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Andreas Stephan • Oleksandr Talavera • Andriy Tsapin

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DIW Berlin
German Institute for Economic Research
Mohrenstr. 58
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Tel. +49 (30) 897 89-0
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Corporate Debt Maturity Choice in Transition Financial Markets*

Andreas Stephan
Jönköping International Business School, DIW Berlin, CESIS Stockholm

Oleksandr Talavera
Aberdeen Business School

Andriy Tsapin
European University Viadrina

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*We are grateful to Oleksandr Antonenko for his excellent assistance. Furthermore, we thank the participants at the annual conference of the German Economic Association for their useful comments and suggestions. Corresponding author: Andriy Tsapin, e-mail: atsapin@euv-ffo.de Mailing address: August-Bebel Str. 12, 15234 Frankfurt (Oder), Germany

Corporate Debt Maturity Choice in Transition Financial Markets

Abstract

This paper investigates the determinants of liability maturity choice in transition markets. We formulate a model of firm value maximization that describes managers' choice of optimal debt structure. The theoretical predictions are tested using a unique panel of 4,300 Ukrainian firms during the period 2000-2005. Our estimates confirm the importance of liquidity, signaling, maturity matching, and agency costs for the liability term structure of firms operating in a transition economy. In addition, we find that companies do not react uniformly to determinants of debt maturity. Firms that mainly rely on external funds are sensitive to signaling and they consider the variability of firm value an important determinant of their debt maturity choice. For less constrained companies that rely more on internal funding, asset maturity is an essential determinant of debt structure.

Keywords: debt maturity, capital structure, transition period, Ukraine.

JEL Classification Numbers: G32, G30, D24

1 Introduction

The optimal term structure of corporate debt has attracted considerable attention in the economics and finance literature. Generally, the literature stresses the role of signaling, liquidity, agency costs, and tax hypotheses in corporate debt maturity decisions (Diamond (1991), Guedes and Opler (1996), Harris and Raviv (1991)). However, a number of the assumptions made in the literature regarding the determinants of debt maturity are not plausible or require modification for firms operating in transition markets (Demirgüc-Kunt and Maksimovic (1998)). In transition financial markets, companies are forced to use relatively expensive external funds. The volatility of the macroeconomic environment and the absence of a credit history increase the likelihood of both loan denial and premium default. In this environment, companies may follow two strategies: (i) try to prolong the maturity of their liabilities so as to reduce the liquidity risk or (ii) act to ensure their credit quality.

The signalling hypothesis implies that rational investors use firms' debt maturity structure to infer private information held by insiders who are better informed than outside investors about the quality of the firm. Flannery (1986) states that undervalued companies prefer high priority claims (e.g. secured short-term debt) to indicate their creditworthiness, while their low-quality counterparts favor long-term debt because they cannot afford to roll over short-term debt in case of positive transaction costs. As an improved credit rating leads to a lower risk premium, debt maturity is negatively related to firm quality. However, the high level of uncertainty and further imperfections of transition financial markets incur significant costs in providing useful information to outsiders. From the creditor's perspective, monitoring of creditworthiness is difficult and expensive (Marr and Ogden (1989)) because the higher volatility during transition makes it difficult to recognize valid signals of creditworthiness (or not).

Information asymmetry gives rise to conflicts between firm insiders and external providers of capital. Firms' managers are conscious that equity is residual claim and, therefore, they might choose riskier operating strategies to transfer wealth from debt to stockholders. If creditors are aware of this conflict of interests, different debt covenants

can be introduced to limit excessive borrowing. Moreover, agency costs can be reduced if firms issue short-term debt and, thus, are evaluated periodically. Information asymmetry and conflict between shareholders and debtholders can be intensified in transition economies for three reasons: (i) lack of shareholder and creditor protection owing to the imperfect legal system; (ii) the high level of uncertainty enables firms with overdue debt to switch to high-risk assets, which increases flotation and/or transaction costs; and (iii) the ownership structure of companies in emerging markets creates potentially higher agency costs because managers dominate the board of directors and have comparatively greater control rights (Harvey, Lins and Roper (2004)). Additionally, Smith and Warner (1979) argue that riskier and smaller companies have higher agency-related costs because managers of small companies have mutual interests with the shareholders since they are holding a larger proportion of the equity. The managers are interested in increasing the equity value even if doing so reduces the firm's total value, behavior that obviously conflicts with the creditors' objectives.

One important strategy firms can employ to reduce agency costs is to match the duration of assets and liabilities. Morris (1976) argues that such a strategy allows firms to decrease uncertainty both over interest costs over the asset's life as well as over the net income that will be derived from the assets. The higher the term premium, the stronger should be the firm's incentive for maturity matching (Emery (2001)). A positive term premium implies that long-term interest rates are higher than short-term rates and, hence, the yield curve is positive. When confronted with a positive yield curve, a firm will prefer to shorten its debt maturity so as to avoid paying an excessive term premium. However, Brick and Ravid (1985) demonstrate that a positive term structure of interest rates encourages companies to use long-term debt to reduce the firm's expected tax liability, which yields the opposite effect on debt maturity. Therefore, it can be presumed that firms with higher marginal tax rates prefer longer-term debt as it helps reduce tax payments and thereby provides an uninterrupted tax shield. Guedes and Opler (1996) point out that long-term debt is particularly beneficial when interest rates are volatile and a stream of taxable earnings is expected; otherwise, the firm

prefers short-term financing. A positive effect of taxes is also predicted by the clientele tax theory, which suggests that only a small fraction of companies can afford to issue long-term debt (Scholes and Wolfson (1992)). Because by their very nature, transition financial markets are characterized by higher volatility of interest rates and restricted access to capital markets, a positive relationship between debt maturity and the tax rate can be expected in these markets.

To shed some light on debt maturity choice in transition economies, a topic thus far neglected in the literature, we model the behavior of a firm that chooses its optimal structure of liabilities.[1] The theoretical model incorporates the tax, liquidity risk, and maturity matching hypotheses. The setup involves managers who make financial and investment decisions so as to maximize the value of the second period undertaking. In the first period, the company is engaged in designing a process for creating its products. To launch the enterprise, short- and long-term debt are used to finance the fixed and working capital, respectively.

The theoretical propositions are tested using a unique panel of 4,300 Ukrainian firms during years 2000-2005. The results provide support for taxes, maturity matching, agency cost, liquidity, and signaling as being key to choosing an optimum debt maturity. We also find that different categories of companies have different sensitivities to changes in the determinants of debt maturity. For firms heavily reliant on external funds, the variability of firm value reduces debt maturity. For these companies, signaling is also a very important determinant of their liabilities maturity. Firms that are less financially constrained and able to self-finance from their retained earnings consider their assets maturity as an essential determinant of debt structure. These companies are usually large companies with lower leverage and less severe cash constraints.

The rest of the paper is organized as follows. The peculiarities of debt maturity choice during the transition period in Ukraine are described in Section 2. Section 3 presents the theoretical considerations that are the basis of our empirical investigation. Section 4 describes the data and empirical results. Section 5 concludes.

[1]We use liabilities/debt interchangeably.

2 Transition Financial Markets and Corporate Finance in Ukraine

After the collapse of Soviet Union, Ukraine faced numerous market imperfections that hampered access to information and adequate external financing. The problem was partly caused by lack of an appropriate legislative basis for the financial system, legislation that finally began to be enacted in 1995, but not completed until 2000.[2] In 1998, a sudden crisis revealed the fragility of the Ukrainian financial market. Subsequent financial defaults created numerous distortions in the financial system. Although the National Bank of Ukraine (NBU) was eventually successful in overcoming this problem and revitalized the financial and credit markets, leading to stabilization, economic agents reacted very slowly to these positive developments. Ukrainian firms faced constant difficulty in obtaining sufficient financing, since a high level of system uncertainty and insufficient financial intermediation triggered high prices for financial resources.[3] In this environment, enterprises looked for cheaper finance alternatives, including, for example, barter, trade credits, and postponed tax liabilities.[4]

The economy's negative tendency (e.g. real GDP growth) persisted until 1999-2000. And even then, despite some progress, many issues remained unsolved. A prolonged recession, coupled with postponed restructuring, aggravated the financial crisis of Ukrainian companies. It appeared that the companies' growing financial needs could not be met solely with internal funds. Firms' demand for external financing increased, even in the face of very high costs of same.

Figure 2 shows the interest rate dynamics in Ukraine during 2000-2005. The observed convergence of interest rates can be attributed to the development of financial markets. However, in the transition phase, market imperfections led to there being very few

[2]Principles and pathways for capital market development were fixed in several Laws of Ukraine, including "On State Regulation of Securities Market in Ukraine" (1996), "On the National Bank of Ukraine" (1999), and "On Banks and Banking" (2000).

[3]The main reasons for the shortage of long-term finance were a high inflation rate and unstable macroeconomic policy.

[4]For instance, in 1999, the barter share was 24 percent of all payments (World Business Environment Survey, World Bank-EBRD, 1999).

alternatives to bank loans as a method of financing. Only 18 percent of companies considered stock issue as the most important way to finance (SCSSM (2004)). The State Commission on Securities and Stock Market reported that more than half of the joint stock companies (59 percent) intended to apply for a bank loan in 2004.

The development of a financial sector simplified access to bank financing. The marked increase in bank lending (from 61 percent to about 74 percent of broad money during the period of investigation) led to a growing role for long-term liabilities (Figure 3). While the banks' share of long-term assets was only 18 percent in 2000, it reached 62 percent in 2005. However, it is worth noting that the relatively low nominal interest rates do not coincide with effective interest rates. For example, since Ukrainian banks find it difficult to make an accurate assessment of a firm's credit rating (because these firms can spread their accounts over several banks) (Johnson (1997)), they tend to increase the price of lending, which comprises both default and liquidity components. As there is a great deal of uncertainty as to the default risk, the debt payments incorporate not only transaction costs but also other commission charges in case of long-term debt, e.g., commission for early repayment.[5] Duenwald, Gueorguiev and Schaechter (2005) point out that the absence of alternative sources of corporate financing in transition financial markets has induced banks to compete with each other over credit terms (e.g., the range and fees for services), rather than on the basis of interest rates.

In addition, Ukrainian-specific bank preferences might distort corporate debt maturity choices as Ukrainian banks avoid lending money to newer and riskier firms and industries (Dewatripont and Maskin (1995)). At the same time, nonbank intermediaries, which are more willing to finance risky projects, are underdeveloped in Ukraine.[6] Thus, banks might discriminate against clients with respect to loan covenants and debt maturity in particular.

Figure 4 illustrates that the debt maturity ratio increased notably in all sectors from

[5]Budina, Garresten and de Jorg (2000) argue that a firm-specific premium is required by banks because of inability to monitor all aspects of investment projects.

[6]For example, Tadesse (2002) finds that bank-based systems better promote economic growth in case of underdeveloped financial sectors.

2000 to 2005. In general, the average debt maturity for firms that use long-term liabilities was 12.1 percent at the beginning of this period and 20.3 percent at the end. The share of firms that applied for long-term bank loans increased from 1.5 percent in 2000 to 15.1 percent in 2005. Less than 5 percent of Ukrainian companies issued bonds in 2000 and more than 15 percent of firms exploited the opportunity to employ long-term financing on capital markets in 2005.

In short, Ukrainian firms faced many obstacles to implementing a reasonable debt policy and the country thus provides an interesting illustration of the motivations behind debt maturity choice in a transition period.

3 Theoretical model

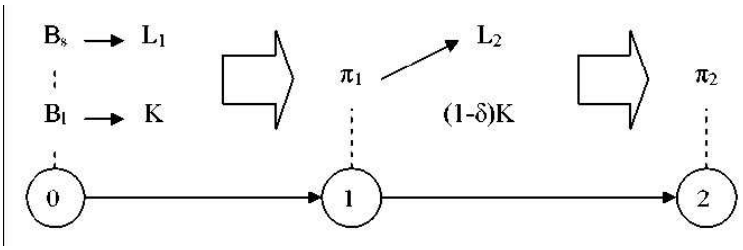
To gain insight into the determinants of debt maturity choice in a transition economy, we model the behavior of a firm over two periods. The managers of this firm make decisions concerning debt maturity that will maximize the firm's wealth at the end of the second period (Figure 1). In the first period, the company is completely devoted to preparing to do business, for example, training employees in a new process, designing or adapting the technology that will be needed to produce its product, and so forth. To launch the project, managers must incur long-term debt, which is invested in capital assets. Short-term debt is used to finance working capital (the labor input) in the first period.[7] The financial result of the first stage is utilized to employ labor, while capital is consumed completely during the design time.

We assume a Cobb-Douglas type of production relationship between inputs and output that can be described by the net revenue function $\pi = AK^{\alpha}L^{\beta}$, where A is total factor productivity, K is capital stock, and L is labor. Capital and labor shares are denoted by α and β respectively. Constant return to scale is assumed, i.e., $\alpha+\beta=1$ (hence $\beta=1-\alpha$).

Positive cash flows are created by external financing (short-term B_s and long-term

[7]Long-term debts are usually used to acquire fixed assets and equipment. Short-term liabilities are frequently used to obtain currently needed capital, such as payroll and inventories.

Figure 1: Model of a firm's behavior.



debts B_l) in the first phase and by turning a profit in the second phase. Negative cash flows include gross interest payments for borrowing (both short-term $R_s B_s$ and long-term $R_l B_l$). Firm value is maximized by

$$W = \max\{A\left[(1-\delta)\,B_l\right]^{\alpha}\left[AB_l^{\alpha}B_s^{(1-\alpha)} - R_s B_s\right]^{(1-\alpha)}(1-\tau)^{(1-\alpha)} - R_l B_l\,(1-\tau)\} \quad (1)$$

subject to

$$B_l \leq \bar{B} \quad (2)$$

where B_l is long-term debt equal to investment expenditures, B_s is short-term debt, K is beginning-of-period capital stock, δ is the constant rate of capital depreciation, and τ denotes the tax rate.

The transition financial market environment implies that there is free access to short-term debt and limited access to long-term debt because of financial frictions (Jaramillo and Schintarelli (2002)). In our model, we introduce financial frictions via a constraint on long-term debt ($B_l \leq \bar{B}$), which, quite reasonably, considering the specifics of our environment, makes these funds more expensive. The multiplier on this constraint, denoted λ is the shadow cost associated with raising external long-term liabilities.

We assume that every successful project enhances creditworthiness. Therefore, the prevalent uncertainty in emerging financial markets forces companies to develop credit

records that improve their reputation and creditworthiness, thereby enhancing their access to capital markets.[8]

Deriving the first-order conditions, the firm's optimal debt maturity choice can be described as:

$$\frac{B_l}{B_s} = \frac{\alpha}{(1-\alpha)} \frac{R_s(1-\tau)}{(1-\delta)} \left(A \frac{(1-\delta)}{R_l(1-\tau)+\lambda} \right)^{\frac{1}{(1-\alpha)}} \tag{3}$$

Equation (3) enables us to derive testable hypotheses on the determinants of debt maturity for the empirical estimations.

Our theoretical model is based on the empirical findings of Demirgüc-Kunt and Maksimovic (1999), who show that firms employ short-term funds to finance current assets, which vary with sales. Thus, the liability structure depends on capital and labor shares in the net revenue function. In line with Emery (2001), we put forth the following hypotheses.

Hypothesis 1: Firms match the maturity of their assets and liabilities.

The $(1-\alpha)$ to α ratio can be interpreted as a firm's liquidity indicator as labor is related to the working and current capital. We expect that firms with more liquid balance sheets are less sensitive to interest payments. A shortage of liquid resources forces a firm to raise external funds, thus increasing the liquidity risk and, hence, reducing debt maturity. Ericsson and Renault (2006) demonstrate that reduction of liquidity risk leads to prolongation of the debt structure and vice versa.

Hypothesis 2: Liquidity risk has a negative effect on debt maturity.

The model predicts an inverse relationship between debt maturity and the long-term interest rate. Decreasing the short-term interest rate leads to a reduction of long-term

[8]The overreliance on short-term finance results from the lack of availability of long-term funds (Chittenden, Hall and Hutchison (1996)). Caprio and Demirgüc-Kunt (1998) interpret the lack of long-term debt in a transition economy to levels of access to financial markets and firms' lack of evidence about their creditworthiness.

debt.[9] Furthermore, the benefits of the tax shield depend on the term structure of interest rates. It is reasonable to expect a positive association between debt maturity and the tax rate. This is in accordance with the idea that a firm raises its value by issuing long-term debt that guarantees that the tax shield will be in place for a longer duration (Newberry and Novack (1999)).

Hypothesis 3: There is a positive relationship between the tax rate and debt maturity.

In a transition environment, corporate debt maturity is shortened due to financial frictions that increase the price of long-term debt. These frictions include, among other things, the extremely high price of accurate information and the underdevelopment of financial institutions. Love (2003) argues that financial development removes restrictions on efficient firm investment by reducing financial constraints. It seems that a company's decision regarding its optimal debt maturity will be affected (and/or distorted) by market constraints.

Hypothesis 4: Less financially constrained companies have more long-term debt.

Thus, we focus in this paper on the tax, maturity matching, and liquidity hypotheses as the most significant determinants of debt maturity choice in general. However, during the transition period, three financial market imperfections are likely to be important for corporate debt decisions – transaction costs, agency costs, and information asymmetry (Marr and Ogden (1989)). Signaling plays an important role, since higher information asymmetry makes evaluation of firm quality more difficult.

Hypothesis 5: Firms with high creditworthiness prefer short-term debt.

Large companies are more transparent and thus creditors can obtain fairly accurate information on them at fairly low cost. Moreover, larger firms are considered to have a lower risk of bankruptcy and, thus, they face fewer constraints on obtaining external financing (Chittenden et al. (1996)).

[9] An increasing share of capital stock causes a higher (inverse) effect of long-term interest rate on debt maturity due to raising of the $1/(1-\alpha)$ power.

Hypothesis 6: Debt maturity is positively related to firm size.

Another type of financing constraint may arise based on the rate at which a company grows. Firms that grow very quickly may be severely constrained because their financing needs exceed their internal resources (Demirgüc-Kunt and Maksimovic (1998)). Binks and Ennew (1996) point out that the faster the company's growth, the more restricted is their access to credit owing to the considerable gap between the collateral valuation of newly acquired assets and their costs.

Hypothesis 7: Firms with high growth opportunities prefer short-term borrowing.

The agency issue can be alleviated by the higher variability of firm value, which can interfere with the firm's ability to payoff its obligations (de Haas and Peeters (2006)). Moreover, higher volatility may induce a firm to frequently revise its capital structure. Kane, Marcus and McDonald (1985) explain this effect as a tradeoff between tax shield advantages, expected bankruptcy costs (our main hypotheses), and transaction costs.

Hypothesis 8: Debt maturity decreases if firm value volatility increases.

Thus, all major hypotheses on the corporate debt maturity choice in transition financial markets have been defined and we can proceed to the estimation of their empirical appropriateness.

4 Empirical implementation

To check the model's predictions about corporate debt maturity choice, we specify the expression for debt maturity as a linear function of the tax rate, asset maturity, leverage, turnover, size, and growth opportunities. Table 1 summarizes our hypotheses and describes the variables and expected signs.

$$DebtMaturity_{it} = \beta_0 + \beta_1(TaxRate)_{it} + \beta_2(AssetMaturity)_{it} + \beta_3(Leverage)_{it} \quad (4)$$

$$+ \quad \beta_4(Turnover)_{it} + \beta_5(GrowthOpportunities)_{it}$$
$$+ \quad \beta_6(Size)_{it} + \beta_7(Volatility_{it}) + \epsilon_{it}$$

where the subscript i refers to firms and the subscript t to periods, *Debt Maturity* is defined as the ratio of long-term debt to total debt, *Tax Rate* is the total tax charge divided by taxable income, *Asset Maturity* is calculated as the ratio of fixed assets to total assets, *Leverage* is the firm's debt to total assets ratio, *Growth Opportunities* denotes the promotion expenses to total sales ratio, *Turnover* is the firm's total sales to total assets ratio, *Size* is a control variable for total assets, *Volatility* is a dummy variable reflecting the variability of firm value, and ϵ_{it} denotes the error term. According to the previous section, it can be expected that β_4, β_5, and β_7 have negative signs, and that β_1, β_2, β_3, β_6 are positive. The equation also includes year and industry dummy variables.

4.1 Data

We use a panel of open joint stock companies during the period 2000-2005 that was collected by SMIDA (State Commission on Securities and Stock Market). The dataset includes detailed information on balance sheet and income. To discard outliers, firm-level variables are truncated at the most extreme (top and bottom) 1 percent level of the distribution on an annual basis. To reduce data errors, we keep only those firms that report positive sales. After these screening procedures, our data contain about 4,300 firms per year. Since firms might have different forms of debt structure across categories of firms, we also investigate the relevance of our hypotheses for sample splits according to size, growth, leverage, and liquidity.

The definition of *long-term debt* is crucial to our analysis. According to "Standards of Accounting in Ukraine," long-term liabilities are defined as those not included in current liabilities. Long-term debt comprises bank loans, prolonged liabilities, other financial long-term liabilities, and other long-term liabilities with a duration of more than one year. Note that Ozkan (2002), in his analysis of U.K. companies, distinguishes

between three types of debt: (i) current (borrowing repayable in one year), (ii) short term (loans due within five years), and (iii) long-term loans (loans for more than five years). Guedes and Opler (1996) consider long-term debt of U.S. corporations to be that with a term that exceeds 30 years. However, as we are investigating debt maturity choice in a transition economy, we believe it is reasonable to define as long-term liabilities having a duration of more than one year.

Table 2 contains descriptive statistics for the variables used in the regression analysis (*Debt Maturity*, *Leverage*, *Size*, *Tax*, *Growth*, *Asset Maturity*). Debt Maturity is a stock variable that reflects the cumulative result of debt decisions. We find a low level of average long-term debt. However, the large variation in *Debt Maturity* (0.116) relative to the mean (0.06) understates the level of long-term debt because a great many Ukrainian firms (about 60 percent) have no long-term debt whatsoever.

Previous studies have used abnormal profit as a proxy for credit quality (Ozkan (2002)). During the period of our study, Ukrainian companies reported, on average, profit rates of about 14 percent. Many Ukrainian firms try to conceal their real profit by adjusting their costs to their turnover so as to avoid excessive scrutiny by taxing authorities. Therefore, we utilize *Turnover* as an alternative measure for abnormal profit. *Turnover* is defined as the ratio of sales to total assets. The tax hypothesis might be confirmed by significance of the tax shield variable, *Tax*, calculated as the total tax charge divided by taxable income.

The variable *Asset Maturity*, which is calculated as the ratio of fixed assets to total assets, allows testing the maturity matching hypothesis. Moreover, a very important strategy for companies in a transition period is to use tangible assets as collateral because the disposal or acquisition of these assets supports a higher debt capacity and they are relatively easy to monitor. However, firms with high leverage hold fewer assets that can be used as collateral (notably lower value of *Tangibility* in Table 4), so banks (or other financiers) probably rely, instead, on other characteristics, such as higher turnover and better credit rating, when making loan decisions. Our proxy for the firm value variability takes value one within the 25 percent range of the standard deviation of

$[(EBIT_t/Sales_t) - (EBIT_{t-1}/Sales_{t-1})]$, and zero otherwise.

Size and *Growth* are control variables used to examine the hypothesis about conflict between shareholders and creditors. The natural logarithm of total assets is used to proxy firm size, which is an explanatory variable for testing the agency cost hypothesis. *Growth* is defined as the promotion expenses to total sales ratio. The choice of proxy for growth is motivated by the idea that in a transition period, firms are compelled to advertise in order to gain any ground in the market. Scott and Bruce (1987) note that during a firm's growth and expansion stages, the key issues for firms are to finance the growth and to maintain a competitive advantage, which requires additional promotion expenses. Bandyopadhyay and Kumar Das (2005) show that promotion expenses boost sales growth in the long run. Moreover, in the marketing literature, the promotion expenses to sales ratio is treated as an indicator of product quality, which is positively related to the firm's market growth (Carpenter (1987)).

4.2 Estimation of the model and discussion of the results

Equation (4) is used to estimate the determinants of corporate debt maturity. To avoid the problem of possible endogeneity, we use lagged values of variables instead of current values. We calculate censored regressions because the dependent variable is restricted to the range from zero to one and a large number of firms do not have long-term liabilities.[10] Moreover, firm heterogeneity is likely to be relevant here. Therefore, we chose to apply the Tobit model with random (RE) and fixed (FE) effects for the estimations. If firm-specific effects and the explanatory variables are correlated, then the fixed-effects Tobit model is expected to give more reliable estimates, though it should be noted that this model produces biased estimates due to the incidental parameter problem (Greene (2004)).[11]

In our model, the explanatory variables influence the conditional mean of debt ma-

[10]Firms that have no long-term liabilities at all are smaller, more profitable (14.5 percent vs. 13.9 percent), have lower leverage ratio, and have notably larger turnover. Apparently, companies without long-term debt have less severe cash constraints and prefer financing by internal funds. Actually, the higher level of debt maturity is intrinsic to less constrained firms (Tables 3 and 4).

[11]Note that in the case of the fixed-effects model, the industry effects are not estimable.

turity in the positive part of the distribution. At the same time, regressors affect the probability that the observation will be in this part of the distribution. The marginal effects are evaluated at the sample means of the observations.

4.2.1 Results for All Firms

We run several sets of regressions and compare the results with respect to different subsamples. The coefficients and marginal effects for the expected value of Debt Maturity conditional on being uncensored are reported in Tables 5-7. Table 5 sets out the estimated parameters of determinants of debt maturity for all firms. Debt maturity is positively related to *Leverage*, *Size*, *Assets Maturity*, and *Tax*, and negatively related to *Turnover* and *Volatility*. All these coefficients have the predicted signs and are significant. The positive coefficient for *Leverage* is consistent with arguments that long maturity leads to attenuating liquidity risk, which can be equivalent to reducing expected bankruptcy costs (Johnson (2003)). The economic impact ranges from 9 percent to 19.6 percent for random- and fixed-effects models, respectively.

Companies need to choose an optimal debt structure in order to weaken their dependence on the refinancing decisions of creditors who require a confirmation of creditworthiness. There are several ways a firm can prove it capacity to repay debt: high credit rating, high turnover, and growth opportunities. Obviously, a good credit rating and reputation enhance the probability of obtaining credit. Unfortunately, firm age, which is often used as a proxy for credit rating and reputation, cannot be used as such here because the recent procedure for firm registration in Ukraine causes a bias in relevant data.[12] The most convenient way to confirm credit quality in an environment of underdeveloped capital markets monopolistic banks is to use collateral.[13] However, to signal their creditworthiness, Ukrainian firms most likely demonstrate stable turnover or point out their growth potential, instead of bringing up the issue of collateral, because in many cases the assets that could be considered collateral are hopelessly obsolete and

[12]Some firms have been operating for a long time but reregistered as new ones.

[13]Boot and Thakor (1994) argue that collateral is efficient in early stages of a banking relationship to solve moral hazard problems of investment.

of little value on a competitive market. There is a negative association between debt maturity and firm credit quality measured by *Turnover* (Table 5). This result supports the findings of Flannery (1986) and Harris and Raviv (1991), who suggest that riskier firms with lower creditworthiness try to prolong the maturity of their liabilities as they are crucially dependent on refinancing. This sort of behavior appears to be appropriate for firms that are forced to enhance the productivity of their assets; it can be explained as an attempt to avoid an additional burden of long-term interest payments, as was predicted by our theoretical model.

Signaling can be especially important for small firms that have comparatively lower creditworthiness. Small companies need to look for niche market credit because the larger companies can use their advantages of scales to issue debt.[14] On the other hand, in transition economies, both large and small firms prefer bank debt seeing as in such an environment, bank financing is likely to be more stable that that derived from a stock issue.[15]

A negative relationship between debt maturity and the volatility of firm value is found, which confirms that uncertainty might influence the signaling behavior of companies in transition. Such a finding implies that a higher profit to sales variability increases the risk that a company will not be able to cover its interest payments. At the same time, volatility of firm value and comparatively higher uncertainty about a firm's cash flow mitigate the agency problem. The results for the general sample show an ambiguous relationship between debt maturity and growth, and significant impact of *Size*. Our findings also reveal a significant positive association between *Debt* and *Asset Maturity* that is in agreement with Morris (1976), who argues that firms adjust cash flows because maturity matching allows them to control the agency conflicts (Table 5).

The influence of taxes on debt maturity is a worthy topic on its own as previous empirical studies have reported quite controversial findings. Barclay and Smith (1995) cannot confirm that taxes affect debt structure. Ozkan (2002) assumes an inverse rela-

[14]Titman and Wessels (1988) state that larger companies have easier access to the capital markets.

[15]Blackwell and Kidwell (1988) argue that search costs for bank loans are less sensitive to interest rate volatility.

tionship between debt maturity and the corporate tax rate but the empirical analysis disproved this idea. Newberry and Novack (1999) assert a positive impact of the tax rate on debt maturity. Despite the possible negative term structure of interest rates in a transition economy, the current study cannot confirm the impact of taxes. Thus, the regression results provide strong support for all but two of our hypotheses. The two no confirmed are those concerning tax and growth opportunities (Hypothesis 3 and Hypothesis 7).

4.2.2 Results for Subsamples of Firms

Having established the determinants of debt maturity, we now discuss the results from the subsamples analyses. The estimated coefficients associated with *Leverage* and *Size* indicate that debt maturity decisions across subsamples are affected by the liquidity risk and the agency issue.

Examination of our model for the subsamples of large and small firms shows that large companies have comparatively more growth opportunities, which underlines the relevance of the agency issue for these firms (Tables 3 and 6). The economic impact of growth opportunities is 15.5 percent for the random effects model and approaches 30 percent in the alternative model; in both cases the coefficients are significant at the 1 percent level. Furthermore, to reduce agency costs, large firms match the maturities of liabilities and assets, whereas small companies generally do not.

The relatively high tax burden borne by large companies makes them more prone to use the tax shield but the relationship between debt maturity and tax rate is ambiguous for large firms (Tables 3, 4, and 6).[16] Small firms do not consider taxes an important factor of their debt structure.

Table 6 also contains the results of regressions for companies with different levels of market growth. As expected, firms with high sales growth are compelled to lower

[16]Ukrainian firms frequently operate under tax breaks and prolonged budget liabilities, mainly because the fiscally-oriented tax system of Ukraine induces firms to consider taxable income as an object of accounting policy. As a result, Ukrainian companies systematically announce losses to avoid taxation. For example, the share of unprofitable firms is 55.7 percent for 1999 and 34.2 percent for 2005 (State Statistics Committee of Ukraine).

their debt maturity to reduce agency costs; the same is not necessary for their low growth counterparts.[17] These last finding exposes a common characteristic of transition economies and corroborates our growth hypothesis (Hypothesis 7). The economic impact of the promotion expenses ratio on liabilities maturity is 37.7 and 39.6 percent in the random and fixed effects models, respectively.

For high growth firms, higher income variability attenuates the underinvestment problem, lowering the related agency costs of debt (de Haas and Peeters (2006)). This occurs because the effect of firm value volatility tends to make these companies to choose optimal debt maturity (Table 6). At the same time, firm value variability emphasizes the essential role of signaling. A negative significant relationship between debt maturity and turnover for firms with high market growth is in line with the signalling theory. It implies that these companies tend to signal their quality by demanding more short-term debt. Unlike firms with high market growth, low growth firms are very sensitive to the tax rate despite their weak tax burden.[18] The coefficient for *Tax* has the predicted positive sign and its economic impact is substantial (Table 6). Thus, the tax hypothesis is confirmed only for firms with low growth opportunities.

Table 7 reports the outcomes of regressions for firms with different levels of leverage. Note that companies with a high leverage ratio do not take liquidity risk into consideration when choosing their debt maturity. The optimal debt structure for these firms is extremely dependent on the firm value variability. The economic influence appears to be substantial (4.7 percent in both models). Due to the great importance of volatility, companies with a higher leverage ratio tend to shorten their debt maturity in order to signal their credit quality. Firms with high leverage have bigger turnover in comparison with their counterparts, but they possess fewer assets that can be used as debt provisions (Table 4). For instance, Graham et al. (1998) argue that companies with less liquid balance sheets have a greater possibility of using a mortgage to obtain long-term

[17]Stohs and Mauer (1996) find that debt maturity does not decrease when growth opportunities increases because firms with high growth have lower leverage and therefore there is no need to reduce the interests conflicts between shareholders and creditors.

[18]Graham, Lemmon and Schallheim (1998) find that firms with low tax rates have lower leverage and lease more equipment instead of buying it.

financing. However, tangible assets in the Ukraine are generally very obsolete (about 55 percent of initial value for our sample) and it is reasonable to conclude that firms have few resources to pledge as collateral. Thus, it appears that, to confirm their creditworthiness, low leveraged companies prefer utilizing growth opportunities as a kind of collateral, as they are more profitable than their counterparts. Moreover, these companies face more severe agency problems, which are confirmed in the estimation results by the simultaneous significant economic impact of *Size*, *Growth*, and *Asset Maturity*.

The results for firms with low and high liquidity are demonstrated in Table 7. The level of liquidity indicates cash constraints as it is defined as the current assets to current liabilities ratio. Firms with severe cash constraints have comparatively higher levels of leverage, but lower debt maturity (Table 4). Obviously, the shortage of liquidity induces such firms to focus on short-term obligations to signal their quality, despite lower turnover and profitability.

As expected, the economic effect of the agency issue is especially strong for firms with weaker cash constraints. This result supports the maturity matching hypothesis for companies with high liquidity, whereas their low liquidity counterparts do not adjust assets and liabilities maturities when selecting their optimal debt structure. The estimated coefficients for *Size* and *Growth* are significant for both subsamples, and the influence on debt maturity is larger in case of high liquidity firms. The economic impact of asset maturity for liquid firms varies from 3.5 percent to 20.0 percent for random and fixed specifications, respectively.

5 Conclusions

This paper investigates the determinants of debt maturity choice in transition markets. We formulate a theoretical model where firms make investment and debt maturity decisions to maximize the value of a multistage business. The model shows that managers balance the elasticity of short- and long-term debt with regard to the structure of invested capital. The external long-term financing is constrained since financial frictions exist and, thus, these funds are more expensive compared to short-term financial

resources.

By employing a panel dataset of balance sheets and income statements from open joint stock Ukrainian companies over the period 2000-2005 we find sufficient evidence to support our hypotheses relating to the relevance of liquidity, signaling, maturity matching, and agency costs. The estimated effects are consistent with the predictions from the theoretical model. In general, we find evidence that the debt maturity choice of companies in transition markets is different from that of companies operating in developed markets. The empirical results also indicate that different groups of firms have different sensitivity with regard to changes in the determinants of liabilities maturity.

Several features of corporate finance in transition are worth special note. First, despite the great importance of liquidity, we find no evidence that companies with a high leverage ratio take liquidity risk into consideration when choosing debt maturity. Second, we find a significant positive effect of the tax rate on liability structure, but only for companies with low market growth. This is surprising on the one hand, considering the generally low tax burden of these companies. However, on the other hand, this result is compatible with the tax clientele argument, since companies with low growth have restricted ability to issue long-term debt. Third, signaling is especially important for companies that are less profitable and have more severe cash constraints. Fourth, the agency problem is intensified in transition economies for less constrained companies. These firms also consider asset maturity as an essential determinant of the debt structure. In contrast, companies that have a greater reliance on external finance face a comparatively weaker agency problem. The related agency costs are lower because the higher income variability of these firms erodes their capacity to cover their interest and credit payments.

From the economic policy perspective, our results indicate that firms' liability structures are strongly affected by specific characteristics of transition financial markets, implying that there is a pressing need to facilitate this phase of financial market development toward more stability. Financial market development would remove restrictions on efficient firm investment by reducing financial constraints (Love (2003)). Moreover,

it would be useful to implement a legal requirement concerning the reporting of the effective credit rate to avoid confusing debtors and undervaluing their liquidation rates. Banks in transition financial markets charge additional commissions for long-term loans, thus increasing the cost of long-term financing and potentially distorting firms' financial decisions. Our study underlines that underdeveloped transition financial markets are an impediment to prudent long-term financing of companies.

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Appendix 1: Theoretical model

A firm maximizes

$$W = \max\{A\left[(1-\delta)\,B_l\right]^{\alpha}\left[AB_l^{\alpha}B_s^{(1-\alpha)} - R_sB_s\right]^{(1-\alpha)}(1-\tau)^{(1-\alpha)} - R_lB_l\,(1-\tau)\} \quad (5)$$

subject to $B_l \leq \bar{B}$

The first order conditions are as follows:

$$\begin{aligned} B_l : W_l^{'} &= \alpha A(1-\delta)^{\alpha}B_l^{\alpha-1}[AB_l^{\alpha}B_s^{(1-\alpha)} - R_sB_s]^{(1-\alpha)}(1-\tau)^{(1-\alpha)} \\ &+ \alpha(1-\alpha)A(1-\delta)^{\alpha}B_l^{\alpha}AB_s^{(1-\alpha)}B_l^{\alpha-1}[AB_l^{\alpha}B_s^{(1-\alpha)} - R_sB_s]^{-\alpha}(1-\tau)^{(1-\alpha)} \\ &- R_l(1-\tau) - \lambda = 0 \end{aligned} \quad (6)$$

$$\begin{aligned} B_s : W_s^{'} &= (1-\alpha)A(1-\delta)^{\alpha}(1-\tau)^{(1-\alpha)}B_l^{\alpha}[AB_l^{\alpha}B_s^{(1-\alpha)} - R_sB_s]^{-\alpha} \\ &\times \quad [A(1-\alpha)B_l^{\alpha}B_s^{-\alpha} - R_s] = 0 \end{aligned} \quad (7)$$

$$\lambda : \bar{B} - B_l \geq 0 \quad (8)$$

Expression eq. (7) gives:

$$B_l^{\alpha}B_s^{(1-\alpha)} = \frac{R_sB_s}{A(1-\alpha)} \quad (9)$$

Assuming constant returns to scale simplifies the following transformations. Substituting (9) into (6), we can rewrite the equation:

$$(1-\delta)^{\alpha}\,(1-\tau)^{(1-\alpha)}\,B_l^{\alpha-1}\left[\frac{R_sB_s}{(1-\alpha)} - R_sB_s\right]^{(1-\alpha)}(\alpha A + (1-\alpha)A) = R_l\,(1-\tau) + \lambda \quad (10)$$

Finally, the optimal level of debt maturity is:

$$\frac{B_l}{B_s} = \frac{\alpha}{(1-\alpha)}\frac{R_s\,(1-\tau)}{(1-\delta)}\left(A\frac{(1-\delta)}{R_l\,(1-\tau)+\lambda}\right)^{\frac{1}{(1-\alpha)}} \quad (11)$$

Figure 2: Interest rates in Ukraine

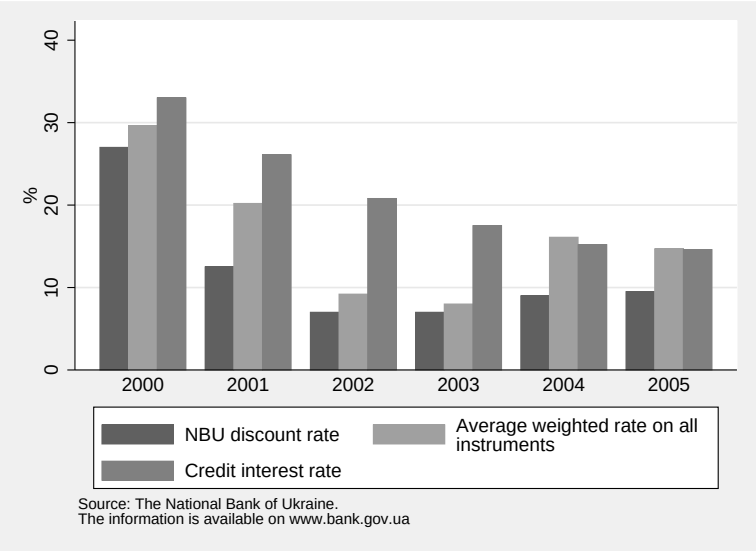

Figure 3: Term structure of credits in Ukraine, 2000-2005

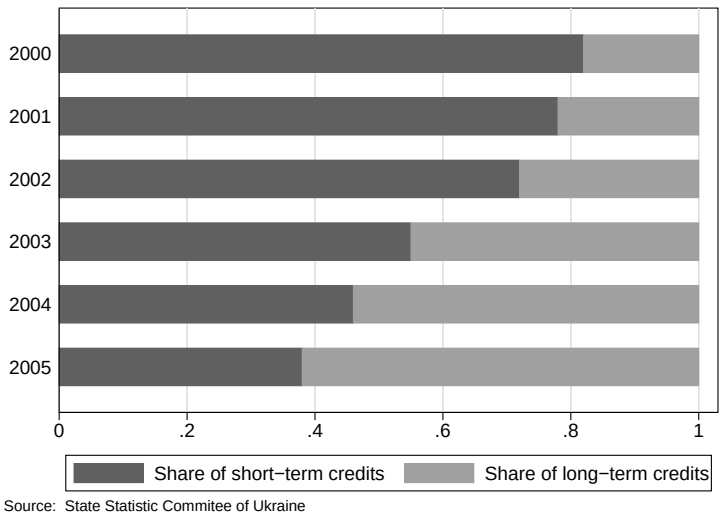

Figure 4: Corporate Long-term Debt across Industries in Ukraine, 2000 and 2005

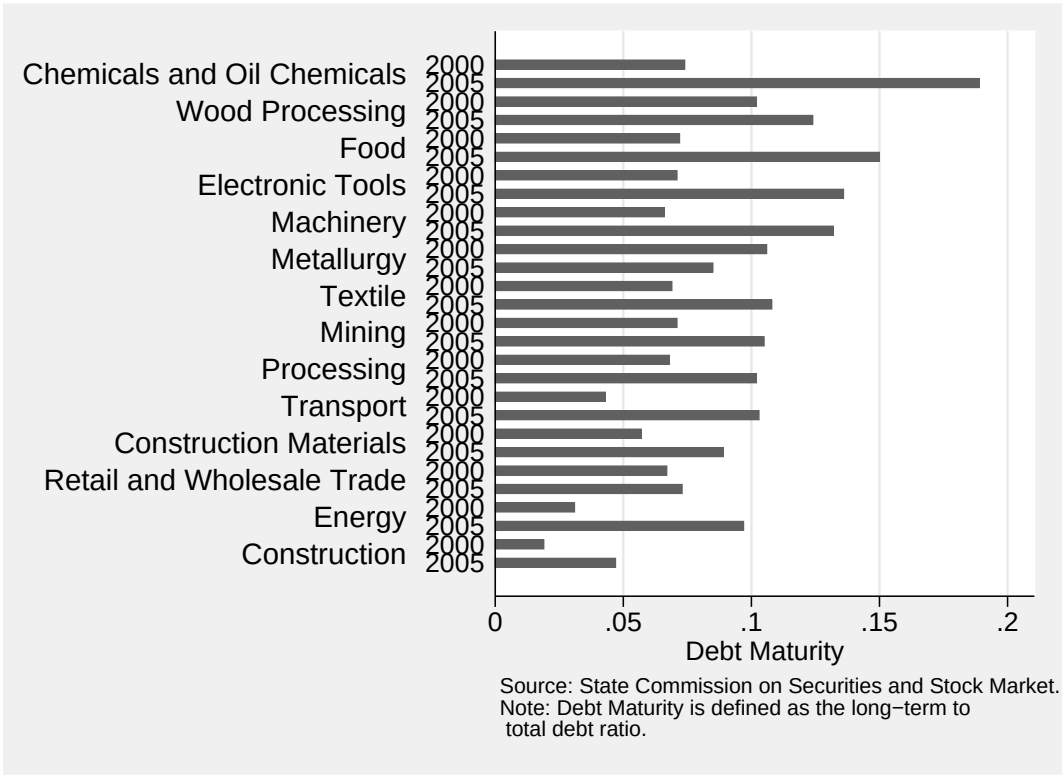

Table 1: Hypotheses, Variables and Expected signs

Hypothesis	Variable	Definition	Expected sign
Taxes	Tax	$\frac{tx_{it}}{EBIT_{it}}$	+/-
Liquidity risk	$Leverage$	$\frac{B_{it}}{TA_{it}}$	+
Maturity matching	$Asset\ Maturity$	$\frac{FA_{it}}{TA_{it}}$	+
Agency cost	$Growth$	$\frac{E^p_{it}}{S_{it}}$	-
Agency cost	$Size$	$log(TA_{it})$	+
Signaling	$Turnover$	$\frac{S_{it}}{TA_{it}}$	-

Note: it denotes firm i at time t, $tx_{it}/EBIT_{it}$ is the total tax charge divided by taxable income, FA_{it}/TA_{it} is calculated as the fixed assets to total assets ratio. B_{it}/TA_{it} is the firm's debt to total assets ratio, E^p_{it}/S_{it} denotes the promotion expenses to total sales ratio, S_{it}/TA_{it} is the firm's total sales to total assets ratio, and $log(TA_{it})$ denotes control variable for size.

Table 2: Descriptive statistics 2000-2005

Variable	μ	σ	Min	$1st\ Qrtl.$	$Midpoint$	$3rd\ Qrtl.$	Max
Debt Maturity	0.060	0.116	0.000	0.156	0.312	0.468	0.624
Leverage	0.270	0.210	0.021	0.278	0.535	0.792	1.049
Size	8.199	1.238	5.718	7.258	8.798	10.338	11.877
Turnover	0.750	0.676	0.026	1.007	1.987	2.967	3.948
Asset Maturity	0.664	0.176	0.191	0.381	0.572	0.762	0.953
Tax Rate	0.076	0.143	0.000	0.175	0.350	0.525	0.700
Growth Opportunities	0.020	0.037	0.000	0.051	0.103	0.154	0.205

Note: Table shows the descriptive statistics for the sample of Ukrainian open joint stock companies 2000-2005. Number of observations is 12,268. *Debt Maturity* is defined as the ratio of long-term debt to total debt. *Leverage* is the firm's debt to total assets ratio. *Size* is the natural logarithm of total assets. *Growth Opportunities* denotes the promotion expenses to total sales ratio. *Turnover* is the firm's total sales to total assets ratio. *Asset Maturity* is calculated as the fixed assets to total assets ratio. *Tax Rate* is the total tax charge divided by taxable income.

Table 3: Descriptive statistics 2000-2005

	Small (N=4,274)		Large (N=4,151)		*Low Growth* (N=3,936)		*High Growth* (N=4,285)	
Variable	μ	σ	μ	σ	μ	σ	μ	σ
Debt Maturity	0.050	0.105	0.070	0.126	0.058	0.110	0.063	0.122
Leverage	0.252	0.199	0.288	0.219	0.260	0.204	0.274	0.213
Size	7.208	0.582	9.202	0.862	7.993	1.182	8.397	1.259
Growth Opportunities	0.018	0.038	0.023	0.034	0.021	0.039	0.020	0.034
Turnover	0.717	0.669	0.783	0.683	0.595	0.570	0.898	0.732
Asset Maturity	0.683	0.172	0.645	0.178	0.685	0.173	0.645	0.176
Tax Rate	0.052	0.124	0.100	0.158	0.049	0.121	0.102	0.158
Profitability	0.141	0.093	0.144	0.090	0.139	0.092	0.147	0.090
Tangibility	0.920	0.169	0.868	0.190	0.895	0.184	0.897	0.173

Note: Table shows the descriptive statistics for the sample of Ukrainian open joint stock companies 2000-2005. *Debt Maturity* is defined as the ratio of long-term debt to total debt. *Leverage* is the firm's debt to total assets ratio. *Size* is the natural logarithm of total assets. *Growth Opportunities* denotes the promotion expenses to total sales ratio. *Turnover* is the firm's total sales to total assets ratio. *Asset Maturity* is calculated as the fixed assets to total assets ratio. *Tax Rate* is the total tax charge divided by taxable income. *Tangibility* is defined as the tangible to fixed assets ratio.

Table 4: Descriptive statistics 2000-2005

	Low Leverage (N=4,859)		*High Leverage* (N=3,566)		*Low Liquidity* (N=3,541)		*High Liquidity* (N=4,884)	
Variable	μ	σ	μ	σ	μ	σ	μ	σ
Debt Maturity	0.051	0.106	0.072	0.128	0.057	0.108	0.062	0.122
Leverage	0.138	0.089	0.450	0.192	0.395	0.216	0.179	0.149
Size	8.131	1.206	8.290	1.275	8.186	1.245	8.208	1.233
Growth Opportunities	0.020	0.036	0.021	0.037	0.020	0.038	0.020	0.036
Turnover	0.658	0.618	0.877	0.731	0.725	0.681	0.767	0.673
Asset Maturity	0.707	0.160	0.605	0.180	0.700	0.177	0.639	0.171
Tax Rate	0.078	0.145	0.073	0.140	0.051	0.122	0.094	0.154
Profitability	0.150	0.093	0.134	0.089	0.129	0.089	0.151	0.092
Tangibility	0.914	0.158	0.867	0.206	0.880	0.201	0.905	0.165

Note: Table shows the descriptive statistics for the sample of Ukrainian open joint stock companies 2000-2005. *Debt Maturity* is defined as the ratio of long-term debt to total debt. *Leverage* is the firm's debt to total assets ratio. *Size* is the natural logarithm of total assets. *Growth Opportunities* denotes the promotion expenses to total sales ratio. *Turnover* is the firm's total sales to total assets ratio. *Asset Maturity* is calculated as the fixed assets to total assets ratio. *Tax Rate* is the total tax charge divided by taxable income. *Tangibility* is defined as the tangible to fixed assets ratio. The level of liquidity is defined as the current assets to current liabilities ratio and indicates cash constrains.

Table 5: Determinants of debt maturity for all firms

	(RE)	(FE)
$Leverage_{it-1}$	0.228***	0.200***
	(11.793)	(10.622)
	[0.090]	[0.196]
$Size_{it-1}$	0.029***	0.033***
	(8.919)	(7.514)
	[0.012]	[0.032]
$Growth_{it-1}$	-0.339***	-0.097
	(-3.304)	(-1.136)
	[-0.134]	[-0.095]
$Turnover_{it-1}$	-0.038***	-0.028***
	(-5.171)	(-4.363)
	[-0.015]	[-0.027]
Tax_{it-1}	0.099***	-0.003
	(3.252)	(-0.131)
	[0.039]	[-0.003]
$Asset\ Maturity_{it-1}$	0.046**	0.079***
	(1.987)	(3.434)
	[0.018]	[0.077]
$Volatility_{it-1}$	-0.026***	-0.016*
	(-2.933)	(-1.725)
	[-0.010]	[-0.016]
Log-L	-1102.670	1262.240
$E(y\|y>0)$	0.060	0.137
$McFadden\ Pseudo-R^2$	0.527	
N	8,425	8,425

Note: Dependent Variable is $Debt\ Maturity_{it}$. RE=random effects, FE=fixed effects. Each equation includes year and industry dummy variables. Reference category for industry effects is Mining (a heavily subsidized sector). Standard errors are reported in the parentheses. The marginal effects for the expected mean value of debt maturity conditional on being uncensored are indicated in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%.
Debt Maturity is defined as the ratio of long-term debt to total debt. *Leverage* is the firm's debt to total assets ratio. *Size* is the natural logarithm of total assets. *Growth Opportunities* denotes the promotion expenses to total sales ratio. $Turnover$ is the firm's total sales to total assets ratio. *Asset Maturity* is calculated as the fixed assets to total assets ratio. Tax is the total tax charge divided by taxable income. $Volatility$ is a dummy variable reflecting the variability of firm value.

Table 6: Determinants of debt maturity: small and large firms, firms with low and high growth

	Small		*Large*		*Low Growth*		*High Growth*	
	(RE)	(FE)	(RE)	(FE)	(RE)	(FE)	(RE)	(FE)
$Leverage_{it-1}$	0.288***	0.228***	0.185***	0.134***	0.187***	0.131***	0.271***	0.080***
	(8.579)	(7.113)	(7.787)	(5.395)	(6.615)	(4.622)	(9.806)	(3.212)
	[0.090]	[0.229]	[0.088]	[0.133]	[0.073]	[0.131]	[0.109]	[0.072]
$Size_{it-1}$	0.056***	0.077***	0.022***	0.034***	0.028***	0.072***	0.030***	0.038***
	(5.843)	(7.093)	(4.101)	(4.978)	(5.502)	(10.666)	(6.417)	(6.537)
	[0.018]	[0.078]	[0.011]	[0.034]	[0.011]	[0.072]	[0.012]	[0.034]
$Growth_{it-1}$	-0.370**	-0.037	-0.327**	-0.301**	-0.301**	0.090	-0.377**	-0.396***
	(-2.358)	(-0.321)	(-2.272)	(-2.198)	(-2.113)	(0.830)	(-2.486)	(-2.737)
	[-0.117]	[-0.037]	[-0.155]	[-0.298]	[-0.117]	[0.090]	[-0.151]	[-0.358]
$Turnover_{it-1}$	-0.052***	-0.014	-0.019**	-0.003	-0.052***	-0.008	-0.026**	-0.035***
	(-4.182)	(-1.286)	(-2.026)	(-0.390)	(-4.280)	(-0.650)	(-2.558)	(-4.145)
	[-0.016]	[-0.014]	[-0.009]	[-0.003]	[-0.020]	[-0.008]	[-0.010]	[-0.031]
Tax_{it-1}	0.082	-0.002	0.083**	-0.050**	0.117**	0.081**	0.081**	0.001
	(1.447)	(-0.042)	(2.297)	(-1.969)	(2.203)	(2.385)	(2.033)	(0.047)
	[0.026]	[-0.002]	[0.040]	[-0.050]	[0.046]	[0.081]	[0.032]	[0.001]
$Asset\ Maturity_{it-1}$	0.033	0.123***	0.070**	0.110***	0.021	0.040	0.063*	-0.024
	(0.918)	(3.348)	(2.242)	(3.514)	(0.635)	(1.106)	(1.827)	(-0.728)
	[0.010]	[0.123]	[0.033]	[0.109]	[0.008]	[0.040]	[0.025]	[-0.022]
$Volatility_{it-1}$	-0.038**	-0.023	-0.015	0.018	0.000	-0.063***	-0.043***	-0.030**
	(-2.227)	(-1.310)	(-1.393)	(1.474)	(-0.025)	(-4.179)	(-3.537)	(-2.434)
	[-0.012]	[-0.023]	[-0.007]	[0.018]	[-0.001]	[-0.063]	[-0.017]	[-0.002]
Log-L	-647.663	468.216	-412.251	743.791	-508.437	575.552	-571.168	684.190
$E(y\|y>0)$	0.046	0.308	0.074	0.160	0.057	0.269	0.063	0.091
$McFadden\ Pseudo-R^2$	0.500		0.557		0.510		0.530	
N	4,274	4,274	4,151	4,151	3,936	3,936	4,285	4,285

Note: Dependent Variable is $Debt\ Maturity_{it}$. RE=random effects, FE=fixed effects. Each equation includes year and industry dummy variables. Reference category for industry effects is Mining (a heavily subsidized sector). Standard errors are reported in the parentheses. The marginal effects for the expected mean value of debt maturity conditional on being uncensored are indicated in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%.
Debt Maturity is defined as the ratio of long-term debt to total debt. *Leverage* is the firm's debt to total assets ratio. *Size* is the natural logarithm of total assets. *Growth Opportunities* denotes the promotion expenses to total sales ratio. *Turnover* is the firm's total sales to total assets ratio. *Asset Maturity* is calculated as the fixed assets to total assets ratio. *Tax* is the total tax charge divided by taxable income. *Volatility* is a dummy variable reflecting the variability of firm value.

Table 7: Determinants of debt maturity: firms with low and high leverage, firms with low and high liquidity

	Low Leverage		*High Leverage*		*Low Liquidity*		*High Liquidity*	
	(RE)	(FE)	(RE)	(FE)	(RE)	(FE)	(RE)	(FE)
$Leverage_{it-1}$	0.358***	0.284***	0.107***	0.029	0.169***	0.135***	0.463***	0.277***
	(5.870)	(5.063)	(3.542)	(1.188)	(5.716)	(5.470)	(10.191)	(7.186)
	[0.119]	[0.262]	[0.051]	[0.029]	[0.074]	[0.133]	[0.169]	[0.264]
$Size_{it-1}$	0.036***	0.033***	0.023***	0.039***	0.023***	0.032***	0.037***	0.029***
	(7.494)	(4.439)	(4.923)	(8.282)	(5.725)	(6.224)	(7.064)	(4.820)
	[0.011]	[0.030]	[0.011]	[0.040]	[0.010]	[0.032]	[0.013]	[0.028]
$Growth_{it-1}$	-0.441***	-0.328**	-0.261*	-0.047	-0.327**	-0.184*	-0.594***	-0.465***
	(-3.012)	(-2.392)	(-1.713)	(-0.421)	(-2.529)	(-1.738)	(-3.633)	(-3.692)
	[-0.146]	[-0.303]	[-0.124]	[-0.047]	[-0.142]	[-0.182]	[-0.216]	[-0.444]
$Turnover_{it-1}$	-0.036***	0.005	-0.044***	-0.039***	-0.026***	-0.041***	-0.045***	0.007
	(-2.907)	(0.450)	(-4.613)	(-5.043)	(-2.676)	(-5.842)	(-3.797)	(0.733)
	[-0.012]	[0.005]	[-0.021]	[-0.038]	[-0.011]	[-0.041]	[-0.016]	[0.007]
Tax_{it-1}	0.034	-0.045	0.202***	-0.030	0.132***	-0.039	0.072	-0.040
	(0.715)	(-1.387)	(4.686)	(-1.049)	(3.056)	(-1.481)	(1.581)	(-1.350)
	[0.011]	[-0.041]	[0.096]	[-0.029]	[0.057]	[-0.028]	[0.026]	[-0.038]
$Asset\ Maturity_{it-1}$	0.069*	0.095**	0.020	0.004	0.063*	-0.023	0.097**	0.210***
	(1.917)	(2.436)	(0.638)	(0.140)	(1.675)	(-0.703)	(2.401)	(5.198)
	[0.023]	[0.087]	[0.010]	[0.004]	[0.027]	[-0.022]	[0.035]	[0.200]
$Volatility_{it-1}$	-0.020	-0.020	-0.047***	-0.047***	-0.034***	-0.009	-0.031**	-0.019
	(-1.576)	(-1.285)	(-3.585)	(-3.851)	(-2.672)	(-0.659)	(-2.388)	(-1.467)
	[-0.007]	[-0.018]	[-0.022]	[-0.047]	[-0.015]	[-0.009]	[-0.011]	[-0.018]
Log-L	-749.283	494.635	-314.999	752.021	-292.095	822.027	-754.130	568.425
LogLNoRE	-1448.280	0.000	-783.195	0.000	-673.222	0.000	-1574.710	0.000
$E(y\|y>0)$	0.049	0.107	0.075	0.130	0.059	0.117	0.060	0.120
$McFadden\ Pseudo-R^2$	0.483		0.598		0.566		0.521	
N	4,859	4,859	3,566	3,566	3,541	3,541	4,884	4,884

Note: Dependent Variable is $Debt\ Maturity_{it}$. RE=random effects, FE=fixed effects. Each equation includes year and industry dummy variables. Reference category for industry effects is Mining (a heavily subsidized sector). Standard errors are reported in the parentheses. The marginal effects for the expected mean value of debt maturity conditional on being uncensored are indicated in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%.
Debt Maturity is defined as the ratio of long-term debt to total debt. *Leverage* is the firm's debt to total assets ratio. *Size* is the natural logarithm of total assets. *Growth Opportunities* denotes the promotion expenses to total sales ratio. *Turnover* is the firm's total sales to total assets ratio. *Asset Maturity* is calculated as the fixed assets to total assets ratio. *Tax* is the total tax charge divided by taxable income. *Volatility* is a dummy variable reflecting the variability of firm value.