Changes in Capital Structure of Czech SMEs:
A Dynamic Panel Data Approach[#]

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ABSTRACT

In this paper, we explore two of the most relevant theories that explain financial policy in small and medium enterprises (SMEs): pecking order theory and trade-off theory. The theoretical section provides an overview of contemporary theories of capital structure. According to the pecking order theory changes in the level of debt are not motivated by the need to reach a given debt target, but instead are motivated by the need for external financing. In trade of theory companies identify their optimal capital structure and weigh up the advantages and disadvantages of an additional monetary unit of debt. Panel data methodology is used to test the empirical hypotheses over the sample of 260 Czech SMEs during the years 2004–2011 using annual data. To test pecking order theory and trade-off theory we use total debt ratio as a dependent variable and independent/explanatory variables depending on previous literature that that correspond to specific company characteristics. The results suggest that both theoretical approaches contribute to explain capital structure in Czech SMEs andidentify major forces that lie behind their indebtedness.

Keywords: Capital structure, Trade-off theory, Pecking order theory, Small and medium sized enterprises, Transitional economy.

JEL Classification: C33, C34, G32, G33

1. Introduction

In this paper, we explore two of the most relevant theories that explain financial policy in small and medium enterprises (SMEs): pecking order theory and trade-off theory. As the topic of capital structure is nowadays a well-trodden area we apply the knowledge on the Czech market, where no similar study was conducted up to now.

The present article is inspired by the works of Mira and Gracia (2006), García-Teruel and Martínez-Solano (2006), Frank and Goyal (2007) and Gaud et. al. (2005). To test pecking

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order theory and trade-off theory we use total debt ratio as a dependent variable and independent/explanatory variables depending on previous literature that correspond to the specific company characteristics, namely default risk, growth opportunities, asset structure, size, profitability, age and liquidity.

The structure of this paper is as follows: The first part provides the introduction. Part two summarizes the previous literature dealing with the capital structure looking at the general framework of recent studies exploring capital structure, followed by a summary of recent studies on empirical evidence and application of recent thoughts on the sector of small and medium sized companies, which is showing some peculiarities due to special nature of this segment of companies its ownership structure and small size.

Part three explains the methodology and used data. The model is based on the work of previous researchers namely Bradley et al. 1984, Mackie–Mason, 1990; Jensen and Meckling, 1976; Myers, 1977; Stulz, 1990; Myers, 1977; Scott, 1977; Myers and Majluf, 1984; Williamson, 1988; Harris and Raviv, 1990; Ang, 1992; Myers, 1984 and Özkan, 2001. The used data comes from Albertina database and the total number of 297 Czech SMEs during the years 2004–2011 using annual data in the Czech currency is used.

Part four summarizes our results and findings. It has been shown on the Czech sample that the trade-off model is statistically significant at the 1% of statistical significance in all three tested model specifications: the OLS, two stage OLS and GMM. The lagged leverage effect is statistically significant for OLS and GMM models. This shows that the adjustment speed of Czech SMEs is high.

The pecking order was tested using panel data with ordinary OLS model and subsequently regression with fixed effects and random effects. Pecking order models are also statistically significant at 5 per cent and 1 percent level. The pecking order model shows that in general the level of debt increased with age of the company.

Part five provides conclusion and suggests areas for further research.

2. Literature Review

As the topic of capital structure is nowadays a well-trodden area. In this section of our paper we concentrate on review of recent empirical studies in Europe and some issues of general framework in relation to the segment of small and medium sized enterprises.

2.1 General framework and empirical evidence

To summarise theoretical framework Frydenberg (2011) provides a review of the central theoretical literature. The claims, that the most important arguments for what could determine capital structure is the pecking order theory and the static trade off theory. These two theories are reviewed, but neither of them provides a complete description of the situation why some firms prefer equity and others debt under different circumstances. The paper is ended by a summary where the option price paradigm is proposed as a comprehensible model that can augment most partial arguments. The capital structure and corporate finance literature is filled with different models, but few, if any give a complete picture.

To move to emprical evidence, authors Sogorb-Mira and López-Gracia (2006) in their paper explore two of the most relevant theories that explain financial policy in small and medium enterprises (SMEs): pecking order theory and trade-off theory. Panel data methodology is used to test the empirical hypotheses over a sample of 6482 Spanish SMEs during the five year period 1994–1998. The results suggest that both theoretical approaches contribute to explain capital structure in SMEs. The research revealed, that while there is an

evidence that SMEs attempt to achieve a target or optimum leverage (trade-off model), there is less support for the view that SMEs adjust their leverage level to their financing requirements (pecking order model).

Lucey and Mac an Bhaird (2005) provided empirical evidence from Ireland using a sample of 299 Irish small and medium sized enterprises (SMEs hereafter). The sources of finance used by respondents are delineated by internal and external sources and viewed through a life cycle model. Recognizing the financial intertwining of owners and their businesses, a description of the means of collateral provided to secure debt financing is also viewed through a life cycle model. The pecking order theory and life cycle model are reviewed to formulate testable hypotheses concerning the use of short term and long term debt, and internal and external equity by companies. Multivariate regression results indicate relationships between determinants identified in previous studies, namely, age, size, ownership structure, sector and growth opportunities and the use of long term debt, external equity and internal equity. The authors have also found the relationships between age, size, sector and growth opportunities and the means of collateral used to secure debt financing. In seeking to provide a more holistic explanation for observed capital structures, their paper reported also SME owners' attitudes and perception towards sources of finance. Predictions of the pecking order theory seem to explain the financing choices of SMEs, although there are sectoral differences. The underlying justification for this theory is twofold: the respondents' desire for independence and control, and the perceived lack of information asymmetries in debt markets.

Gaud et al. (2005) have analysed the determinants of the capital structure for a panel of 104 Swiss companies listed in the Swiss stock exchange. The authors have performed dynamic tests for the period 1991–2000. It has been found that the size of companies and the importance of tangible assets are positively related to leverage, while growth and profitability are negatively associated with leverage. The sign of these relations suggest that both the pecking order and trade-off theories are at work in explaining the capital structure of Swiss companies, although more evidence exists to validate the latter theory. The analysis also shows that Swiss firms adjust toward a target debt ratio, but the adjustment process is much slower than in most other countries. It is argued that reasons for this can be found in analysing the institutional context.

Study from the Czech market by Jindrichovska and Koerner (2008) investigated the empirical evidence on determinants of financing decisions on the pool of respondents among financial managers of Czech firms. The theoretical section provides an overview of prominent contemporary theories on capital structure. Employing Chi-square Sign Test and Logit regression the empirical analysis provides the evidence how the financial managers perceive particular instruments of internal and external financing. The authors find, that firms follow pecking order theory for working capital financing, however in investment financing the arguments for pecking order theory are not that strong. Firms prefer retained earnings among internal financing instruments and bank loans and leasing among external financing instruments.

2.2 Capital structure and SMEs

Frank and Goal (2009) have investigated the issues related to small and medium sized firms in contrast to big firms. The authors have analyzed taxes bankruptcy costs, transactions costs, effect of adverse selection and agency conflicts, which were traditionally advocated as major explanations for the corporate use of debt financing. These ideas have often been synthesized into the trade-off theory and the pecking order theory of leverage. These theories and the related evidence are reviewed in this survey. A number of important empirical

stylized facts are identified. To understand the evidence, it is important to recognize the differences among private firms, small public firms and large public firms. Private firms seem to use retained earnings and bank debt heavily. Small public firms make active use of equity financing. Large public firms primarily use retained earnings and corporate bonds. The available evidence can be interpreted in several ways. Direct transaction costs and indirect bankruptcy costs appear to play important roles in a firm's choice of debt. The relative importance of the other factors remains open to debate. No currently available model appears to be capable of simultaneously account for all of the stylized facts.

Harris and Chaplinsky (2008) claim that finance scholars' approach to capital-structure issues reflects a progression of thought over time. Their paper provides an overview of the current state of capital-structure theory. One perspective on capital-structure choice is to view it as posing trade-offs among five elements: (1) the tax benefits of financing, (2) the explicit costs of financial distress, (3) the agency costs of debt (including an array of indirect costs linked to financial distress), (4) the agency costs of equity, and (5) the signaling effect of security issuance. The first two elements reflect the "modern, traditional" balancing theory of capital structure. The third and fourth build on agency theory and influence of imperfect information and emphasize the individual incentives of decision makers. The fifth element recognizes that the very act of issuing a security can convey new information to investors when there is imperfect information. While newer theories provide a rich array of insights into aspects of financial policy beyond how much debt the firm should undertake, the downside is that at present time there is no overarching synthesis of these theories. As a result, practical application requires careful identification of how are these particular theories relevant to the business, the markets, and the situation of particular company at hand.

3. Methodology and Data

If any model has lag of the dependent variable as a independent variable, this model called as a dynamic model. Based on the trade-off model we use one lagged form of debt variable in independent variables thus we apply dynamic panel data methods to our data.

The dynamic model with one lagged dependent variable as follows:

$$y_{it} = \gamma y_{i,t-1} + \beta' X_{it} + \alpha_i^* + \lambda_t + u_{it}, \qquad i=1,\ldots,N \tag{1}$$

$$t = 1,\ldots,T$$

where $u_{it} \sim iid(0, \sigma_u^2)$.

The independent variable $y_{i,t-1}$ is correlated with the error term. This result causes that the OLS estimator is biased and inconsistent even if the error term u_{it} is not serially correlated.

Dynamic panel regression models that include many firms and a limited number of time observations, will result in inconsistent estimators. The reason of the inconsistency may result from correlations that could arise between the unobservable individual effects, the regressors and the error terms and also due to the existence of regressor endogeneity (Baltagi, 2005). An alternative transformation is suggested from Anderson and Hsiao (1982). Anderson and Hsiao use first differenced model to eliminate the problem which as follows in two equations (Wawro, 2002).

$$y_{it} - y_{i,t-1} = \gamma(y_{i,t-1} - y_{i,t-2}) + (x_{it} - x_{it-1})\beta + u_{it} - u_{i,t-1} \tag{2}$$

$$\Delta y_{it} = \gamma \Delta y_{i,t-1} + \Delta x_{it} \beta + \Delta u_{it} \tag{3}$$

where Δ is difference operator. There is still correlation between disturbance term and independent variables. They suggest first differencing the model using $\Delta y_{i,t-2} = (y_{i,t-2} - y_{i,t-3})$ or simply $y_{i,t-2}$ as an instrument for $\Delta y_{i,t-1} = (y_{i,t-1} - y_{i,t-2})$ remove this correlation These instruments are consistent and not correlated with $\Delta u_{it} = (v_{it} - v_{i,t-1})$ (Baltagi, 2005).

Arellano and Bond (1991) use GMM estimation that has lesser variances than those of the Anderson and Hsiao (1982) Instrumental Variable estimators. This GMM methodology allows us some features. It provides control for error correlation throughout the time, heteroskedasticity between the different firms, simultaneity, and measurement mistakes due to the use of orthogonally conditions of the variance–covariance matrix.

The standard IV (instrumental aviables) estimator is a special case of a generalized method of moments (GMM) estimator. There are some advantages of GMM over IV; if model has a heteroskedasticity, the GMM estimator is more efficient than the simple IV estimator, on the contrary if model has no heteroskedasticity the GMM estimator is asymptotically no worse than the IV estimator. After GMM or IV model estimated, variables should be tested for overidentifying restricons. Although Overidentifying restrictons in GMM can be tested by J statistics of Hansen (1982), for IV model Sargan Test Statistic is special case of Hansen's J under assumption of conditional heteroskedasticity. Also Durbin-Wu-Hausman (DWH) tests is used for testing endogenity in IV estimation (Baum and Schaffer, 2003). If the null hypothesis is rejected then instrumental variable is endogenous and IV is the preferred estimator.

Sargan's test statistic is asymptotically distributed as chi-square under the null hypothesis of instrument validity. This test is important because the GMM estimator provides consistent estimations only if a valid set of instruments is employed (Mira and Gracia, 2003). Therefore, the higher the p-value of the Sargan statistic is the better.

In the trade-off model framework, companies identify their optimal capital structure and weigh up the advantages and disadvantages of an additional monetary unit of debt.

$$D_{it} = \alpha + \beta_1 D_{it-1} + \beta_2 DR_{it} + \beta_3 GO_{it} + \beta_4 AS_{it} + \beta_5 ROA_{it} + \beta_6 Size_{it} + \beta_7 LIQ_{it} + \varepsilon_{it} \tag{4}$$

The pecking order theory establishes that the level of debt should be adjusted to the financing needs of the company, taking as exogenous all the variables that form the earlier financing deficit. Mira and Gracia (2003) define the second model to test pecking order theory, which is below The authors added the variable cash flow (CF) from Hernando and Valles (1992) whose highlighted endogeneity of the variable:

$$D_{it} = \alpha + \beta_1 CF_{it} + \beta_2 Age_{it} + \beta_3 GO_{it} + \varepsilon_{it} \tag{5}$$

The sample consists of 260 firms for the period 2004–2011 are obtained from database Albertina, managed by Soliditet, s.r.o. The database includes information from about 2 mil. of registered firms in Czech Republic. The original purpose of the database was to provide information for verification of payment discipline the solvency of Czech companies in historical context. The sample of this paper consists of limited companies and limited liability companies in the private sector predominantly from manufacturing sector and from the sector of trade and services. We have excluded financial and insurance firms. We have included the

firms from several districts of Bohemia and Moravia taking the sample of several randomly selected districts. Although we have taken in account the economic situation in the district. Districts with high unemployment and other economic problems were excluded. After uploading the data from Albertina database − initially we have 589 firms then firms with missing years and those showing extremes (outliers in dependent variable) and inconsistent figures in CZK (the currency of the Czech sample) are deleted. The final sample consists of 260 SMEs which gives the total of 2080 observations. The firms have been selected from 10 different districts, Table 1 shows number of firms per district.

Table 1: Sample Representation by District

District	Name	Number of firms	Percent
21C0	Rakovník	9	3.46
2130	Kladno	27	10.38
2150	Kutná hora	8	3.08
2170	Mladá Boleslav	16	6.15
3230	Plzeň-město	45	17.31
5110	Česká Lípa	1	0.38
5130	Liberec	29	11.15
5210	Hradec Králové	44	16.92
6140	Třebíč	16	6.15
8120	Frýdek Místek	3	1.15
8160	Ostrava-město	62	23.85
Total		260	100

Based on the hypothesis[1] in previous literature (Bradley et al., 1984; Mackie–Mason, 1990; Jensen and Meckling, 1976; Myers, 1977; Stulz, 1990; Scott, 1977; Myers and Majluf, 1984; Williamson, 1988; Harris and Raviv, 1990; Ang, 1992; Myers, 1984 and Özkan 2001) we use Total Debt/(Total Debt + Equities) (Debt1) as a dependent variable and default risk (DR), growth opportunities (GO), asset structure (AS), profitability (ROA), natural logarithm of number of years of the company (AGE) and liquidity (LQ) as independent variables. The dependent variable shows leverage effect.

Default Risk (DR): The higher the default risk the lower the debt the company should undertake since debt is increasing the default risk of company.

Growth Opportunities (GO): Growth opportunities increase the future potential of company and thus increase its value. Greater debt provides relatively inexpensive source of funding for next projects exploring new growth opportunities. Companies would want to have some potential to increase their debt in case of need to explore the emerging growth opportunity.

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[1] For detailed information about hypothesis see: Sogorb-Mira, Francisco and López-Gracia (2006).

Asset Structure (AS): Asset structure is defined as proportion of tangible assets and inventories to total assets. The more long terms assets the company has the higher long term dent can be expected. Therefore the higher the ratio the higher the debt

Profitability (ROA): One would expect positive relation between profitability and debt, unless the company management is very for some reason very conservative or if the economic situation in the country does not favor debt in general which may be the case in the situation of economic crisis.

Number of Years (AGE): The older the company the more debt would be expected, even though rationally companies usually optimize their capital structure to manage their cost of capital and avoid the danger of bankruptcy.

Liquidity (LQ): Liquidity is a question of short term assets and short term liabilities. The more liquidity the company has the more long term resources including debt it would use, so we would expect a positive relation.

Mean of Total Debt of the firms is 35693 with maximum 389396 and minimum -606 values and it has right skewed and leptokurtic distribution. The variable age is in natural logarithm and it is not constant and increased for each year 2004 to 2011. Based on this information about Age; it can be said that oldest firm had been established 18 ($e^{2.890372}$)years ago in 2011. Average profitability, liquidity and default risk are 0.09, 2.32 and 0.04 respectively (see Appendix 2).

It is the basic tool to see relationship between variables by correlation coefficient. The correlation coefficients between independent variables and dependent variable(Debt) for trade-off and pecking order theory are given Table 2 (see Appendix 3 for correlation matrix).

Table 2: Correlation Coefficient Between Debt and Independent Variables

Independent Variable	Correlation Coefficient
Debt(-1)	0.1482***
DR	-0.0040
GO	-0.0173
AS	0.0965***
Size	0.6763***
ROA	-0.1064***
Age	0.0498**
LQ	-0.0842***

Notes: *** and **denote that the coefficient is statistically significant at a 1% and 5% 10% level respectively.

4. Results

Table 3 represents the results of the OLS, Anderson and Hsiao (1982) 2SLS and Arellano and Bond (1991) GMM models for trade off theory. Although we cannot reject the null hypothesis for 2SLS model by Durbin and Wu-Hausman tests, we can reject the null for Sargan Test. Whereas the results of rejection of the hypothesis are different both 2SLS and GMM are not valid. OLS is valid for the model. The lagged leverage effect expressed by change in total debt is statistically significant for OLS. It shows that the adjustment speed of

Czech SMEs is high based on the value 0.72 which calculate difference of leverage effect for 1. The adjustment coefficient has values in range of 0 to 1 and means that the adjustment costs are much higher than the unbalanced costs and the costs of being unbalanced are very large compared to the costs of self adjustment respectively. Therefore for the Czech SMEs having the costs of being unbalanced position is easier than bearing the costs of self adjustment. Table 4 summarizes the sign of the coefficients of the model.

Table 3: Trade-off Model (Dependent Variable: Debt1)

		OLS		Anderson and Hsiao (1982) 2SLS		Arellano and Bond (1991) GMM
		Dependent Variable: Debt1		**Dependent Variable: ΔDebt1**		**Dependent Variable: Debt1**
		Coefficient		Coefficient		Coefficient
Independent Variables[1]	**Debt1(-1)**	0.7206***	**Debt(-1)**	0.1676	**Debt(-1)**	1.0022***
	DR	0.0002	**ΔDR**	-0.0002	**DR**	-0.0006
	GO	-0.0819	**ΔGO**	0.0228	**GO**	-0.6592*
	AS	0.0058	**ΔAS**	-0.0072	**AS**	-0.0860*
	Size	-0.0133***	**ΔSize**	0.1818***	**Size**	0.1788***
	ROA	0.4348***	**ΔROA**	-0.3956***	**ROA**	-0.5362***
	LQ	-.0047***	**ΔLQ**	0.0003	**LQ**	-0.0006
Constant		0.3538***	**Constant**	-0.0265***	-	-
F Test		484.21***		-		-
Wald Test		-		464.93***		236,05***
R quared[2]		0.6318		0.2733		-
1st order autocorrelation[3]		-		-		-11.307***
2nd order autocorrelation		-		-		-0.1677
Sargan Test		-				126.2305***
Durbin (score)[4]		-		0.156231		-
Wu-Hausman[4]		-		0.155529		-

Notes: ***, ** and *denote that the coefficient is statistically significant at a 1%, 5% and 10% level respectively. $\Delta Debt1_{it-1}$ and $\Delta Debt1_{it-2}$ are instrument variable in 2SLS model. 1 (-1) shows one lagged variable. Δ shows first difference of variable. 2. Overall 3. Ho is no autocorrelation 4. Ho is variables are exogenous.

In OLS model, Size and ROA variables are significant and sign of the coefficients confirms the theory. Coefficient of Size is positive and the result is the same with Mira and Gracia (2003) and previous studies (Ocaña et al.,1994; Hutchinson, 1995; Chittenden et al., 1996; Berger and Udell, 1998; Michaelas et al., 1999; Romano et al., 2000). The profitability ratio ROA is highly significant. It has a negative coefficient that reveals a negative association between debt and firm profitability, which implies that more profitable companies use less debt. This is consistent with the predictions of pecking order theory and same with Myers (1984). Ozkan, 2001 states that liquidity affects the firm's capital structure and the findings show that LQ has a significant relation in our model.

Table 4: Summary of The Models

Independent Variable	Expected Sign	OLS Result	2SLS Result	GMM Result
Debt-1	+	-	n.s.	+
DR	-	n.s.	n.s.	n.s
GO	-	-	n.s.	-
AS	+	n.s.	-	-
Size	+	+	+	+
ROA	-	-	-	-
LQ	+/-	-	n.s.	n.s.

Note: n.s: Not Significant.

The second theory we want to test is the pecking order theory that is represented in equation (5). Table 5 shows results of pecking order model. We use OLS, Fixed Effect (FE), Random Effect (FE) and 2SLS model for testing the theory. Nevertheless both FE and RE models have heteroskedasticity problem therefore we use robust standard errors for FE and RE to remove heteroskedasticity.

Table 5: Pecking Order Model (Dependent Variable: Debt1)

Variables	OLS Coefficient	Fixed Effect[1] Coefficient	Random Effect[1] Coefficient	Anderson and Hsiao (1982) 2SLS	Coefficient
CF	-6.82 10-6***	-2.69 10-6***	-3.06 10-6***	CF(-1)	1.50 10-6***
AGE	-0.0936***	-0.1428***	-0.1375***	ΔCF	-1.33 10-6***
GO	-0.3554	0.3426	0.2664	ΔAGE	-0.1418
Constant	0.8369***	0.9185***	0.9087***	ΔGO	-0.0339
F Test	65.15	350.7***			
Wald Test	-		79.38***		33.51***

R squared	0,0903	0.1091	0.0674	0,0917
Durbin (score)[3]	-	-	-	16.7338***
Wu-Hausman[3]	-	-	-	16.8943***

Notes: *** and ** denote that the coefficient is statistically significant at a 1% , and 5% level. ΔCF, ΔCF_{it-2}, are instrument variable in 2SLS model. (-1) shows one lagged variable. Δ shows first difference of variable. 1. Regression with Driscoll-Kraay standard errors. 2. within R-squared 3. Ho is variables are exogenous.

Table 5 is summarized in Table 6 below. The two tables show that even though we have very low explanatory power ratio models are statistically significant. More variables would be added the model or the sample size would be increased. Durbin (Score) and Wu-Hausman tests conclude that instrumental variables are found endogenous in the model, thus 2SLS model is not valid.

Table 6: Summary of The Pecking Order Models

Variable	Expected Sign	Total Debt/(Total debt+Equity)		
		OLS	FE	RE
CF	-	-	-	-
AGE	-	-	-	-
GO	+	n.s.	n.s.	n.s.

Note: n.s: Not Significant.

In Pecking order theory, we can see that only the CF and Age are significant for explaining the capital structure. OLS is significant at 5% level, FEM and REM are significant at 1% level. The results show that according to pecking order theory creditors are willing to extend debt to Czech companies, which generate large enough cash flows and are in the market for longer time. This is partially against the proposition of debt optimization normally recognized in the group of "older" companies, but it can be recognized as a feature of transitional market with higher precaution of default risk. These results need to be interpreted with caution, because of low significance of the OLS, RE and FE models. In 2SLS model only the change in CF and lagged CF are significant and the model is well generally well specified. Similar results have been found in the literature see e.g. Jindrichovska (2013) for summary.

Conclusion

In this paper we have been searching the validity of two capital structure models on the sample of 260 Czech SMEs. In our tests we have used the traditional trade-off model and pecking order model using the specification in previous literature. Our testing has also included the dynamic parameter i.e. testing for the speed of adjustment to target debt level. It has been found that OLS model is valid for trade-off theory and except lagged variable of Debt all significant coefficients sings are the same as expected.

As long as the pecking order theory is concerned our results confirm the relation, but need to be interpreted with some reservations. According to our results the models are significant, but have a low explanatory value, thus there is a need to add more variables or

take in consideration specifics of the Czech case because there are not enough independent variables to explain it.

The empirical analysis provides evidence on how Czech SMES work with their capital structure. As we can see from the results of the model with independent variable leverage (Debt/Equity), the Czech companies are very heavily indebted and this suggests that the indebtedness should be open for further investigation. For further research we recommend to test different model specifications to characterize the capital structure or complement the research with some qualitative characteristics of Czech companies. It would be also interesting to compare our finding with SMEs on other transitional markets like Turkey or other markets that recently changed their political establishment.

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APPENDIX 1 Definition of variables

Variable	Definition
Debt	Total Debt
Debt1	$\dfrac{Total\ Debt}{Total\ Debt + Equities}$
Default Risk (DR)	$\dfrac{Interests\ Paid}{EBIT}$ Earnings before Interest and tax.
Growth Opportunities (GO)	$\dfrac{Long\ term\ untagibles}{Total\ Asset}$
Asset Structure (AS)	$\dfrac{LT\ Tangibles + Inventories}{Total\ Asset}$
Size	Natural logarithm of total assets
Profitability (ROA)	$\dfrac{EBIT}{Total\ Asset}$
Age	Nat. Log. of number of years
LQ	Current Liquidity

APPENDIX 2   Descriptive statistics

	Debt	Debt1	CF	DR	GO	AS	Size	ROA	AGE	LQ
Mean	35692.93	0.5836	6107.489	0.0428	0.0030	0.4735	10.4809	0.0968	2.2317	2.3213
Sd	47473.73	0.3062	10629.51	2.2169	0.0180	0.2348	1.1894	0.1456	0.5120	4.5621
Variance	2.25E+09	0.0937	1.13E+08	4.9148	0.0003	0.0551	1.4146	0.0212	0.2629	20.8125
Skewness	3.2749	1.1928	1.1421	-40.4411	13.8489	-0.0512	-0.3919	-0.7659	-1.6539	15.4811
Kurtosis	17.3594	8.2365	26.591	1770.283	219.7899	2.2467	3.2056	22.6844	6.7073	395.2773
Min	-606	-0.2157	-125563	-97.125	-0.0119	0	5.2470	-1.6947	0	-39.46
Max	389396	2.770528	99763	11.8125	0.3583	1.2160	13.4934	1.2944	2.8903	134.36
Observation	2080	1984	2080	2072	2080	2080	2080	2080	2070	2080

APPENDIX 3 Correlation Matrix Table

	Debt	Debt(-1)	DR	GO	AS	Size	ROA	AGE	LQ
Debt	1.0000								
p									
Debt1	0.7945	1.0000							
p	0.0000								
DR	-0.0040	0.0093	1.0000						
p	0.8552	0.6784							
GO	-0.0173	-0.0273	0.0038	1.0000					
p	0.4304	0.2240	0.8634						
AS	0.0965	0.0517	0.0177	-0.0410	1.0000				
p	0.0000	0.0213	0.4207	0.0613					
Size	0.6763	-0.1720	-0.0110	0.0266	0.1210	1.0000			
p	0.0000	0.0000	0.6147	0.2248	0.0000				
ROA	-0.1064	-0.1040	0.0111	0.0054	-0.1774	0.0313	1.0000		
p	0.0000	0.0001	0.6135	0.8052	0.0000	0.1536			
AGE	0.0498	-0.1258	-0.0040	0.0030	0.0372	0.2330	-0.1031	1.0000	
p	0.0232	0.000	0.8556	0.8897	0.0902	0.0000	0.0000		
LQ	-0.0842	-0.1248	-0.0026	0.0088	-0.0124	0.0194	0.0754	-0.0049	1.0000
p	0.0001	0.0000	0.9039	0.6871	0.5707	0.3768	0.0006	0.8230	

APPENDIX 4 List of Czech SMEs in the Sample with corresponding Industry

No	Name	Ind.	No	Name	Ind.
1	1.jizerskohorská stavební společnost, s.r.o.	C	131	Krategus, s.r.o.	T
2	1.Servis-Energo, s.r.o.	S	132	K-top, s.r.o.	S
3	A - Z Chlazení, s.r.o.	S	133	Kühtreiber, s.r.o.	P
4	AC LAK, s.r.o.	P	134	Lawi sport, s.r.o.	P
5	Accom Gastro, s.r.o.	T	135	Lesing plus, s.r.o.	C
6	AGC Moravské Budějovice, s.r.o.	P	136	LG - Dinex, s.r.o.	P
7	Agimon, s.r.o.	C	137	Libea, s.r.o.	P
8	Air Bohemia, a.s.	L	138	Libros Ostrava, s.r.o.	T
9	AIR Power, s.r.o.	P	139	Linatra, s.r.o.	P
10	Alfin Trading, s.r.o.	T	140	Lipraco, s.r.o.	P
11	Alkal Baterie, s.r.o.	T	141	Litra, s.r.o.	L
12	Alutex, s.r.o.	P	142	M.A.T. Group, s.r.o.	T
13	Alzakom, s.r.o.	T	143	Majka EŠV, s.r.o.	P
14	AmpluServis, a.s.	S	144	Marjánka Medical, s.r.o.	T
15	AP-Auto Profi, s.r.o.	T	145	Matezex, s.r.o.	T
16	Aquasped, s.r.o.	L	146	Medial Pharma, s.r.o.	T
17	ARC-H Hradec Králové, s.r.o.	P	147	Medinet, s.r.o.	T
18	Artweld, s.r.o.	T	148	Medtec - VOP, s.r.o.	P
19	Aspekta Trading, s.r.o.	T	149	Merida Hr. Králové, s.r.o.	T
20	Astra - Slaný, s.r.o.	P	150	Metalcom Kutná Hora, a.s.	T
21	Auto Dubina, a.s.	S	151	Mezos, s.r.o.	T
22	Autocentrum Jan Šmucler, s.r.o.	T	152	MICo, s.r.o.	P
23	Autocentrum TA, a.s.	T	153	Midap, s.r.o.	T

24	Autodíly Meteor, s.r.o.	T	154	Mocca, s.r.o.	P
25	Autohity CZ, s.r.o.	T	155	Modic Line, s.r.o.	S
26	Autolaros Speed, s.r.o.	S	156	Moravská Chalupa 9,s.r.o.	S
27	Autosalon F3K, s.r.o.	S	157	Moravské Montáže, s.r.o.	P
28	Autoviva, s.r.o.	T	158	Moravskoslezské Drátovny, a.s.	P
29	A-Z izolace, s.r.o.	S	159	Mostárna Lískovec, s.r.o.	P
30	Bateria Slaný CZ, s.r.o.	T	160	MPL Kauf, s.r.o.	T
31	Battex, s.r.o.	P	161	MSIo, s.r.o.	C
32	Bimont, s.r.o.	S	162	MSV Liberec, s.r.o.	P
33	BMB Ocel, s.r.o.	T	163	Nástrojárna Palaba, s.r.o.	P
34	Bohdan Bolzano, s.r.o.	T	164	Nisaform, s.r.o.	P
35	Bohemiaflux, s.r.o.	T	165	O.K. Konstrukce, s.r.o.	P
36	Boxservis, s.r.o.	T	166	OBB stavební materiály, s.r.o.	T
37	BR Progress, s.r.o.	P	167	Obnova-JaK, s.r.o.	S
38	Brukov, s.r.o.	P	168	Obreta, s.r.o.	S
39	C connect, s.r.o.	P	169	Okrouhlický s. r. o.	S
40	Callidus trading, s.r.o.	P	170	Olmex-KAL, s.r.o.	P
41	CargOSPOl, s.r.o.	L	171	Omega Plus, s.r.o.	L
42	Centrum Moravia Sever, s.r.o.	T	172	Osapo, s.r.o.	T
43	Čestav, s.r.o.	C	173	Ostravská dopravní společnost, a.s.	L
44	Chladírenský Servis Jedlička, s.r.o.	S	174	PCV Alfa s. r. o.	T
45	Colora, s.r.o.	T	175	Pekass, s.r.o.	T
46	ColorWest, s.r.o.	P	176	Perpet, s.r.o.	P
47	Comfort Sdružení a. s.	S	177	Pešek - Rambousek, s.r.o.	T
48	Cone - Stavitelství, a.s.	C	178	Petrof, s.r.o.	P

49	Cremer Bohemia, s.r.o.	P	179	Pokart, s.r.o.	P
50	CS. TOP, s.r.o.	S	180	Profer Plus, s.r.o.	T
51	D + k Drmela, s.r.o.	T	181	Protimex CS, s.r.o.	T
52	D.L.I., s.r.o.	T	182	Průmyslové zboží, s.r.o.	T
53	Dagen, s.r.o.	T	183	První železářská společnost Kladno, s.r. o.	P
54	Dagro Plzeň, s.r.o.	P	184	Rakotrans Doprava CZ, s.r.o.	L
55	Daneker, s.r.o.	C	185	Re Engineering CZ, s.r.o.	P
56	Dankar, s. r. o.	T	186	REBYT-plasty, s.r.o.	P
57	Delta HL, s.r.o.	P	187	Rec 21, s.r.o.	P
58	Despa OK, s.r.o.	P	188	Regio Auto, s.r.o.	P
59	DHW pro s. r. o.	L	189	Rekos - S+D, s.r.o.	T
60	Dobos, s.r.o.	L	190	Rektimont, s.r.o.	S
61	Dodávky automatizace, s.r.o.	S	191	Řeznictví - Pirník, s.r.o.	T
62	Dopravní podnik Mladá Boleslav	L	192	Ricom gas, s.r.o.	T
63	Draspol-stavební podnik, s.r.o.	C	193	Rimini, s.r.o.	T
64	Dzimas Steel, a.s.	P	194	RM Kovo, s.r.o.	P
65	EBK Eret Bernard, s.r.o.	T	195	Rozvaděče Šašinka, s.r.o.	P
66	ECE Group, s.r.o.	P	196	Rubing, s.r.o.	P
67	EKA - Komplet, s.r.o.	P	197	S.P.M. Liberec, s.r.o.	P
68	EL - Stroj, s.r.o.	S	198	Scanwest Plzeň, s.r.o.	T
69	Elceram, a.s.	P	199	SDP - Kovo, s.r.o.	P
70	Elektro - viola, s.r.o.	T	200	SE-MI Technology, a.s.	P
71	Elektromont Matějka, a.s.	C	201	Sgjw Hradec Králové,s.r.o.	P
72	Elproinvest, s.r.o.	C	202	Sigma - Energo, s.r.o.	S
73	Energetická montážní společnost Liberec, s.r.o.	C	203	Signal Mont, s.r.o.	P

74	Energis 92, s.r.o.	S	204	Sinit, a.s.	S
75	Energize Group, s.r.o.	S	205	SÍŤ, s.r.o.	T
76	Esko-t, s.r.o.	S	206	Sklopan Liberec, a.s.	P
77	Euros Gastro, s.r.o.	S	207	Škoda TVC, s.r.o.	P
78	Eurovit, s.r.o.	P	208	SKS - separace, s.r.o.	P
79	Exim Protect, a.s.	T	209	Smažík, s.r.o.	T
80	Femont, s.r.o.	P	210	Solpap, s.r.o.	P
81	Foliant EU, s.r.o.	P	211	Sovis s. r. o.	C
82	FOM - Stav, s.r.o.	C	212	Speed Press Plus, a.s.	T
83	Forte Steel, s.r.o.	T	213	Správa Komunikací, s.r.o.	C
84	France CAR, s.r.o.	T	214	Staba - Servis Antikor,s.r.o.	P
85	Gamys, s.r.o.	P	215	Startronic Gastro, s.r.o.	S
86	Gastrotip, s.r.o.	S	216	Stastr Čáslav, s.r.o.	P
87	Gema MB, s.r.o.	C	217	Stavby a rekonstrukce k.N.Š., s.r.o.	C
88	Geos AGT, s.r.o.	T	218	Stavební firma Hádlík, s.r.o.	C
89	GIS - Geoindustry, s.r.o.	S	219	Stavební podnik, s.r.o.	C
90	Gist, s.r.o.	P	220	Stemp, s.r.o.	P
91	Haco, s.r.o.	P	221	Straka 82, s.r.o.	S
92	HC electronics, s.r.o.	P	222	Stratos Auto, s.r.o.	S
93	Hebios, s.r.o.	T	223	Střecha Plzeň, s. r. o.	C
94	Hemat Trade Ostrava, a.s.	T	224	Středočeské komunální služby,s.r.o.	S
95	Hofmeister, s.r.o.	P	225	STS Uhlířské Janovice,s.r.o.	P
96	Hopa Plzeň, s.r.o.	P	226	Stylbau, s.r.o.	C
97	Houška OK, s.r.o.	P	227	SV Unips, s.r.o.	C
98	HSF System, a.s.	C	228	Tecam, s.r.o.	T

99	I.v., s.r.o.	P	229	Technické služby Kutná Hora	S
100	IC West, s.r.o.	P	230	Technické služby, Slezská Ostrava	S
101	ILD cz., s.r.o.	S	231	Technoma, a.s.	T
102	Incentrum, s.r.o.	P	232	TL-Ultralight, s.r.o.	P
103	Industroprofil, s.r.o.	T	233	Toner - Copy, s.r.o.	t
104	Inpoz, s.r.o.	T	234	Trado-MAD, s.r.o.	L
105	Invelt Energo, s.r.o.	S	235	Transcentrum bus, s.r.o.	L
106	IRE-TEX Praha, s.r.o.	P	236	Transpan, s.r.o.	L
107	IRP Krejčí, s.r.o.	P	237	Trebilift, s.r.o.	C
108	Ismm Production & Business Cooperation, s.r.o.	P	238	TriLine, s.r.o.	P
109	Isobast, s.r.o.	P	239	Údržba městských komunikací Rakovník , s.r.o.	S
110	Ites, s.r.o.	S	240	UNiBON, s.r.o.	P
111	JC Trans, s.r.o.	L	241	Uniplast, s.r.o.	P
112	Jipa Bauer, s.r.o.	T	242	V O P Dolní Bousov, s.r.o.	S
113	Jipe, s.r.o.	P	243	Vacek - Elektro, a.s.	T
114	Jirků A-Z, s.r.o.	P	244	VAE Controls, s. r. o.	S
115	Jiry, s.r.o.	T	245	Vamoz - servis, a.s.	C
116	JOB AIR - Central Connect Airlines, s. r. o.	L	246	Vestav Kladno, s.r.o.	T
117	JRK Kladno, s.r.o.	T	247	Vibrom, s.r.o.	P
118	JTA - Holding, s.r.o.	C	248	Voda CZ, s.r.o.	C
119	K & k Pneu, s.r.o.	T	249	Voith Industrial Services, s.r.o.	S
120	KASRO, s.r.o.	T	250	VP trend, s.r.o.	P
121	KB CAR, s.r.o.	S	251	VPS Chlumec, s.r.o.	P
122	Kelcom International	S	252	VPS CZ, s.r.o.	T

	Liberec,s.r.o.				
123	KH Tebis, s.r.o.	S	253	VSK Profi, s.r.o.	T
124	Klára květiny, s.r.o.	T	254	VV Auto, s.r.o.	T
125	Kohút a Spol., s.r.o.	T	255	Výtahy CZ, s.r.o.	P
126	Kolimpex, s.r.o.	T	256	Výtahy Voto Plzeň, s.r.o.	P
127	Kořan Nábytek, s.r.o.	P	257	VZV Steel, s.r.o.	T
128	Kovo Group, s.r.o.	P	258	ZAM - Servis, s.r.o.	P
129	Kovovýroba Kaufner, s.r.o.	P	259	Zdravotnický holding Králo-véhradeckého kraje, a.s.	L
130	Král PM Centrum, s.r.o.	S	260	ZVU Servis, a.s.	P

P = production, L= logistic (transport), T = trade, C = construction, S = services

APPENDIX 5: Sample Representation by Industry

Industry	Number	Percentage
Production (manufacturing)	94	36,15
Logistic (transport, storage)	15	5,77
Construction (buildings, roads)	24	9,23
Services (hotels, catering, others)	47	18,08
Trade (retail, wholesale)	80	30,77
Total	260	100,00