НОВЫЕ ИССЛЕДОВАНИЯ

Capital structure determinants of Russian public companies

Ilya Ivanov[1]

This paper investigates the determinants of capital structure choice of Russian public companies. The sample comprises 7 times more observations than any other known study of Russian firms. Significant influences on financial leverage are identified for the company's profitability, tangibility of assets, growth opportunities, size, ownership structure, credit rating, accounting standard, life cycle stage, level of intellectual capital, as well as for time effects. These results, first, help to challenge the conclusions of the prior research. Second, they evidence the validity of the trade-off and pecking order theories, market-timing and managerial over-optimism hypotheses. Third, they prove the influence on capital structure of several institutional features of the Russian corporate environment: higher non-transparency of economic relationships and a monopolistic character of the economy.

JEL: G32

Key words: capital structure, leverage, Russian public companies, pecking order theory, trade-off theory, empirical analysis

Introduction

Half a century has already passed since the debates about the capital structure choice began. The issue is of interest not only for an individual company that wants to maximize its value but also for the economy as a whole. Studying the debt load determinants might reveal the imperfections in the financial system and institutional peculiarities of the country that affect its economic development through the financing decisions of individual firms. Therefore, the evidence of capital structure studies might have not only scientific, but also practical value.

Fifty years of research resulted in the formation of several capital structure theories, appearance of different empirical tests, and accumulation of evidence about the determinants of financial leverage. However, these studies often find contradicting evidence: both confirmation and denial of each theory have been found many times, while several stylized facts cannot be explained by the existing models at all. In spite of unsatisfactory results during the long years of analysis, the theoretical development continues. New theories and comprehensive models appear: they have inherently fewer restrictive assumptions and can shed light upon several previously unknown mechanisms of capital structure choice. Empirical studies are also in progress and become more "attentive to details", i.e. the empirical model is being adapted to the special features of the country under study. Therefore, there is still a need for new unconventional approaches in the conduction of theoretical and empirical research.

This paper makes a contribution to the empirical branch of literature. The object of the investigation is the determinants of capital structure of Russian public firms. The evidence about the Russian companies' financial leverage seems to be limited and provides much room for improvement and critical verification of the prior results. This study employs data for almost 700 Russian public companies for 2003-2008 and tests the empirical model using the cross-sectional methodology. Most of the new determinants prove their relevance and explanatory power for the

[1] Master of Science in Corporate Finance, Higher School of Economics

financial leverage of Russian companies. Moreover, a big sample and its clusterization help identify the incorrectness of some prior studies' conclusions. Finally, the analysis reveals specific characteristics of the Russian corporate environment which influence the capital structure and economic development.

The structure of the paper is the following. The first chapter analyzes existing specifications and results of empirical tests. In particular, the studies of companies in developing countries are reviewed in order to develop the empirical model further and attune it better to the Russian corporate environment. The second chapter presents the proposed empirical model and substantiates the hypotheses. Finally, the third chapter focuses on regression analysis and the discussion of results.

Literature review

The topic of capital structure choice in the literature

Although the issue of capital structure appeared at least as early as in the paper of Williams (1938), a surge of interest in the topic appeared after the seminal work of Modigliani, Miller (1958). Afterwards, researchers directed their efforts mainly at the relaxation of Modigliani-Miller's assumptions in order to explain the so called "puzzles of capital structure", i.e. the failure of the irrelevance proposition. As a result, several theoretical models or even schools of thought appeared: the trade-off (Myers, 1984) and the pecking-order theories (Myers, Majluf, 1984), market-timing (Baker, Wurgler, 2002) and inertia (Welch, 2004) hypotheses. This paper focuses on the first two theories since the other two has not yet gained a foothold in the literature.[2]

In the following, the main designs of empirical capital structure studies are identified and the cross-sectional methodology is covered in detail. Furthermore, the state of empirical studies in developed and developing countries is discussed. It helps identify the drawbacks of the prior studies, as well as prospective and little-studied sides of the problem.

Methodology of empirical capital structure studies and cross-sectional evidence from companies in developed countries

According to Frank, Goyal (2008), there are several methodological designs of empirical capital structure studies: studies at the aggregate level (Wright, 2004; Lemmon et al., 2006 etc.), cross-sectional evidence (Bradley et al., 1984; Titman, Wessels, 1988), event studies (Eckbo, Norli, 2004; Eckbo et al., 2007), natural experiments (Blanchard et al., 1994; Givoly et al., 1992), surveys (Graham, Harvey, 2001; Bancel, Mittoo, 2004), etc.

Cross-sectional analysis of the relationship (correlation) between financial leverage and some parameters is one of the most popular methodological tools (Titman, Wessels, 1988; Rajan, Zingales, 1995). First, this kind of analysis allows distinguishing between the trade-off and the pecking order theories because they imply in most cases different influences of the same factors on leverage[3]. Second, it is possible to check simultaneously for the importance of other factors in capital structure choice: institutional differences between countries or violations of Modigliani and Miller's assumptions other those in the center of major theories. The sample might include only one country (Titman, Wessels, 1988; Lemmon et al., 2006)) or a set of countries (Rajan, Zingales, 1995; Wald, 1999). The empirical analysis within this part of cross-sectional studies is based on one linear regression model:

[2] Myers (2001), Frank, Goyal (2008) present an extensive overview of the trade-off and the pecking order theories.

[3] In other words, these factors serve as proxies for the drivers of capital structure that underlie the trade-off (tax shields, costs of financial distress, free cash flow problem) and the pecking order (information asymmetries between insiders and outsiders) theories.

$$L = \alpha + X\beta + \varepsilon$$

$$L - financial\ leverage \qquad (1)$$

$$X - set\ of\ \ factors\ that\ determine\ capital\ structure$$

The vector of coefficients β is of interest because it allows the identification of dependencies between the capital structure and key parameters. Within the model (1) Rajan, Zingales (1995) proposed the following specification (2) that became widely accepted in the literature:

$$Leverage_i = \alpha + \beta_1(Tangible\ \ assets)_i + \beta_2(Market\ \ to\ \ Book\ \ ratio)_i + \\ + \beta_3 \ln(Sales_i) + \beta_4(Return\ \ on\ \ assets)_i + \varepsilon_i \qquad (2)$$

These four explanatory variables cover a firm from four important dimensions (Tangibility of assets, Growth opportunities, Size, and Profitability) and have been used as core explanatory variables in most research papers afterwards. Frank, Goyal (2008) present a good overview of the underpinnings for the inclusion of these factors into the model, main empirical results about their relevance and influence in developed countries and possible proxies. Table 1 summarizes the findings of the prior studies about the direction of correlations for these four factors.

Table 1

Overview of capital structure determinants in developed countries

Factor	*Result*	*Papers*
Profitability	+, trade-off	
	-, pecking order	Kester (1986), Titman, Wessels (1988), Rajan, Zingales (1995), Shyam-Sunder, Myers (1999), Lemmon et al. (2006)
	0, none	Long and Malitz (1986)
Tangibility	+, trade-off, pecking order	Long, Malitz (1986), Titman, Wessels (1988), Rajan, Zingales (1995), Lemmon et al. (2006)
	-, pecking order	Daskalakis, Psillaki (2007)
	0, none	
Size	+, trade-off	Rajan, Zingales (1995), Barclay, Smith (1996), Frank, Goyal (2003), Lemmon et al. (2006)
	-, pecking order	Kester (1986), Titman, Wessels (1988)
	0, none	Ozkan (2001), Daskalakis, Psillaki (2007)
Growth	+, pecking order	Kester (1986), Long, Malitz (1986), Titman, Wessels (1988), Harris, Raviv (1991)
	-, trade-off	Titman, Wessels (1988), Rajan, Zingales (1995), Barclay, Smith (1996), Ozkan (2001), Lemmon et al. (2006)
	0, none	

Summing up the results of the prior research, the four factors (Profitability, Tangibility, Size, and Growth opportunities) proposed by Rajan, Zingales (1995) have proved their relevance and explanatory power in many studies of financial leverage in developed countries. The evidence for the impact of the first three determinants is relatively stable in most papers. Growth opportunities show contradictory evidence, which is presumably the result of the usage of different proxy variables.

In the recent years, the research focus is gradually moving towards developing countries. The next section explores whether any new conclusions have been derived from the extension of the investigation object.

Empirical evidence of financial leverage of companies in developing countries

So far, most empirical capital structure studies have been done on companies from developed countries, which surely provide the researchers with longer, more representative and more reliable data (Booth et al., 2001). The first papers devoted to the analysis of developing countries used the standard methodology and applied often only the four factors of Rajan, Zingales (1995). Their common conclusion is that these determinants have explanatory power also for the financial leverage of firms in developing countries. The results of some studies are summarized in Table 2. In comparison to the studies in developed countries, there is no such unanimity of results. With an exception of Profitability, three other factors demonstrate perhaps all possible combinations of influence on leverage.

Table 2

Overview of capital structure determinants in developing countries

Factor	*Result*	*Papers*
Profitability	+, trade-off	
	-, pecking order	Wiwattanakantang (1999), Booth et al. (2001), Chen (2004), Nivorozhkin (2005), Delcoure (2007), Mihalca, Antal (2009)
	0, none	Omet (2006), Supanvanij (2006)
Tangibility	+, trade-off, pecking order	Chen (2004), Nivorozhkin (2005), Delcoure (2007)
	-, pecking order	Booth et al. (2001), Nivorozhkin (2005), Mihalca, Antal (2009)
	0, none	Wiwattanakantang (1999), Booth et al. (2001)
Size	+, trade-off	Wiwattanakantang (1999), Booth et al. (2001), Chen (2004), Nivorozhkin (2005), Mihalca, Antal (2009)
	-, pecking order	Booth et al. (2001), Chen (2004), Delcoure (2007)
	0, none	Nivorozhkin (2005)
Growth	+, pecking order	Chen (2004)
	-, trade-off	Wiwattanakantang (1999), Booth et al. (2001),
	0, none	Delcoure (2007)

Looking for the grounds of such inconsistency, several cross-country studies (Wald, 1999; Booth et al., 2001; Delcoure, 2007) come in particular to the conclusion that institutional, country-specific factors influence the capital structure choice of companies in developing countries not less than the four factors described above. Moreover, Booth et al. (2001) affirms that developed countries have similar institutions, while developing countries have much more different institutional patterns and deserve extra interest and scrutiny. As a result, several authors introduce additionally specific factors in the regression analysis in order to capture the peculiarities of the corporate environment in the country under consideration. For instance, the factors of ownership structure (Wiwattanakantang, 1999; Harvey et al., 2004; Pöyry, Maury, 2009), level of investor protection (Seifert, Gonenc, 2008), financial constraints in the banking sector (Chen, 2004), and political risks (Desai et al., 2007) have already been tested within the cross-sectional methodology. This group of research has already given some insight into how companies in the respective countries make their decisions about the capital structure.

Empirical evidence of financial leverage of companies in Russia

When it comes to the analysis of the Russian specific institutional characteristics, there is much room for further development. Delcoure (2007) and Seifert, Gonenc (2008) include Russia in their cross country analysis and employ rather standard methodological tools in the form of regression (2); the sample comprises only 33 and 37 Russian firms respectively. A bit more profound research is presented in Ivashkovskaya, Solntseva (2008) and Pöyry, Maury (2009), where the focus is only on Russia and besides core determinants of Rajan, Zingales (1995) an interesting factor of the ownership patterns is included. These two studies still concentrate on the biggest 74 and 95 Russian companies.

Ivashkovskaya, Solntseva (2008) present some evidence that the government ownership increases financial leverage; however, they do not explain the identified phenomenon. Pöyry, Maury (2009) go one step further and introduce also a special feature of the Russian market of corporate control: oligarch ownership. The notion oligarch is interpreted as "an owner with sufficient wealth and strategic ownership to have significant economic and thus also political influence" (Pöyry, Maury, 2009, p. 3). The analysis reveals a positive influence of both the state and oligarch ownership on the level of enterprises' indebtedness. Pöyry, Maury (2009) link elegantly this effect to the national features of the Russian corporate environment.

Their first observation is that the banking system in Russia is mainly (40-50%) in the hands of state-owned banks, which politicizes the allocation of credits (La Porta et al., 2002; Vernikov, 2007). Therefore, the firms, in which the state has a large holding of shares, have better access to debt financing in comparison to the counterparts. When it comes to oligarch-controlled enterprises, they might bear the benefits of their owners' political interconnections and thus a preferential access to debt capital from the state banks (Faccio, 2006). Furthermore, these corporations can raise more money with a help of oligarchs' connections to other financial-industrial groups (Guriev, Rachinsky, 2005). As a result, Pöyry, Maury (2009) make a conclusion that Russian companies do not have equal access to debt financing, which results in oligarch- and state-owned firms having more debt.

There are several directions where the potential for improvement might be realized. First, expansion of the sample is highly desired in order to study not only the biggest corporations. Second, inclusion of other specific for Russia and potentially influential factors might reveal new important considerations for the choice of financial leverage in the Russian corporate environment. The empirical investigation presented below is directed exactly at the realization of this enhancement.

Empirical model of capital structure determinants

Empirical model and hypotheses

Based on the analysis of the existing research and presented below hypotheses about the determinants of capital structure of Russian companies, the following cross-sectional regression specification (3) is proposed:

$$\begin{aligned} Leverage = {} & \alpha + \beta_1 Profitability + \beta_2 Tangibility + \beta_3 Growth\_opportunities + \\ & + \beta_4 Size + \beta_5 (Ownership\ dummies) + \beta_6 (Headquarters\ dummies) + \\ & + \beta_7 (Rating\ dummies) + \beta_8 M\ \&\ A\_activities + \\ & + \beta_9 (Accounting\ standard\ dummies) + \beta_{10} (Life\ cycle\ stage\ dummies) + \\ & + \beta_{11} Intellectual\_capital + \beta_{12} (Year\ dummies) + \\ & + \beta_{13} (Industry\ dummies) + \varepsilon \end{aligned} \quad (3)$$

In the following, the measures of debt load and their explanatory variables are discussed and the underpinnings for the inclusion of each factor in the empirical model are presented. Moreover, the hypotheses for the direction of factors' influence on the debt ratio are formulated, as well as the quantitative measures for the factors are proposed.

The best measure of financial leverage is the object of much controversy in the literature (Myers, 1977; Welch, 2004; Barclay et al., 2006). The first question is what type of debt to study: short-term, long-term, or total debt, whether to include the trade credit in the measure. Secondly, book or market values of assets to use for the normalization of debt values. In order to avoid the ambiguous choice of the dependent variable, the broadest range is considered. Among different dimensions of debt, short-term debt, long-term debt, total debt as well as total liabilities[4] are used. Both book and market values of total assets are utilized for debt normalization. Overall, seven various proxies of financial leverage are used in the analysis[5]. The short names and precise calculations of dependent variables are presented in Table 3.

Table 3

Dependent variable definitions

Book leverage ratios	
BL_STD	Short-term debt / Book value of Total assets
BL_LTD	Long-term debt / Book value of Total assets
BL_TD	Total debt / Book value of Total assets
BL_TL	Total liabilities / Book value of Total assets
Market leverage ratios	
ML_STD	Short-term debt / Market value of Total assets
ML_LTD	Long-term debt / Market value of Total assets
ML_TD	Total debt / Market value of Total assets
	where Market value of Total assets = Book value of Total debt + Market capitalization

The basic explanatory variables of the model represent the conventional factors of Profitability, Tangibility, Growth opportunities, and Size introduced in Rajan, Zingales (1995). To proxy for these factors, the standard variables are constructed. Profitability is modeled by return on assets (Rajan, Zingales, 1995; Titman, Wessels, 1988). For Tangibility of assets, two alternative variables are selected: a share of fixed assets in total assets (Rajan, Zingales, 1995; Wiwattanakantang, 1999) and a broader category of long-term assets to total assets. Growth opportunities are to be reflected by the market-to-book ratio (Rajan, Zingales, 1995), capital expenditures to total assets (Harvey et al., 2004), and growth of Sales (Frank, Goyal, 2002). Three measures are to proxy for the Growth opportunities because they characterize the factor from different dimensions and have different underlying hypotheses; it is difficult to judge a priori which one will perform better. Finally, a natural logarithm of total assets (Nivorozhkin, 2004, 2005) and sales (Titman, Wessels, 1988) are responsible for Size effects. Based on the results of capital structure research in developed and developing countries, it is expected that less profitable, bigger firms with higher share of tangible assets and higher growth opportunities use more debt in Russia.

[4] The measure of financial leverage based on total liabilities is not very common in the literature; however, several studies advocate its usefulness (e.g. Cornelli et al., 1996; Nivorozhkin, 2002). The advantage of this variable is that it covers an alternative source of credit – trade credit, which might be quite important in the transition environment that faces credit rationing on the side of banks (Nivorozhkin, 2002).

[5] The measures of total liabilities and market value of total assets (as a sum of book value of total debt and market capitalization) are considered non-comparable and excluded from the research design.

This paper aims also to study more precise the effect of Ownership structure on financial leverage documented by Ivashkovskaya, Solntseva (2008) and Pöyry, Maury (2009). Three groups of shareholders that might influence the capital structure of the company are considered. First two are oligarchs and the state[6] as in Pöyry, Maury (2009). Without any other evidence, the same results as in Ivashkovskaya, Solntseva (2008) and Pöyry, Maury (2009) are expected: higher debt level for both state-owned and oligarch-owned companies. The third case is the manager who is simultaneously a large shareholder. According to theory (John, John, 1993), a big managers' holding of shares in the company leads to a closer alignment of managers' incentives with the interests of the shareholders. This is expected to reduce the free cash flow problem, i.e. less debt is needed to control managers in this case.

In compliance with the definition of an oligarch- or state-owned company in Pöyry, Maury (2009) and an ultimate controlling owner in La Porta et al. (1999), the threshold is set as 20% (also for manager-owned). The list of corporate groups considered as oligarchs is the same as introduced by Guriev, Rachinsky (2005), which was also adopted in Pöyry, Maury (2009). Contrary to Pöyry, Maury (2009), the observations with overlapping ownership structures (e.g. with the state and an oligarch simultaneously being ultimate owners) are not counted twice in both dummy variables but defined as a separate variable. Hence, four combinations of dual and triple ownership are also in the analysis. There might be different relationships between two large shareholders which affect firm's leverage. Therefore, it is not trivial to hypothesize the integral effects in these cases. Altogether, there are eight possible combinations and seven dummy variables.

The Russian economic environment is also characterized by the concentration of financial and economic life in Moscow and Saint-Petersburg (Kolossov et al., 2002; Leksin, 2007). The richest people live in two capitals; both stock exchanges and most investment funds are located in Moscow. It is supposed that the banking system covers Russia more or less uniformly, while the equity investors are concentrated in these two cities. Several studies, e.g. Cumming et al. (2003), show that strategic investors prefer to invest their funds in the geographically close projects because it is easier to monitor them, as well as to participate in the management of the companies. Therefore, the hypothesis is that a lower level of indebtedness is a case for the companies located in Moscow or Saint-Petersburg. Two dummy variables are introduced for Headquarters' location.

Although Rating variables do not often appear in capital structure research (Faulkender, Petersen, 2006), they might have significant influence on financial leverage. First, Joeveer (2006) and Al-Bahsh (2009) advocate that in developing countries the transparency is much lower, while information asymmetries and bankruptcy costs are more pronounced. Therefore, intermediation of a renowned rating agency in the debt raising process is expected to be of high value. Second, a credit rating might indicate the quality of financial management, degree of business risk and the size of bankruptcy costs, which are otherwise latent and difficult to quantify. Companies with a better financial management and lower business risks are expected to have lower bankruptcy costs and borrow more according to the trade-off theory. Altogether, the expectation is that higher levels of indebtedness are typical for enterprises with a credit rating. Dummy variables for an existence of an investment grade and non-investment grade ratings are used to model the influence.

Expenditures for mergers and acquisitions have not appeared often in the capital structure literature. However, the topic of what factors influence the means of payment in such transactions is covered in several works (Ghosh, Ruland, 1998; Faccio, Masulis, 2005). It is expected that companies with liquid shares will finance their mergers and acquisitions with a higher share of equity. The reason is that the company stocks in this case are a close equivalent to cash and allow the seller to go into money quickly and with lower transaction costs. There are two variables in this category: the relation of M&A expenditures to total assets for the deals with disclosed values and the total number of deals including transactions with undisclosed payments.

Rajan, Zingales (1995) identify significant differences in accounting figures reported according to different standards. This issue is also relevant for this study since Russian companies

[6] In the following, the federal and regional governments are included into the notion of the state.

in the sample report according to IFRS, US GAAP, and Russian accounting standards (RAS), which result in big differences in accounting figures (McGee, Preobragenskaya, 2003)[7]. However, the corrections to achieve comparability between standards are not straightforward.

Furthermore, there might be some self selection of those companies that choose foreign standards of accounting. IFRS and US GAAP are considered as more adequate and trustworthy in Russia since RAS is still not fully attuned to the market economy of today (McGee, Preobragenskaya, 2003). Therefore, it is expected that IFRS and US GAAP lower the information asymmetries between insiders and outsiders. This is the case for equity investors rather than for banks because for the latter the collateral is much more important than the right profit estimation. Overall, the adoption of IFRS or US GAAP is expected to ease access to external equity and decrease the debt ratio. Two dummy variables for IFRS and US GAAP are introduced.

The literature devoted to Life cycle stages finds significant differences in the financial leverage of companies at various stages of development as shown for instance in Black (1998) or Teixeira, Santos (2006). The overall observation is some kind of a bell curve: at first, young start-ups use more equity, while their mature peers rely more heavily on debt, and finally dying firms decrease their leverage. However, there is an interesting question about the integral effect of Life cycle stage if changes in other fundamental parameters over the cycle are taken into account. The base expectation is that the Modigliani and Miller's premise about the independence of financial and investment decisions holds: after controlling for other factors, the correlations are zero.

For the identification and recognition of the Life cycle stages, the approach of Dickinson (2007) is applied. Five stages of life cycle are defined: Introduction, Growth, Maturity, Shake-out, and Decline. The procedure is to match 8 possible combinations of signs of cash flow from operations (CFO), investment (CFI) and financing (CFF) activities to five stages. The matching is presented in Table 4. Dickinson (2007) provides a comprehensive basis for such a correspondence scheme. Four dummy variables (for the stages Introduction, Growth, Mature, and Decline) are constructed.

Table 4

Definition of Life cycle stages

Sign	*Introduction*	*Growth*	*Maturity*	*Shake-out*			*Decline*	
Cash flow from operations	–	+	+	–	+	+	–	–
Cash flow from investments	–	–	–	–	+	+	+	+
Cash flow from financing activities	+	+	–	–	+	–	+	–

Source: Dickinson (2007)

Cornell, Shapiro (1987) and Barton et al. (1989) show that a high level of *Intellectual capital* in a firm influences its capital structure. Linking Intellectual capital to the existing theories of capital structure gives several considerations. First, the trade-off model implies two opposite trends simultaneously. On the one hand, these companies are expected to bear higher costs of financial distress because the disappearance of intellectual capital in the case of bankruptcy takes away a substantial share of company's value. On the other hand, intellectual capital generates extra profits relative to the book value of its assets, which should make companies increase their indebtedness to

[7] These discrepancies are not necessarily exactly expected in the measurement of debt ratio components (debt, liabilities or total assets themselves). They can also be in the magnitudes of other accounting figures in the model (3), i.e. fixed assets, operating income, capital expenditures, etc.

restrain their managers and minimize the free cash flow problem. Second, the pecking order predicts higher information asymmetries between insiders and outsiders, which lies in the difficulty of equity investors to value firm's intellectual capital. Overall, there are two considerations in favor of higher leverage and one against. The expectation is a resultant positive relation.

As a characteristic of a high level of Intellectual capital among company's assets, a top 10% ROA within each industry is considered. This approach is a simplified version of the one used by Stewart (1997), Luthy (1998). The underlying idea is that firms with intellectual capital have fewer assets recorded on the balance sheet because accounting standards are usually conservative about the recognition of intangible assets. However, these assets create added value and thus such companies demonstrate a higher return on the book value of assets. To exclude industry specific features, this ranking is done in each industry.

Year dummies should trace the effect of time patterns in the behavior of firms. Based on the macro tendencies in the Russian economy in 2003-2008, there are two expectations. First, there might be some dynamics in book leverage which are due to changes in interest rates and the availability of debt funding. Second, market capitalization increased very fast in the recent years. Thus, companies most likely did not sustain the market leverage and it decreased relative to the movement of fundamental factors.

Finally, model (3) accounts for the industry effects. These control variables are included in regression analysis by most researchers (Frank, Goyal, 2008). The industry factor proved itself to be a powerful prediction of the firm leverage: it encompasses the otherwise omitted variables (Bradley et al., 1984; Frank, Goyal, 2007a) and accounts for different regulations in industries (Nivorozhkin, 2005).

All factors described above, their short names and definitions of quantification are summarized in Table 5.

Table 5

Independent variable defitions

Profitability	
ROA	Earnings before interest and tax / Book value of Total assets
Tangibility	
PPE/TA	Net book value of property, plant and equipment / Book value of Total assets
LTA/TA	Book value of Long-term assets / Book value of Total assets
Growth opportunities	
Capex/TA	|Capital expenditures| / Book value of Total assets[8]
MTB	(Market capitalization + Book value of total liabilities) / Book value of Total assets
Rev_growth	(Total revenue / Total revenue of the previous year) - 1[9]
Size	
ln(TA)	Natural logarithm of Book value of Total assets

[8] To preserve a big number of observations (around 20-25%), this measure is estimated as a relation of capital expenditures during a year to total assets at the end of the same year. A proper ratio would have been the relation of capital expenditures during a year to total assets at the end of the previous year; however, it seems to be not very damaging for the analysis.

[9] To preserve a big number of observations (around 20-25%), this measure of every second observation for a company is extrapolated to the first one. The reason is the impossibility to construct this variable for the first observation due to the lack of the lagged value for revenues. This trick is presumably not much damaging because the revenue growth appeared to be of much persistence during 2004-2008 in Russia: the Spearman ranked correlation coefficients between the pre-correction revenue growth and its lagged values is higher than 80%.

ln(Sales)	Natural logarithm of Sales
Ownership	
Olig_only	Dummy variable: 1 - only an oligarch has a significant holding of shares; 0 - otherwise
Man_only	Dummy variable: 1 - only the manager has a significant holding of shares; 0 - otherwise
State_only	Dummy variable: 1 - only the state (federal or regional government) has a significant holding of shares; 0 - otherwise
Olig+ Man	Dummy variable: 1 - only an oligarch and the manager have a significant holding of shares; 0 - otherwise
Man+State	Dummy variable: 1 - only the manager and the state (federal or regional government) have a significant holding of shares; 0 - otherwise
State+Olig	Dummy variable: 1 - only the state (federal or regional government) and an oligarch have a significant holding of shares; 0 - otherwise
Olig+Man+ State	Dummy variable: 1 - an oligarch, the manager, and the state (federal or regional government) have simultaneously a significant holding of shares; 0 - otherwise
Headquarters' location	
M_HQ	Dummy variable: 1 - headquarters in Moscow; 0 - otherwise
StP_HQ	Dummy variable: 1 - headquarters in Saint-Petersburg; 0 - otherwise
Rating	
IG_rating	Dummy variable: 1 - existence of an investment grade credit rating (BBB- and higher in classification of Standard & Poor's, analogous thresholds for other agencies); 0 - otherwise
NIG_rating	Dummy variable: 1 - existence of a non-investment grade credit rating (BB+ and lower in classification of Standard & Poor's, analogous thresholds for other agencies); 0 - otherwise
M&A activities	
M&A/TA	Total value of completed M&A transactions / Total assets; book or market value of Total assets is used for regressions with book and market leverage ratios respectively
M&A	Total number of M&A deals (including transactions with an undisclosed value)
Accounting standard	
USGAAP	Dummy variable: 1 - reporting standard is US GAAP; 0 - otherwise
IFRS	Dummy variable: 1 - reporting standard is IFRS; 0 - otherwise
Life cycle stage	
Intro	Dummy variable: 1 - if simultaneously CFO<0, CFI<0 and CFF≥0; 0 - otherwise
Growth	Dummy variable: 1 - if simultaneously CFO≥0, CFI<0 and CFF≥0; 0 - otherwise
Mature	Dummy variable: 1 - if simultaneously CFO≥0, CFI<0 and CFF<0; 0 - otherwise
Decline	Dummy variable: 1 - if simultaneously (CFO<0, CFI≥0, CFF≥0) or (CFO<0, CFI≥0, CFF<0); 0 - otherwise
Intellectual capital	

Intel_cap	Dummy variable: 1 - ROA is among top 10% in the industry; 0 - otherwise
Year	
Y2004	Dummy variable: 1 - the year is 2004; 0 - otherwise
Y2005	Dummy variable: 1 - the year is 2005; 0 - otherwise
Y2006	Dummy variable: 1 - the year is 2006; 0 - otherwise
Y2007	Dummy variable: 1 - the year is 2007; 0 - otherwise
Y2008	Dummy variable: 1 - the year is 2008; 0 - otherwise
Industries	
Agro	Dummy variable: 1 - for industrial group "Agriculture, forestry, and fishing"; 0 – otherwise
Mining	Dummy variable: 1 - for industrial group "Mining"; 0 - otherwise
Construct	Dummy variable: 1 - for industrial group "Construction"; 0 - otherwise
Transport	Dummy variable: 1 - for industrial group "Transportation"; 0 – otherwise
Communic	Dummy variable: 1 - for industrial group "Communication"; 0 – otherwise
Utilities	Dummy variable: 1 - for industrial group "Utilities"; 0 - otherwise
Trade	Dummy variable: 1 - for industrial group "Wholesale and retail trade"; 0 – otherwise
Service	Dummy variable: 1 - for industrial group "Service industries"; 0 – otherwise

Although, the collected data presents panel data, the estimation tool of the analysis is ordinary least squares (OLS). There are several reasons for this choice. In the first place, the analysis as presented below has been done in line with the panel data analysis. Based on the Hausman test, the random effect model was rejected. As the primary focus of this paper is to analyze the influence of the time-invariant (Headquarters' location, Accounting standard) or almost time-invariant variables (Ownership structure, Life cycle stage, Intellectual capital, etc.), the fixed effect model is of little use: it drops the former and absorbs the effect of the latter making the respective coefficients insignificant. As shown in Hsiao (2003), choosing the OLS estimation procedure in this case leads to the risk of the so called omitted variable bias. There is a hope that a variety of variables proposed above captures most of the individual effects and thus reduces the omitted variable bias. Estimating model (3) by the random effect panel procedure in spite of the Hausman tests' ban guarantees a bias due to hidden covariations.

The decision was made in favor of the OLS method. In order to make this estimating procedure more robust, several corrections and crosschecks were made. First, as economic shocks tend to be persistent, financial adjustment is costly and some autocorrelated independent variables might be missing from the model (3), serial correlation in error terms might be the case (Lemmon et al., 2006). To correct for this, adjustments of standard errors for intragroup (one company) correlations were used. Second, the derived signs and the significance of the time-variant variables (Profitability, Size, Growth opportunities, Tangibility, and Year) have been proved under the fixed effect model. These results are not reported due to close similarity.

Data sources

This study focuses on public non-financial Russian companies during 2003-2008. First, a firm is considered public in this study if its securities are registered at the Russian main stock exchange "Russian Trading System" (RTS). Overall, there are ca. 1500 companies that meet this criterion. There seems to be no possibility to collect necessary information about a significant number of private companies for the described above research specification. Second, only non-financial companies are under study as in most analogous studies. The reason is that financial companies have a specific capital structure, which is a reflection of regulative standards (Rajan,

Zingales, 1995); money is not a means of financing but a resource (Damodaran, 2005). Third, the time frame is motivated by the availability of accounting data.

The accounting figures originate from the database Factiva of the Dow Jones news agency. There are three forms of accounting reporting for the last five years[10], as well as the headquarters' location, accounting standard and the industry profile of the firm. Only 692 public non-financial companies[11] with at least three consecutive yearly observations are available in Factiva. The industry in Factiva is reported according to the Standard Industrial Classification (SIC) and was aggregated based on the SIC subgroups to form the following Industry categories:

- Agriculture, forestry and fishing
- Mining
- Construction
- Manufacturing
- Transportation
- Communications
- Utilities
- Wholesale and retail trade
- Service industries

Data for mergers and acquisitions stems from the Zephyr database of Bureau van Dijk. Deal figures are attributed to the year when the deal was completed. Consequently, pending or withdrawn transactions were not counted because no payments and changes in capital structure are expected upon completion. Market capitalization on a daily basis was downloaded from the Datastream database of Thomson Reuters.

The credit ratings were obtained from the websites of the three international rating agencies (Standard & Poor's, Moody's, Fitch ratings) and three major national ones (Expert RA, National Rating Agency, RusRating). These agencies are the biggest in the country and are considered relatively trustworthy. If the history for the company ratings is available, the rating at the end of the respective year is used. Otherwise, the last one available is used. The boundary for an investment grade is a standard one: BBB- and higher in the international scale classification of Standard & Poor's and the equivalent thresholds for the rival agencies.

Mandatory quarterly disclosure reports of public firms to the Federal Financial Markets Service provided information about the ownership patterns. The state of the ownership structure is gauged on the 31st December of the respective year. The ownership of Russian companies is in the majority of cases non-transparent (Chernykh, 2008) because many companies belong to some offshore, limited liability companies or nominees that do not disclose their beneficiaries. However, the market participants and the public usually know the ultimate owners (Chernykh, 2008). Therefore, in the case of an obscure ownership structure, the respective companies and their offshore shareholders are checked in the press[12]. If such information is missing, the company is attributed to "None" category. The group "None" accumulates companies which belong to foreign owners, a private investor (not an oligarch or the manager) or that have a diluted ownership structure. As managers, all people mentioned in item 1.1. "Persons who are part of the executive board of the issuer" of the disclosure report are counted. If a group of managers altogether own 20% and more voting shares, this observation is recognized in the manager variable of Ownership structure. If the manager and the oligarch are one person, then this observation is counted as a dually owned company in the variable Olig+Man.

[10] Data for the year 2003 were obtained at the beginning of 2009 before the publication of 2008 figures.

[11] Several companies that are listed abroad but their operations are concentrated in Russia were also included in the sample: X5 Retail Group, Evraz Group SA, Amur Minerals Corp., and Sibir Energy plc.

[12] Only information in the main economic periodicals (Kommersant, D', Expert, RBC daily, Vedomosti, Smart Money, Sekret Firmy) is considered as trustworthy.

All nominal values from the sources described above and nominated in foreign currency were afterwards converted in millions of Russian rubles. For each year, the conversion was done using the yearly average of official daily and year-end exchange rates set by the Central Bank of the Russian Federation[13].

Sample

Altogether, the data were collected for 692 companies with 3726 observations. However, only 446 of them (2217 observations) publish a Cash Flow Statement since this financial statement is not obligatory under Russian Accounting Standards. This information allows adding to the analysis variables describing Life cycle stage and Growth opportunities based on capital expenditures. Finally, market capitalization is available for 154 companies (666 observations), which share prices are available in Datastream database[14]. These figures are needed to construct market ratios of debt and a market-to-book proxy of Growth opportunities. In the following, these three samples will be referred as the "Big Sample", the "Middle Sample", and the "Small Sample" respectively.

All three samples are used in the assessment to enrich the investigation, to test the stability of results on different samples and to make implications about different companies (small, big, average, with liquid shares). For the last purpose, additionally a "Sample of Small Firms" (151 companies, 554 observations) and a "Sample of Big Firms" (139 companies, 554 observations) are picked out from the Middle Sample. As criterion, the lower and upper quartiles (i.e. 25% and 75% quantiles[15]) of total assets were selected. To get a feeling of what the data look like, how these five samples compare with each other and what regularities become evident in the course of preliminary non-regression analysis, the next paragraph presents descriptive statistics.

Descriptive statistics

The data characteristics presented below might be divided into two parts. The first part presents, describes and analyzes the mean, median, minimum, and maximum values, as well as a standard deviation of all variables for five samples. The second part of this section investigates the correlation dependencies between variables.

Table 6 presents descriptive statistics of the initially collected quantitative data, mostly accounting data[16], for five samples (the Big, Middle and Small Samples, as well as the Samples of Small and Big Firms). Only the categories relevant for the following calculation of variables in model (3) are presented. The data demonstrate a distinct clusterization and ordering of firms in these samples: an average firm increases from one sample to another. This ordering of samples is quite intuitive and expected. The Samples of Small and Big Firms are at the extremes due to their construction from 25% observations with the smallest and biggest total assets. The Big, Middle, and Small Samples originated from various classes of available information. Therefore, Table 6 indicates that bigger companies disclose more information and the liquid shares are an attribute of an even bigger corporation.

[13] The data were obtained from the official website of the Central Bank of the Russian Federation (http://www.cbr.ru/eng/). For information only, the exchange rate was in the range 34-36 RUR/Euro for the years 2003-2008.

[14] Although all companies in our analysis are public, i.e. they are registered at the Russian Trading System, only a minor part of them have shares that are actively traded. As a result, the market capitalization is available only for 154 firms.

[15] These figures amount to 933.95 mln rubles and 12 507.24 mln rubles respectively.

[16] In Table 8, the characteristics of the expenditures for mergers and acquisitions are computed based on the companies with non-zero expenditures. This might be easily seen in the positive minimum levels of the expenditures. It is supposed that this representation is more relevant for the understanding of differences of this measure in different samples.

Table 6

Distribution of money-term variables, mln rubles

Variable	Sample of small firms 151 companies 554 observations 3.7 years for a firm	Big sample 692 companies 3726 observations 5.4 years for a firm	Middle sample 446 companies 2217 observations 5.0 years for a firm	Small sample 154 companies 666 observations 4.3 years for a firm	Sample of big firms 139 companies 554 observations 4.0 years for a firm
Property, plant and equipment, net					
mean	181.7	14 364.6	22 220.5	64 937.1	86 075.0
median	144.4	444.8	767.9	9 524.0	19 692.2
min	0.0	0.0	0.0	0.0	84.1
max	772.0	4 020 522.0	4 020 522.0	4 020 522.0	4 020 522.0
standard deviation	139.9	130 285.8	167 065.9	299 410.3	326 885.7
Long-term assets					
mean	202.1	19 421.7	28 719.2	82 987.5	110 952.4
median	169.4	563.8	1 082.1	13 001.6	24 677.7
min	0.0	0.0	0.0	9.6	1 123.8
max	862.2	5 596 493.0	5 596 493.0	5 596 493.0	5 596 493.0
standard deviation	150.5	174 106.4	220 540.5	394 396.0	431 118.4
Total assets					
mean	469.1	28 341.6	41 5395	117 130.5	158 493.0
median	499.2	1 514.0	2 732.0	22 521.6	39 507.9
min	14.2	0.1	10.0	273.9	12 573.1
max	933.2	7 168 568.0	7 168 568.0	7 168 568.0	7 168 568.0
standard deviation	259.3	229 925.0	290 408.2	518 124.1	566 621.5
Short-term debt					
mean	54.8	2 397.9	3 732.7	9 861.9	13 710.6
median	20.0	108.4	253.8	1 664.4	4 098.7
min	0.0	0.0	0.0	0.0	0.0
max	545.1	525 525.0	525 525.0	525 525.0	525 525.0
standard deviation	83.3	17 170.1	22 067.1	38 308.5	42 716.2
Long-term debt					
mean	25.1	3 689.7	5 946.8	16 690.1	23 037.4
median	0.0	2.0	45.0	1140.0	4 500.8
min	0.0	0.0	0.0	0.0	0.0
max	480.9	984 963.0	984 963.0	984 963.0	984 963.0
standard deviation	63.3	34 246.8	44 187.7	77 983.1	86 401.1

Total liabilities					
mean	223.4	11 896.6	18 827.8	50 259.4	70 973.5
median	172.1	701.7	1 344.9	9 389.1	18 961.7
min	0.0	0.0	0.0	1.2	1 439.5
max	2 260.3	2 841 767.0	2 841 767.0	2 841 767.0	2 841 767.0
standard deviation	215.0	91 614.9	118 066.6	207 955.0	229 011.3
Capital expenditures					
mean	23.7		3 934.9	11 512.6	15 284.2
median	7.9		78.2	1 762.1	3 838.2
		NA			
min	0.0		0.0	0	0.0
max	796.3		714 714.0	714 714.0	714 714.0
standard deviation	48.3		26 022.5	46 220.0	50 519.3
Total revenue					
mean	702.5	19 294.6	29 374.4	77 384.1	107 723.0
median	530.2	1 512.6	2 742.8	16 650.0	27 425.0
min	0.0	0.0	0.0	0.0	218.5
max	5 851.3	3 518 960.0	3 518 960.0	3 518 960.0	3 518 960.0
standard deviation	651.0	124 122.8	158 007.9	272 363.8	303 167.9
EBIT					
mean	39.6	3 993.1	6 033.1	17 181.5	23 516.7
median	19.8	76.9	142.6	1 547.7	3 452.8
min	-404.7	-42 630.0	-42 630.0	-29 352.0	- 42 630.0
max	1 621.7	1 260 306.0	1 260 306.0	1 260 306.0	1 260 306.0
standard deviation	99.7	34 049.4	43 409.9	77 567.1	84 695.2
M&A expenses					
mean	192.1	15 177.7	16 710.1	20 047.4	19 582.5
median	261.4	1 335.2	1 751.5	2 487.6	2 567.0
min	2.73	0.1	1.4	1.4	1.4
max	312.0	447 471.6	447 471.6	447 471.6	447 471.6
standard deviation	165.9	54 400.0	57 470.6	63 739.5	61 973.2
Market capitalization					
mean				118 911.3	
median				13 926.6	
	NA	NA	NA		NA
min				0.3	
max				7 047 522.0	
standard deviation				508 827.0	
Firm value					
mean				145 463.4	
median				21 327.7	
	NA	NA	NA		NA
min				2.6	
max				8 146 645.0	
standard deviation				614 716.5	

Table 7

Distribution of dummy variables, %

Variable (short name)	Sample of small firms 151 companies 554 observations 3.7 years for a firm	Big sample 692 companies 3726 observations 5.4 years for a firm	Middle sample 446 companies 2217 observations 5.0 years for a firm	Small sample 154 companies 666 observations 4.3 years for a firm	Sample of big firms 139 companies 554 observations 4.0 years for a firm
Ownership					
Oligarch only (Olig_only)	8.7%	13.8%	16.4%	20.4%	21.1%
Manager only (Man_only)	28.7%	24.6%	20.7%	17.0%	14.4%
State only (State_only)	17.1%	26.0%	28.0%	32.9%	36.8%
Oligarch + Manager (Olig+Man)	0.0%	1.2%	2.1%	4.8%	7.4%
Manager + State (Man+State)	4.5%	2.5%	3.0%	0.8%	1.3%
State + Oligarch (State+Olig)	1.8%	3.2%	4.0%	5.7%	6.5%
Oligarch + Manager + State (Olig+Man+State)	0.0%	0.1%	0.2%	0.3%	0.4%
None	39.2%	28.5%	25.6%	18.1%	12.1%
City					
Moscow (M_HQ)	9.2%	13.0%	15.6%	24.6%	30.5%
Saint-Petersburg (StP_HQ)	3.8%	5.5%	6.5%	8.3%	7.4%
Others	87.0%	81.5%	77.9%	67.1%	62.1%
Rating					
Investment grade (IG_rating)	0.0%	1.6%	2.4%	6.9%	9.6%
Non-investment grade (NIG_rating)	0.7%	7.8%	12.3%	29.6%	39.0%
No rating	99.3%	90.6%	85.3%	63.5%	51.4%
Accounting standard					
US GAAP (USGAAP)	0.0%	2.5%	4.2%	10.2%	15.9%
IFRS (IFRS)	2.4%	9.5%	15.5%	37.1%	46.9%
RAS	97.6%	88.0%	80.3%	52.7%	37.2%
Life cycle stage					
Introduction (Intro)	19.7%		21.1%	17.0%	14.1%
Growth (Growth)	20.9%	NA	31.3%	43.1%	49.6%
Maturity (Mature)	21.7%		23.9%	27.8%	27.1%
Shake-out	10.6%		6.9%	4.6%	4.3%
Decline (Decline)	27.1%		16.8%	7.5%	4.9%
Intellectual capital					
high level of intellectual capital (Intel_cap)	9.6%	10.1%	8.8%	8.7%	10.1%
average level of intellectual capital	90.4%	89.9%	91.2%	91.3%	89.9%
Year					
2003	14.4%	13.2%	11.0%	10.5%	8.7%
2004 (Y2004)	20.6%	17.1%	16.9%	13.4%	11.6%
2005 (Y2005)	19.5%	18.1%	18.6%	15.0%	17.0%
2006 (Y2006)	18.6%	18.4%	19.3%	21.0%	20.4%
2007 (Y2007)	15.7%	17.9%	18.8%	20.9%	22.4%
2008 (Y2008)	11.2%	15.3%	15.5%	19.2%	20.0%

Industry					
Agriculture, forestry, and fishing (Agro)	5.4%	2.8%	2.5%	0.6%	0.7%
Mining (Mining)	6.3%	12.5%	13.3%	18.0%	22.2%
Construction (Construct)	6.1%	9.3%	5.6%	0.9%	3.6%
Manufacturing	66.6%	56.0%	56.3%	41.1%	33.4%
Transportation (Transport)	2.7%	5.8%	6.6%	6.2%	4.0%
Communication (Communic)	3.3%	2.7%	4.6%	12.9%	2.7%
Utilities (Utilities)	8.1%	5.8%	6.0%	14.7%	4.3%
Wholesale and retail trade (Trade)	0.9%	2.8%	2.8%	3.0%	13.9%
Service industries (Service)	0.5%	2.3%	2.3%	2.6%	15.2%

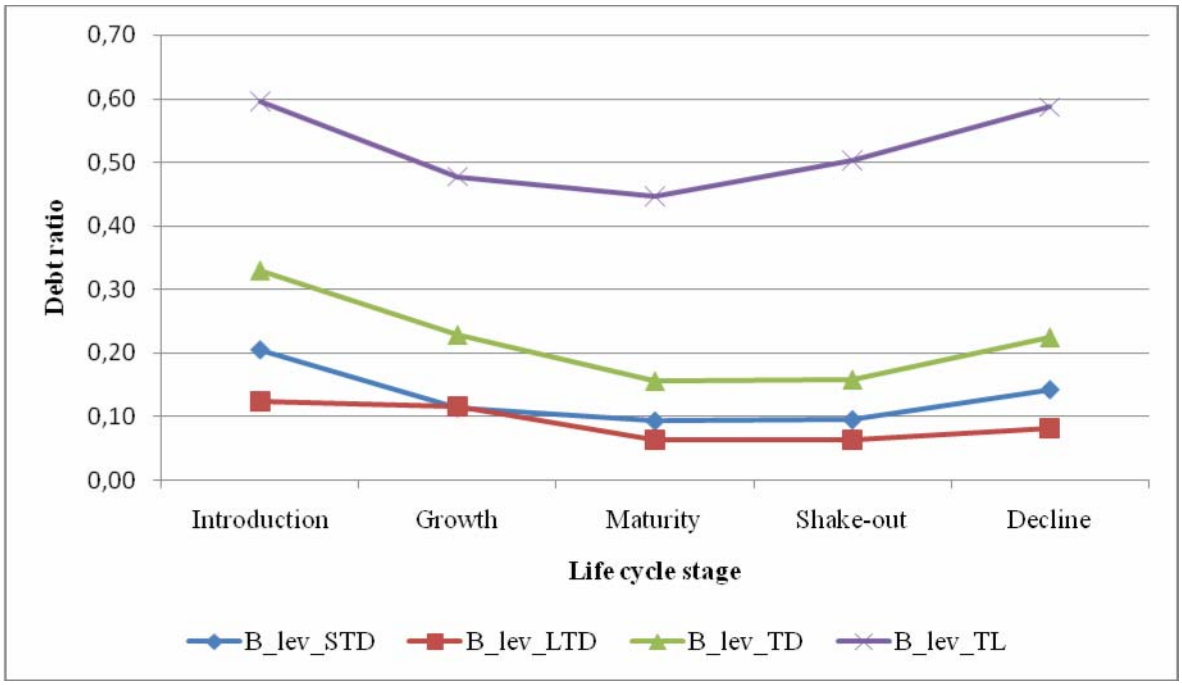
Table 7 above describes the distribution of firms' characteristics that will later comprise the dummy variables. A similar ordering as above remains in most cases. From left to right: the companies are bigger (the conclusion from Table 6); more companies are headquartered in Moscow and Saint-Petersburg; more often the firms possess a credit rating from a specialized agency, report according to IFRS or US GAAP and have either an oligarch or the state among the shareholders; on the contrary, managers more rarely own the company as well as the none category (i.e. foreign, dispersed or non-oligarch ownership) occurs less often.

When it comes to the Life cycle characteristics of the sample firms, the evidence is striking. The first point is that as a sample has bigger companies, they tend to be more often at the beginning stages and in the Maturity state. At the same time, the share of smaller firms at the Shake-out and Decline stages is higher. This observation is not in line with what one would expect intuitively and based on the literature (Black, 1998): smaller firms come into an industry, those successful out of them grow and afterwards as big firms they get older and are forced out of business by smaller innovative rivals.

"However, a firm is a portfolio of multiple products, each at a different product life cycle stage. For that reason, firm life cycle is cyclical in nature and the firm's primary goal is to maintain its firm life cycle at the growth stage where profits are maximized. This goal can be achieved through continual product and market innovation and expansion." (Dickinson, 2007, p. 10)

Therefore, Life cycle stage should not be associated directly with the age or size of the company. The development of the company might be reverted at any stage.

The second observation about the Life cycle factor is presented on Graph 1. The chart demonstrates an average financial leverage for companies at different development stages. A gently sloping U-curve can be identified for all types of debt. This is already in direct contradiction with the results of empirical studies in developed countries (Black, 1998). The interpretation of the aforementioned phenomena will be interpreted below after the accumulation of some other evidence.



Graph 1. Average financial leverage for firms at different Life cycle stages

Turning back to Table 7 and analyzing the time structure of observations, a trend of companies becoming bigger in time and disclosing more information is noticeable. There is also some regularity in the distribution of industry characteristics in the samples, which presumably comes from the size of an average firm and a disclosure practice in different branches.

Table 8 presents information about the distribution of all non-dummy variables for the empirical model (3)[17]. The winsorization procedure was applied in order to exclude extreme values (outliers) from the sample. Frank, Goyal (2008) point out that the method of winsorization becomes more and more common in capital structure research. The procedure implies the replacement of 1% of the biggest and the smallest values by the values of 99% and 1% quantiles respectively. Table 8 presents the descriptive statistics after the application of winsorization.

Based on book ratios, smaller firms use less long-term and total debt. The relationship to short-term debt is controversial. One striking observation is that only the biggest companies (from the Sample of Big Firms) have more long-term debt than short-term debt, although this is common in other developing countries as well (Demirguc-Kunt, Maksimovic, 1999; Booth et al., 2001).

As the market-to-book ratio is slightly above 1, market debt ratios are of the same magnitude as the book values. Other authors (Booth et al., 2001; Chen, 2004) point out that financial leverage in developing countries is lower than in developed ones (e.g. 66% based on total debt for the G-7 countries in Rajan, Zingales (1995)). Russia is not an exception from this trend. The size of indebtedness 20-30% estimated on the collected data is comparable to other studies of Russian firms (Ivashkovskaya, Solntseva, 2008).

When it comes to the independent variables, from left to right bigger companies tend to be more profitable (with an exception of the figures for the Middle Sample), have higher Tangibility of assets and more Growth opportunities (based on the average capital expenditures relative to total assets and the median growth of Sales). Moreover, companies spend more on mergers and acquisitions as their Size increases. The interpretation of these relationships to size will be given after the correlation analysis below.

[17] The only exception is the Size factor because its proxies are simply a logarithm of total assets and revenues that have already been presented in Table 6.

Table 8

Distribution of computable variables, %

Variable	Sample of small firms 151 companies 554 observations 3.7 years for a firm	Big sample 692 companies 3726 observations 5.4 years for a firm	Middle sample 446 companies 2217 observations 5.0 years for a firm	Small sample 154 companies 666 observations 4.3 years for a firm	Sample of big firms 139 companies 554 observations 4.0 years for a firm
Short-term debt to Total assets (BL_STD)					
mean	11.0%	13.3%	13.1%	12.5%	12.0%
median	5.8%	8.5%	9.1%	9.3%	9.3%
min	0.0%	0.0%	0.0%	0.0%	0.0%
max	73.7%	97.1%	90.7%	77.4%	77.4%
standard deviation	14.2%	15.4%	14.0%	12.1%	11.4%
Long-term debt to Total assets (BL_LTD)					
mean	5.7%	8.2%	9.5%	12.2%	14.1%
median	0.0%	0.1%	1.9%	8.0%	10.8%
min	0.0%	0.0%	0.0%	0.0%	0.0%
max	70.4%	98.2%	94.9%	78.6%	70.6%
standard deviation	12.5%	14.5%	14.5%	14.0%	13.4%
Total debt to Total assets (BL_TD)					
mean	16.8%	21.6%	22.7%	24.7%	26.1%
median	9.5%	15.8%	18.8%	22.7%	24.9%
min	0.0%	0.0%	0.0%	0.0%	0.0%
max	86.1%	98.5%	97.2%	84.4%	77.9%
standard deviation	19.0%	21.1%	20.1%	18.5%	17.9%
Total liabilities to Total assets (BL_TL)					
mean	46.9%	51.9%	51.5%	48.2%	51.1%
median	42.3%	51.2%	50.5%	45.9%	51.7%
min	0.0%	0.0%	0.0%	0.0%	4.7%
max	196.5%	196.5%	196.5%	196.5%	112.1%
standard deviation	31.0%	29.5%	28.7%	27.5%	22.4%
Short-term debt to Firm value (ML_STD)					
mean				15.2%	
median				9.1%	
min	NA	NA	NA	0.0%	NA
max				77.7%	
standard deviation				17.2%	

Long-term debt to Firm value (ML_LTD)					
mean				13.2%	
median				7.1%	
	NA	NA	NA		NA
min				0.0%	
max				82.5%	
standard deviation				17.2%	
Total debt to Firm value (ML_TD)					
mean				28.5%	
median				21.6%	
	NA	NA	NA		NA
min				0.0%	
max				99.3%	
standard deviation				25.4%	
Return on assets (ROA)					
mean	7.8%	9.6%	8.9%	10.4%	11.5%
median	4.9%	7.2%	6.6%	9.0%	9.9%
min	-29.2%	-29.2%	-29.2%	-29.2%	-29.2%
max	55.4%	55.4%	55.4%	55.4%	55.4%
standard deviation	13.9%	13.3%	12.5%	11.8%	11.8%
Net property, plant, and equipment to Total assets (PPE/TA)					
mean	39.3%	38.8%	40.4%	48.2%	50.1%
median	39.0%	37.3%	38.9%	50.1%	52.1%
min	0.1%	0.1%	0.1%	0.1%	0.5%
max	87.0%	87.0%	87.0%	87.0%	87.0%
standard deviation	19.1%	21.4%	22.1%	22.8%	23.5%
Net long-term assets to Total assets (LTA/TA)					
mean	44.4%	46.8%	49.5%	61.8%	63.0%
median	43.0%	45.8%	49.8%	64.7%	67.2%
min	2.7%	2.7%	2.7%	2.7%	4.3%
max	95.6%	95.6%	95.6%	95.6%	94.2%
standard deviation	20.3%	22.2%	22.7%	20.3%	19.9%
Market-to-book (MTB)					
mean				1.6	
median				1.2	
	NA	NA	NA		NA
min				0.2	
max				58.3	
standard deviation				2.6	

Capital expenditures to Total assets (Capex/TA)					
mean	4.9%		6.5%		10.1%
median	2.3%		3.8%	9.3%	8.5%
min	0.0%	NA	0.0%	7.5%	0.0%
max	37.8%		37.8%	0.0%	37.8%
standard deviation	7.0%		7.6%	37.8%	7.7%
				8.0%	
Growth of Total revenues (Rev_growth)					
mean	22.2%	29.7%	28.5%	27.9%	35.6%
median	13.5%	17.8%	18.6%	20.2%	23.5%
min	-75.1%	-75.1%	-75.1%	-75.1%	-75.1%
max	435.2%	435.2%	435.2%	435.2%	435.2%
standard deviation	55.5%	66.4%	61.1%	52.6%	60.4%
M&A expenditure to Total assets (M&A/TA)					
mean	0.1%	0.4%	0.6%	1.5%	1.7%
median	0.0%	0.0%	0.0%	0.0%	0.0%
min	0.0%	0.0%	0.0%	0.0%	0.0%
max	42.2%	42.2%	42.2%	42.2%	42.2%
standard deviation	2.4%	3.3%	3.6%	5.5%	5.5%

The second part of the section is devoted to the analysis of interconnections between different variables based on pairwise Spearman correlations. The special feature of the Spearman test is that it is nonparametric and checks the existence of a relationship without an assumption of a linear dependence. The correlation is pairwise, i.e. all observations for two variables are used in the estimation and no restrictions to a particular sample are imposed. Table 9 provides the estimated Spearman ratios for the dependent variables.

The first point to mention is a small correlation between short- and long-term debt ratios (30% and less) both in book and market groups. This is in fact in conformity with the prior research (Titman, Wessels, 1988) but slightly more pronounced. This gives grounds to expect different determinants of short- and long-term debt, which was not taken into account at the stage of hypothesis formulation.

Secondly, the book and market ratios of the same type of debt are closely related (75-90%), although there is no theoretical reason why market and book definitions should match (Barclay et al., 2006). Thus, close results for book and market regressions are expected. This also supports the approach of this paper to divide the Middle Sample into small and big companies and to concentrate on book ratios: the sample sizes are bigger and the results for the market ratios would have been rather close. Thirdly, the total liabilities measure of debt is middle-size correlated (30-60%) with the remaining 6 dependent variables, which provides an alternative and potentially insightful view of leverage (Cornelli et al., 1996; Nivorozhkin, 2002).

As a result of a high correlation between book and market values, only book values are checked for the correlations with the independent variables and are presented in Table 10. Dummy variables are not considered here because the ranked correlation ratio is of little use for them. All debt ratios are negatively associated with Profitability (ROA). Tangibility of assets according to both proxies is negatively correlated with total liabilities and short-term debt, but positively with long-term debt, which results in an insignificant relation to total debt. Growth opportunities are not or slightly negatively linked to short-term ratios. Long-term and total debt is positively related to Growth opportunities, while total liabilities give mixed evidence. All measures of debt are

positively related to Size. Therefore, the preliminary correlation analysis supports the suggested hypotheses. However, as it was predicted two paragraphs above, the patterns of short- and long-term debt are in many cases contrary different. This finding is verified in the next chapter with a help of regression analysis.

One more observation is that the alternative measures of Tangibility and Size are highly correlated (more than 80%), while Growth opportunities' measures as predicted describe different dimensions of future prospects and are of weak correlation. The interdependencies between explanatory variables are fortunately weak (in most cases less than 30%), which gives hope for a limited problem of multicollinearity. No corrections are done in the regression analysis to tackle this problem.

Some facts found in the first part of this section can be identified here as well. For instance, more profitable companies tend to be bigger and have slightly more Tangible assets and Growth opportunities. This observation means that bigger companies grew faster, carried out higher capital expenditures, and had higher profitability. A higher share of tangible assets might, first, appear due to the industry specifics. For instance, a more profitable mining industry has presumably by its nature more tangible assets than firms from other branches. Second, accelerated capital expenditures result in putting in commission new expensive equipment instead of the old and mostly amortized one.

Table 9

Spearman pairwise correlations, dependent variables

	BL_STD	BL_LTD	BL_TD	BL_TL	ML_STD	ML_LTD	ML_TD
BL_STD	1.00						
BL_LTD	0.21*	1.00					
BL_TD	0.81*	0.65*	1.00				
BL_TL	0.50*	0.34*	0.61*	1.00			
ML_STD	0.82*	0.21*	0.61*	0.53*	1.00		
ML_LTD	0.23*	0.92*	0.65*	0.47*	0.32*	1.00	
ML_TD	0.64*	0.54*	0.76*	0.63*	0.84*	0.69*	1.00

* - 5% significance level

Table 10

Spearman pairwise correlations, dependent and independent variables

	BL_STD	BL_LTD	BL_TD	BL_TL	ROA	PPE/TA	LTA/TA	Capex/TA	MTB	Rev_growth	ln(TA)	ln(Sales)	M&A/TA
BL_STD	1.00												
BL_LTD	0.21*	1.00											
BL_TD	0.81*	0.65*	1.00										
BL_TL	0.50*	0.34*	0.61*	1.00									
ROA	-0.25*	-0.10*	-0.26*	-0.36*	1.00								
PPE/TA	-0.07*	0.13*	-0.01	-0.26*	0.07*	1.00							
LTA/TA	-0.10*	0.20*	0.01	-0.28*	0.01	0.81*	1.00						
Capex/TA	-0.07*	0.24*	0.08*	-0.13*	0.32*	0.41*	0.36*	1.00					
MTB	0.06	0.07*	0.12*	0.16*	0.11*	-0.14*	-0.12*	0.15*	1.00				
Rev_growth	-0.01	0.08*	0.03*	0.06*	0.21*	0.01	-0.00	0.15*	0.01	1.00			
ln(TA)	0.13*	0.42*	0.26*	0.05*	0.06*	0.13*	0.26*	0.31*	-0.07	0.08*	1.00		
ln(Sales)	0.14*	0.36*	0.21*	0.05*	0.22*	0.12*	0.16*	0.40*	-0.04	0.16*	0.89*	1.00	

M&A/TA	0.04*	0.19*	0.10*	0.02	0.09*	0.06*	0.16*	0.19*	0.17*	0.09*	0.31*	0.30*	1.00

* - 5% significance level

Chapter 3. Regression analysis

In this section the results of the regression analysis are presented. Model (3) was tested on all five samples (the Big, Middle, and Small Samples, as well as the Samples of Small and Big Firms) using all available variables[18]. The results are presented in Table 11. The coefficients for each individual regression are presented in columns. The last row shows the R-squares to characterize the explanatory power of regressions. The number of observations for each regression within one sample is the same and was presented in Tables 6-8. Independent variables are in the left column and are grouped in line with the factors in model (3). The coefficients for the Industry factor are not presented in order to simplify the perception of the table and since industry effects are not in centre of attention in this paper. Contrary to all other tables, the results for the Sample of Small Firms are moved to the right in order to ease the comparison of the results for the smallest and the biggest firms.

All insignificant variables were excluded from the model in regression analysis and such cases are marked by empty cells in the Table 11. For Size and Tangibility, only one variable with a higher explanatory power is left in each case. There is no uniqueness restriction for the variables of Growth opportunities since they characterize different sides of future growth and are not much correlated. For the factors Headquarters' location, Rating, Accounting standard, and Year, the hypotheses about the insignificant differences in coefficients are tested. If the null hypothesis cannot be rejected, the respective variables are merged. In the following, the results for each factor and variable are thoroughly analyzed.

[18] Due to the lack of the necessary data, the following variables were not included in the analysis based on the:

- Big Sample – Growth opportunities (Capex/TA and MTB), Life cycle stage (all variables: Intro, Growth, Mature, Decline)
- Middle Sample, the Samples of Small and Big Firms - Growth opportunities (MTB)

All variables, for which there are no observations due to the specificities of sample formation, are marked in grey color in Table 11 in order to distinguish this situation from the simple insignificance of a variable. Moreover, as shown in Table 7 for the Sample of Small Firms, there are no observations of companies with an investment grade credit rating, as well as which shareholders are simultaneously an oligarch and the managers or an oligarch, the managers, and the state. Therefore, the respective variables (IG_rating, Olig+Man, Olig+Man+State) were excluded from the model (3) for the Sample of Small Firms.

Table 11

Results of empirical analysis

Results of empirical analysis																								
	Big sample				Middle sample				Small sample							Sample of small firms				Sample of big firms			
	BL_STD	BL_LTD	BL_TD	BL_TL	BL_STD	BL_LTD	BL_TD	BL_TL	BL_STD	BL_LTD	BL_TD	BL_TL	ML_STD	ML_LTD	ML_TD	BL_STD	BL_LTD	BL_TD	BL_TL	BL_STD	BL_LTD	BL_TD	BL_TL
Profitability																								
ROA	-0.361'''	-0.204'''	-0.564'''	-1.094'''	-0.278'''	-0.300'''	-0.563'''	-1.029'''	-0.235'''	-0.405'''	-0.624'''	-0.697'''	-0.435'''	-0.322'''	-0.740'''	-0.302'''	-0.188'''	-0.558'''	-1.311'''	-0.212'''	-0.308'''	-0.510'''	-0.594'''
Tangibility																								
PPE/TA														0.083''	0.124'''									
LTA/TA	-0.114'''	0.057'''	-0.060'''	-0.346'''	-0.088'''		-0.064'''	-0.326'''	-0.043'			-0.207'''					0.075'''		-0.273'''	-0.063''			-0.250'''
Growth opportunities																								
Capex/TA						0.440'''	0.430'''	0.226'''		0.428'''	0.341'''			0.298'''			0.454'''	0.479'''			0.299'''	0.314'''	
MTB													-0.007'''	-0.005''	-0.012'''								
Rev_growth		0.021'''	0.024'''	0.029'''		0.019'''	0.025'''	0.018''		0.032'''	0.032''										0.026'''	0.038'''	0.037'''
Size																								
ln(TA)	0.010'''	0.020'''	0.030'''	0.013'''	0.011'''	0.021'''	0.030'''	0.020'''		0.009''														
ln(Sales)																0.027'''	0.012'''	0.038'''	0.023''				
Ownership																								
Olig_only				0.061'''				0.051'''	-0.029''	0.060'''	0.033'	0.067''	-0.045'''	0.086'''	0.025'				0.078'				0.040'
Man_only	-0.022'''	0.020'''				0.044'''	0.034'''		-0.035''	0.088'''	0.045''		-0.093'''	0.094'''			0.028''	0.036''		-0.026'	0.037''		
State_only	-0.025'''	-0.020'''	-0.047'''	0.025''	-0.012'		-0.021''	0.034''		0.034''	0.041''	0.114'''		0.097'''	0.071'''		-0.045'''	-0.066'''	-0.075''	-0.037'''			0.051''
Olig+ Man	-0.044''		-0.074''		-0.035'				-0.038'				-0.058''	0.076''									0.071'
Man+State	-0.051'''		-0.068'''		-0.037''		-0.040'		-0.090'					0.058'''	0.051'''		-0.060''	-0.079''		-0.102''			
State+Olig		-0.053'''	-0.070'''			-0.047'''	-0.056'''						-0.049'	0.083'''		-0.090''		-0.147''		-0.061'''			
Olig+Man																								
Headquarters' location																								
M_HQ	-0.025'''		-0.028'''	-0.024''	-0.024'''					0.035'''	0.047'''	0.060'''		0.034''					-0.087'''				0.057'''
StP_HQ																								

Table 11.

Results of empirical analysis (continuation)

Results of empirical analysis																								
	Big sample				Middle sample				Small sample							Sample of small firms				Sample of big firms			
	BL_STD	BL_LTD	BL_TD	BL_TL	BL_STD	BL_LTD	BL_TD	BL_TL	BL_STD	BL_LTD	BL_TD	BL_TL	ML_STD	ML_LTD	ML_TD	BL_STD	BL_LTD	BL_TD	BL_TL	BL_STD	BL_LTD	BL_TD	BL_TL
Rating																								
IG_rating										0.054'											0.081'''	0.058'''	0.049''
NIG_rating		0.041'''	0.047'''	0.059'''		0.032'''	0.043'''	0.070'''		0.032''	0.029'	0.077'''				0.140''	0.162'''	0.309'''	0.426'''		0.044'''		
M&A activities																								
M&A/TA																								
M&A																								
Accounting standard																								
USGAAP		-0.060'''	-0.049'''		0.016'	-0.059'''	-0.054'''		0.020''	-0.051'''	-0.035''			-0.028''	-0.039''					0.019'	-0.084'''	-0.067'''	
IFRS																								
Life cycle stage																								
Intro					0.081'''	0.026'''	0.123'''	0.063'''	0.075'''		0.117'''		0.086'''		0.062'''	0.055'''	0.039''	0.087'''		0.073'''		0.075'''	
Growth					0.014''		0.032'''				0.038''	-0.057''											
Mature												-0.093'''		-0.056'''	-0.099'''								
Decline					0.025''		0.051'''	0.070'''	0.056''		0.086'''	0.103''	0.102'''									0.059'	0.078''
Intellectual capital																								
Intel_cap	0.022''	0.018'	0.039'''	0.117'''		0.034''	0.031'	0.098'''		0.052''	0.062''	0.090''					0.055''	0.083''	0.295'''				
Year																								
Y2004											0.050''												
Y2005																								
Y2006																								
Y2007		0.016'''	0.021'''			0.010'	0.017''			0.036'''	0.086'''	0.043''	-0.047'''		-0.034''						0.028'''	0.045'''	
Y2008									0.032'''											0.031'''			0.038''
R-square	0.140	0.145	0.199	0.268	0.186	0.198	0.272	0.259	0.290	0.273	0.346	0.267	0.320	0.272	0.362	0.215	0.192	0.284	0.303	0.267	0.307	0.332	0.432

'' - significance level 1%
'' - significance level 5%
' - significance level 10%

Profitability appears to be significantly negatively related to all measures of debt and in all samples as expected. This result, both the sign and the absolute value of the coefficient, is in compliance with most other research (Harris, Raviv, 1991; Rajan, Zingales, 1995; Booth et al., 2001; Delcoure, 2007)[19]. The evidence is that more profitable firms issue less debt using presumably the internally generated funds, i.e. behaving in line with the predictions of the pecking

[19] This also applies to the studies that concentrated on the time-variant determinants and estimated their models as fixed-effect, maximum likelihood, Gauss-Newton method, etc.

order theory. Even more, the companies with liquid shares in the Small Sample, for which the information asymmetries play the biggest role, decrease their debt most with an increase in profitability: 60-70% of EBIT is directed to substitute for debt.

Tangibility shows a rather mixed dynamics, which is against the hypothesis. Tangible assets demonstrate a negative relation with short-term debt in four samples and a zero or positive correlation with long-term debt. This finding is not unique in the research on companies in developing countries: Booth et al. (2001), Nivorozhkin (2002), Omet (2006), Ivashkovskaya, Solntseva (2008) identified similar patterns in their analysis. Nivorozhkin (2002) explains this discrepancy with the studies in developed countries by several factors.

On the one hand, the standard proposition is that Tangibility is linked to the availability of collateral and predicted to increase debt capacity. On the other hand, developing economies impose several restrictions on this logic. First, inefficient legal systems impede enforceable debt contracts, which delay and raise the costs of collateral's recovery. Moreover, the secondary market for fixed assets and inventories is often illiquid. Third, assets' specificity (morally outdated equipment) also limits the possibilities for reselling. Therefore, these factors destroy the collateral function of fixed assets making it inapplicable in most developing countries, including Russia.

However, the obtained results are not fully insignificant and seem to demonstrate another influential business issue: the maturity matching of assets and liabilities. This implies that current assets are financed by short-term debt or trade credit (as indicated by a liability ratio) and large fixed assets are financed by long-term loans. Perhaps due to the lack of long-term financing (Grant Thornton, 2008), the positive effect of Tangibility on long-term debt is smaller than a negative one on short-term debt. This means that companies switch to another source of long-term financing – equity.

Measures of Growth opportunities revealed no connections to the short-term debt in all samples (with a controversial MTB ratio as an exception). At the same time, the book ratios of long-term and total debt are positively associated with the Growth opportunities (as in Delcoure, 2007). This observation indicates once again the prevalence of the pecking order hypothesis: companies with higher future prospects need to invest more and thus resort to external financing and not surprisingly to long-term financing. In the market-based model the relation to Growth opportunities measured as the MTB ratio is negative, like in most other studies according to Frank, Goyal (2008). Notwithstanding, as advocated by Booth et al. (2001), the relationship of this measure is considered to be automatically autocorrelated due to construction of the proxy. Otherwise, the influence of MTB would have been identified for the book ratios of debt in the Small Sample.

The Size has a significantly positive effect on debt in the Big and Middle Samples, as well as in the Sample of Small Firms for all types of debt, but is insignificant in the other two samples. This means that this factor is of zero importance for bigger companies. The positive relation between Size and leverage is a common place in the literature (Frank, Goyal, 2008). However, an insignificant relation also appears in several studies where the sample is limited to relatively big public companies (Booth et al., 2001; Pöyry, Maury, 2009). A possible explanation for the phenomenon is that big firms are already enough diversified, mature and well-reputed at capital markets and an increase in size does not ease raising debt anymore. Judging by this variable, the trade-off explanation seems to be more plausible.

The factor Ownership provides additional information in comparison to Pöyry, Maury (2009). When it comes to the pure oligarch and state ownership, the results in the Small Sample, which is similar to the sample of Pöyry, Maury (2009), are close at first sight to the prior research. However, all other samples show a contradictory finding – the correlations are not stable and differ depending on the set of observations under consideration. In other words, the positive effect of an oligarch and state ownership on debt ratios identified in Pöyry, Maury (2009) is typical only for the "most public" firms.

Therefore, an alternative explanation for the phenomenon is needed given the new findings. The firms from the Small Sample differ from all other companies in the liquidity of their equity,

which is actively traded at the stock exchange. As a result, these corporations interact with the capital markets on an everyday basis and their equity is priced by the markets. If such a company has only one influential shareholder (an oligarch, the manager, or the state), its minority shareholders face the possibility of the major shareholder diverting the wealth of the company in his/her own favor and they reflect this negatively in the stock prices.

The major shareholder in turn does not want to lose equity wealth, which prices are mostly set up in transactions between minority holders at the stock market. Thus, firms try to compensate this cost of a single major shareholder by extra leveraging of 3-5%. The mechanism is the same as in the case of the free cash problem: higher interest payments and a large creditor as an inside monitor restrain the influential owner. These companies prefer long-term loans in order to have a strategic creditor for a long time to serve as a guarantee for minority shareholders.

When there is more than one major shareholder in a company with liquid shares, this problem disappears because the owners control each other or at least the minority shareholders believe in this: the coefficients for the dual and trial ownership variables are insignificant. However, market ratios of debt indicate that only three shareholders together neutralize each other. Dually owned companies still use less short-term debt, more long-term and the same or slightly more amount of total debt, probably for the same reasons as the firms with a single major shareholder do.

Let now consider ownership patterns in other samples; the Small Sample is not considered any more in the discussion of ownership. Oligarch-owned companies do not demonstrate any differences in debt levels with an exception of long-term liabilities. For the latter, there is an average increase of 3-8% in indebtedness in all samples. This rise should be attributed to the trade credit since the effect on total debt is zero. This indicates that oligarch-owned companies resort to the commercial credit from their partners more often than the firms with other forms of ownership. First, the partners might trust these companies because their party is part of a big group and is potentially more stable. Second, these partners might be also part of the same oligarch-owned vertically integrated holding. Thus, the trade credit is used in such a supply chain more actively than between independent parties.

In most samples, companies run by the manager who is simultaneously a major shareholder tend to use less short-term debt, more long-term debt and altogether either the same or higher amount of total debt. This evidence is in direct contradiction with the expectation that the managerial ownership should relieve the free cash flow problem. One possible explanation for the phenomenon is the overconfidence of managers. The manager who simultaneously owns a big stake in his/her company is in many studies a symbol of his or her over-optimism because this exposes the manager to the individual risk of the company twice: both labor and capital incomes depend on one enterprise (Malmendier, Tate, 2005). Several studies show that manager's overconfidence results in a more aggressive investment and debt policy (Malmendier et al., 2005; Gombola, Marciukaityte, 2007). For the total liability ratio, no significant differences have been identified.

The results for state-owned enterprises reject one of the prior hypotheses again. These companies in most cases use less short-term, long-term, and total debt. This phenomenon might have two explanations. First, a company with the state as a major shareholder does not have incentives to exploit tax shields. The reason is that all taxes go to the government while the gains from tax shields in the form of dividends go to other shareholders as well. Thus, the reduction of taxes is not beneficial for the state. Second, it is reasonable to expect that the state makes fewer efforts to maximize the value of its companies. An official is appointed to represent the government and participate in the management of the company. These people are however less motivated to control the effectiveness and integrity of managers than private investors because the salary of the official does not depend on the financial results of the company. As a result, the state monitors the managers more poorly and does not insist on the increase in financial leverage to restrain the free cash flow problem. The risk-averse manager would prefer to lower the debt level and minimize the risks for his labor income and reputation.

As in the case of a large oligarch shareholder, a positive relation with total liabilities indicates that the usage of trade credit is higher among state-owned companies. The explanation here is similar. First, these companies might enjoy the confidence of the counterparties because they are part of "the state's holding" and the government will not easily allow them to go bankrupt. Second, they have a big circle of trade partners that are also government-owned and thus practice trade credits between each other more easily.

When it comes to dual ownership, it is difficult to interpret the results due to various possible relationships between parties. Nevertheless, several tendencies seem important and worth mentioning. Companies which belong to an oligarch and the manager do not differ from the control group in most samples (with an exception of the Big and Middle Samples); they do not exploit trade credit possibilities, which was the case with oligarch-owned firms. In the pairs "manager-state" and "oligarch-state", the state imposes its pattern of behavior. Finally, triple ownership appeared insignificant in all samples and for all debt variables – three powerful shareholders balance and control each other and consequently their companies act as other "normal" firms without such owners.

The Headquarters' location demonstrates very controversial results. A located in Moscow or Saint-Petersburg: average Russian firm from the Big or Middle Sample has less short-term debt, company with liquid shares from the Small Sample has a higher long-term debt burden, smaller company from the Sample of Small Firms resorts less to trade credit, and bigger firm from the Sample of Big Firms, on the contrary, uses more trade credit. This phenomenon does not correspond to the suggested hypothesis. It seems to be impossible to provide an explanation for the identified influences having only these results. Additional investigation is needed.

The Rating factor showed partly unexpected results. An investment grade credit rating results in higher long-term debt levels only for big or actively traded companies. Other companies with an investment grade rating have the same level of debt as their non-rated peers. This might be explained by an idea that smaller companies in order to gain an investment grade rating have to possess smaller levels of indebtedness. Only the biggest, most diversified, "most public" ones, which perhaps have better financial management, can afford to take an advantage of lower costs of capital and increase thereby the debt level (by 5-8% in terms of debt-to-assets ratio).

On the contrary, a speculative class rating demonstrates an expected positive relation, yet not for the short-term debt. Companies use their rating advantage to resort to long-term borrowings as Russian companies seem to be constrained with this type of external financing (Ershov, 2006; Grant Thornton, 2008). Interestingly, in a normal case rating helps increase debt level by 3-8%, while for smaller companies (in the Sample of Small Firms) the effect is 14-31%. This result might be exaggerated due to availability of only 3 observations with a credit rating in the Sample of Small Firms. Nevertheless, this indicates at least a higher influence of a credit rating on the balance sheet of small firms.

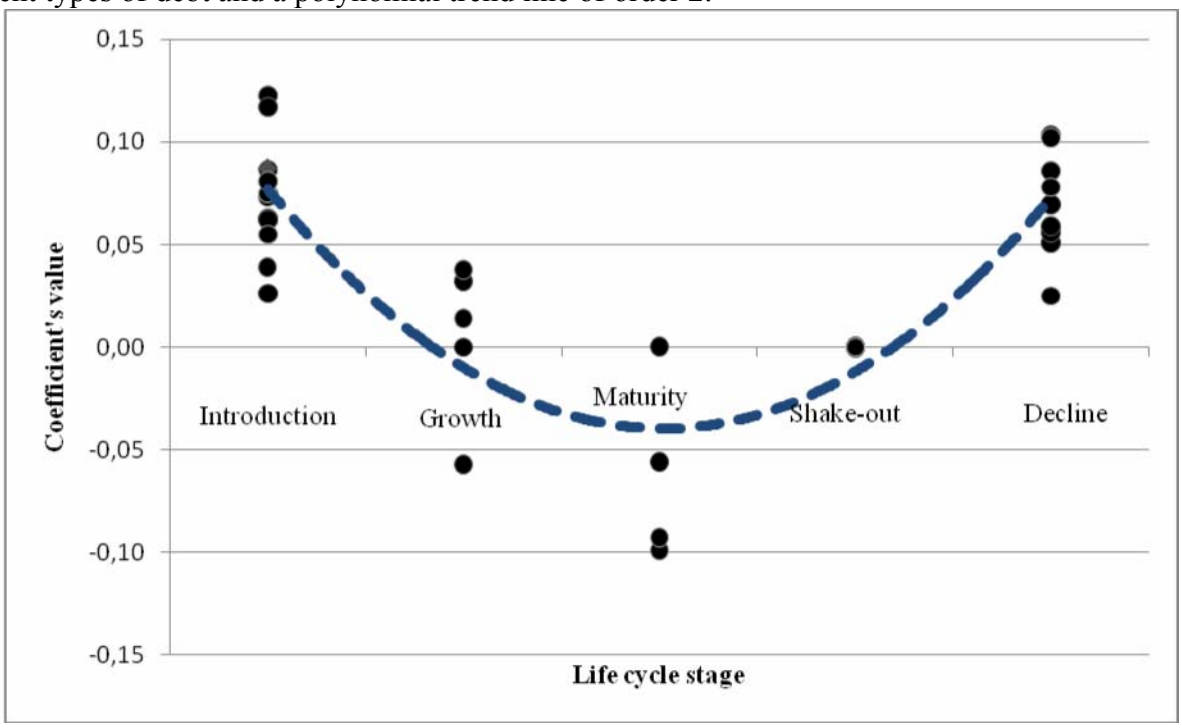
Despite expectations and Spearman correlations, Expenditures on mergers and acquisitions cannot help to explain the debt-equity structure of the Russian firms. There might be several reasons for this. First, on average all Russian companies might finance their M&A transactions with the financial leverage they currently have. The liquidity of the Russian stock exchange is rather low and a big holding of even liquid shares is not a cash-like means of payment. Second, the data collected from the official sources might severely deviate from reality in Russia. As companies very often are owned by offshore companies, many M&A deals should happen between these various shadow companies and not appear in the official records. Consequently, the lack of these data might destroy the predictive power of M&A expenditures.

Accounting standards appear to be rather influential. With an exception of the Sample of Small Firms[20], reporting in accordance with IFRS or US GAAP decreases the long-term and total financial leverage by 5-8% and slightly increases the ratio of short-term debt by 1-2% in some cases. The former evidence supports the expectation that IFRS and US GAAP lower information

[20] There are just a few observations with accounting statements under IFRS and no US GAAP-reporting enterprises.

asymmetries with equity investors. Although a pure coincidence due to the differences in accounting measures is not excludable.

The Life cycle stage group of variables rejects the suggested hypothesis. Graph 1 showed an anomaly in financial leverage of Russian companies at different stages of life cycle. The regression analysis only exaggerates this divergence from the prior research. The coefficients indicate a U-curve evolution of financial leverage, which can be seen on Graph 2.There are all coefficients for different types of debt and a polynomial trend line of order 2.



Graph 2. Life cycle stage coefficients

At the Introduction stage Russian companies have 12%[21] higher total debt ratio than at the Shake-out stage. At the Growth stage, extra indebtedness decreases but is still 3% above the Shake-out stage. Maturity and Shake-out stages are almost undistinguishable. Once again at the Decline stage the indebtedness goes up by around 5% of total assets. Therefore, the results of the regression analysis give grounds to doubt the assumption of Modigliani and Miller about the independence of financial and investment decisions.

This phenomenon together with the prior evidence from the Descriptive statistics section might have two explanations. The first one is the monopolistic character of the Russian economy. 2003-2008 were the years of a rapid economic growth and bigger companies managed to reverse their development, invest into future growth and switch to the initial stages of Life cycle evolution. On the one hand, big Russian firms used their monopolistic power to sweep the market, raised debt for the development of new products and thereby they expanded. On the other hand, smaller firms were discriminated, did not have many possibilities to grow and develop, were perhaps pushed aside from the market and saw a fall in financial results from operations, which led to the increase in their indebtedness. Thus, they moved to Shake-out and Decline stages.

The second dimension of this problem is a limitation of equity financing at the earliest stages of organization development and lack of risky equity investors. Russia is lacking far behind many other countries when it comes to the institute of Business angels, Venture capital or Private equity (GEM, 2008, 2007, 2006). Lack of finance is called one of the main impediments for the development of entrepreneurship in Russia (GEM, 2008; Grant Thornton, 2008). Consequently, entrepreneurs have to rely on their own scarce funds and debt capital, which results in a higher

[21] In this paragraph, the figures are quoted based on the total debt ratio from the Middle Sample as the most representative figures for an "average" firm.

share of debt in comparison to mature companies that are less risky and in addition generate a positive operating cash flow.

The next factor under consideration is Intellectual capital. The regression analysis shows that except for the Small Sample with market debt ratios and the Sample of Big Firms, the coefficient is positive and significant, which supports the initial expectation. However, insignificant results for the remaining two samples are not out of line. First, the trade-off implication about the free cash flow problem referred only to the book leverage measures. The market values reflect the excess future cash flows. Second, another consideration seems to be at work for the biggest enterprises. The excessive profitability might also indicate some kind of a monopolistic position of the company, which is most probably the case for the biggest corporations. In the case of a highly profitable monopoly, there are no preconditions for information asymmetries that existed for the companies with intellectual capital. The monopolistic power is well understood by the markets and can be valued easier than intellectual capital. As a result, in both cases two remaining suppositions balance each other and the coefficient is insignificant.

The last presented factor in model (3) is Year structure of observations. Based on the regression analysis, small companies did not notice an improvement in the market conditions or did not manage to exploit it. On the contrary, all bigger companies (except for the Sample of Small Firms) increased their leverage by around 1-4% in 2006-2008. This observation once again proves the Life cycle stage speculation that these were big companies that used the market conditions to their benefit and conducted substantial capital expenditures financed by debt. Market debt ratios demonstrate a negative correlation, which stems from the fact that the market capitalization of the Russian stock market increased more rapidly than total assets and indebtedness in the economy. Year dummies supported the hypothesis.

Summing up the results presented above, most new determinants suggested in this paper showed their significance. However, many hypotheses were found to be wrong or did not account properly for the differences between various components of debt: short-term debt, long-term debt, total debt, and trade credit. The analysis shows that none of the capital structure choice theories can explain all identified stylized facts. The peculiarities of the Russian corporate environment play an important role as well.

Conclusions

This paper presented an empirical study of capital structure choice of Russian public companies. There were three key objectives of the analysis. First, the verification of already existing evidence about the capital structure determinants of Russian companies was of interest. Second, the paper made an attempt to propose new factors that are specific for the Russian corporate environment. Third, new manifestations of the trade-off and pecking order theories were looked for. In order to fulfill this aim, the following steps were done.

First, the analysis of the existing studies helped to identify the possibilities for improvement of the empirical model. Among potentially influential determinants of capital structure, the following were chosen: Profitability, Tangibility, Size, Growth opportunities, Ownership structure, Headquarters' location, Rating, M&A activities, Accounting standard, Life cycle stage, Intellectual capital, Year, and Industry. Second, data for almost 700 Russian companies were collected. This sample is more than seven times bigger than in any other known study devoted to this issue in Russia. Out of these observations, five different samples were formed with the criteria of size, data availability, and the existence of liquid shares. Third, the regression was done. The analysis showed some discrepancies with the prior research, new factors influencing financial leverage, significant variations in the behavior of different types of debt, and new puzzles of capital structure for the future research.

Summing up the results of the conducted investigation, the following can be concluded. Capital structure is a complex phenomenon, where the influence of many factors is closely interwoven. It is evident that none of the existing theories can explain all empirically identified

interconnections and effects. The results of this empirical work find confirmation of the pecking order theories (Profitability, Growth opportunities, Rating, Accounting standard, Life cycle stage), the trade-off theory (Size, lower financial leverage for the state-owned companies), a combination of the pecking order and trade-off theories (Intellectual capital), market-timing hypothesis (Year effects), and managerial overconfidence (higher leverage for companies with the manager-shareholder).

Moreover, the relevance of these theories depends on the institutional characteristics of each country. For instance, there are several things that are peculiar for the Russian corporate environment. First, the non-transparency of economic relationships, which results in a big role of the credit rating and the foreign standards of accounting, and in a discount in share prices for companies with only one big shareholder. Second, some markets are underdeveloped in developing countries. This leads, for instance, to tangible assets not serving as effective collateral for debt. Third, the monopolistic character of the economy plays an important role in Russia by affecting, for example, the potential to grow and expand among companies of different size. These features affect not only the financing decisions of enterprises but also the economic development of the whole country in the end.

Several new regularities and peculiarities of capital structure choice in Russia have been identified in this paper. The suggested analysis and interpretation of the identified phenomena represents a synthesis of theories from different areas of research and needs additional support from separate studies focused on a particular identified relationship. Moreover, there has not been found an answer about the influence of the Headquarters' location and M&A expenditures on capital structure. The interactions between two large and powerful shareholders are also not clear, which prevents the analysis of the effect of dual ownership on debt level. All these and many other questions are open for the continuation of research in the area of capital structure choice of Russian companies.

References

1. Al-Bahsh, R. (2009). The capital structure of enterprises in risky emerging economies under liberalization: the case of the Middle East and the Gulf Region countries. Working paper, CR2M, University of Montpellier .
2. Baker, M., & Wurgler, J. (2002). Market timing and capital structure. Journal of Finance (57), 1-32.
3. Baker, M., Ruback, R., & Wurgler, J. (2007). Behavioral corporate finance. In B. Eckbo, Handbook of Corporate Finance: Empirical Corporate Finance (Vol. 1). North-Holland, Amsterdam: Handbook of Finance Series, Elsevier.
4. Bancel, F., & Mittoo, U. (2004). Cross-country determinants of capital structure choice: A survey of european firms. Financial Management , 33 (4), 103–132.
5. Barclay, M., Morellec, E., & Smith, C. (2006). On the debt capacity of growth options. Journal of Business (79), 37–59.
6. Barton, S., Hill, N., & Sundaram, S. (1989). An empirical test of stakeholder theory predictions of capital structure. Financial Management , 18 (1), 36-44.
7. Black, E. (1998). Life-Cycle Impacts on the Incremental Value-Relevance of Earnings and Cash Flow Measures. Journal of Financial Statement Analysis , 4 (1), 40 -56.
8. Blanchard, O., de Silanes, F., & Shleifer, A. (1994). What do firms do with cash windfalls? Journal of Financial Economics (36), 337–360.
9. Booth, L., Aivazian, V., Demirguc-Kunt, A., & Maksimovic, V. (2001). Capital structures in developing countries. Journal of Finance , 56 (1), 87-130.
10. Bradley, M., Jarrell, G., & Kim, E. (1984). On the existence of an optimal capital structure: theory and evidence. Journal of Finance (39), 857-877.
11. Brennan, M., & Schwartz, E. (1984). Optimal financial policy and firm valuation. Journal of Finance (39), 593–607.

12. Chang, S., & Hong, J. (2000). Economic performance of group affiliated companies in Korea: Intragroup resource sharing and internal business transactions. Academy of Management Journal (43), 429–448.
13. Chen, J. (2004). Determinants of capital structure of Chinese-listed companies. Journal of Business Research (57), 1341-1351.
14. Chernykh, L. (2008). Ultimate ownership and control in Russia. Journal of Financial Economics (88), 169-192.
15. Cornell, B., & Shapiro, A. (1987). Corporate stakeholders and corporate finance. Financial Management (16), 5-14.
16. Cornelli, F., Portes, R., & Schaffer, M. (1996). The capital structure of firms in central and eastern Europe. CERP Discussion Paper 1392 .
17. Cumming, D., Kaul, A., & Mehrotra, V. (2003). Provincial Preferences in Private Equity. In D. Harris, It's Time. (pp. 273-357). WPC − Committee to Review the Structure of Securities Regulation in Canada. Research Studies. Online at: www.wise-averties.ca.
18. Damodaran, A. (2005). Investment valuation: Tools and techniques for determining the value of any assets. New York: John Wiley & Sons, Inc.
19. Delcoure, N. (2007). The determinants of capital structure in transitional economies. International Review of Economics and Finance (16), 400–415.
20. Demirguc-Kunt, A., & Maksimovic, V. (1999). Institutions, financial markets and firm debt maturity. Journal of Financial Economics (54), 295-336.
21. Desai, M., Foley, C., & Hines, J. (2009). Capital structure with risky foreign investment. Journal of Financial Economics, forthcoming .
22. Dickinson, V. (2007). Cash Flow Patterns as a Proxy for Firm Life Cycle. Working paper №1268509, Social Science Research Network .
23. Eckbo, B., & Norli, O. (2004). The choice of seasoned-equity selling mechanisms: Theory and evidence. Working paper, Dartmouth .
24. Eckbo, B., Masulis, R., & Norli, O. (2007). Security offerings. In B. Eckbo, Handbook of Corporate Finance: Empirical Corporate Finance (Vol. 1). North-Holland, Amsterdam: Handbook of Finance Theories, Elsevier.
25. Ershov, M. (2006). Ершов, М. Экономический рост: новые проблемы и новые риски. Вопросы экономики (12), 20-37.
26. Faccio, M. (2006). Politically connected firms. American Economic Review (96), 369-386.
27. Faccio, R., & Masulis, R. (2005). The Choice of Payment Method in European Mergers and Acquisitions. Journal of Finance , 60 (3), 1345-1388.
28. Fama, E., & French, K. (2002). Testing trade-off and pecking order predictions about dividends and debt. Review of Financial Studies (15), 1–33.
29. Faulkender, M., & Petersen, M. (2006). Does the Source of Capital Affect Capital Structure? Review of Financial Studies , 19 (1), 45-79.
30. Ferri, M., & Jones, H. (1979). Determinants of Financial Structure: A New Methodological Approach. Journal of Finance , 34 (3), 631-644.
31. Fischer, E., Heinkel, R., & Zechner, J. (1989). Dynamic capital structure choice: theory and tests. Journal of Finance (44), 19-40.
32. Frank, M., & Goyal, V. (2007a). Capital structure decisions: Which factors are reliably important? Working paper, University of Minnesota and HKUST .
33. Frank, M., & Goyal, V. (2003). Testing the pecking order theory of capital structure. Journal of Financial Economics (67), 217–248.
34. Frank, M., & Goyal, V. (2008). Trade-off and Pecking Order Theories of Debt. In B. Eckbo, Handbook of Corporate Finance: Empirical Corporate Finance (Vol. 2). North-Holland: Handbooks in Finance Series, Elsevier.
35. GEM. (2006-2008). Russia Report. Global Entrepreneurship Monitor, online at: http://www.gemconsortium.org/files.aspx?Ca_ID=202 .

36. Ghosh, A., & Ruland, W. (1998). Managerial Ownership, the Method of Payment for Acquisitions, and Executive Job Retention. Journal of Finance , 53 (2), 785-798.
37. Givoly, D., Hahn, C., Ofer, A., & Sarig, O. (1992). Taxes and capital structure: Evidence from firms' response to the tax reform act of 1986. Review of Financial Studies (5), 331-355.
38. Goldstein, R., Ju, N., & Leland, H. (2001). An ebit-based model of dynamic capital structure. Journal of Business (74), 483–512.
39. Gombola, M., & Marciukaityte, D. (2007). Managerial Overoptimism and the Choice Between Debt and Equity Financing. Journal of Behavioral Finance , 8 (4), 225 - 235.
40. Graham, J., & Harvey, C. (2001). The theory and practice of corporate finance: Evidence from the field. Journal of Financial Economics (60), 187–243.
41. Grant_Thornton. (2008). Кадровый голод препятствует развитию бизнеса. Финансовый директор .
42. Grinblatt, M., & Titman, S. (2002). Financial markets and corporate strategy. The McGraw-Hill Companies.
43. Guriev, S., & Rachinsky, S. (2005). The role of oligarchs in Russian capitalism. Journal of Economic Perspectives (19), 131-150.
44. Harris, M., & Raviv, A. (1991). The theory of capital structure. Journal of Finance (46), 297–356.
45. Harvey, C., Lins, K., & Roper, A. (2004). The effect of capital structure when expected agency costs are extreme. Journal of Financial Economics , 74 (1), 3-30.
46. Hennessy, C., & Whited, T. (2005). Debt dynamics. Journal of Finance (60), 1129-1165.
47. Hovakimian, A., Opler, T., & Titman, S. (2002). The Capital Structure Choice: New Evidence For A Dynamic Trade-off Model. Journal of Applied Corporate Finance , 15 (1), 24-30.
48. Ivashkovskaya, I., & Solntseva, M. (2008). Ивашковская, И.В.; Солнцева, М.С. Структура капитала в российских компаниях как стратегическое решение. Вестник Санкт-Петербургского университета , 8 (3), 3-32.
49. Jõeveer, K. (2006). Sources of Capital Structure: Evidence from Transition Countries. CERGE-EI Working Papers wp306, The Center for Economic Research and Graduate Education - Economic Institute, Prague .
50. John, T., & John, K. (1993). Top-management compensation and capital structure. The Journal of Finance , 48 (3), 949-974.
51. Kalotay, K. (2007). The Rise of Russian Transnational Corporations. The Geneva Post Quarterly , 2 (1), 55-85.
52. Kane, A., Marcus, A., & McDonald, R. (1984). How big is the tax advantage to debt? Journal of Finance (39), 841–853.
53. Kester, W. (1986). Capital and Ownership Structure: A Comparison of United States and Japanese Manufacturing Corporations. Financial Management , 5-16.
54. Kolossov, V., Vendina, O., & O'Loughlin, J. (2007). Moscow as an Emergent World City: International Links, Business Developments, and the Entrepreneurial City. Eurasian Geography and Economics , 43 (3), 170-196.
55. Kraus, A., & Litzenberger, R. (1973). A state-preference model of optimal financial leverage. Journal of Finance (33), 911-922.
56. La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (1999). Corporate ownership around the world. Journal of Finance (54), 471-517.
57. La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2002). Government Ownership of Banks. Journal of Finance (57), 265-301.
58. La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. (1998). Law and finance. Journal of Political Economy (106), 1113–1155.
59. Leary, M., & Roberts, M. (2005). Do firms rebalance their capital structures? Journal of Finance (60), 2575–2619.

60. Leksin, V. (2007). Regional Economic Centers and Social Life of Russia. Problems of Economic Transition , 49 (12), 54-62.
61. Lemmon, M., Roberts, M., & Zender, J. (2006). Back to the beginning: Persistence and the cross-section of corporate capital structure. Working paper №881819, Social Science Electronic Publishing, Inc .
62. Long, M., & Malitz, I. (1985). The investment-financing nexus: Some empirical evidence. Midland Finance Journal , 53-59.
63. Luthy, D. (1998). Intellectual Capital and its measurement. In Proceedings of the Asian Pacific Interdisciplinary Research in Accounting Conference (APIRA).
64. MacKie-Mason, J. (1990). Do Taxes Affect Corporate Financing Decisions? Journal of Finance , 45 (5), 1471-1493.
65. Malmendier, U., & Tate, G. (2005). Does Overconfidence Affect Corporate Investment? CEO Overconfidence Measures Revisited. European Financial Management , 11 (5), 649–659.
66. Malmendier, U., Tate, G., & Yan, J. (2005). Corporate financial policies with overconfident CEOs. Working Paper, Stanford University .
67. Manos, R., Murinde, V., & Green, C. (2007). Leverage and business groups: Evidence from Indian firms. Journal of Economics and Business (59), 443-465.
68. McGee, R., & Preobragenskaya, G. (2003). Problems of Implementing International Accounting Standards in a Transition Economy: A Case Study of Russia. Working paper №459363, Social Science Electronic Publishing, Inc .
69. Modigliani, F., & Miller, M. (1958). The Cost of Capital, Corporate Finance and the Theory of Investment. American Economic Review (48), 261-297.
70. Myers, S. (2001). Capital Structure. The Journal of Economic Perspectives , 15 (2), 81-102.
71. Myers, S. (1977). Determinants of Corporate Borrowing. Journal of Financial Economics (5), 147-175.
72. Myers, S. (1984). The capital structure puzzle. Journal of Finance (39), 575–592.
73. Myers, S., & Majluf, N. (1984). Corporate financing and investment decisions when firms have information that investors do not have. Journal of Financial Economics (13), 187–221.
74. Nivorozhkin, E. (2002). Capital structures in emerging stock market: the case of Hungary. Developing Economies , 40 (2), 166-187.
75. Nivorozhkin, E. (2005). Financing choices of firms in EU accession countries. Emerging Markets Review (6), 138-169.
76. Nivorozhkin, E. (2004). The dynamics of capital structure in transition economies. Economics of Planning , 37 (1), 25-45.
77. Omet, G. (2006). Ownership structure and capital structure: evidence from the Jordanian capital market (1995-2003). Corporate Ownership Control , 3 (4), 99-107.
78. Palacios, R., & Pallarès-Miralles, M. (2000). International Patterns of Pension Provision. Working paper №9, Social Protection Discussion Paper Series, the World Bank .
79. Pöyry, S., & Maury, B. (2009). Influential ownership and capital structure. Managerial and Decision Economics, forthcoming .
80. Prowse, S. (1991). The structure of corporate ownership in Japan. Finance and Economics Discussion Series 174, Board of Governors of the Federal Reserve System (U.S.) .
81. Rajan, R., Zingales, L., & Ivanov, I. (1995). What Do We Know about Capital Structure? Some Evidence from International Data. Journal of Finance (50), 1421-1460.
82. Seifert, B., & Gonenc, H. (2008). The international evidence on the pecking order hypothesis. Journal of Multinational Financial Management , 18 (3), 244-260.
83. Shyam-Sunder, L., & Myers, S. (1999). Testing static tradeoff against pecking order models of capital structure. Journal of Financial Economics (51), 219–244.
84. Stevens, D. (1973). Financial Characteristics of Merged Firms: A Multivariate Analysis. The Journal of Financial and Quantitative Analysis , 8 (2), 149-158.

85. Stewart, T. (1997). Intellectual capital: The wealth of nations. New York: Doubleday/Currency.
86. Stiglitz, J. (1973). Taxation, corporate financial policy and the cost of capital. Journal of Public Economics (2), 1–34.
87. Strebulaev, I. (2007). Do tests of capital structure theory mean what they say? EFA 2004 Maastricht Meetings Paper No. 3411 .
88. Taub, A. (1975). Determinants of the Firm's Capital Structure. The Review of Economics and Statistics , 57 (4), 410-416.
89. Teixeira, G., & dos Santos, M. (2006). Do Firms have Financing Preferences along their Life Cycles? Theory, and Evidence from Iberia. Working paper, Financial Management Association .
90. Thornton, G. (2008). Кадровый голод препятствует развитию бизнеса. Финансовый директор (5).
91. Titman, S., & Tsyplakov, S. (2007). A dynamic model of optimal capital structure. Review of Finance , 11 (3), 401-451.
92. Titman, S., & Wessels, R. (1988). The determinants of capital structure choice. Journal of Finance (43), 1-21.
93. Vernikov, A. (2007). Russia's banking sector transition: Where to? BOFIT discussion paper (The Bank of Finland Institute for Economies in Transition BOFIT) .
94. Wald, J. (1999). How firm characteristic affect capital structure: an international comparison. Journal of Financial Research , 22 (2), 161-188.
95. Welch, I. (2004). Capital structure and stock returns. Journal of Political Economy (112), 106–131.
96. Williams, J. (1938). The Theory of Investment Value. Cambridge, MA: Harvard University Press.
97. Williamson, O. (1988). Corporate Finance and Corporate Governance. Journal of Finance , 43 (3), 567-591.
98. Wiwattanakantang, Y. (1999). An empirical study on the determinants of the capital structure of Thai firms. Pacific-Basin Finance Journal , 7 (3-4), 371-403.
99. Wright, S. (2004). Measures of stock market value and returns for the us nonfinancial corporate sector, 1900-2002,. Review of Income and Wealth (50), 561–584.