which are among global industry leaders, innovative companies, and companies with original management models. The boards of directors of western companies have a wide range of choice of candidates to replace top executives who show performance results that do not satisfy shareholders.

Additionally, the high liquidity of the stock market allows shareholders to easily withdraw their interests in companies when poor or with unsatisfactory performances.

The effective judiciary systems of these countries also makes it possible to take independent decisions regarding shareholder disputes, and to bring the management and members of the boards of directors to justice if abuses in the performance of their duties takes place.

Under these circumstances, the main function of boards of directors is general supervision and control over the activities of management [3]. The logic of this approach is that in the event of poor company performance, the board of directors should replace management, and not be dragged into problem-solving processes. Although in recent years the general trend has been an increase in the time spent by members of the boards of directors of Western companies on fulfilling their duties, their excessive activity is viewed cautiously as a risk factor regarding interference with the scope of appropriate management responsibility.

Boards of directors in Russia: The different model

The ownership structures in public Russian companies and the environments in which they operate are very different from their counterparts in Western countries.

All Russian public companies are characterised by a very high ownership concentration, with the power invested in an controlling shareholder (or a small group of shareholders) to determine the composition of the board of directors. Hence, there is often the possibility of a change in board composition at any time. The controlling shareholders of Russian companies are deeply involved in the management process, to the extent of direct participation in operational decision-making. They closely interact with the management of companies and commonly establish informal relationship with them, which is facilitated by the extremely controversial nature of legal regulation. An essential characteristic of the environment in which Rus-

sian companies and their major shareholders operate is the low level of trust in society as a whole, and in the business environment [4]. The Russian judicial system is ineffective in ensuring the just resolution of shareholder conflicts, countering corporate raiding, and recovering damages from management and board members in cases of abuse.

It is not surprising then, that under conditions of a high concentration of ownership of public Russian companies, their major shareholders believe that, from an economic perspective, the right to exercise effective control over the activities of a company is vested in them, and not in the boards of directors. In the minds of major shareholders, the nominal legal right of boards to exercise supervision and control has no basis in terms of the nature of ownership relations in these companies. Given the state of the general business environment, Russian majority shareholders view the transfer of the actual functions of control and supervision over the activities of their companies to boards of directors as a significant risk [4]. As a result, the practice of most boards of directors is perfunctory, and the range of tools and technologies they use is very limited. Board members, as a rule, understand these limitations and their reasons, which has implications for their levels of activity.

Mastering the basics of western best practice in corporate governance, the principles of establishing and organising the work of boards of directors by a growing number of large Russian companies from the late 1990s to the late 2000s relied on the interest of their controlling shareholders in increasing the market capitalisation of their companies. However, even during this period, such a factor did not lead to the transformation of boards of directors into bodies that exercise effective control over companies. One of the reasons for this is the short-term orientation of most foreign portfolio investors in the Russian stock market, and the determining influence on their behavior of macroeconomic, and political factors alongside trends in commodity prices. Furthermore, under the conditions of the overall high attractiveness of emerging markets (and the rapid growth of the Russian economy), mastering even a limited set of elements of organising the work of boards of directors under the Anglo-US model (election of several independent directors, establishment of board committees, adoption of a number of internal documents) yielded positive results in the form of rapid capitalisation growth [3].

However, since the late 2000s the prospect of growth in market capitalisation has almost lost its importance in the minds of Russian shareholders as a factor for stimulating an increase in the role of boards of directors. This is due the following reasons:

- a stagnation of the Russian economy, reducing its attractiveness for Western investors;
- a decrease in demand for investments from Russian companies themselves;
- a drastic reduction in opportunities for capitalisation growth due to exodus of Western portfolio investors;
- domestic political restrictions on the transfer of control over large Russian companies to foreign investors.

In the view of the author, in the foreseeable future, there is no reason to expect that the interest of Russian controlling shareholders in growing the capitalisation of their companies will be a driver for the transfer of actual supervisory powers to boards of directors. There is also no reason to expect a qualitative decrease in the ownership concentration in Russian companies. In a great number of the largest Russian companies partially owned by the government, the practice of forming strong personal relations between top management and representatives of top political leadership [4] contributes to preserving the current nominal role of boards of directors.

Since 2000s, a significant factor contributing to the adoption of Western corporate governance practices by large Russian companies has been the activity of the stock market regulatory authorities - first of the FCSM-FFMS, and then of the Central Bank of the Russian Federation. In recent years, in the author's estimation, this factor has become the most crucial one. However, the persistence of high ownership concentration in Russian public companies alongside a notable decrease in any economic interest from shareholders in the transfer of power to their boards of directors should lead to a growing concern about the impact of the regulatory factor. Increased pressure from the regulator on non-state-owned companies to try and force controlling shareholders to transfer actual control to the boards poses a risk of increased simulation of the work of boards in key areas of their responsibility.

Professional management development as a key function of the board of directors

In the current situation, in order to significantly increase their involvement in strategic management, the boards of directors of Russian companies need to prove to controlling shareholders they have the capability to contribute to the creation of economic value. The boards could do this through a vigorous development of professional company management in areas which form long-term competitive advantages, and by focusing on unconventional approaches to understanding and solving relevant challenges. To this end, board members should master and actively use new, effective practices, technologies, and tools for analysing management issues and researching their solutions. In the author's view, the most important areas of management in which the boards of directors of Russian companies should implement this function are as follows: strategic planning, ensuring and improving competitiveness, building up and developing the company's human capital, risk management, and internal control.

The implementation by boards of directors of these functions can demonstrate their value to controlling shareholders, giving the latter serious reasons for delegating effective powers to boards and bestowing upon them a real influence in the management process [5]. It could also lay the foundations for meaningful collaboration between the boards and management as a joint team of the company. Within such a proposed professional development initiative, the interaction of controlling shareholders, manage-

ment, and board members would ideally be carried out on a basis that assuages any possible psychological challenges for shareholders.

What could induce the controlling shareholders of Russian companies, at least in part, to move away from their current sole reliance on management as the only source of value creation and development drivers? In the opinion of the author, the increasingly evident inefficiency of the present model, and its increasing non-competitiveness, is just such a factor.

With the high level of top managers' remuneration in large Russian companies (which has reached, and in a good number of cases, exceeded the level of remuneration of company leaders in countries with developed markets), Russian companies increasingly lag behind companies of developed countries and a growing number of companies from emerging markets in key areas [6].

Here are some stark examples that characterise the low quality of management in Russian companies (according to 2015–2016 research data): the share of companies with network management and flexible corporate systems in the world totally is 61%, while in Russia this figure lies at 36%; levels for leadership training programs with strategic goals in the world totals 61%, whereas in Russia this figure is 36%; the level of coverage by managerial development training programs for lower and mid-level managers in the world is 42%, yet in Russia is just 18%; Russia ranks last in a selection of 28 countries in terms of staff readiness to interact with colleagues within cross-functional teams; and finally, 80% of Russian companies do not carry out any analytics in the field of human resource management. In the ranking of the most technologically advanced companies in the world as of the end of 2016, Russia is represented by one company (*Magnit*), the same number as Saudi Arabia and Chile. In the ranking of the 50 most innovative companies in the world as of the end of 2015, compiled by *Fast Company*, there are no Russian companies, but companies from Malawi, Chile, and several companies from China and India are represented. In the ranking of the 50 most innovative companies in the world as of the end of 2015, made by the *Boston Consulting Group*, there is no Russian company. In terms of the labour productivity index in 2013 (in US dollars in 2013 prices adjusted for PPP), according to the *Conference Board and Eurostat*, Russia ranked 42nd, lower than not just all European countries, but also Turkey, Trinidad and Tobago. According to the OECD, ranked by the share of GDP per 1 hour of work, at current prices, as of the end of 2015, Russia ranks 36th, which is lower than Turkey and Chile and slightly higher than Mexico, (a drop from the 2014 position). For the period 1991–2012 Russia has increased labour productivity by about 30%, while China has done so by 700%. According to estimates by experts, labor productivity in Russia is 4 to 10 times lower than the corresponding indicator of developed countries. It is fair to say that a very large share of responsibility for such "achievements" rests within the business environment.

Business processes all over the world are increasingly determined by factors that pose even more serious challenges to the current practices in Russian company management and governance. These include a dramatic increase in the value of human capital and collective experience, the significance of considering the psychological aspects of management processes, openness to information from external sources, the ability to encourage unusual views and ideas, and the importance of professional reflection [5].

The ability to draw the attention of controlling shareholders to these factors, to effectively help the formation of relevant qualities among top managers, is a chance for the boards of directors of our companies to become a really significant component of management processes.

In the author's view, the idea of increasing the contribution of the board of directors to the development of large companies through the implementation of the "Business Council" model is unpromising. This term refers to a practice whereby the board members themselves propose specific business ideas and projects, effectively influences their implementation, and features their involvement in the project management processes [2]. Such a model of the board of directors is common in startups and companies at an early stage ("infancy" stage according to I. Adizes). However, at the advanced stages of a company's life cycle, interference with the competence of management (e.g. the actual substitution of its functions in any scope) leads to a dilution of responsibility for the overall performance of the company, and gives rise to conflicts of interest. The development of professional management in the company also requires a professional board of directors. The contribution of the board of directors of a large Russian company to the creation of economic value should be primarily the function of the professional development of management with the gradual expansion of effective supervision and control [7].

As previously asserted, the author stresses that the following are the most important areas to implement professional development of management for Russian companies by the boards: strategic planning, creation and improvement of competitiveness; building-up and development of the company's human capital; risk management and internal control.

Role of the board of directors in professional development in key management areas

Strategic planning, creation and improvement of competitiveness

In accordance with the provisions of applicable corporate law, and the recommendations of the Bank of Russia Corporate Governance Code (based on the classical model of the board of directors formed in countries with developed markets), board members should focus on the analysis of strategy validity at the stage of its discussion. They should also focus on the analysis of performance against the stated objectives and specified indicators, and finally, they should focus on the correspondence of ongoing and proposed new projects under approved strategies [8]. These discussions in Russian boards are often of a technical

nature. The attention is focused on simply specific details (a set of benchmarks, target values, causes of deviations from target results, arguments for adjusting targets, etc.). Meanwhile, the overall logic of the strategy and management actions are not considered for analysis.

Within the developmental process of management in the fields of strategy and competitiveness, members of the board should aim to build management's ability to take a fresh view of the company's business and the environment in which it operates [9]. As A. de Geus, the former head of the strategic planning for Shell, noted, "planning exists not to make plans, but to change ideas".

A set of possible approaches and topics that will help the management to form a systematic and novel view of the company's business and its environment may vary. It is generally determined by the professional experience and knowledge of the board members.

In this author's opinion, it is useful for members of the board to focus their attention on the aspects outlined below.

The company's business model as an integral indicator of performance, competitive advantage and sustainability

Consider a company's activities in the example of a working business model that links production and technical solutions with the right economic results. Members of the board and management of such a company can jointly formulate answers to the following questions: what is the company's specific business model with reference to the current strategy? To what extent is a differentiated access to key resources required for the current business model? How well are intra-company processes developed within the business model which are aimed at creating value for the consumer, but are difficult to replicate for competitors? To what extent does the existing system of remuneration of management and employees correspond to the current business model? Which trends in this business environment are of particular importance for the company? Do these trends enhance or minimise the disadvantages and advantages of our company's business model?

The ability of management to organise a process for developing their own innovations, but also for replicating ("imitating") innovations borrowed from outside

Avant-garde theorists and business practitioners have already overcome the idea that borrowing innovation as something improper and not worthy of interest. Let us cite O. Shenkar, the head of *Ford Motor Company's* board for global business management: "Imitation is a strategy which is not only consistent with innovation, but is necessary for concentrating and effectively using innovative capacities... A systematic, consistent approach to imitation is needed as part of the company's strategy". The term "innovative companies" has long been established, referring to those companies that successfully and cost-effectively integrate replicated elements ("imitations") with ingenuity and knowledge of context, as well as a broad approach to selecting objects for replication. These objects can be a product, process, procedure, or business model. Research into sharing benefits from the introduction of innovations in the American economy for 1948–2001 showed that innovative companies received only 2.2% of the present value of their innovations.

As part of the discussion of this area of activities, members of the board and management can jointly formulate answers to the following questions: Does the company have a policy of targeted analysis and selection from outside of new products, services, procedures, processes, models and ideas? To what extent is such a policy consistent with the company's strategy and the business model it uses? What is being done in the company for the formation of a culture and attitudes that not only accept, but also value and promote borrowing and imitation as well as their own innovations? Where did new ideas for the industry and the company come from over the last five years that led to the creation of new products, services, procedures, processes, and models? How do the principles of motivation of personnel promote the policy of borrowing and developing new products, services, procedures, processes, models and ideas?

The effects on the company's business of global trends in the use of "big data" and information and internet technologies

Within the opportunities created by the development of information technology and the internet, we can outline at least three areas for discussion in the company:

- the use of "Big Data" to obtain new knowledge about the state of the markets, industries and customers of interest to the company;
- the application of information technologies for the integration of business processes, the creation of new products/services and new ways of delivery, end-to-end processes from ordering, designing, and manufacturing to sales and servicing, and the formation of business ecosystems;
- the use of information technology to personalise customer relationship.

In discussing the potential opportunities created for the company's business within both the above and other areas related to the use of information and internet technologies, members of the board of directors and management can jointly formulate answers to the following questions: What economic value for the company can be created by centralised accumulation, storage, and processing of data about the company's business (its internal and external sides), and by mastering the technology of " Big Data"? What are the dynamics of the use in the industry of information technology to integrate business processes and companies' businesses, the creation of new products/services and delivery methods, end-to-end processes from ordering, designing and manufacturing to sales and servicing, and building business ecosystems? How does management see the economic value of using this experience in our company? What economic value can a company create by personalising relationships with its customers? Which examples of personalisation of relations with cus-

tomers in our industry or related ones exist abroad? What technical and organisational capabilities does the company have for this approach to customers?

Feasibility and capabilities of the company to offer experiences as a new kind of economic proposal ("experience economy")

Increasing competition encourages companies to seek new ways to form their uniqueness [10]. One of the features of this tendency is the determination of the economic offer to consumers, in which the stable emotional experience of the customer when interacting with the company constitutes a key or very significant component. The basis for the growing attention of companies in various industries to this area is the new technological capability to create strong positive experiences for consumers through mass personalisation of a companies' offers at competitive (sometimes tailored) prices.

From the perspective of "experience economy" principles, members of the board and management can jointly formulate answers to the following questions: What economic value for the company can be created by using the concept of "experience economy" in relations with its customers? What technical and organisational capabilities does the company have for this approach to customers? Which elements of Russian and international experience in customer relations can be applied in our company?

Creation and development of the company's human capital

The quality of human capital is increasingly viewed throughout the world as the main competitive advantage of companies. The assistance of the board of directors to the professional development of management in matters of strategic development and competitiveness is in itself a contribution to the development of the company's human capital (at the level of top management) [11]. But this is not enough. Further targeted work of a board is needed to promote the development of the company's human capital on a wider scale.

As concerns the professional development of management in the field of creation and development of the company's human capital, members of the board should focus their attention on the below aspects.

Search for new organisational structures that promote self-organisation and the creative potential of employees

A growing number of companies realise that the behavior of employees in the workplace is largely determined not by training, but by the organisational structures of the company within which they have to operate. The response to this understanding is the expanding practice of experimentation with organisational structures with a view to seeking a good balance over several variables, including: reliability, willingness to perform standard actions, flexibility, independent responses to non-standard work related issues, the company's various subdivisions, and the taking of proactive steps to reduce business and strategic risks [12].

As part of the discussion of management practices to promote business-conscious behaviour, board members and management can jointly seek answers to the following questions: How should the balance of business process reliability and flexibility change within the framework of the current development strategy of the company? Which business processes need organisational behaviour among employees based on flexibility and adaptability? What measures does management implement to develop organisational behaviour among employees based on flexibility and adaptability? What are the results of these measures? What steps to change the organisational behaviour of employees are taken by industry leaders, and the company's main competitors in Russia? Which useful lessons can be learnt from them for our company?

Principles of the company's management team building

In the managerial practice of world leading companies, the formation of top management based on the principles of a 'complementary team' is gaining recognition [13]. Each member of such a team assumes the role and functions necessary for the effective work of the executive body, which are inextricably linked with different types of personality among the members of the management team. The classification of types of managers, developed by I. Adizes, can serve as an example. A particular strength of the first of these types of personalities is the organisation of the company's work to achieve current operational objectives; of the second - the systematisation of management processes; the third one is characterised by long-term vision, the ability to offer fresh ideas, and a willingness to accept risks in achieving large-scale results in the future; the fourth reflects the creation of an environment and a system of values that will encourage people to act jointly. The non-availability of a representative of one of these types of managers in the management team greatly reduces the overall effectiveness of its work.

Board members and management can jointly formulate answers to the following questions: What does the optimal composition of our company's management mean in terms of complementary managerial roles? How does management take into consideration the principles of forming a complementary team in the process of searching for candidates for key managerial positions in a company? What is the practice of personal involvement of top managers in the selection and professional development of key management personnel of the company, taking into account the principles of team building?

Qualitative improvement of the company's HR service practice

Leading global companies are actively seeking ways to enhance the integration of their HR units in the management process, and increase their contribution to the creation of economic value. For example, a company might assigning their HR team certain new tasks, such as the evaluation of the staffing of the company's strategy and diagnosing problems in this area. They might challenge them with forecasting team performance, or the development of proposals to improve the company's competitiveness in terms of its human capital (organisational behavior, qualification, motivation, etc.). HR units may formulate a task aimed at the composition of key perfor-

mance indicators, or at participation in budgeting. Board members and management can focus their attention on regular discussion of these issues and jointly search for answers to the following questions: What economic value for the company does the work of HR units create, and how is it measured? In which areas should the HR units make the greatest contribution to achieve the company's strategic goals within the approved strategy? To what extent is the performance assessment, and the motivation principles of the HR team vis-a-vis business objectives, approved as part of company strategy? To what extent is the head of the HR units involved in the most important management decisions of the company? Does management find this involvement to be optimal?

Improved management of internal company knowledge

The systematisation of knowledge and skills of employees, and the motivation of employees to expand this knowledge base and its mastering are a recognised part of management practice not only in the leading companies of developed countries, but also of a growing number of companies from emerging-market countries [13]. This practice makes it possible to identify, formalise, and disseminate practical solutions that provide the greatest economic effect within the company. This can also help to reduce losses in the event that such knowledge holders leave the company, and evaluate the practical impact of external employee training [11]. In analysing the company's practice in this area, board members and management can jointly formulate answers to the following questions: what are the main components of the company's internal corporate knowledge management practice? What economic value does this company system provide? How does the cost of external and internal training of personnel contribute to the growth of internal corporate knowledge? How is the development and use of this system incorporated in the current system of personnel motivation at various levels?

Personnel performance assessment practice

A growing number of companies in countries with developed and emerging markets are seeking a balance between the traditional annual assessment and intermediate performance assessments of employees. This goal is sought after in order to more promptly adjust workloads, and to identify ways of effectively combining formal assessment and managers' experienced judgment on the performance of a subordinate. The assessment focus often shifts towards future goals and development potential, and various software applications are being actively implemented which enable a quick analysis of the results of interim assessments to promote best practice in internal corporate communications [12]. In discussing these issues and studying best practices, members of the board and management can jointly develop answers to the following questions: To what extent is the company's employee assessment system optimal in terms of combining operational and strategic objectives? To what extent is the relationship between the criteria and the results of assessment of employees of different motivational levels optimal? To what extent is the development and implementation of effective ways of employee assessment incorporated in the principles of performance assessment and motivation of the HR service and its manager?

The work of the board on risk management, and the creation and development of the internal control system

The critical importance of attention to risk management is determined by such trends as a sharp increase in uncertainty about the future at global, regional, country, industry and corporate levels; increased non-linearity of industry development; and rapid technological changes that can drastically disrupt industries or business models, and destroy boundaries between industries [10].

Within the function of professional development of management in the field of risk management and internal control, it is useful for members of the board to focus their attention on the below aspects.

General principles in the formation of risk management and internal control system

The approach to the establishment of an integrated risk management system by incorporating risk management into all business processes in a company has become a widely recognised approach. Companies strive to form a balanced risk profile through the right combination of high and low risk activities, and the correct use of asymmetry and non-linear effects. Risk is considered not only as a threat, but also as an opportunity. Instead of efforts to improve the accuracy of forecasting negative probabilities, companies focus on increasing the flexibility and adaptability ("antifragility") of the company's internal processes to possible negative events [14]. In discussing these issues and studying best practices, board members and management can jointly develop answers to the following questions: What is the extent of adaptability and flexibility of the company's internal processes to changes? What plans are in place to increase it? Does the current strategy of the company contain a strong negative asymmetry, by considering the likelihood of large losses in the event of changes in the basic parameters of the business environment in one direction, with appropriate changes in the other direction? Does the current strategy of the company contain a strong dependence on one variable of the business environment (where change entails a sharp deterioration in all parameters of the company's activity)? Which new opportunities were identified in the process of analysing the company's strategic risks?

Formation of an effective risk culture of the company

The practice of risk management and the internal control of the world's leading companies is based on an understanding of determining influences of the general nature of corporate culture on risk culture, and dependence of the latter on the organisational behaviour of employees. The need for the relationship between the principles of employee performance assessment and their motivation with their attention to risk is also a valuable consideration [9]. The set of risk culture development tools is rapidly expanding (internal portal, discussion forum, database on occurred risks, certification, dissemination of information on realised risks, risk culture research, and regular assessment of

the effectiveness of the tools used, etc.). In analysing these issues and best practices, board members and management can jointly develop answers to the following questions: What are the results of the company's corporate culture assessment in terms of promoting initiative, self-reliance and taking responsibility for their actions? How does management evaluate the organisational behavior of employees in terms of promoting risk culture development? Does the employee performance assessment system sufficiently promote the development of the company's risk culture? Does the employee motivation system sufficiently contribute to the development of their risk culture? How effective are the tools used to develop a risk culture?

Risks of information technology use

The development of modern information and communication technologies creates new unprecedented opportunities for the integration of various production and service processes, interactions with consumers, and the fostering of innovation. IT and the internet themselves became the basis for radical changes in a huge variety of production and financial processes, as well as the creation of completely new products and markets. At the same time, the cost of possible losses associated with troubles in the operation of information and communication systems, and the loss of knowledge accumulated in them as a result of technical failures is also growing rapidly. In discussing these issues and studying the best practices of other companies in this field, members of the board and management can jointly develop answers to the following questions: What are the weak points identified in the IT security system, and what is the plan to remedy them? What is the cost effectiveness of IT security? How is IT security policy integrated into the company's risk culture development policies, performance assessment system and employee motivation? To what extent is the management familiar with the best practices in ensuring IT security in other companies, and which of their valuable points are used in our company?

The above list of issues on which the board of directors can focus its attention in the process of implementing the function of professional development of management and questions and the answers to which it can formulate in the process of dialogue with management is indicative. Each board should define the list of such issues, their priority, the number and focus of questions specifying their discussion, independently taking into account the specifics of the company activities, the experience of its management and the board members themselves.

Effective practices and tools of the board of directors for professional management development

Success of implementation by the board of directors of the function of professional management development depends not only on the range of professional areas and issues chosen by the board for this, and on how this choice takes into account the specifics of the company activities. The effectiveness of such work depends to a large extent on practices and tools used by the board for this purpose. Such practices and tools should take into account the psychological barriers which make it difficult for managers to perceive new approaches and ideas, and stimulate a quicker and more complete mastering of these concepts.

Here we will look at some of the most important, practices and tools that board members can use as part of their efforts to provide professional management development.

Purposeful discussion by board members and management of the issues of mental distortions and psychological traps in the process of making management decisions, and ways to overcome them. Examples of such distortions and traps can be group thinking, the "mid effect" (exclusion of decisions far from the "golden mean"), "anchoring" (tying reasoning to the figures and facts presented first), "priming" (giving rise to associations that are similar to what a person has faced), and showing stronger negative emotions in a situation arising as a result of ones own actions than in the same situation as a result of inaction.

The professional development of top executives and controlling shareholders by the boards will be more effective if it is done with new practices, techniques and tools. In the author's view, the following ones should be used by boards of Russian companies:

- Regular presentations of experts, the use of coaches, and the identification of these traps in the process of discussing specific management problems can facilitate the maintenance of the reflection of board members and management regarding these issues.
- *Purposeful expansion of the framework for joint discussion by board members and management of the most important issues of the company (strategy, business model, market positioning, innovations, risks, etc.).* The purpose of this approach is to see the objectives set by the company and the methods of their solutions, on which it relies, in a broad, meaningful context. Such expansion can be carried out in several directions. First, by involving data in the analysis from the industry in which the company operates, but also data from related or even remote industries, but where similar business models are applied. Second, through the incorporation in the analysis of not only Russian, but also international experience. Third, through the extension of timeframes, allowing to see development trends in more distant time horizons (for example, the last three or five years).
- *Practice of prepared, purposeful discussions of alternative and even oppositional approaches as a way of countering firm views and approaches in discussing the most important issues of the company.*
- *Maximum visualsation of the problems discussed and informational materials provided for discussion.*
- *Benchmarking, compulsory comparability and compatibility (with leaders, competitors) of data when discussing the main activities of the company, and ways to solve the most important problems,and the results obtained.*

- *Introduction of the rule of mandatory advance submission by the members of the board and its committees of their written opinions on the agenda.* First, it encourages board members to take a more responsible approach to the analysis of materials and the formulation of their questions. Second, it resolves or mitigates the problem of dominance in discussing certain issues of authoritative board members. Third, it gives management time to prepare answers to the questions from members of the board. Fourth, it facilitates an assessment of the quality of work for each board member.
- *High-quality preparation of written materials for meetings of the board of directors and its committees.* This implies the availability of materials on each important issue, containing a large amount of explanatory materials, and a high-quality summary of the problem and arguments in favour of the proposed method for solving it (*summary*) of no more than 1.5 pages. A clear division of material into the base one (which is the most important to study), and supplementary materials (reference material, contained in applications). One should seek to minimise text and maximise the use of graphic and tabular materials. The organiser should also limit the total amount of materials sent to members of the board, seeking wherever possible to promptly dispense additional materials upon personal request.
- *Mandatory use by board members of previously prepared control questions for management, analysis and subsequent use of the answers received in the course of work (not only at this meeting).* Questions should be primarily focused not on quantitative indicators, but on the quality of understanding by the management of the company's managerial processes in the context of management practice development in leading companies in their industry and in other industries, in Russia and internationally. For example, the questions of the company's competitiveness in the industry with regard to its main competitors should be considered, as well as questions such as the quality of business processes, the efficiency of the business model used by the company and the prospects for its change, understanding the sources of innovation and ways to turn them into economic value for the company, effective practices and technologies for the formation of human capital, etc. It will be useful for board members to keep a table in which the essence of the received answers to the asked control questions, their own conclusions, and the appropriateness of obtaining additional information on them from the management are reflected.

Conclusions

A focus by boards of directors on the development of professional management practices, with a specific emphasis on uncommon approaches to understanding and solving problems will help not only to solve the critical management problem of Russian companies, but also to create acute motivating influences among controlling shareholders to strengthen the actual role of boards of directors in governing companies. This specific focus can help mitigate the conflicts between the functions of boards arising from their nominal legal rights and the framework established by actual ownership relationship in Russian companies.

Board members need to move from focusing on the standard recommendations of international best practice of the boards (within the framework of the control and supervision function), to an in-depth study of key business processes for companies, as well as management innovations, effective international business practices, technologies and tools for promoting new management approaches, and ideas which facilitate the process of overcoming the mental and psychological barriers that impede their effective implementation by the management.

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