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# 'BLACK SPOTS' IN CAPITAL STRUCTURE STUDIES: THE CASE OF NON-EXISTING DEBT

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## Abstract

This study focuses on what can be characterized as "black spots" in the existing studies - the selection issue, which is manifested in the fact that a nontrivial number of companies occasionally do not have any debt on their balance sheet. The problem of zero debt is akin to truncated and censored regression models, which are useful when the dependent variable is observed in some ranges but not in others. We find strong evidence that the results of the target adjustment studies of capital structure, which use fitted values of debt ratios, can be potentially biased due to failure to correct for censoring due to zero-leverage observations. This paper also looks at the issue of dynamic properties of capital structure choice and the persistence in the capital structure choice and examines the effect of the 2008 global financial crisis on Russian firms' capital structure choice.

## Introduction

The issue of firms' capital structure choice has been extensively investigated in the literature ever since the seminal contributions of Modigliani and Miller (1958, 1963). This paper is an example of a cross-sectional study determining which factors are correlated with leverage.[1] Unlike other studies, we do not intend to examine whether debt ratios vary across firms as predicted by the theory. Instead, we focus on what can be characterized as "black spots" in the existing studies - the selection issue, which is manifested in the fact that a nontrivial number of companies occasionally do not have any debt on their balance sheet – the issue which until recently has been largely overlooked in the literature (Strebulaev and Yang, 2013; Bessler et al., 2013). The problem of zero debt is akin to truncated and censored regression models, which are useful when the dependent variable is observed in some ranges but not in others. We investigate the importance of this phenomenon for the capital structure studies and its potential implications for the existing results in the literature.

Moreover, this paper looks at the issue of dynamic properties of capital structure choice and the persistence in the capital structure choice. Lemmon et al. (2008) emphasized surprisingly stable capital structures in the sample of the US companies during 1963-2003.[2] As this study uses a sample of Russian companies, the evidence from the emerging markets of Central-Eastern Europe and the former Soviet Union (commonly known as transition economies) is of particular interest. A recent paper by Hanousek and Shamshur (2011) reconfirms the findings of Lemmon et al. (2008) in the sample of seven transition economies. Contrary to what was expected, the volatile economic environment of the region did not affect the capital structure of firms. Similar to the previous studies of the region (e.g. Nivorozhkin, 2005; Haas and Peeters, 2006), the authors argued that firms' credit constraints are partially responsible for the surprising stability of capital structure. The companies from transition countries seem to remain underleveraged and tend to adjust their capital structures more slowly than firms in developed economies. Our study extends the existing empirical evidence by examining the effect of the 2008 global financial crisis on firms' capital structure choice.

As mentioned before, a novel feature of this study is explicit acknowledgment of the issue of self-selection related to firms with zero level of debt. According to a recent survey of the empirical corporate finance literature by Betton, Eckbo, and Thorburn (2008), "there are unresolved econometric issues of endogeneity and self-selection" in most of the existing studies. Even when corrections for self-selection are discussed in the literature, actual corrections are rarely implemented in empirical tests. In the context of firms' capital structure choice, the selection issue is manifested in the fact that some companies occasionally do not have any debt on their balance sheet. Nevertheless, virtually all

1. The prominent examples of these studies are Bradley et al., 1984; Long and Malitz, 1985; Titman and Wessels, 1988; Crutchley and Hansen, 1989; Smith and Watts, 1992; Rajan and Zingales, 1995; and Frank and Goyal, 2009..
2. Importantly, this view has recently been challenged in DeAngelo and Roll (2014).

studies do not explicitly address the issue of firms with zero debt levels and treat the financial leverage as a continuous variable. The problem is (arguably) ignored mainly because of a relatively small number of zero observations among the developed world firms and, as a consequence, no significant implications of the phenomenon for the main results of the studies (e.g. Rajan and Zingales, 1995).[1] Nevertheless, a recent paper reported 9.3 percent of zero leverage firms for the period 1950–2000 in the Compustat files data (Frank and Goyal, 2008).

Strikingly, an average of 30 percent of the Russian firms per year, in the 8-year sample from 2003 to 2010 used in this study, did not have any debt in their capital structure.[2] The leverage ratios remained extremely low by international standards, with the average debt-to-assets ratio ranging between 8 and 15 percent and even lower median values of leverage.[3] Large changes in leverage were quite rare in the sense that it was common for a firm to remain within the same leverage decile category from one year to the next. In fact, 61 percent of Russian firms in the sample did exactly that. Strikingly, 81 percent of companies which started with zero debt did not leverage up within a year.

We find strong evidence that the results of the target adjustment studies of capital structure, which use fitted values of debt ratios, can be potentially biased due to failure to correct for censoring due to zero-leverage observations. The magnitude of the bias is obviously related to the proportion of zero-leverage firms in the samples used, which is likely to be nontrivial outside of the United States. We find significant differences between fitted values of the traditional panel data models and the Tobit model used in this paper. The models also tend to differ on whether firms are below or above the target leverage.

Moreover, we find that the leverage ratios of Russian companies appeared to increase significantly after the recent global financial crisis. This seems to reflect the fact that in response to the crisis, the Russian government implemented large stimulus packages, part of which took form of subsidies to industry in the form of preferential loans. The results are also consistent with the Russian companies drawing on their retained earnings in response to the negative shock to profitability.

## Capital Structure Choices of Firms in Transition Economies

The early evidence on the capital structure of firms in Central-Eastern Europe revealed some puzzling facts and developments, which often could not be explained using traditional approaches. Hussain and Nivorozhkin (1997) and Cornelli et al. (1998) documented surprisingly low levels of leverage for firms in Poland and Hungary in the first half of the 1990s. Both papers examine the determinants of capital structure and conclude that the low levels of debt financing are most likely a supply-side phenomenon.

Nivorozhkin (2002) studied developments in the Hungarian capital markets during 1992–1995 and investigated the determinants of the capital structures of companies listed on the Budapest Stock Exchange. The results supported the earlier finding that Hungarian firms were financially constrained. This situation was apparently the result of the combination of the financial incentives of firms and credit rationing within the financial environment. Revoltella (2001) investigated the effects of firm specific variables on leverage in the Czech Republic during the first years of transition. Supply factors were found to significantly determine the financial choices of enterprises. The paper also suggested evidence of a transformation in credit allocation policies.

Klapper et al. (2002) analyzed small and medium-size enterprise (SME) financing in Eastern Europe in 1999. The authors found that the SME sector comprised relatively young, highly leveraged, and relatively profitable firms. The financial constraints were found to impede the access of firms to long-term financing and their ability to grow.

1. Rajan and Zingales (1995) implement a correction using a Tobit model similar to the one used in this study but do it in order to correct for the companies with negative leverage, resulted from the adjustments implemented by the authors in their study.
2. A similar (or even higher) proportion of companies with zero debt can be found in other transition countries and emerging markets in the Orbis dataset we use in this study.
3. Given the characteristics of large publicly listed companies we study, our results seem to be consistent with the World Bank's Enterprise Surveys indicating that only 30.6 percent of Russian firms were using banks to finance their investment in 2009, up from 15.8 percent in 2005 (World Development Indicators, 2013).

Nivorozhkin (2005) presented evidence on the actual and target capital structures of firms in five EU-accession countries of Central and Eastern Europe and the former Soviet Union. The author investigated and compared the determinants of firms' target capital structure and the speed of leverage adjustments. On average, the leverage of companies in the transition countries remained lower than in EU countries. Nevertheless, the average levels of debt–equity ratios of companies in advanced transition economies of Estonia, Poland and the Czech Republic were approaching those observed in several EU countries. Despite the remaining differences in the capital structures of firms across EU accession countries, there was a significant convergence in the average level of firms' leverage across countries studied. The determinants of target capital structure of firms in transition countries appear to be rather similar to what has been observed in EU countries. Moreover, the effects of conventional factors on companies' leverage could not in general be explained by institutional differences between transition countries. At the aggregate level, developments in credit markets and the general economic environment in the countries studied explained the variation in firm's debt–equity ratios. Haas and Peeters (2006) also found that during the transition process, firms generally increased their leverage, lowering the gap between the actual and the target leverage. Similar to the earlier studies, the authors found that firms preferred internal finance above bank debt and adjust leverage only slowly.

A relatively low level of indebtedness of East European firms has also been found in Jõeveer (2006). The author stressed that country-specific factors were the main determinants of variation in leverage for small unlisted companies, while firm-specific factors explain most of the variation in leverage for listed and large unlisted companies in nine Eastern European countries in 1995-2002.

## Russian Capital Markets

The domestic capital markets in Russia started to emerge in the 1990s but the progress of their development was impaired by an unfavorable macroeconomic environment, weak regulatory framework and poor supervision. This period was characterized by a significant number of high-profile corporate failures due to pyramid schemes and asset stripping by majority shareholders and the fiscal problems culminating in the default on government debt in 1998. Since 2000, however, bond and equity markets grew rapidly and proved relatively resilient to the shock of the global financial crisis in 2008. There was a wave of defaults in the corporate bond market at the beginning of the crisis, but yields subsequently fell back to pre-crisis levels (OECD, 2011). Nevertheless, at the pick of the crisis, the level of non-performing loans rose dramatically (see Table 1) and required the fiscal response to the financial problems of the corporate sector. The Russian government implemented a large stimulus package, part of which took form of subsidies to industry. The enterprise sector was also assisted indirectly through liquidity support to the banking sector (EBRD, 2009).

The Russian equity market grew larger in relation to GDP than most middle-income countries, reaching the level of 116 percent in 2007 and declining to 68-70 percent in the post-crisis period. The number of listed companies grew by over 61 percent from 2003 to 2010, with over a 4-fold increase in market capitalization in the dollar terms. The liquidity of the market has also improved dramatically during the period, as captured by the stock trading volumes as a percent of GDP and the turnover ratio (see Table 1). Nevertheless, the stock market capitalization is dominated by a small number of natural resource extraction companies and floats tend to be small, with a large number of key companies controlled either by the state or private majority shareholders.

The Russian private banks emerged during the initial transition period as the Russian central bank issued a very large number of banking licenses in a relatively short period of time. The weakness in newly created legal and supervisory frameworks for commercial banks and central banking were highlighted by the 1998 financial crisis, which resulted in large-scale bank failures. The subsequent improvements in the banking laws included streamlining bank bankruptcy, regulation on ownership of banks, introduction of financial reporting under International Financial Reporting Standards, the introduction of deposit insurance for household deposits, tightened procedures for increasing authorized capital, the creation of a system of credit bureaus and refinements to prudential supervision (OECD, 2011).

With bank assets reaching 75 percent of GDP at the end of 2010, the banking system plays an increasingly important role in intermediating savings and investment, and has become increasingly sophisticated and integrated into the global financial system. However, the banking system remains very concentrated and is dominated by state-owned banks, with the five largest, accounting for more than half of total bank assets. The number of foreign banks more than doubled in the last decade but the foreign ownership in the banking sector remained limited with only 10 percent of total number of banks classified as foreign in 2009 (see Table 1). Despite some consolidation in the sector, the number of banks remained greater than 1,000 in 2009 indicating a very small size of most of the banks and an apparent lack of genuine banking business on the part of small institutions. Many banks were initially setup to act primarily as treasuries for non-bank corporations, and related party lending remained extensive throughout the system (OECD, 2011).

The domestic credit to private sector as a percent of GDP was increasing steadily during the 2000s and remained stable during the crisis period above the level of 40 percent. The domestic credit provided by banking sector as a percent of GDP averaged at 24 percent until 2009 but increased subsequently, reaching almost 40 percent in 2010. The volume of non-performing loans as a percent of total loans in the banking sector, on the other hand, remained relatively low during the period and picked up significantly during the 2008 financial crisis, reaching 9.7 percent in 2009. This indicator is likely to be higher in the absence of budgetary subsidies and current transfers which increased substantially since 2007 exceeding 7 percent of GDP in 2009 (see Table 1). The real GDP growth was the record high prior to the crisis followed by the record fall of 7.9 percent in 2009.

A surprising resilience of the Russian banking sector to increased bad loan rates and losses on securities holdings in the 2008-09 global crisis was due to the decisive policy response of Russian authorities. In fact, the overall economic impact of the global crisis on Russia was relatively severe and a huge volume of subsidies to large firms was introduced or expanded during this period (OECD, 2011).

The development of capital markets has been hindered by the deficiencies of the country's corporate governance system, where Russia's standing internationally is low. Ownership and control of firms are still somewhat muddled, there are outstanding problems with protection of minority shareholders, and a number of state-owned enterprises adopted governance structures that prevent normal rules for oversight and accountability. In 2010, Russia was placed 113th of 139 countries on Global Competitiveness Index score on efficacy of corporate boards, while on protection of minority shareholder interests Russia was ranked 132nd (World Economic Forum, 2010).

## Data and descriptive statistics

A sample of Russian publicly listed companies comes from Orbis, a Bureau Van Dijk's global company database that provides comprehensive firm-level financial data.[1] We selected all listed companies with consolidated financial statements and non-missing observations for the variables of interest in each particular year of the sample.

The final sample consists of 1,490 firm-years during 2003-2010. The sample is unbalanced with the number of firms ranging from 79 in 2003 to 267 in 2008 (see Table 2a). The average number of listed companies in Russia during this period averaged at 288 so the sample covers on average about 65 percent of all listed companies.

The mean levels of debt-to-assets and debt-to-equity ratios reported in Table 2a remained low by international standards and changed in a U-shaped fashion during the period. They almost doubled from the minimum levels of 8 and 13 percent in 2005 to the maximum of 15 and 24 percent respectively in 2010. The median values tend to fall below the means indicating that distribution of the companies' leverage was skewed to the left. This is not surprising given that on average 30 percent of companies each year did not have any debt in their capital structure. As a result, the mean debt-assets ratio in the sample of companies with positive debt (see Table 2b) is 3-6 percent higher than

1. More information on the Orbis database is available at https://orbis.bvdinfo.com

in the full sample.[1] The difference for the debt-to-equity ratio is even greater – 4-10 percent higher means, and 4-14 percent higher medians. The standard deviations of the leverage ratios remained rather stable during the period and they tend to be larger than means in the full sample.

Table 3 sheds more light on the distribution and dynamic properties of companies' leverage in our sample. The bottom row of Table 3 indicates how common each leverage category is in the overall data. Most of the firms in our sample have leverage ratios between 0 and 10%. Moreover, the companies without debt are the largest category. As leverage increases, the number of firms declines. Only 2 percent of firms have leverage greater than 50 percent. Large changes in leverage are quite rare in the sense that it is common for a firm to remain within the same category from one year to the next. In fact, 61 percent of firms in out sample did exactly that. Strikingly, 81 percent of companies which started with zero debt did not leverage up within a year. Just like in the developed markets, when the firm leaves a particular category, it typically moves to an adjacent leverage category, drastic changes in leverage are uncommon.

As it was mentioned before, the leverage of Russian companies is significantly lower than the one of their western counterparts. Rajan and Zingales (1995) report the average 26 percent debt-assets ratio and 41 percent debt-equity ratio for companies in Germany, France, Italy, the UK, the US, Japan, and Canada. Nevertheless, the debt-assets ratio of 16 percent in Germany and debt-equity ratio of 28 percent in the UK, reported by Rajan and Zingales (1995), are close to the maximum values we find in the Russian sample.[2] Hanousek and Shamshur (2011) report the average debt-equity ratio of 44 percent for the sample of companies from the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, and the Slovak Republic.[3]

The level of non-equity liabilities of the Russian publicly listed companies also appear to be significantly lower than the ones reported by Rajan and Zingales (1995) – 50 percent in Russia versus 64 percent in the seven developed markets. On the other hand, Glen and Singh (2004) report that, globally, the average company in their sample financed just over half of its balance sheet with liabilities, with higher figures for emerging market countries.

## Methodology

The problem of zero debt is akin to truncated and censored regression models, which are useful when the dependent variable is observed in some ranges but not in others. Similar to the logic of a classical example in Tobin (1958) study, Russian firms' leverage tends to be responsive to a number of factors, such as firms' profitability and size, but a non-trivial number of companies has no debt in their capital structure. The problem, in this case, is how to model the response. A classical linear model is clearly inappropriate due to the presence of many observations with values of 0. However, a model can be constructed using a latent variable approach.

Suppose that we consider a latent continuous variable $Y^*$ that is normally distributed with mean $\mu$ and variance $\sigma^2$. The standard Tobit model is given by

$$Y^* = X\beta + \varepsilon$$

$$Y = Y^* \quad \text{if } Y^*>0$$

$$=0 \quad \text{if } Y^*=0$$

To estimate this model we need to consider two pieces of the overall likelihood, the probability that $Y^*$ is non-masspoint and the probability that $Y^*$ is a masspoint (at zero). Combining these into a single expression for the joint probability (likelihood) results in the following expression

1. The median leverage is 2-8 percent higher.
2. Note that the median values indicate that the distribution of leverage tend to be more symmetric in the developed markets.
3. Note that Hanousek and Shamshur (2011) do not report separate figures for the listed companies and define debt as the difference between total liabilities and trade credits, which could result in an error as non-financial debt could inflate the reported leverage.

$$L=\prod_{y^*=0}\left[1-\Phi\left(\frac{X\beta}{\sigma}\right)\right]\prod_{y^*>0}\frac{1}{\sigma}\phi\left[(Y-X\beta)/\sigma\right],$$

where $\Phi(\bullet)$ and $\phi(\bullet)$ are, respectively, the cumulative standardized normal distribution function and standardized normal density function. If we were to use OLS on all observations, we would get biased estimates. It is also the case that OLS applied to the non-masspoint observations would yield biased estimates. In this case, the expectation of Y is not equal to , as it would be in a classical linear regression model. In fact,

$$E\left(\mathrm{Y}|\mathrm{Y}^*>0\right)= X\beta+E\left(\varepsilon\middle|\varepsilon\right\rangle-X\beta\Big)$$

The last term is not necessarily equal to zero. If we assume normality of , then

$$E\left(\mathrm{Y}|\mathrm{Y}^*>0\right)=X\beta+\sigma\lambda\left(\frac{X\beta}{\sigma}\right)$$

where $\lambda(\bullet)=\phi(\bullet)/\Phi(\bullet)$.

Given the panel nature of the data used in this study, we estimate random-effects Tobit model.[1]

We also estimated a treatment-effects model, which considers the effect of an endogenously chosen binary treatment on another endogenous continuous variable, conditional on two sets of independent variables. In our case, the binary treatment is the presence or absence of debt ($Z^*$) in the capital structure of a company while the endogenous continuous variable is a measure of leverage ($Y^*$).

$$Z^*=X\lambda+\upsilon$$

$$Y^*=\alpha+X\beta+Z\delta+u$$

where and are bivariate normal random errors with zero mean and variance covariance matrix

$$\sum_{\upsilon u}=\begin{pmatrix}\sigma_\upsilon^2 & \sigma_{\upsilon u}\\ \sigma_{u\upsilon} & \sigma_u^2\end{pmatrix}$$

The treatment-effects model helps to provide more insights into the determinants of non-zero debt but fails to control for the panel nature of the data.[2]

In order to infer the effect of correction for the zero-debt observations, as a benchmark, we also estimate an ordinary panel data model.[3]

## Model specification

The capital structure model used in this paper follows the earlier literature in terms of selecting dependent and explanatory variables.

Our main empirical models use two book measures of leverage – debt divided by total assets (DA) and debt divided by the sum of debt and book value of equity (DE). A sufficient amount of market data was only available for the 2006-2010 period, so for that period we also report the results of regressions using market leverage defined as debt divided by the sum of book debt plus the market value of equity (DM).

The relative illiquidity and volatile nature of Russian stock market coupled with high ownership concentration of listed companies makes market leverage an unlikely guide to corporate financial policy. Nevertheless, the results with market leverage are informative as growth opportunities are likely to affect the capital structure choice of firms (Myers, 1977).

1. We use xttobit function in Stata 12.
2. We use treatreg function in Stata 12. The selection equation was also estimated separately using a panel data logit and the signs and significance of explanatory variables were almost identical. The magnitude of the coefficients was unsurprisingly different though.
3. We use xtreg function in Stata 12.

A set of explanatory variables was also selected based on the earlier literature for developed and transition countries that identified factors that exhibit the most robust correlation with leverage (Nivorozhkin, 2005; Frank and Goyal, 2009).

Firm's size, typically measured by the logarithm of total assets (SIZE), tends to have robustly positive relation with leverage in most of the empirical studies. This is consistent with large firms being able to borrow more because they are more diversified and have lower default risk. Larger firms also tend to be more mature firms, which can alleviate agency costs of debt through the reputation effect.

Tangibility of assets, measured by the ratio of fixed assets to total assets (TANG), is usually used as a proxy for collateralizable assets, which are expected to suffer a smaller loss of value when firms go into distress. Agency costs of debt could also be lower for firms with more tangible assets, as it makes it difficult for shareholders to substitute high-risk assets for low-risk ones. The relation between leverage and tangibility of assets is reliably positive in the developed countries studies. Nivorozhkin (2005) argues that underdeveloped and/or inefficient legal systems together with thin and illiquid secondary markets for firms' assets tend to limit the importance of tangible assets as collateral in transition economies. In fact, a negative (or insignificant) relationship between leverage and tangibility has been found in a number of previous studies of transition economies (e.g. Cornelli et al., 1998; Nivorozhkin, 2002; Nivorozhkin, 2005).

A negative relation between profitability and leverage is one of the most robust ones in the capital structure literature. Profitable companies prefer internal finance over external funds. They do not seem to leverage up because of lower expected bankruptcy costs and more valuable interest tax shields or use debt to mitigate the free cash flow problem (Jensen, 1986). On the other hand, the negative relationship is consistent with operating profitability being a proxy for growth opportunities. We use the ratio of income before interest, tax and depreciation to total assets as a proxy for company profitability (PROF).

We also control for industry effects on leverage. Frank and Goyal (2009) argue that industry median debt ratios, no matter how noisy, tend to reflect a number of otherwise omitted common factors. The industry of a firm could also be important for the level of its leverage because of product market interactions.

In addition to using debt financing, firms may be financed by their suppliers. The literature (e.g. Petersen and Rajan, 1997) suggests that firms may rely more on trade credit when debt financing is unavailable. We control for the effect of trade credit on leverage by including the ratio of net trade credit to total assets (NTC). Nivorozhkin (2005) argues that substitutability between trade credits and financial leverage found for the industrial countries should be reinforced by the larger market imperfections in the credit markets of the transition countries and finds the supporting evidence for the hypothesis.

As we use a sample of listed companies, we also decided to control for the time of firms' IPO, as the fact of stock exchange listing and its duration is likely to affect the menu of financing choices of the companies. For example, Baker and Wurgler (2002) find that book leverage reduces sharply following the IPO.

In the regressions with market leverage we also control for growth opportunities proxied by the ratio of market value of assets to book value of assets and commonly referred to as market-to-book ratio (MB). The capital structure theories differ in their expectations of the relation between growth opportunities and leverage but empirical studies generally conclude that debt ratios are negatively related to market-to-book ratio (Rajan and Zingales, 1995; Frank and Goyal, 2009).

## Results

To gain some preliminary insights into the differences in characteristics of companies with and without debt we report the results of the mean and the median difference tests (see Table 4). According to the results, the leveraged companies tend to be larger and have more net trade credits and tangible fixed assets. They also tend to obtain the exchange listing earlier. The differences in the level of

profitability and non-equity liabilities (hence equity) are insignificant. The leveraged firms are more likely to be in the agriculture (Ind0) and the light manufactured products industries (Ind2). The firms producing heavy manufactured products (Ind3) are more likely to have zero debt on their balance sheets.

Table 5 and 6 present results of estimation of a random effects panel model, a random effects panel tobit model, and a treatment effects model. Table 5 reports on the model specification with industry dummies, while Table 6 reports on the model specification with median industry leverage.

The results are qualitatively similar across models and in line with our expectations.

Firm's size has a positive and significant effect on debt ratios in all models, except for the treatment effects model with debt-equity ratio in Table 6. Larger firms are also less likely to have zero level of debt in their capital structure.[1]

A larger proportion of tangible fixed assets in total assets decreases chances of a company to have no debt, but it is negatively related to leverage, albeit only in models with debt-equity ratio as a dependent variable and not in the Tobit regression which we would regard as the most reliable.

Firm's profitability has a uniformly strong negative effect on both the level of leverage and its probability of being positive.

The IPO year does not appear to have a significant effect on leverage, but this relationship seems to be affected by its relatively high correlation with firm's size.[2] If size is not controlled for, the IPO year tends to have a negative and significant effect on leverage. It looks like the duration of listing has a positive effect on leverage but there is a significant interplay of the listing duration and firms' size. Alternative interpretation could be that larger companies obtained the exchange listing earlier.

The results in Table 5 do not reveal any major variation in leverage across industries except for the significant difference between the light and the heavy manufactured goods. A higher leverage in the light manufactured products industries is consistent with a smaller number of zero-leverage companies in this industry, as reported in Table 4. As expected, the industry median debt ratios in our model have a strong and positive association with companies' leverage (see Table 6).

For the time trend in the model, the year 2008 was chosen as a reference category because the global financial crisis left most transition economies largely unaffected until mid-2008 and hit hard in the subsequent period as commodity prices collapsed, exports contracted and capital inflows stopped (EBRD, 2009). The results for the time trend seem to be sensitive to the model specification. The models in Table 5 control for the firms' industries and seem to be the most reliable. Moreover, the panel tobit model seems to be the most appropriate given the panel structure of our data and the relative weight of zero-debt observations. The results reveal that Russian companies' leverage increased significantly post-2008. The debt-to-assets ratio in 2010 was significantly higher than the one in any previous year since 2004. The debt-to-equity ratio in 2010 was higher than in any year between 2004 and 2008. The 2009 debt ratios are not significantly different from the 2007 ones. The results seem to reflect the fact that in response to the crisis, the Russian government implemented large stimulus packages, part of which took form of subsidies to industry in the form of preferential loans (EBRD, 2010). Nevertheless, the results are also consistent with the Russian companies drawing on their retained earnings in response to the negative shock to profitability.

The regressions with market leverage are consistent with the previously described results. Firm's profitability and size seem to be the only covariates with the consistent effect on leverage. The effect of market-to-book ratio is negative as expected but only significant in the treatment model – the high-growth companies are more likely to have a positive level of debt, but higher growth opportunities are inversely related to the level of leverage. The time trend indicates that the market leverage of Russian companies increased significantly in 2008 which is not surprising given that Russia stock market experienced 72.5 per cent decline in local currency terms in 2008 (World Bank, 2009).

1. Given that the selection equation of the treatment effects model does not control for the panel nature of the data, it was re-estimated as the panel data logit model but the results were qualitatively the same.
2. The correlation of Size and IPO is -0.21.

The next issue is an effect of correction for zero-leverage observations on our results.

A large number of recent papers look at the dynamic properties of the capital structure choice. Many studies focus on leverage adjustment costs and attempt to suggest a target adjustment process. Importantly, since the target is not observable, it must be estimated or its effects must be imputed. Many studies tend to adopt a two-step procedure in which an equation for the target is estimated first and the fitted value is then substituted into the adjustment equation (e.g., Hovakimian et al., 2001; Fama and French, 2002; Korajczyk and Levy, 2003; and Kayhan and Titman, 2007). Other studies substitute the target equation into the adjustment equation and then estimate the resulting structure (e.g., Banerjee et al., 2004, Nivorozhkin, 2005; Flannery and Rangan, 2006; Lemmon et al., 2007; Frank and Goyal, 2007; and Huang and Ritter, 2009). Byoun (2008) finds evidence that adjustments toward a target can be asymmetric in the sense that firms weigh differently positive and negative deviations of their leverage ratio from a target.

In view of the evidence discussed in this paper, the results of the target adjustment studies can be potentially biased due to failure to correct for the zero-leverage observations. The results in Tables 8 and 9 reveal the implications of correcting the fitted values of the models. Table 8 reports the mean difference across industries between the predicted values of the regular panel data models and the Tobit models reported in Table 5. Table 9 reports the differences in the magnitude of the financial surplus/deficit defined as the difference between the target and the actual leverage of a firm. In Table 8, there is a significant difference between the fitted values of the models in virtually all industries. The unadjusted target leverage tends to be higher but there are cases where the opposite is true. The results in Table 9 indicate a significant difference between the estimated amounts of financial deficit/surplus. In fact, in more than 50 percent cases the models differ on whether the industry is below or above the target.

## Conclusions

This study uses Russian company-level data to investigate the issue that can be characterized as "black spots" in the existing capital structure studies. The selection issue, we focus on, is manifested in the fact that a nontrivial number of companies in Russia, and in many other countries, occasionally do not have any debt on their balance sheet. The problem of zero debt is akin to truncated and censored regression models, which are useful when the dependent variable is observed in some ranges but not in others. We find strong evidence that the results of the target adjustment studies of capital structure, which use fitted values of debt ratios, can be potentially biased due to failure to correct for censoring due to zero-leverage observations. The comparison of adjusted and unadjusted fitted values in our study reveals statistically significant differences in the fitted values of debt ratios and the magnitude of financial deficit/surplus estimated based on them.

Despite the significant differences in fitted values, the models used in this study yield similar qualitative results – the factors that were identified in the literature to exhibit the most robust correlation with leverage work similarly across models and typically in line with expectations (Frank and Goyal, 2007). The effect of higher tangibility of assets is a noteworthy exception which, similar to previous studies (e.g. Nivorozhkin, 2005), seem to indicate that underdeveloped and/or inefficient legal systems together with thin and illiquid secondary markets for firms' assets tend to limit the importance of tangible assets as collateral in emerging markets like Russia.

Finally, we find some evidence of the response of companies' financial choices to the effects of the 2008 global financial crisis. The changes in the debt ratios captured by the models are consistent with the Russian government implementing large stimulus packages during the crisis, part of which took form of subsidies to industry in the form of preferential loans (EBRD, 2010). Nevertheless, the results are also consistent with the Russian companies drawing on their retained earnings in response to the negative shock to profitability and dramatic decline of the Russian Stock Market.

*Table 1.*

**Russian Macroeconomic and Financial Indicators (2003-2010)**

| | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|
| Listed domestic companies, total | 214 | 215 | 296 | 309 | 328 | 314 | 279 | 345 |
| Market capitalization of listed companies (% of GDP) | 54 | 45 | 72 | 107 | 116 | 24 | 70 | 68 |
| Market capitalization of listed companies (current US$, bill.) | 231 | 268 | 549 | 1057 | 1503 | 397 | 861 | 1005 |
| Stocks traded, total value (% of GDP) | 19 | 22 | 21 | 52 | 58 | 34 | 56 | 54 |
| Stocks traded, total value (current US$, bill.) | 81 | 131 | 159 | 514 | 755 | 562 | 683 | 800 |
| Stocks traded, turnover ratio (%) | 46 | 52 | 39 | 64 | 59 | 59 | 108 | 86 |
| Number of banks (foreign-owned) | - | 1299 (42) | 1253 (52) | 1189 (65) | 1136 (86) | 1108 (102) | 1058 (108) | - |
| Domestic credit provided by banking sector (% of GDP) | 27.9 | 25.7 | 22.1 | 22.5 | 24.4 | 23.9 | 33.7 | 38.4 |
| Non-performing loans (in per cent of total loans) | 5.0 | 3.5 | 2.7 | 2.6 | 2.6 | 3.9 | 9.7 | 8.2 |
| Domestic credit to private sector (in per cent of GDP) | 21.2 | 24.1 | 25.7 | 30.9 | 37.7 | 41.3 | 44.4 | 44.9 |
| Eurobond issuance (in % of GDP) | - | 2.8 | 2.3 | 2.2 | 2 | 1.3 | 0.5 | - |
| Budgetary subsidies and current - transfers (in % of GDP) | | 3.7 | 3.5 | 3.5 | 4.7 | 5.4 | 7.1 | - |
| Real GDP growth | 7.35 | 7.2 | 6.4 | 8.2 | 8.5 | 5.2 | -7.9 | 4.4 |

Source: EBRD (2013) and World Bank Development Indicators (2013)

*Table 2a.*

**Descriptive Statistics: Full Sample**

DA is a ratio of total debt to total assets, DE is a ratio of debt to the sum of debt and equity, TL is a ratio of total non-equity liabilities to total assets, NTC is a ratio of net trade credits to total assets, TANG is a ratio of fixed tangible assets to total assets, PROF is a ratio of EBITD to total assets, and SIZE is logarithm of total assets.

| Year | Statistic | DA | DE | TL | NTC | TANG | PROF | SIZE |
|---|---|---|---|---|---|---|---|---|
| 2003 | Number of obs. | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| 2004 | Number of obs. | 114 | 114 | 114 | 114 | 114 | 114 | 114 |
| 2005 | Number of obs. | 177 | 177 | 177 | 177 | 177 | 177 | 177 |
| 2006 | Number of obs. | 228 | 228 | 228 | 228 | 228 | 228 | 228 |
| 2007 | Number of obs. | 265 | 265 | 265 | 265 | 265 | 265 | 265 |
| 2008 | Number of obs. | 267 | 267 | 267 | 267 | 267 | 267 | 267 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2009 | Number of obs. | 259 | 259 | 259 | 259 | 259 | 259 | 259 |
| 2010 | Number of obs. | 101 | 101 | 101 | 101 | 101 | 101 | 101 |
| 2003 | Mean | 0.12 | 0.19 | 0.47 | 0.01 | 0.54 | 0.11 | 13.20 |
| 2004 | Mean | 0.10 | 0.16 | 0.45 | -0.02 | 0.50 | 0.14 | 12.89 |
| 2005 | Mean | 0.08 | 0.13 | 0.50 | -0.05 | 0.42 | 0.15 | 12.42 |
| 2006 | Mean | 0.09 | 0.15 | 0.51 | -0.07 | 0.42 | 0.13 | 12.61 |
| 2007 | Mean | 0.11 | 0.18 | 0.51 | -0.04 | 0.40 | 0.11 | 12.81 |
| 2008 | Mean | 0.11 | 0.18 | 0.52 | -0.01 | 0.40 | 0.09 | 12.88 |
| 2009 | Mean | 0.13 | 0.21 | 0.53 | -0.01 | 0.40 | 0.07 | 13.02 |
| 2010 | Mean | 0.15 | 0.24 | 0.48 | -0.03 | 0.44 | 0.10 | 13.74 |
| 2003 | Median | 0.08 | 0.12 | 0.41 | -0.01 | 0.56 | 0.10 | 13.00 |
| 2004 | Median | 0.06 | 0.10 | 0.41 | -0.01 | 0.53 | 0.12 | 12.79 |
| 2005 | Median | 0.02 | 0.04 | 0.52 | -0.01 | 0.42 | 0.13 | 12.46 |
| 2006 | Median | 0.03 | 0.05 | 0.51 | -0.02 | 0.43 | 0.11 | 12.70 |
| 2007 | Median | 0.05 | 0.08 | 0.54 | -0.01 | 0.39 | 0.08 | 12.85 |
| 2008 | Median | 0.05 | 0.09 | 0.56 | -0.01 | 0.40 | 0.07 | 12.82 |
| 2009 | Median | 0.07 | 0.12 | 0.55 | -0.01 | 0.40 | 0.06 | 12.94 |
| 2010 | Median | 0.15 | 0.19 | 0.44 | -0.01 | 0.47 | 0.09 | 13.83 |
| 2003 | St. dev. | 0.14 | 0.22 | 0.24 | 0.10 | 0.19 | 0.09 | 1.71 |
| 2004 | St. dev. | 0.13 | 0.20 | 0.23 | 0.13 | 0.21 | 0.11 | 1.99 |
| 2005 | St. dev. | 0.12 | 0.19 | 0.25 | 0.18 | 0.25 | 0.13 | 2.09 |
| 2006 | St. dev. | 0.14 | 0.21 | 0.24 | 0.18 | 0.26 | 0.13 | 2.07 |
| 2007 | St. dev. | 0.14 | 0.22 | 0.24 | 0.14 | 0.25 | 0.12 | 2.11 |
| 2008 | St. dev. | 0.14 | 0.22 | 0.25 | 0.14 | 0.26 | 0.14 | 2.09 |
| 2009 | St. dev. | 0.16 | 0.24 | 0.26 | 0.14 | 0.26 | 0.10 | 2.05 |
| 2010 | St. dev. | 0.14 | 0.25 | 0.26 | 0.14 | 0.26 | 0.10 | 1.99 |

*Table 2b.*

**Descriptive Statistics: Non-zero leverage companies**

DA is a ratio of total debt to total assets, DE is a ratio of debt to the sum of debt and equity, TL is a ratio of total non-equity liabilities to total assets, NTC is a ratio of net trade credits to total assets, TANG is a ratio of fixed tangible assets to total assets, PROF is a ratio of EBITD to total assets, and SIZE is logarithm of total assets.

| Year | Statistic | DA | DE | TL | NTC | TANG | PROF | SIZE |
|---|---|---|---|---|---|---|---|---|
| 2003 | Number of obs. | 65 | 65 | 65 | 65 | 65 | 65 | 65 |
| 2004 | Number of obs. | 87 | 87 | 87 | 87 | 87 | 87 | 87 |
| 2005 | Number of obs. | 117 | 117 | 117 | 117 | 117 | 117 | 117 |
| 2006 | Number of obs. | 143 | 143 | 143 | 143 | 143 | 143 | 143 |
| 2007 | Number of obs. | 178 | 178 | 178 | 178 | 178 | 178 | 178 |
| 2008 | Number of obs. | 174 | 174 | 174 | 174 | 174 | 174 | 174 |
| 2009 | Number of obs. | 180 | 180 | 180 | 180 | 180 | 180 | 180 |
| 2010 | Number of obs. | 74 | 74 | 74 | 74 | 74 | 74 | 74 |
| 2003 | Mean | 0.14 | 0.23 | 0.50 | 0.01 | 0.56 | 0.11 | 13.46 |
| 2004 | Mean | 0.13 | 0.21 | 0.46 | 0.00 | 0.54 | 0.14 | 13.34 |
| 2005 | Mean | 0.12 | 0.20 | 0.48 | -0.02 | 0.50 | 0.15 | 13.29 |
| 2006 | Mean | 0.15 | 0.24 | 0.50 | -0.02 | 0.50 | 0.12 | 13.47 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2007 | Mean | 0.16 | 0.26 | 0.51 | -0.02 | 0.46 | 0.11 | 13.57 |
| 2008 | Mean | 0.16 | 0.28 | 0.53 | 0.00 | 0.48 | 0.09 | 13.68 |
| 2009 | Mean | 0.19 | 0.30 | 0.53 | -0.01 | 0.47 | 0.06 | 13.67 |
| 2010 | Mean | 0.21 | 0.33 | 0.50 | 0.00 | 0.50 | 0.09 | 14.27 |
| 2003 | Median | 0.10 | 0.16 | 0.42 | 0.00 | 0.57 | 0.10 | 13.31 |
| 2004 | Median | 0.09 | 0.14 | 0.41 | -0.01 | 0.55 | 0.13 | 13.27 |
| 2005 | Median | 0.09 | 0.14 | 0.43 | 0.00 | 0.50 | 0.13 | 13.23 |
| 2006 | Median | 0.11 | 0.18 | 0.49 | -0.01 | 0.50 | 0.11 | 13.45 |
| 2007 | Median | 0.12 | 0.22 | 0.51 | -0.01 | 0.47 | 0.10 | 13.58 |
| 2008 | Median | 0.13 | 0.22 | 0.56 | 0.00 | 0.49 | 0.07 | 13.90 |
| 2009 | Median | 0.15 | 0.25 | 0.53 | -0.01 | 0.50 | 0.05 | 13.88 |
| 2010 | Median | 0.21 | 0.28 | 0.45 | 0.00 | 0.53 | 0.08 | 14.39 |
| 2003 | St. dev. | 0.14 | 0.22 | 0.22 | 0.11 | 0.17 | 0.08 | 1.66 |
| 2004 | St. dev. | 0.13 | 0.21 | 0.22 | 0.10 | 0.18 | 0.11 | 1.83 |
| 2005 | St. dev. | 0.13 | 0.20 | 0.23 | 0.12 | 0.21 | 0.12 | 1.74 |
| 2006 | St. dev. | 0.15 | 0.22 | 0.21 | 0.11 | 0.23 | 0.10 | 1.71 |
| 2007 | St. dev. | 0.15 | 0.23 | 0.21 | 0.11 | 0.24 | 0.12 | 1.77 |
| 2008 | St. dev. | 0.14 | 0.22 | 0.22 | 0.10 | 0.24 | 0.14 | 1.80 |
| 2009 | St. dev. | 0.16 | 0.24 | 0.24 | 0.10 | 0.24 | 0.09 | 1.88 |
| 2010 | St. dev. | 0.13 | 0.23 | 0.23 | 0.08 | 0.24 | 0.07 | 1.93 |

*Table 3.*

**Leverage Transition Rates**

Leverage transition rates for the book leverage ratios (DA) for the period 2003–2010. The data are from Orbis. Book leverage is defined as the ratio of book value of debt divided by book debt plus book value of equity. The row number is the group that the firm leverage belongs to in year *t*. The column number is the group that the firm's leverage belongs to in year *t* + *1*. The cell entries measure percentages.

| | DA=0 | 0< DA ≤0.1 | 0.1< DA ≤0.2 | 0.2< DA ≤0.3 | 0.3< DA ≤0.4 | 0.4< DA ≤0.5 | 0.5< DA ≤0.6 | 0.6< DA ≤0.7 | 0.7< DA ≤0.8 | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| DA=0 | 311 | 38 | 20 | 9 | 3 | 1 | 1 | 0 | 0 | 383 |
| | 81.2 | 9.92 | 5.22 | 2.35 | 0.78 | 0.26 | 0.26 | 0 | 0 | 100 |
| 0<DA≤0.1 | 37 | 240 | 58 | 30 | 4 | 3 | 1 | 0 | 0 | 373 |
| | 9.92 | 64.34 | 15.55 | 8.04 | 1.07 | 0.8 | 0.27 | 0 | 0 | 100 |
| 0.1<DA≤0.2 | 9 | 49 | 101 | 33 | 13 | 0 | 1 | 0 | 0 | 206 |
| | 4.37 | 23.79 | 49.03 | 16.02 | 6.31 | 0 | 0.49 | 0 | 0 | 100 |
| 0.2<DA≤0.3 | 1 | 11 | 28 | 39 | 27 | 4 | 3 | 1 | 0 | 114 |
| | 0.88 | 9.65 | 24.56 | 34.21 | 23.68 | 3.51 | 2.63 | 0.88 | 0 | 100 |
| 0.3<DA≤0.4 | 1 | 2 | 10 | 20 | 24 | 11 | 1 | 0 | 0 | 69 |
| | 1.45 | 2.9 | 14.49 | 28.99 | 34.78 | 15.94 | 1.45 | 0 | 0 | 100 |
| 0.4<DA≤0.5 | 0 | 1 | 1 | 3 | 11 | 10 | 4 | 0 | 0 | 30 |
| | 0 | 3.33 | 3.33 | 10 | 36.67 | 33.33 | 13.33 | 0 | 0 | 100 |
| 0.5<DA≤0.6 | 0 | 0 | 1 | 1 | 1 | 3 | 1 | 4 | 0 | 11 |
| | 0 | 0 | 9.09 | 9.09 | 9.09 | 27.27 | 9.09 | 36.36 | 0 | 100 |
| 0.6<DA≤0.7 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 6 |
| | 0 | 0 | 0 | 0 | 16.67 | 16.67 | 16.67 | 16.67 | 33.33 | 100 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.7<DA≤0.8 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 4 |
| | 0 | 0 | 0 | 0 | 25 | 0 | 25 | 25 | 25 | 100 |
| Total | 359 | 341 | 219 | 135 | 85 | 33 | 14 | 7 | 3 | 1,196 |
| | 30.02 | 28.51 | 18.31 | 11.29 | 7.11 | 2.76 | 1.17 | 0.59 | 0.25 | 100 |

*Table 4.*

**Mean and Median Difference Tests of Debt Ratios.**

The sample is split by whether or not the firm has a positive debt ratio. Median difference is tested by means of the Wilcoxon- Ranksum test. TL is a ratio of total non-equity liabilities to total assets, NTC is a ratio of net trade credits to total assets, TANG is a ratio of fixed tangible assets to total assets, PROF is a ratio of EBITD to total assets, and SIZE is logarithm of total assets, Ind0- Ind8 are industrial classifications defined using one-digit U.S. SIC.

| | (1) Total Sample | | (2) Non-zero Debt | | (3) Zero Debt | | Difference | |
|---|---|---|---|---|---|---|---|---|
| | Mean | Median | Mean | Median | Mean | Median | t-test | Ranksum Test |
| | | | | Continuous Variables | | | | |
| TL | 0.50 | 0.51 | 0.51 | 0.48 | 0.50 | 0.56 | 0.49 | 0.11 |
| NTC | -0.03 | -0.01 | -0.01 | -0.005 | -0.07 | -0.04 | 7.9*** | 7.5*** |
| TANG | 0.42 | 0.43 | 0.49 | 0.50 | 0.28 | 0.19 | 16.60*** | 15.37*** |
| PROF | 0.11 | 0.09 | 0.11 | 0.09 | 0.11 | 0.08 | -0.11 | 0.35 |
| SIZE | 12.87 | 12.83 | 13.58 | 13.58 | 11.33 | 11.09 | 22.66*** | 19.88*** |
| IPO | 2001.86 | 2003 | 2001.38 | 2001.38 | 2002.89 | 2005 | -6.19*** | -5.53*** |
| | | | | Binary variables | | | | |
| | Proportions | | | | | | Proportion test | |
| Ind0 | .005 | | .008 | | .000 | | 1.93* | |
| Ind1 | .129 | | .136 | | .114 | | 1.13 | |
| Ind2 | .129 | | .165 | | .051 | | 6.12*** | |
| Ind3 | .440 | | .409 | | .506 | | -3.53** | |
| Ind4 | .200 | | .189 | | .225 | | -1.61 | |
| Ind5 | .048 | | .048 | | .049 | | -0.05 | |
| Ind7 | .021 | | .018 | | .030 | | -1.48 | |
| Ind8 | .009 | | .008 | | .008 | | 0.071 | |
| N | 1490 | | 1018 | | 472 | | | |

Note:***Significant at the 1% level, **Significant at the 5% level, *Significant at the 10% level.

*Table 5.*

**Estimated Models of the Debt Ratios in 2003–2010**

| | Random Effects Panel | Random Effects Tobit | Treatment Regression | | Random Effects Panel | Random Effects Tobit | Treatment Regression | |
|---|---|---|---|---|---|---|---|---|
| | DA | DA | DA | DA>0 | DE | DE | DE | DE>0 |
| Debt>0 | | | 2.069 | | | | 0.221*** | |
| | | | (1.562) | | | | -0.064 | |
| NTC | -0.012 | 0.017 | 0.039 | 0.620** | 0.054 | 0.131** | 0.121*** | 0.620** |
| | (0.023) | (0.038) | (0.025) | (0.277) | (0.036) | (0.059) | (0.036) | (0.277) |
| TANG | 0.007 | 0.032 | 0.016 | 0.844*** | -0.066** | -0.038 | -0.126*** | 0.844*** |
| | (0.020) | (0.027) | (0.019) | (0.187) | (0.031) | (0.043) | (0.028) | (0.187) |
| PROF | -0.097*** | -0.171*** | -0.130*** | -1.187*** | -0.208*** | -0.336*** | -0.224*** | -1.187*** |
| | (0.023) | (0.034) | (0.031) | (0.342) | (0.037) | (0.055) | (0.045) | (0.342) |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| SIZE | 0.021*** | 0.045*** | 0.016*** | 0.365*** | 0.034*** | 0.071*** | 0.012* | 0.365*** |
| | (0.003) | (0.005) | (0.005) | (0.026) | (0.005) | (0.007) | (0.007) | (0.026) |
| IPO | -0.001 | -0.002 | -0.001 | -0.014 | -0.002 | -0.003 | 0.000 | -0.014 |
| | (0.002) | (0.002) | (0.001) | (0.010) | (0.002) | (0.003) | (0.001) | (0.010) |
| ind0 | 0.027 | 0.104 | 0.01 | 5.349 | 0.043 | 0.164 | -0.036 | 5.349 |
| | (0.083) | (0.112) | (0.046) | (133.311) | (0.126) | (0.175) | (0.067) | (133.311) |
| ind1 | 0.008 | 0.011 | -0.011 | -0.203 | -0.007 | -0.004 | -0.030* | -0.203 |
| | (0.021) | -0.03 | (0.011) | (0.124) | (0.033) | (0.047) | (0.015) | (0.124) |
| ind2 | 0.080*** | 0.125*** | 0.070*** | 0.722*** | 0.115*** | 0.184*** | 0.063*** | 0.722*** |
| | (0.022) | (0.030) | (0.013) | (0.140) | (0.033) | (0.047) | (0.019) | (0.140) |
| ind4 | 0.006 | -0.003 | 0.001 | -0.117 | 0.001 | -0.014 | 0.003 | -0.117 |
| | (0.018) | (0.026) | (0.009) | (0.110) | (0.028) | (0.041) | (0.013) | (0.110) |
| ind5 | 0.053 | 0.069 | 0.034** | -0.005 | 0.089* | 0.113 | 0.060*** | -0.005 |
| | (0.033) | (0.047) | (0.016) | (0.187) | (0.051) | (0.073) | (0.023) | (0.187) |
| ind7 | 0.003 | 0.015 | -0.003 | -0.031 | -0.01 | 0.003 | -0.015 | -0.031 |
| | (0.045) | (0.065) | (0.022) | (0.239) | (0.069) | (0.102) | (0.032) | (0.239) |
| ind8 | 0.086 | 0.108 | -0.018 | -0.502 | 0.103 | 0.134 | -0.018 | -0.502 |
| | (0.061) | (0.083) | (0.035) | (0.394) | (0.094) | (0.131) | (0.051) | (0.394) |
| 2003 | -0.013 | 0.009 | -0.007 | 0.337 | -0.018 | 0.014 | -0.012 | 0.337 |
| | (0.011) | (0.015) | (0.017) | (0.209) | (0.018) | (0.024) | (0.024) | (0.209) |
| 2004 | -0.014 | 0.004 | -0.01 | 0.282 | -0.029* | -0.003 | -0.025 | 0.282 |
| | (0.010) | (0.013) | (0.014) | (0.177) | (0.016) | (0.021) | (0.021) | (0.177) |
| 2005 | -0.008 | 0.009 | -0.01 | 0.250* | -0.019 | 0.005 | -0.023 | 0.250* |
| | (0.008) | (0.012) | (0.013) | (0.151) | (0.014) | (0.019) | (0.018) | (0.151) |
| 2006 | 0.000 | 0.007 | -0.001 | 0.037 | -0.006 | 0.001 | -0.005 | 0.037 |
| | (0.008) | (0.011) | (0.011) | (0.137) | (0.012) | (0.017) | (0.016) | (0.137) |
| 2007 | 0.007 | 0.015 | 0.007 | 0.115 | 0.003 | 0.012 | -0.002 | 0.115 |
| | (0.007) | (0.010) | (0.011) | (0.131) | (0.011) | (0.016) | (0.016) | (0.131) |
| 2009 | 0.017** | 0.024** | 0.018* | 0.098 | 0.018 | 0.027* | 0.014 | 0.098 |
| | (0.007) | (0.010) | (0.011) | (0.133) | (0.011) | (0.016) | (0.016) | (0.133) |
| 2010 | 0.038*** | 0.047*** | 0.031** | -0.004 | 0.048*** | 0.057*** | 0.040* | 0.004 |
| | (0.010) | (0.013) | (0.014) | (0.181) | (0.016) | (0.021) | (0.021) | (0.181) |
| Constant | 2.434 | 3.886 | 0.035 | 23.781 | 3.037 | 5.071 | 0.087 | 23.781 |
| | (3.168) | (4.436) | (0.042) | (19.206) | (4.836) | (6.920) | (2.27) | (19.206) |
| Observations | 1,490 | 1,490 | 1,490 | 1,490 | 1,490 | 1,490 | 1,490 | 1,490 |
| Hausman Test | 35.44*** | | | | 19.28** | | | |
| LM test | 1265.37*** | | | | 1243.46*** | | | |
| sigma_u | | 0.149*** | | | | 0.231*** | | |
| | | (0.008) | | | | (0.013) | | |
| sigma_e | | 0.098*** | | | | 0.158*** | | |
| | | (0.002) | | | | (0.004) | | |
| lambda | | | 0.065*** | | | | 0.02 | |
| | | | (0.024) | | | | (0.037) | |

Note: ***Significant at the 1% level, **Significant at the 5% level, *Significant at the 10% level.

*Table 6.*

**Estimated Models of the Debt Ratios in 2003–2010**

DA is debt-to-assets ratio, DE is debt-to-equity ratio, NTC is a ratio of net trade credits to total assets, TANG is a ratio of fixed tangible assets to total assets, PROF is a ratio of EBITD to total assets, and SIZE is logarithm of total assets, IPO is the IPO date, Ind0-Ind8 are industrial classifications defined using one-digit U.S. SIC.

| | Random Effects Panel | Random Effects Tobit | Treatment Regression | | Random Effects Panel | Random Effects Tobit | Treatment Regression | |
|---|---|---|---|---|---|---|---|---|
| | DA | DA | DA | DA>0 | DE | DE | DE | DE>0 |
| DEBT>0 | | | 0.079* | | | | 0.252*** | |
| | | | (0.042) | | | | -0.064 | |
| NTC | -0.010 | 0.027 | 0.019 | 0.436 | 0.058 | 0.140** | 0.107*** | 0.436 |
| | (0.022) | (0.037) | (0.023) | (0.272) | (0.036) | (0.058) | (0.034) | (0.272) |
| TANG | 0.01 | 0.034 | 0.008 | 0.889*** | -0.064** | -0.036 | -0.136*** | 0.889*** |
| | (0.019) | (0.027) | (0.019) | (0.183) | (0.030) | (0.042) | (0.028) | (0.183) |
| PROF | -0.087*** | -0.158*** | -0.110*** | -1.140*** | -0.192*** | -0.307*** | -0.215*** | -1.140*** |
| | (0.023) | (0.034) | (0.029) | (0.335) | (0.037) | (0.054) | (0.044) | (0.335) |
| SIZE | 0.020*** | 0.044*** | 0.011** | 0.360*** | 0.032*** | 0.069*** | 0.009 | 0.360*** |
| | (0.003) | (0.004) | (0.004) | (0.026) | (0.005) | (0.007) | (0.007) | (0.026) |
| IPO | -0.002 | -0.002 | -0.001 | -0.014 | -0.002 | -0.003 | .000 | -0.014 |
| | (0.002) | (0.002) | (0.001) | (0.01) | (0.002) | (0.003) | (0.001) | (0.010) |
| Med. Industry Debt Ratio | 0.351*** | 0.739*** | 0.392*** | 4.939*** | 0.610*** | 0.887*** | 0.426*** | 4.939*** |
| | (0.059) | (0.125) | (0.077) | (0.699) | (0.093) | (0.129) | (0.117) | (0.699) |
| 2003 | -0.019 | -0.004 | -0.016 | 0.25 | -0.027 | -0.002 | -0.02 | 0.25 |
| | (0.011) | (0.015) | (0.016) | (0.208) | (0.018) | (0.024) | (0.024) | (0.208) |
| 2004 | -0.005 | 0.013 | -0.003 | 0.415** | -0.013 | 0.018 | -0.015 | 0.415** |
| | (0.01) | (0.013) | (0.014) | (0.177) | (0.016) | (0.021) | (0.022) | (0.177) |
| 2005 | 0.014 | 0.034*** | 0.011 | 0.558*** | 0.019 | 0.061*** | 0.002 | 0.558*** |
| | (0.009) | (0.013) | (0.014) | (0.157) | (0.015) | (0.021) | (0.021) | (0.157) |
| 2006 | 0.019** | 0.027** | 0.019 | 0.303** | 0.026** | 0.045** | 0.018 | 0.303** |
| | (0.008) | (0.011) | (0.012) | (0.144) | (0.013) | (0.018) | (0.018) | (0.144) |
| 2007 | 0.018** | 0.024** | 0.017 | 0.272** | 0.022* | 0.039** | 0.01 | 0.272** |
| | (0.007) | (0.010) | (0.011) | (0.133) | (0.012) | (0.016) | (0.016) | (0.133) |
| 2009 | 0.010 | 0.019** | 0.009 | 0.001 | 0.007 | 0.012 | 0.005 | 0.001 |
| | (0.007) | (0.010) | (0.010) | (0.133) | (0.011) | (0.016) | (0.016) | (0.133) |
| 2010 | 0.007 | -0.017 | -0.004 | -0.470** | -0.006 | -0.024 | 0.003 | -0.470** |
| | (0.011) | (0.017) | (0.016) | (0.193) | (0.018) | (0.024) | (0.024) | (0.193) |
| Constant | 2.918 | 3.954 | 2.27 | 23.42 | 3.684 | 5.865 | 0.418 | 23.42 |
| | (3.053) | (4.312) | (1.502) | (19.154) | (4.670) | (6.740) | (2.268) | (19.154) |
| Observations | 1,490 | 1,490 | 1,490 | 1,490 | 1,490 | 1,490 | 1,490 | 1,490 |
| Hausman Test | 17.92** | | | | 40.09*** | | | |
| LM test | 1292.38*** | | | | 1330.71*** | | | |
| sigma_u | | 0.146*** | | | | 0.227*** | | |
| | | (0.008) | | | | (0.013) | | |
| sigma_e | | 0.097*** | | | | 0.156*** | | |
| | | (0.002) | | | | (0.004) | | |
| lambda | | | 0.038 | | | | -0.001 | |
| | | | (0.024) | | | | (0.037) | |

Note: ***Significant at the 1% level, **Significant at the 5% level, *Significant at the 10% level.

**Estimated Models of the Market Leverage in 2006–2010**

DM is debt divided by the sum of book debt plus the market value of equity, MB is a market–to-book ratio, NTC is a ratio of net trade credits to total assets, TANG is a ratio of fixed tangible assets to total assets, PROF is a ratio of EBITD to total assets, and SIZE is logarithm of total assets, IPO is the IPO date, Ind0-Ind8 are industrial classifications defined using one-digit U.S. SIC.

| | Random Effects Panel | Random Effects Tobit | Treatment Regression | |
|---|---|---|---|---|
| | DM | DM | DM | DM>0 |
| Debt>0 | | | 0.140*** | |
| | | | (0.053) | |
| MB | -0.004 | -0.003 | -0.014*** | 0.072* |
| | (0.003) | (0.004) | (0.003) | (0.042) |
| NTC | -0.04 | -0.062 | 0.036 | 0.908* |
| | (0.042) | (0.071) | (0.042) | (0.504) |
| TANG | 0.018 | 0.037 | -0.024 | 0.610** |
| | (0.035) | (0.049) | (0.027) | (0.311) |
| PROF | -0.169*** | -0.266*** | -0.143*** | -0.814 |
| | (0.043) | (0.061) | (0.049) | (0.645) |
| SIZE | 0.026*** | 0.061*** | 0.008 | 0.480*** |
| | (0.005) | (0.008) | (0.007) | (0.047) |
| IPO | -0.001 | 0 | -0.001 | -0.003 |
| | (0.002) | (0.003) | (0.001) | (0.016) |
| ind0 | 0.065 | 0.092 | 0.033 | 4.405 |
| | (0.127) | (0.174) | (0.073) | (569.401) |
| ind1 | -0.024 | -0.042 | -0.018 | -0.677*** |
| | (0.032) | (0.046) | (0.019) | (0.222) |
| ind2 | 0.081** | 0.154*** | 0.045* | 5.589 |
| | (0.032) | (0.044) | (0.025) | (107.303) |
| ind4 | 0.024 | 0.021 | 0.023* | 0.055 |
| | (0.024) | (0.036) | (0.013) | (0.172) |
| ind5 | -0.053 | -0.066 | -0.046* | -0.532 |
| | (0.053) | (0.076) | (0.027) | (0.341) |
| ind7 | -0.012 | -0.035 | -0.009 | -0.441 |
| | (0.055) | (0.087) | (0.032) | (0.368) |
| ind8 | -0.107 | -0.063 | -0.136* | 4.339 |
| | (0.127) | (0.175) | (0.073) | (573.077) |
| 2006 | -0.072*** | -0.078*** | -0.061*** | -0.02 |
| | (0.014) | (0.018) | (0.019) | (0.262) |
| 2007 | -0.057*** | -0.073*** | -0.038** | -0.008 |
| | (0.011) | (0.015) | (0.015) | (0.203) |
| 2009 | -0.014 | -0.019 | -0.009 | -0.039 |
| | (0.010) | (0.013) | (0.014) | (0.195) |
| 2010 | 0.000 | -0.001 | 0.007 | 0.106 |
| | (0.013) | (0.017) | (0.018) | (0.240) |
| Constant | 1.815 | -0.459 | 2.15 | 0.718 |
| | (4.403) | (6.414) | (2.360) | (32.088) |
| Observations | 607 | 607 | 607 | 607 |
| Hausman Test | 26.53** | | | |

| | | | |
|---|---|---|---|
| LM test | 1292.38*** | | |
| sigma_u | | 0.163*** | |
| | | (0.013) | |
| sigma_e | | 0.099*** | |
| | | (0.004) | |
| lambda | | | 0.018 |
| | | | (0.031) |

Note:***Significant at the 1% level,**Significant at the 5% level, *Significant at the 10% level.

*Table 8.*

**Mean Difference Test of the Debt Ratios Predicted Values**

DA is debt-to-assets ratio, DE is debt-to-equity ratio, NTC is a ratio of net trade credits to total assets, TANG is a ratio of fixed tangible assets to total assets, PROF is a ratio of EBITD to total assets, and SIZE is logarithm of total assets, IPO is the IPO date, Ind0-Ind8 are industrial classifications defined using one-digit U.S. SIC.

| | | Predicted Values (*DA*) -Random Effects Panel | Predicted Values (*DA*) -Random Effects Tobit | | Predicted Values (*DE*) -Random Effects Panel | Predicted Values (*DE*) -Random Effects Tobit | |
|---|---|---|---|---|---|---|---|
| | N | | | Difference | | | Difference |
| | | Mean | Mean | *t*-test | Mean | Mean | *t*-test |
| Ind0 | 36 | .098 | .036 | 5.678*** | .164 | .078 | 5.040*** |
| Ind1 | 192 | .129 | 0.091 | 9.057*** | .201 | .126 | 11.665*** |
| Ind2 | 192 | .108 | .160 | -22.361*** | .164 | .240 | -20.510*** |
| Ind3 | 655 | .108 | .0313 | 38.022*** | .176 | .063 | 35.403*** |
| Ind4 | 298 | .117 | .047 | 17.565*** | .183 | .071 | 18.010*** |
| Ind5 | 72 | .111 | .111 | -0.112 | .188 | .204 | -1.695* |
| Ind7 | 32 | .094 | .016 | 14.336*** | .161 | .029 | 15.663*** |
| Ind8 | 13 | .119 | .165 | -2.556** | .168 | .210 | -1.448 |

Note: ***Significant at the 1% level, **Significant at the 5% level, *Significant at the 10% level.

*Table 9.*

**Mean Difference Test of the Leverage Deficit (-)/Surplus (+)**

The Deficit/Surplus is defined as a negative/positive difference between predicted and actual values of debt-to-assets (DA) and debt-to-equity (DE) ratios. Ind0-Ind8 are industrial classifications defined using one-digit U.S. SIC.

| | | Deficit/ Surplus (*DA*) -Random Effects Panel | Deficit/ Surplus (*DA*) -Random Effects Tobit | | Deficit/ Surplus (*DE*) -Random Effects Panel | Deficit/ Surplus (*DE*) -Random Effects Tobit | |
|---|---|---|---|---|---|---|---|
| | *N* | | | Difference | | | Difference |
| | | Mean | Mean | *t*-test | Mean | Mean | *t*-test |
| Ind0 | 36 | -.072 | -.124 | 5.270*** | -.098 | -.174 | 4.995*** |
| Ind1 | 192 | .018 | -.012 | 7.051*** | .025 | -.024 | 7.506*** |
| Ind2 | 192 | .001 | -.012 | 5.224*** | .003 | -.017 | 5.515*** |
| Ind3 | 655 | -.000 | -.062 | 29.874*** | -.005 | -.010 | 29.505*** |
| Ind4 | 298 | .003 | -.057 | 14.823*** | .001 | -.092 | 14.995*** |
| Ind5 | 72 | .009 | -.027 | 5.645*** | .009 | -.045 | 5.449*** |
| Ind7 | 32 | .001 | -.064 | 12.003*** | -.007 | -.112 | 12.374*** |
| Ind8 | 13 | .099 | .076 | 1.251 | .129 | .088 | 1.385 |

Note: ***Significant at the 1% level, **Significant at the 5% level, *Significant at the 10% level.

## References

1. Baker, M. and J. Wurgler (2002). Market Timing and Capital Structure. The Journal of Finance 57(1), 1-32.
2. Banerjee S., A. Heshmati and C. Wihlborg (2004). The Dynamics of Capital Structure, Research in Banking and Finance 4, 275-297.
3. Besslera W., W. Drobetzb, R., Hallerb, and I. Meierc (2013). The international zero-leverage phenomenon. Journal of Corporate Finance 23, 196–221.
4. Betton, S., E. Eckbo, and K. Thorburn (2008). Corporate takeovers. In Handbook of corporate finance: Empirical corporate finance, ed. E. Eckbo, vol. 2, chap. 15, 293–416. Amsterdam: North-Holland.
5. Bradley, M., G. Jarrell and E. H. Kim (1984). On the Existence of an Optimal Capital Structure: Theory and Evidence. Journal of Finance 39, 857–877.
6. Byoun, S. (2008). How and When Do Firms Adjust Their Capital Structures toward Targets? The Journal of Finance 63 (6), 3069–3096.
7. Cornelli, F., Portes, R., and M. Schaffer (1996). The capital structure of firms in Central and Eastern Europe. CEPR Discussion Paper 1392.
8. Crutchley, C. E. and R. S. Hansen (1989). A Test of the Agency Theory of Managerial Ownership, Corporate Leverage, and Corporate Dividends. Financial Management 18, 36–46.
9. DeAngelo, H. and R. Roll (2014). How Stable Are Corporate Capital Structures?. The Journal of Finance. Forthcoming.
10. EBRD (2009). Transition in Crisis? Transition Report. European Bank for Reconstruction and Development, London, the UK.
11. EBRD (2010). Recovery and Reform. Transition Report. European Bank for Reconstruction and Development, London, the UK.
12. Frank, M. Z. and V. K. Goyal (2008). Tradeoff and Pecking Order Theories of Debt, in B. E. Eckbo (Ed.), Handbook of Corporate Finance: Empirical Corporate Finance, vol. 2, Chapter 12 (Elsevier/North-Holland, Handbooks in Finance Series).
13. Frank, M. Z. and V. K. Goyal (2007). Corporate leverage: How much do managers really matter? Working Paper, University of Minnesota and Hong Kong University of Science and Technology.
14. Frank, M. Z. and V. K. Goyal (2009). Capital Structure Decisions: Which Factors are Reliably Important? Financial Management 38 (1), 1–37.
15. Fama, E. and K. R. French (2002). Testing Trade-Off and Pecking Order Predictions About Dividends and Debt. Review of Financial Studies, 15, 1–33.
16. Flannery, M. and K. Rangan (2006). Partial Adjustment Towards Target Capital Structures. Journal of Financial Economics 79, 469–506.
17. Glen, J. and A. Singh (2004). Comparing Capital Structures and Rates of Return in Developed and Emerging Markets. Emerging Markets Review 5 (2), 161-192.
18. Haas, R. and M. Peeters (2006). The dynamic adjustment towards target capital structure of firms in transition economies. Economics of Transition 14, 133–169.
19. Hanousek, J. and A. Shamshur (2011). A stubborn persistence: Is the stability of leverage ratios determined by the stability of the economy? Journal of Corporate Finance 17, 1360–1376.
20. Hovakimian, A., T. Opler and S. Titman (2001). The Debt-Equity Choice. Journal of Financial and Quantitative Analysis 36, 1–24.
21. Huang, R. and J. R Ritter (2009). Testing Theories of Capital Structure and Estimating the Speed of Adjustment. Journal of Financial and Quantitative Analysis 44 (2), 237–271.

22. Hussain, Q., Nivorozhkin, E. (1997). The capital structures of listed companies in Poland, IMF Working Paper, WP/97/175.
23. Jensen, M.C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. American Economic Review 76, 323–329.
24. Joeveer, K. (2006). Sources of capital structure: evidence from transition countries. CERGE-EI Working Paper 306.
25. Kayhan, A. and S. Titman (2007). Firms' Histories and Their Capital Structures. Journal of Financial Economics 83, 1–32.
26. Korajczyk, R. A. and A. Levy (2003). Capital Structure Choice: Macroeconomic Conditions and Financial Constraints. Journal of Financial Economics 68, 75–109.
27. Klapper, L., Sarria-Allende, V., Sulla, V., 2002. Small-and Medium-Size Enterprise Financing in Eastern Europe, World Bank Policy Research Working Paper 2933.
28. Lemmon, M.L., Roberts, M.R., and J.F. Zender (2008). Back to the beginning: persistence and the cross-section of corporate capital structure. Journal of Finance 63, 1575–1608.
29. Long, M. S. and I. B. Malitz (1985). The Investment-Financing Nexus: Some Empirical Evidence. Midland Finance Journal, 53–59.
30. Modigliani, F. and M. H. Miller (1958). The Cost of Capital, Corporate Finance and the Theory of Investment. American Economic Review 48, 261–297.
31. Modigliani, F. and M. H. Miller (1963). Corporate Income Taxes and the Cost of Capital: A Correction. American Economic Review 53, 433–443.
32. Myers, S.C. (1977). Determinants of corporate borrowing. Journal of Financial Economics 5, 147–175.
33. Nivorozhkin, E. (2002). Capital structures in emerging stock market: the case of Hungary. Developing Economies 40 (2), 166– 187.
34. Nivorozhkin, E. (2005). Financing choices of firms in EU accession countries. Emerging Market Review 6, 138–169.
35. OECD (2011). OECD Economic Surveys: Russian Federation 2011, OECD Publishing.
36. Petersen M. A. and R.G. Rajan (1997). Trade credit: theories and evidence. Review of Financial Studies 10 (3), 661-691.
37. Rajan, R. and L. Zingales (1995). What Do We Know About Capital Structure: Some Evidence from International Data. Journal of Finance 50, 1421–1460.
38. Smith, C.W. and R. L. Watts (1992). The Investment Opportunity Set and Corporate Financing, Dividend and Compensation Policies. Journal of Financial Economics 32, 263–292.
39. Strebulaev, I. and B. Yang (2013). The Mystery of Zero-Leverage Firms. Journal of Financial Economics 109 (1), 1-23.
40. Tobin, J. (1958). Estimation of relationships for limited dependent variables. Econometrica (The Econometric Society) 26 (1), 24–36.
41. Titman, S. and R. Wessels (1988). The Determinants of Capital Structure Choice. Journal of Finance 43, 1–21.
42. World Bank (2009_. Global Development Finance 2009: Charting a Global Recovery, Volume 1. Review, Analysis, and Outlook. World Bank. Washington, DC.
43. World Economic Forum (2010). The Global Competitiveness Report 2010–2011. World Economic Forum. Geneva, Switzerland.