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The Determinants of Corporate Debt Maturity Structure: Evidence from Czech Firms*

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Abstract
This paper investigates the determinants of the maturity structure of Czech corporate debt. A theoretical section provides an overview of contemporary theories on corporate debt maturity structure. An empirical section describes an econometric model that shows that long-term debt increases with company size and leverage and asset maturity. The impact of growth options, collateralizable assets, corporate-tax rate, and company-level volatility proves statistically insignificant. Finally, the paper discusses the limitations of the results in terms of data, variables, and determinants.

1. Introduction

If we consider decision-making in corporate finance, we can observe two main areas of interest. Besides the debt-versus-equity decision-making (where we can find extensive research in the area of capital structure) there is also the factor of debt maturity, which is of the same importance but is usually not the focus of financial research. Surprisingly, there is rather little empirical evidence on determinants of the corporate debt maturity structure. One of the early papers is by Morris (1975), who focused on U.S. firms. Also, the other authors cover mainly U.S. firms (Mitchell, 1993), (Scherr, Hulburt, 2001), (Stohs, Mauer, 1996), (Barclay, Smith, 1995) or U.K. firms (Ooi, 1999), (Ozkan, 2002), (Ozkan, 2000) and there is also only a limited list of papers focused on cross-country comparison – see (Antoniou et al., 2003) and (Fan et al., 2003). We can also see that empirical evidence is more available in the case of market-based financial systems and more limited in the case of bank-based financial systems (see the cross-country comparison above or Cai et al., 1999). And since there is limited empirical evidence on the corporate debt maturity structure in the case of advanced economies, there is no empirical evidence for transition countries. This paper presents evidence for Czech firms, which can be seen as a good representative of the group of transition countries.

Do we really know how financial practitioners decide on the financing tools of their firms? When and why do they choose bank debt, bond debt, or leasing? According to which terms do they decide on the maturity of these debts? And are the firms really the decision-makers on the financing tools, or are they only decision-

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-takers forced to act by external factors (bank-based and market-based conditions, debtholders decisions)? Despite the huge theoretical and empirical research, not all of the above-mentioned questions can be satisfactorily answered. This paper aims to improve our knowledge on decision-making in corporate financing particularly in the case of Czech firms. Are the patterns of the corporate debt maturity structure of Czech firms similar to those in other developed countries or can we observe some deviations that might be the product of past dependency on the command economy? This paper tries to answer this question too.

The paper proceeds as follows: Section 2 provides an overview of theories of debt maturity structure; Section 3 provides an econometric empirical analysis; Section 4 discusses limitations of the result and Section 5 concludes the paper.

2. Theories of Debt Maturity Structure

Before we can build up an empirical model for the determinants of the corporate debt maturity structure, we need to deliver a survey of theoretical points of departure for our research. The literature offers several leading theories on debt maturity structure, namely Agency Costs, Leverage, Maturity Matching, Taxes, and Signaling.

2.1 Agency Costs

The first group of theories on the debt maturity structure regards agency costs as an important determinant of the debt maturity. We consider growth options, size, and collateralizable assets as the major ones.

Growth Options

The primary study on growth options is (Myers, 1977), who argues that corporate future investment opportunities can be considered as options. The value of these growth options then depends on the probability that the firms will exercise them optimally. In the case of firms, profits from the investments are split among the shareholders and the debtholders accordingly. But in some cases the debtholders may capture too high a share of the profit, leaving below-normal returns to the shareholders. This may create incentive problems for the shareholders since in this particular case the shareholders are keen to reject an investment with a positive net present value. Myers (1977) calls this situation an underinvestment problem. He further argues that the maturity of the debt can play an important role in resolving this issue. Firms can issue more short-term debt which matures and can be re-contracted before the growth options can be exercised. "Thus it seems that permanent debt capital is best obtained by a policy of rolling over short-term maturity debt claims." (Myers, 1977, p. 159) Similarly, Barnea et al. (1980) also argue for shortening the debt maturity, which can serve as a mitigation tool for the agency conflicts between the shareholder and the debtholders. "If the debt matures prior to the exercise of the investment option, the agency problem disappears." (Barnea et al., 1980, p. 1233)

Company Size

It is widely accepted by the current literature that larger firms have lower agency costs of debt (Ozkan, 2000;), (Yi, 2005), (Whited, 1992), because these larger

firms are believed to have easier access to capital markets (they can more easily overcome the transaction costs) and greater negotiation power (they have a stronger position in debt negotiation than smaller firms). Hence both these arguments favor larger firms for issuing more long-term debt compared to smaller firms. In addition to this, Smith and Warner (1979) argue that smaller firms are more likely to face higher agency costs in terms of conflict of interest between shareholders and debtholders.

Collateralizable Assets

The volume of collateralizable assets (e.g. assets such as inventory or premises that can be pledged in favor of the creditor) in the firm's balance sheet is also believed to have an impact on the debt maturity structure (Whited, 1992). Firms with a higher share of collateralizable assets can pledge these assets in favor of the long--term debtholders. This favors these firms in comparison to the firms with fewer collateralizable assets. The firms with fewer collateralizable assets are thus believed to have less long-term debt and more short-term debt. The impact of collateralizable assets is widely accepted, especially in terms of long-term debt discussions. Although short-term financing is to some degree provided on a bianco basis (with no collateral), the bianco approach for long-term debts is very rare and collateral plays a very important role.

Based on these agency costs arguments, we will consider the impact of growth options, size and collateralizable assets on the corporate debt maturity structure.

2.2 Leverage

Leland and Toft (1996) theoretically show that firms with higher leverage tend to choose longer maturity of debt and vice versa. "Optimal leverage depends upon debt maturity, and is markedly lower when the firm is financed by shorter term debt." (Leland, Toft, 1996, p. 1014) Morris (1992) also argues that firms with a higher debt ratio tend to issue more long-term debts in order to delay their exposure to bankruptcy risk. On the other hand, the tax and agency theories predict opposite effects of the leverage on debt maturity. Therefore the impact of the leverage on the debt maturity structure is an empirical puzzle.

Based on these arguments, we will consider the impact of Leverage on corporate debt maturity structure.

2.3 Maturity Matching

Maturity matching can be considered as liquidity immunization of the balance sheet structure. Stohs and Maurer (1996) and Morris (1976) argue that a firm can face the risk of not having sufficient cash in the case that the maturity of the debt is shorter than the maturity of the assets (the debt service is shorter than the asset life cycle, e.g. the ability to produce the cash flow) or even *vice versa* in the case that the maturity of the debt is longer than the maturity of assets (the cash flow from assets necessary for the debt repayment terminates). Following these arguments, the maturity matching principle belongs to the determinants of the corporate debt maturity structure.

Additionally, Myers (1977) argues that maturity matching of company assets and liabilities can also partially serve as a tool for mitigation of the under-investment problem, which was discussed in the section on agency costs theory. Here the maturity matching principle ensures that the debt repayments shall be due according to the decline of the asset value. "We can interpret matching maturities as an attempt to schedule debt repayments to correspond to the decline in the future value of assets currently in place." (Myers, 1977, p. 171)

Gapenski (1999) differentiates two strategies of maturity matching, namely the accounting and financing approaches. The accounting approach considers the assets as current and fixed and calls for the financing of the current assets with short-term liabilities, and of the fixed assets by long-term liabilities and equity. The financing approach considers the assets as permanent and temporary. In these terms the fixed assets are definitely permanent and some stable part of the fluctuating current assets is also taken as permanent. This approach then suggests financing the permanent assets with long-term funds (long-term liabilities and equity) and temporary assets with short-term liabilities. Consequently, the financing approach generally employs *ceteris paribus* more long-term liabilities than the accounting approach does.

The financing approach (borrowing more on a long-term basis) brings more stable interest costs than the accounting approach; but as the yield curve is usually sloped upward, the financing approach is also more costly. The financing approach versus the accounting approach to decision-making is thus a classical risk return trade-off relationship. In practice, the companies commonly favor the accounting approach over the financing approach; the same holds for our consideration of maturity matching for the empirical evidence of the debt maturity structure.

Based on these maturity matching arguments, we will consider the impact of balance sheet liquidity immunization on the corporate debt maturity structure.

2.4 Taxes

Kane et al. (1984) introduced a model that incorporated endogenous determinants of the optimum corporate debt maturity: corporate and personal taxes, bankruptcy costs and flotation costs (transaction costs of external financing). Their optimum debt maturity setting involves a trade-off between the advantage of a corporate debt tax shield and the disadvantage of bankruptcy and flotation costs. They determined that the optimum debt maturity increases with:

i) increasing flotation costs: "As expected, the higher the transaction costs associated with a debt issue, the grater the optimal maturity of the debt, since more time is required to amortize the flotation costs." (Kane et al., 1984, p. 15)

ii) decreasing corporate debt tax shield: "In addition, a high personal tax rate is generally associated with higher optimal maturity. This is again due to the fact that at a lower tax advantage, a longer maturity is required to amortize the flotation costs incurred in issuing the debt. At very high personal tax rates, it becomes optimal for the firm to issue no debt because the tax advantage net of bankruptcy costs is never great enough to offset amortized transactions costs, whatever the maturity." (Kane et al., 1984, p. 15)

iii) decreasing volatility of the company value "reflecting the fact that with less volatile asset returns, the firm rebalances its capital structure less frequently". (Kane et al., 1984, p. 17)

Based on these tax arguments, we will consider the impact of an effective corporate tax rate and company value volatility on the corporate debt maturity structure. We will omit the impact of flotation costs, as they are hard to be measured in our terms.

In order to make the survey of theories on debt maturity structure as comprehensive as possible, we also deliver a list of debt maturity arguments whose impact has not been investigated in this paper.

2.5 Signaling

Signaling Quality

Signaling models predict that the corporate debt maturity structure is related to the degree of asymmetric information between insiders and outsiders (investors). It is generally accepted that the corporate debt maturity structure can signal information about the quality of a firm. Flannery (1986) argues that the debt maturity can serve for more informed insiders as a signaling tool towards less informed outsiders. He further argues that low-quality firms ("bad firms" in his terminology) prefer more long-term debt and high-quality firms prefer more short-term debt. This is supported by the fact that in the transaction costs environment low-quality firms cannot afford to roll-over the short-term debt as they face a considerable risk of financial distress in the event that the debt is not prolonged. Flannery (1986) further argues that high--quality firms ("good firms" in his words) will issue more short-term debt than low--quality firms. The managers of high-quality firms voluntarily expose the firms to the risk of debt renegotiation after more information is available to the outsiders, as they expect this information to be positive. As a result, high-quality firms signal their type by issuing short-term debt. Consequently, the firms will wait with the debt issue if they expect that there will be good news, but they will not wait until bad news is released.

Due to the fact that the company quality is very difficult to be proxied, we retreat from the investigation of the above-mentioned signaling arguments on corporate debt maturity structure.

Liquidity Risk or Creditworthiness Risk

The liquidity risk or financial distress risk provides strong incentives for firms to borrow on a long-term basis. Diamond (1991) argues that short-term debt allows for renegotiation of debt costs after good news about the firm is released, which is in line with Flannery (1986) above. On the other hand, short-term debt represents liquidity risk for the debtor, which would arise if the short-term debt is not renegotiated. Thus a typical trade-off relationship arises. Diamond (1991) further argues that low-quality debtors with low cash-flows for long-term debt repayments are forced to borrow on a short-term basis. Medium-quality debtors favor long-term financing since they face higher liquidity risk than the high-quality debtors. And high-quality debtors who face low liquidity risk favor short-term borrowing. In the end there are two types of short-term borrowers: those of high-quality and those of low-quality, whereas firms of medium-quality are expected to borrow on a long--term basis. "Debt maturity choice is analyzed as a trade-off between a borrower's preference for short-term debt due to private information about the future credit

rating, and liquidity risk." (Diamond, 1991, p. 709) However the predictions of the Diamond model are not testable in the Czech environment. We lack the necessary comprehensive data, and therefore we retreat from the investigation of the above-mentioned creditworthiness arguments on corporate debt maturity structure. In addition to this, we surprisingly see that the arguments on signaling quality and signaling creditworthiness have produced different hypotheses for very similar determinants. Here the theory of corporate finance is to be streamlined in the future.

Company Age

Scherr and Hulburt (2001) also argue that age of a firm can be employed as a signaling tool. In these terms older firms are said to signal through their age that they are more stable than younger firms. Therefore older firms are expected to have a larger share of long-term debt than younger firms do. But, again, since we lack the necessary data, we retreat from the investigation of the above-mentioned company age arguments on corporate debt maturity structure.

3. Empirical Analysis

At this time we have sufficiently evolved the theoretical arguments in order to be able to approach the empirical part. In this section we describe the sample of firms, provide the descriptive statistics for the sample, and then we compose the regression equation, deliver the regression results, and compare these results with other empirical analyses.

3.1 Sample of Firms

Data was kindly provided by Čekia[1]. These data included the financial statements (the balance sheet and the profit and loss account) for all the firms in Čekia's database for the years 2000–2004. The financial statements were provided with various detailed structures (in the full wording or in limited wording with subtotals) for firms of differing statuses (active, in bankruptcy, liquidation, etc.) from different sectors (financial, manufacturing, services, etc.) for differing years (not all firms were covered for the whole time period). Naturally, this data set needed to be processed later to enable the empirical analysis. Generally, the data processing addressed two issues: the data structure (such as the firms covered) and the data (in)consistency (such as illogical data entries).

First, the data structure was handled and the firms from inappropriate sectors (financial institutions), statuses (bankruptcy, liquidation), and legal statuses (municipalities, private entrepreneurs, etc.) were omitted. Second, the data (in)consistency was handled as the data set included some illogical data entries, which needed to be adjusted. Therefore, the following data entries were omitted: firms with negative assets (for some reasons, these firms exist), firms with very little detailed structure of financial statements (determinants of the debt maturity structure could not be computed), years with double data entries (some firms were reported more than once for a particular year, mainly with differing detailed structures of financial statements), firms of unknown business sector, and some other inconsistent data entries.

[1] Česká kapitálová informační agentura – Czech Capital Information Agency

TABLE 1 Descriptive Statistics for Dependant and Explanatory Variables

Descriptive statistics	Valid N	Mean	Std. dev.
Debt maturity structure	3 965	0.35	0.4407
Growth options	3 965	0.05	0.1858
Company size	3 965	7.90	5.6554
Collateralizable assets	3 965	0.43	1.5038
Leverage	3 965	0.09	0.2011
Asset maturity	3 965	-0.04	0.4805
Corporate-tax rate	3 965	0.15	3.9974
Company-level volatility	3 965	6 987	328 820

TABLE 2 Correlation Matrix for Dependant and Explanatory Variables

Correlation matrix	Growth options	Company size	Collateralizable assets	Leverage	Asset maturity	Corporate-tax rate	Company-level volatility	Debt maturity structure
Growth options	1	0.038	0.976	0.583	-0.466	0.001	-0.001	0.048
Company size	0.038	1	0.042	0.287	0.051	0.038	0.034	0.142
Collateralizable assets	0.976	0.042	1	0.598	-0.447	0.003	0.002	0.074
Leverage	0.583	0.287	0.598	1	-0.007	0.009	0.029	0.275
Asset maturity	-0.466	0.051	-0.447	-0.007	1	0.007	0.018	0.164
Corporate-tax rate	0.001	0.038	0.003	0.009	0.007	1	0.001	0.005
Company-level volatility	-0.001	0.034	0.002	0.029	0.018	0.001	1	0.008
Debt maturity structure	0.048	0.142	0.074	0.275	0.164	0.005	0.008	1

This data set was further employed for the econometric analysis, which was computed in TSP software

3.2 Descriptive Statistics

Table 1 reports the descriptive statistics for the dependant and explanatory variables. The data set employed for the empirical evidence included the balanced panel data of 793 firms; each firm was provided with financial statements for 5 years (2000–2004), resulting in 3,965 data entries in total.

Table 2 reports the correlations matrix for the dependant and explanatory variables. The correlations are generally in line with the expectations of the regression model. The coefficients of correlation of explanatory variables are generally low. However, there are some exceptions of stronger correlations. First, growth options strongly positively correlate with collateralizable assets. Since tangible fixed assets are largely depreciated (only land is not depreciated) and also as there are few assets other than tangible fixed assets (such as software) that are depreciated, the volume of depreciation is highly dependent on the volume of tangible fixed assets. Therefore these two explanatory variables correlate strongly. Second, growth

options also positively correlate with leverage. This might be due to the fact that indebted firms have a higher share of depreciated assets (mainly tangible fixed assets) and *vice versa*. Third, growth options further negatively correlate with asset maturity. Here the intuitive explanation does not seem to be at hand, as the asset maturity is computed as an interaction of both fixed assets and equity levels. Fourth, collateralizable assets positively correlate with leverage, which is similar to the correlation of growth options and leverage. It might be the case that firms with a higher share of tangible assets are more heavily indebted and vice versa. Fifth, collateralizable assets are also negatively correlated with asset maturity. Again, as in the case of the correlation of growth options and asset maturity, the explanation is not straightforward. The only simple explanation would be that firms with tangible assets tend to have an excess of equity over fixed assets (and thus less need of long-term funds).

3.3 Test of Data Set on Macroeconomic Environment

Table 3 provides a comparison of the Čekia data set used for our empirical analysis with a data set from the Czech Statistical Office (CZSO) as representative of the general macroeconomic environment. Both portfolios are divided into industries according to NACE. However the CZSO portfolio includes only firms having more than 100 employees, whereas the Čekia portfolio does not differentiate according to the number of employees. Here a small differentiation arises but this is still fully acceptable for the first approximation of the test of our data set with the general macroeconomic environment. In general, the difference in the portfolios of firms of Čekia and CZSO is not strong. The Čekia data set includes fewer manufacturing firms that are outweighed by more utilities and trading firms (wholesale, retail and others). This indicates that our data set is not to be biased from the general macro-economic environment and the regression results can be considered as plausible.

3.4 Regression Equation

Based on the arguments in the section on theories of debt maturity structure and in the section on proxies for debt maturity structure determinants, the regression equation can be written in a following form:

$$\frac{D1}{TD} = \alpha + \beta_1\left(\frac{D}{TA}\right) + \beta_2(\ln S) + \beta_3\left(\frac{TanFA}{TA}\right) + \\ + \beta_4\left(\frac{TD}{TA}\right) + \beta_5\left(\frac{FA-Eq}{TA}\right) + \beta_6\left(\frac{T}{PTI}\right) + \beta_7\left(\frac{EBITDA_t - EBITDA_{t-1}}{EBITDA_{t-1}}\right) + \varepsilon_i \quad (1)$$

where $D1$ is debt maturing over one year, TD is total debt, α is the intercept, β_1 are the unknown parameters of interest, D is annual depreciation, TA is total assets, S is annual sales, $TanFA$ is tangible fixed assets, TA is total assets, FA is fixed assets, Eq is equity, T is tax expense, PTI is pre-tax income, $EBITDA$ is earnings before interest, taxes, depreciation and amortization, t is the time period, ε_i stands for the error term; or it can also be rewritten in the verbal form as

TABLE 3 Data Sets of CZSO and Čekia

NACE	Industry name	Czech Statistical Office	Čekia
A	Agriculture, hunting, forestry	7,7 %	5,3 %
01	Agriculture, hunting, forestry and related activities	6,8 %	4,4 %
02	Forestry and related activities	1,0 %	0,9 %
B	Fishing	0,1 %	0,3 %
C	Mining	0,9 %	1,4 %
D	Manufacturing	55,2 %	38,1 %
DA	Manufacture of food, drink and tobacco products	7,0 %	5,5 %
DB	Manufacture of textile and textile products	3,9 %	2,5 %
DC	Manufacture of leather and leather products	0,7 %	0,0 %
DD	Manufacture of wood products except for furniture	1,5 %	0,8 %
DE	Manufacture of pulp and paper	2,3 %	1,5 %
DF	Manufacture of oil and oil products	0,1 %	0,4 %
DG	Manufacture of chemical and pharmaceutical products	1,9 %	2,8 %
DH	Manufacture of rubber and rubber products	3,6 %	1,8 %
DI	Manufacture of other non-metal mineral products	3,6 %	3,7 %
DJ	Manufacture of basic metals and metal products	8,4 %	4,9 %
DK	Manufacture of machineries	8,1 %	5,8 %
DL	Manufacture of electrical and optical devices	7,1 %	2,9 %
DM	Manufacture of transportation vehicles	4,0 %	4,0 %
DN	Manufacture of other products	3,1 %	1,5 %
E	Utilities	2,7 %	10,6 %
F	Construction	6,7 %	7,9 %
G	Wholesale, retail and repair of conveyance and products for personal use	10,5 %	17,3 %
H	Accommodation	1,8 %	0,5 %
I	Transportation	5,1 %	5,4 %
K	Real estate activities	9,2 %	13,2 %

$$DMS = \alpha + \beta_1(Growth\_options) + \beta_2(Company\_size) + \beta_3(Collateralizable\_assets) + \beta_4(Leverage) + \beta_5(Asset\_maturity) + + \beta_6(Corporate\_tax\_rate) + \beta_7(Company\_level\_volatility) + \varepsilon_i \quad (2)$$

where *DMS* is the debt maturity structure.

The major literature on the corporate debt maturity structure uses pooled OLS. In Ooi (1999) the significance of these pooled OLS results is at least not worse than that of other methods. However this method is known that it does not fully consider the firm-specific effect in case of the panel data analysis. If such firm-specific effects are present (and we do believe that they are), the pooled OLS results are not efficient. In such cases, one-way error component models (fixed effects or random effects) are

TABLE 4 Regression Results

Explanatory variables	Expected sign	Model One		Model Two	
		Fixed effects	Pooled OLS model	Fixed effects	Pooled OLS model
Growth options	-	-0,175 (-0,87)	-0,617 (-3,51)**	-0,175 (-0,87)	-0,617 (-3,51)**
Company size	+	0,037 (2,23)*	0,012 (3,03)**	0,036 (2,21)*	0,012 (-3,03)**
Collateralizable assets	+	-0,648 (-0,04)	0,039 (2,67)**	-0,680 (-0,04)	0,039 (-2,67)**
Leverage	+	0,425 (8,49)**	0,066 (14,46)**	0,424 (-8,46)**	0,655 (-14,46)**
Asset maturity	+	0,538 (2,32)*	0,124 (7,29)**	0,053 (-2,29)*	0,124 (7,29)**
Corporate-tax rate	-	-0,110 (-0,86)	0,049 (-0,03)		
Company-level volatility	-	-0,213 (-1,38)	-0,617 (-0,31)		
Number of observations		3 965	3 965	3 965	3 965
Adjusted R^2		0,6624	0,10989	0,6621	0,10986

Note: ** significant at the 1% level, * significant at the 5% level; *t*-statistics in parenthesis

to be utilized in order to implicitly consider the firm-specific effects. Here, Baltagi (2001, p. 65) suggests the Hausman's specification test for the decision-making mechanism between the fixed effects model and the random effects model. Based on this test (with $p < 0{,}001$) the fixed effects model was indicated as the more appropriate one. However, even the fixed effects method is not without limitations. This is mainly in the case when correlation of disturbances with explanatory variables is not due to a firm-specific effect and some explanatory variables are endogenous. Since the IV method also some has drawbacks (see (Antoniou et al, 2003)), the fixed effects method is widely deemed sufficiently appropriate (see (Stohs, Mauer, 1996), (Heyman et al, 2003), (Barclay, Smith, 1995)).

3.5 Regression Results

Table 4 reports the regression results for model one and model two. We list the results for the two models separately; for both models we provide fixed effects and pooled OLS results. However, as we already mentioned, the fixed effects model is to be considered as appropriate for our data. Therefore the commentary of results shall mention only fixed effects and pooled OLS remains for informational purposes only. Model one includes a full list of explanatory variables listed in the hypotheses section to be considered. Model two does not include the corporate tax rate and company level volatility variables that were not deemed statistically significant in model one for both fixed effects and pooled OLS.

The major explanatory variables have been found to be significant and more importantly also in line with the theoretical predictions (which are noted as an expected sign in the table). Company size has been found to have a statistically sig-

nificant positive impact on the corporate debt maturity structure. Larger firms tend to have more long-term debt since they are said to have lower agency costs, better access to debtholders and stronger negotiation power. Leverage has been found to have a statistically significant positive impact on the corporate debt maturity structure. Firms that are more indebted tend to have more long-term debt and less indebted firms tend to have less long-term debt, which is a very intuitive result. Asset maturity has been found to have a statistically significant positive impact on the corporate debt maturity structure. The firms have been found to conduct the maturity matching of their balance sheets following the simple rule that fixed assets need to be funded by long--term funds (i.e., by equity or by long-term debt). However, the remaining explanatory variables, namely growth options, collateralizable assets, corporate tax rate and company level volatility have not been found to have any statistically significant impact on the debt maturity structure. Growth options and collateralizable assets have been found to be statistically significant in pooled OLS computation, though this was not the case for the fixed effects approach.

It is necessary to mention, that these presented results are not only fully in line with the theoretical expectations, but that they are also in line with other empirics (see below). But most importantly, they are in line with the intuitive expectations of finance practitioners. Despite the fact that there is no thorough analysis of financial managers' opinions, they would probably name company leverage, company size, the company's collateral and asset maturity as the major driving forces of corporate debt maturity structure decision-making. Nevertheless Company's collateral has been found as statistically significant for pooled OLS only and not for fixed effects.

3.6 Comparative Analysis

Table 5 reports the comparison of selected empirical analyses on the corporate debt maturity structure. The results of our analysis are fully in line with the results of other papers. A full consensus has been found in the case of the leverage and asset maturity explanatory variables. Some consensus has been found in the case of the company size, creditworthiness, company age, liquidity, company level volatility, interest rate term structure and interest rate volatility explanatory variables. Whereas for the remaining explanatory variables – growth options, collateralizable assets, company quality and corporate tax rate – no consensus has been found. It seems necessary to mention, that the presented papers employed to some extent varying proxies for particular variables (both dependant and explanatory). However, this variation does not jeopardize the comparability of the findings. For a more detailed discussion, please see (Körner, 2006).

As the empirical findings for Czech firms are generally in line with findings of other empirical analysis papers, which were generally focused on standard advanced economies such as Germany, the UK and the United States, we can state that firms in transition economies seem to have a similar pattern in the debt maturity structure decision-making to that of firms in standard economies.

4. Limitations

Naturally, there are several areas of limitations of the presented empirical analysis. At this point, we try to discuss at least the three most important ones, name-

TABLE 5 Comparison of Regression Results

Regression model *	**Exp. sign**	**Stohs and Maurer (1996)**	**Ozkan (2002)**	**Ozkan (2000)**	**Scherr and Hulgurt (2001)**	**Heyman et al. (2003)**	**Antoniou et al. (2003)**	**Fan et al. (2003)**	**Körner (2006)**
		FE	**CSR**	**GMM, OLS**	**OLS**	**OLS, FE; CSR**	**OLS, GMM**	**OLS**	**FE**
Growth options	-	*Significant positive*	*Significant negative*	*Significant negative*	Insignificant negative	Insignificant negative	*Significant positive for UK*	*Significant negative*	Insignificant negative
Company size	+	*Significant positive*	*Significant positive*	*Significant positive*	*Significant negative*	*Significant negative*	*Significant positive for UK*	*Significant positive*	*Significant positive*
Collateraliz-able assets	+							*Significant positive*	Insignificant negative
Company quality	-	*Significant negative*	Insignificant positive	Insignificant negative	*Significant negative*		Insignificant both positive and negative		
Credit-worthiness	+	*Significant positive*				*Significant negative*			
Company age	+				*Significant positive*				
Leverage	+	*Significant positive*				*Significant positive*	*Significant positive*		*Significant positive*
Liquidity							*Significant positive for Germany*		
Asset maturity	+	*Significant positive*	*Significant positive*	*Significant positive*	*Significant positive*	*Significant positive*	*Significant positive for UK*	*Significant positive*	*Significant positive*
Corporate-tax rate	-	*Significant negative*	Insignificant negative	Insignificant negative			*Significant positive for Germany*	*Significant both positive and negative*	Insignificant negative
Company-level volatility	-	*Significant negative*	*Significant negative*				*Significant negative for France*		Insignificant negative
I.r. term structure	+	*Significant positive*					*Significant positive for UK*		
I.r. volatility	+						*Significant negative for UK*		

Note: * FE is fixed effects, CSR is cross-sectional regression, GMM is the generalized method of moments, and OLS is ordinary least squares.

ly the limited explanatory power of the data, the limited explanatory power of the variables, and the limited explanatory power of the determinants.

4.1 Data Limitations

We need to be aware of the fact that the data employed for the empirical analysis (mainly financial ratios) have some limitations in the evidence they provide. These mainly stem from the fact they are fully based on the accounting data. First, the majority of the financial statements are going through the process of window--dressing in order to look better for shareholders and debtholders or in order to look worse for the tax authorities (depending on which incentive prevails). The discussion of this issue with an endless list of names such as window-dressing, book-cooking or creative accounting is not the subject of this paper. For us it is fully sufficient to state that financial statements can be "cooked" in all items (assets, liabilities, revenues and costs) in all directions (changing statement structure, increasing or decreasing some items or even swapping B/S and off-B/S status[2]) and that this all can be done using both legal and illegal tools.

Second, these collected data (still having in mind the bookkeeping limitations, the data structure, and data inconsistency adjustments mentioned in the data description paragraph) still report some drawbacks. Surprisingly, the data do not fully meet the ex-ante expected range. There are firms with negative assets, negative equity or even negative liabilities. These are states that should not be possible ex--definitione, but which are present and of which explanation is fairly simple (some firms book receivables as negative liabilities; some firms do not proceed according to bankruptcy law if they have negative equity, etc.).

To sum up the data limitations, although the accounting entries are called hard data, we know that they need to be interpreted with some degree of freedom. But despite all these facts (the majority of them shall be understood as data drawbacks), we must be aware of the fact that these data are the best available and therefore bring some added value.

Until now we have discussed the limitations of the information that was included in the data. But we are also facing some limitations which stem from the fact that our data do not include some useful information. First, and most importantly, we lack information on market values. As the Czech corporate governance system is based on bank financing, the Czech capital market is very limited and therefore only a very limited amount of firms can report the market values for their equities. Thus we cannot investigate the impacts of the market value data on the debt maturity structure, which is usually employed for economies with a market based financing corporate governance system. This is especially missing in case of growth options assessments.

Second, we lack information on credit ratings. Some studies on the debt maturity structure also employ credit ratings (Stohs and Mauer, 1996) or some default measures (Scherr, Hulburt, 2001), (Heyman et al., 2003) as proxies for the corporate quality as one of the determinants of the corporate debt maturity structure. But

[2] B/S is balance-sheet status, e.g. items booked on the balance sheet; off-B/S is off-balance-sheet status, e.g. items booked off the balance sheet.

in the Czech environment only a very limited number of firms can report a credit rating of international rating agencies (Moody's, Standard & Poor or Fitch). Some of the firms can report credit ratings of local rating agencies (CRA[3]), but the majority of the reported firms remain unrated. Therefore we were not able to proxy the company quality by credit ratings, but the utilization of a default measure for the Czech evidence might be a subject of future research.

Third, we lack flotation costs data, which is a very common fact for all economies as the transaction costs of a debt are very hard to assess. This would be useful information for purposes tackled in the tax hypothesis paragraph, but once again, as none of the empirical analyses on the corporate debt maturity structure includes this proxy, this paper is not relatively worse in these terms.

Fourth, we lack the age of the companies. Naturally, the Czech Commercial Register provides this type of information. But the nature of our data set where the firm names were not disclosed made it impossible to match the Čekia data and the data from the Czech Commercial Register in order to ascertain the given company's age. This determinant would definitely be interesting to investigate. However, as the company's age is not very often utilized in the debt maturity structure investigations, this paper is again not relatively worse in these terms.

4.2 Variables Limitations

But not only the data as such have limitations. We employ these data for computations of variables, which serve as proxies for the determinants of the corporate debt maturity structure. As was discussed in the empirical analysis section, setting the formula for a variable that shall serve as a proxy for a particular determinant is not always a simple issue. First, some determinants do not have a very explicit name. One can imagine growth options, company quality, creditworthiness or company level volatility in very differing states, and thus sometimes the first task stems from the interpretation of the determinant name. Thus the variable formulas naturally differ across the empirical analysis papers even though there is a main stream of proxies created by papers inspired by each other. Second, even if there is a general consensus with the determinant name interpretation such as collateralizable assets, we face differing formulas for the variables stemming from differing opinions on the items that should or should not be included in the formula. Third, in some cases we can be provided with equally good proxies for one determinant as it seems to be the case for company size and we need to employ some decision-making mechanism in choosing the more appropriate one. And last but not least, we have some variables which might be employed as proxies for differing determinants. Here should be mentioned at least the complementarity of formulas proxying the signaling quality and liquidity risk theories (for the relevant literature, see Table 5), even though these have not been investigated in this paper.

4.3 Determinants Limitations

And finally, there are some limitations of determinants as such, namely in terms of the determinants coverage. In our analysis we employed those determinants

[3] CRA – Czech Rating Agency, recently acquired by Moody's

that were found crucial by theoretical papers, those that were already utilized in empirical papers, and also those where the Czech data necessary for the computations are available. Due to the third reason, we needed to omit creditworthiness and company age, the impact of which would definitely be interesting to assess. But we also face some other determinants that have not been utilized in empirical papers yet. First, no determinant takes into account some sort of cash flow. And as we know that "cash is king" (McKinsey, 2005), the corporate debt maturity structure is expected to also be affected by the fact of whether a firm is cash rich or cash poor. In this regard, the proxies based on the EBITDA are to some extent close to the determinant of cash flow, but one could imagine more a precise proxy for such missing determinant. Second, we are also missing an instrument that would incorporate the off-B/S items important for the corporate debt maturity structure assessments. Leasing is the most important one. Despite some tax impact motivations there are mainly motivations in making the firm less indebted on the on-B/S level that drives the utilization of leasing. And since leasing as a sort of long-term debt is not included in our computations, this makes our on-B/S long-term debt undervalued.

And there is one more thing that we are missing. The determinants of the corporate debt maturity structure are employed equally in the empirical analysis. But there is no reason to believe that in reality they have the same importance. It would be interesting to investigate which determinant is more important than the other one, when this is the case, and why. As this is not possible to achieve using our model, this might be a subject of future research.

To sum up this section, we have data that do not fully represent the variable formulas; we have variables (or proxies) that do not fully represent the determinants; and we have determinants that need not necessarily be the important ones for the corporate debt maturity structure. But despite all this, the results are strong enough to improve our knowledge of the true behavior of firms in debt maturity decision-making.

5. Conclusion

This paper was assembled in search of the determinants of the corporate debt maturity structure of Czech firms. In the theoretical section it has brought an overview of the points of departure for choosing the proper and important determinants for the corporate debt maturity structure. In the regression section it has shown that long-term debt increases with company size, leverage and asset maturity. The impact of growth options, collateralizable assets, corporate tax rate, and company level volatility has been deemed statistically insignificant. It was further shown that these results are generally in line with other papers on this topic covering other economies. Finally, the paper discussed the limitations of the results in the data, variables, and determinants field.

Since the empirical evidence for the debt maturity structure is limited for advanced economies and very rare for transition economies, this paper provides some valuable insights. It has shown that Czech firms, as representatives of transition economies, follow a similar pattern in the setting of the maturity of debt as in the case of standard advanced economies. This also implies that the behavior of Czech financial managers in debt maturity decision-making is fully in line with the standard practice.

Our results are fully in line with the empirical evidence of debt maturity from differing financial systems, whether bank-based or capital market-based ones. This can lead to the conclusion that the nature of the financial system does note determine the companies' debt maturity choice. Moreover it seems that the debt maturity choice is determined by internal features of the company, namely size, the necessity to match the maturity of assets and liabilities and total indebtedness.

The extension of the future research should be channeled toward the fields mentioned in the chapter on the limitations of the results. Three major issues are to be incorporated into the determinants. First, creditworthiness in terms of credit ratings from external agencies might bring valuable insights into how the financial standing affects the debt-maturity choices. Second, off-B/S items (and most importantly leasing) also serve as important sources of financing. Taking these into account would provide a broader picture of corporate debt maturity. Third, being aware of the fact that cash is king, including some sort of cash flow determinant among the explanatory variables, might bring additional knowledge of how the cash position affects the debt maturity structure of a corporate entity.

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