Determinants of Capital Structure: Empirical Evidence from Slovakia

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Abstract

The study analyses determinants of capital structure and capital structure theories – pecking order theory and trade-off theory. The main objective is to investigate which determinants influence capital structure and subsequently which model describes financing decisions in Slovak Republic better. We used panel data of 1,100 non-financial companies from Slovakia in the period of 6 years from 2002 to 2007. Results prove the trade-off theory to be more exact in Slovak conditions.

1. Introduction

The main objective of each firm should be to maximize shareholder value, to create wealth by undertaking investments which produce cash flow. The cash flow is generated by a company's assets, which are financed by different sources of finance which create capital structure of the company.

If a firm could choose any combination of capital structure without influencing its value, the modern theory of capital structure introduced by Modigliani and Miller (1958) would apply. They claim that given certain strict conditions, capital structure is irrelevant to a company's value. When some assumptions are omitted, the capital structure matters.

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Later theories try to explain capital structure by relaxing some assumptions of original Modigliani and Miller's prepositions, and they introduce frictions. Several theories have been put forward. They can be divided into two groups. Firstly, Myers (1984) introduces static trade-off theory, where two frictions (the tax deductibility of debt and the agency costs of financial distress) generate optimal capital structure. Static trade-off theory supposes that firms set up a target debt equity ratio, which they try to keep. The main benefit is the tax deductibility of interest, whereas the main costs are bankruptcy costs and agency costs. The optimal capital structure is achieved when marginal increase in the present value of the tax shield is equal to the marginal increase in expected bankruptcy costs.

The other theory is pecking order theory. The driving force of this theory is the existence of information asymmetry between managers and investors. Managers have much more information about the value of the firm than outsiders. Managers issue equity only when shares are overvalued. Investors are aware of it and hence, they interpret it as a bad signal and they require a discount. As a result, companies should issue securities whose value is least information sensitive because they are least underpriced. Consequently, internally generated sources are preferred to external finance. When internal funds are not sufficient, firms choose debt (safe and then risky) rather than equity. Therefore, there is no target capital structure. (Myers, 1984; Myers and Majluf, 1984)

2. Prior Empirical Findings

The results of empirical research done into testing the validity of pecking order and trade-off theories are mostly ambiguous. According to Myers (2001), We cannot expect to find a valid general theory of capital structure as it does not exist.

Amongst the first to find support for trade-off theory are Schwartz and Aronson (1967), who find evidence of optimal debt ratios. Next, Taggart (1977) proves that companies tend to keep to a target debt ratio. Others also include Marsh (1982) and Opler and Titman (1994), who find mean reversion in debt ratios or some evidence that firms appear to adjust toward debt targets. Bradley et al. (1984) claim that trade-off theory is valid and undertake a synthesis of earlier theoretical and empirical literature on optimal capital structure.

One of the most recent empirical studies contradicting the pecking order theory is carried out by Fama and French (2005) who find that financing decisions are often in conflict with the predictions of pecking order theory. They observe that most firms issue some kind of equity every year whereas, according to the pecking order theory, equity should be the last resort.

On the other hand, Baskin (1989), Chaplinsky and Niehaus (1993), Titman and Wessels (1988) and Rajan and Zingales (1995) find strong negative relationships between debt ratios and profitability which is consistent with pecking order theory. Shyam-Sunder and Myers (1999) also find support for the pecking order theory. They use a sample of American firms which were traded continuously over the period 1971 – 1989. They directly compare it with static trade-off theory and conclude that results offer greater confidence in the pecking order theory than the in trade-off hypothesis.

Other empirical findings are brought by Frank and Goyal (2003) who examine US firms from 1971 to 1998. They use the same methodology as Shyam--Sunder and Myers (1999). They observe little support for the pecking order theory as net equity issues track the financing deficit more closely than net debt issues.

Lemmon and Zender (2002) believe that the pecking order appears to be a good description of the financing policies. They claim that internal funds are the preferred fund of financing, followed by debt and finally by equity, which is consistent with the pecking order theory. However, Frank and Goyal (2007b) test this conclusion and they arrive at the statement that their inferences are influenced by the choice of small high growth firms. Mazur (2007) investigates Polish firms between 2000 and 2004. He runs multivariate regression to test the relationship between capital structure and its potential determinants. He confirms the superiority of pecking order theory.

The last group of researchers report inconclusive findings. For example, Haan and Hinloopen (2003) assert that both pecking order and trade-off theory are empirically important in explaining capital structure. Gaud et al. (2007) examine the driving factors behind capital structure policies in more than 5 000 European firms. They claim that capital structure decisions cannot be reduced to only one theory.

Recently, Antoniou et al. (2008) use panel data to examine the capital structure of companies. They find leverage ratio is positively affected by the tangibility of assets and the size of the firm, but negatively associated with firm profitability, growth opportunities and share price performance. Moreover, firms have a target debt ratio. Therefore, their findings do not strictly support any capital structure theory.

One of the latest pieces of research is carried out by Seifert and Gonenc (2008). They look at how well pecking order theory explains the capital structures of the US, the UK, Germany and Japan. They find little overall support for pecking order theory in all countries except for Japan during the 1980s and early 1990s.

3. Determinants of Capital Structure

A large amount of variables are responsible for determining capital structure decisions. Not all of them are statistically significant in all countries. We will present most of them in the following sub-chapters.

Asset Structure (Tangibility) – It is assumed that fixed assets serve as collateral. Therefore, according to agency cost theories, higher tangibility lowers the risk of a creditor suffering from the agency costs of debt (trade-off theory). On the other hand, pecking order theory assumes the opposite as firms with more fixed assets tend less towards asymmetric information. Therefore, they issue less debt.

Profitability – According to pecking order theory, there should be a negative relationship between debt ratio and profitability as there is a preference for internal finance over external funds. Whereas, according to trade-off theory, firms should choose higher debt ratio to use as a possible tax shield.

Growth Opportunities – A negative relationship with debt ratio is expected in terms of trade-off theory as high leverage can be a threat to future growth. According to pecking order theory, higher growth causes the need for more funds and so a company is expected to borrow more.

Liquidity – Jensen (1986) claims that cash-rich firms should issue more debt to prevent managers from wasting free cash flow, which implies a positive relationship between debt and liquidity in terms of trade-off theory. Conversely, pecking order theory implies a negative relationship between liquidity and leverage.

Firm Size – Larger firms have a lower risk of bankruptcy and they are more diversified. Therefore, according to trade-off theory, they can issue more debt. This implies a positive relationship between leverage and firm size. Information asymmetries are smaller for large firms (Myers and Majluf, 1984). Therefore, according to pecking order theory, the relationship should be the opposite.

Product Uniqueness – Higher product uniqueness is connected with higher bankruptcy costs. Therefore, researchers should observe a negative relationship with debt.

Earnings Volatility – The volatility of profitability is connected with business risk, which is proved to be inversely related to leverage without any difference for pecking order or trade-off theory.

Non-debt Tax Shields – Non-debt tax shields are substitutes for debt related tax shields. Therefore, the relationship with debt ratio should be negative as it contributes to a decrease in taxes.

In Table 1 you can find description of determinants of capital structure.

T a b l e 1

Possible Determinants (Explanatory Variables) of Capital Structure

Explanatory Variable (X_k)		Definition
Asset Structure (Tangibility)	ASSET	Fixed Assets / Total Assets
Profitability	PROFIT	EBIT / Total Assets
	GROWTH_1	Percentage Change of Total Assets
Growth Opportunities	GROWTH_2	Percentage Change of Net Revenues from Sales
	GROWTH_3	Long Term investment / Total Assets
Liquidity	LIQUIDITY	Current Assets / Short Term Liabilities
	SIZE_1	ln Sales
Firm Size	SIZE_2	Net Revenues from Sales
	SIZE_3	Total Assets
Product Uniqueness	UNIQ	Cost of Sales / Net Revenues from Sales
Business Risk (Volatility)	RISK_1	Standard Deviation of Operating Profits
	RISK_2	Percentage Change of Operating Profits
Non-debt Tax Shields	NDTS	Depreciation / Total Assets

Source: Antoniou et al., 2008; Bevan and Danbolt, 2002; Booth et al., 2001; Bradley et al., 1984; de Haan and Hinloopen, 2003; Frank and Goyal, 2003; Friend and Lang, 1988; Gaud et al., 2007; Chaplinsky and Niehaus, 1993; Kester, 1986; Kim and Sorensen, 1986; Lemmon and Zender, 2002; Mazur, 2007; Rajan and Zingales, 1995; Seifert and Gonenc, 2008; Titman and Wessels, 1988; Wald, 1999; Wiwattanakantang, 1999.

4. Sample Description

We use a sample of 1500 Slovakian companies with the highest turnover in 2007 and it covers period over 6 years from 2002 until 2007. The data is collected from database Amadeus and internet websites of companies. Companies with some missing data, companies which were established after 2002 and financial companies are omitted from the data set. After dropping some companies, the final panel data sample includes 1 100 non-financial companies from Slovakia.

Both quoted and non-quoted companies are included. In the case of non-quoted companies, results may be biased as smaller companies which are not traded on the market may have difficulties to issue new shares or they may have problems to obtain long-term debt as their reliability and transparency do not have to be high.

Most items in the balance sheet are stable and they do not change significantly over time. The problem of how to measure leverage of companies arises. Firstly, we can include long-term, short-term or total liabilities in the ratio. Secondly, the ratio can be calculated from book or market values. In the case of Slovakia, debt financing from 2002 to 2007 accounted on average 63% of the total financing of the companies. Short-term liabilities form the larger part of total liabilities (on average 83% of total liabilities). There are still many companies which do not use long-term debt at all. The reason for this could be the relatively high costs of long-term bank debt and early stages of development of the

bond market in the Eastern Europe. We decide to use all types of debts to be able to compare our results to other studies. All values are book values because market values for non-quoted companies are impossible to obtain.

5. Methodology

Many tests of pecking order and trade-off theories are used in practice. Commonly used test is to run the regression **(5-1)** (Rajan and Zingales, 1995) to test significance of determinants of capital structure:

$$D_{it} = \alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + ... + \beta_k X_{kit} + e_{it} \tag{5-1}$$

where
D_{it} – debt level for firm i at time t,
α – absolute coefficient,
β_{kit} – regression coefficient,
X_{kit} – determinant of capital structure and
e_{it} – error term.

We expect that signs of some coefficients of determinants are positive and some are negative as pecking order or trade-off theory should imply. The expected relationship between leverage and determinants is listed in Table 2.

T a b l e 2

Predicted Relationship of Explanatory Variables (X_k) with Debt Ratio

Explanatory Variable (X_k)		Predicted Relationship	
		Trade-off Theory	**Pecking Order Theory**
Asset Structure (Tangibility)	ASSET	+	–
Profitability	PROFIT	+	–
Growth Opportunities	GROWTH_1	–	+
	GROWTH_2	–	+
	GROWTH_3	–	+
Liquidity	LIQUIDITY	+	–
Firm Size	SIZE_1	+	+–
	SIZE_2	+	+–
	SIZE_3	+	+–
Product Uniqueness	UNIQ	–	
Business Risk (Volatility)	RISK_1	–	–
	RISK_2	–	–
Non-debt Tax Shields	NDTS	–	

Source: Antoniou et al., 2008; Bevan and Danbolt, 2002; Booth et al., 2001; Bradley et al., 1984; de Haan and Hinloopen, 2003; Frank and Goyal, 2003; Friend and Lang, 1988; Gaud et al., 2007; Chaplinsky and Niehaus, 1993; Kester, 1986; Kim and Sorensen, 1986; Lemmon and Zender, 2002; Mazur, 2007; Rajan and Zingales, 1995; Seifert and Gonenc, 2008; Titman and Wessels, 1988; Wald, 1999; Wiwattanakantang, 1999.

The analysis should be further developed by testing the impact of size, profitability and industry. It can be done by introducing dummy variables.

Myers (2003) claims that different factors might affect various types of companies in fundamentally different ways. In this case, there are big differences in companies in our sample concerning size or profitability which may influence availability of capital or debt.

Frank and Goyal (2007a) go further and assert that creating one model for firms in different situations will produce unstable results due to the aggregation of information. If we take this assertion into account, we can use dummy variables to distinguish between sub-samples according different profitability and size of companies.

As we collect balanced panel data, we use panel regression to test the capital structure of Slovakian companies. We run regressions in STATA.

There are several estimation techniques of panel regression. There are two most used – namely fixed effects model and random effects model. Subsequently, the Hausman test is used to check which model is better.

Before we run any regression, we need to check if all assumptions, which are made about all regressions, are met. Primarily if we take into account type of data, we have to check that there is no exact linear relationship between explanatory variables (no multicollinearity), the disturbances are homoscedastic and that there is no autocorrelation.

We do not check data for stationarity as Baltagi (2001) argues that stationarity test has sense in case of macroeconomics panel when both time-series and cross-section data tent to infinity. On the other hand, in the case of microeconomics panels when time-series are usually small whereas cross-section data tend to infinity, tests for stationary are not necessary.

To detect multicollinearity, we can use some statistical methods. Gujarati (2003) suggests examining pair-wise correlations among regressors. If it is in excess of 0.5, we consider it as the existence of multicollinearity. Gujarati (2003) continues that high pair-wise correlations are a sufficient but not a necessary condition. Multicollinearity may exist even though correlations are low. Therefore, we run as well auxiliary regressions Gujarati (2003). F statistic of these regressions is compared to the critical F_i at the chosen level of significance and if it exceeds the critical F_i, then particular X_i is collinear with other X's. If we identify multicollinearity, we omit the correlated variable.

To check heteroscedasticity in panel regression in STATA, we can use modified Wald test for groupwise heteroscedasticity. The null hypothesis is that variance of disturbances is constant (Swedish Business School, 2008). If heteroscedasticity is found, robust standard errors are used to remove it.

Autocorrelation can be discovered with Wooldridge test for autocorrelation in panel data. The null hypothesis is no first-order autocorrelation (StataCorp LP,

2003). If autocorrelation is spotted, Arellano-Bond dynamic panel regression is run when lagged dependent variables are used as explanatory variables (Arellano and Bond, 1991).

6. Empirical Results and Interpretation

We run regression **(5-1)** and try to discern the impact of individual determinants on capital structure. The dependant variable is book value of debt to book value of total assets. Debt is expressed in three ways: total, long-term and short-term liabilities. Therefore, three regressions are run. Explanatory variables are determinants of capital structure which explain capital structure in other countries.

Firstly, it is important to check multicollinearity as it is described earlier. We choose more ratios for some determinants as they may be all statistically significant. All ratios and determinants are described in Table 1. Therefore, it is particularly important to check the condition of multicollinearity as some variables may be correlated. We run pair-wise correlations of regressors. We omit on the basis of pair-wise correlations the following variables: GROWTH_1 (Growth Opportunities), GROWTH_2 (Growth Opportunities), SIZE_1 (Firm Size) and RISK_1 (Business Risk – Volatility). Subsequently, we perform auxiliary regressions. On its basis, we omit one more variable: UNIQ (uniqueness).

Furthermore, Wald test for groupwise heteroskedasticity shows presence of heteroskedasticity and Wooldridge test for autocorrelation spots autocorrelation. Panel regression takes into account autocorrelation, which is present, and tries to correct it with the help of the Arellano-Bond dynamic panel-data regression (Arellano and Bond, 1991). One of the biggest advantages of panel data is the ability to model individual dynamics (Verbeek, 2008). The theory suggests that the current capital structure depends upon the past (Ozkan, 2001). Therefore, it is useful to estimate a dynamic model on an individual level. We include statistically significant one lag of dependent variable as a regressor. The results are presented in Table 3.

To select the right regressors in the panel regression, we start with general large model and we reduce it until all explanatory variables are significant.

There is a negative relationship between assets (*ASSET*) and short-term leverage. Whereas, there is a positive relationship between assets and total and long-term debt. The first ones show that a higher proportion of fixed assets in total assets lowers the asymmetric information problem and subsequently, the company issues less debt. Our results contrast with other research undertaken by, for example, Rajan and Zingales (1995) and Titman and Wessels (1988) who obtain a positive relationship between assets and leverage for developed countries. On the

other hand, our findings agree with Bevan and Banbolt (2002) who find assets structure to be positively correlated with long-term liabilities and negatively correlated with short-term debt. The reason can be that smaller companies may face problem with availability of long-term bank debt.

T a b l e 3
Arellano-Bond Dynamic Panel-data Estimation of Determinants of Capital Structure

	Arellano-Bond dynamic panel-data estimation		Random-effects GLS regression
Debt Total Assets	Total Debt	Long-term Debt	Short-term Debt
L(1)	0.48*	0.33***	
(s.e.)	0.10	0.08	
ASSET	0.05*	0.08***	-0.43***
(s.e.)	0.03	0.02	0.02
PROFIT	0.17***		0.38*
(s.e.)	0.05		0.03
GROWTH_3	-0.35***	-0.10***	-0.22***
(s.e.)	0.01	0.01	0.01
LIQID	-0.03***	-0.02***	-0.01***
(s.e.)	0.00	0.00	0.00
SIZE_2	0.03***	0.02***	0.05***
(s.e.)	0.00	0.00	0.00
SIZE_3	0.11***	0.03***	0.05***
(s.e.)	0.01	0.01	0.01
NDTS	-0.32***	-0.38***	-0.29***
(s.e.)	0.12	0.08	0.09
Constant	0.13**	0.16***	0.48***
(s.e.)	0,06	0,04	0,04
R-sq	NA	NA	0.9531

Note: *** statistically significant at 1% confidence interval.
   ** statistically significant at 5% confidence interval.
   * statistically significant at 10% confidence interval.

Source: Own calculation using STATA.

Another important determinant of capital structure is profitability (*PROFIT*). Its positive sign suggests that firms choose higher debt ratio to use as a possible tax shield which confirms trade-off theory. However, our results are not supported by other research as everybody has ever found negative relationships as it is assumed that most companies prefer internal over external funds. That is impossible to compare these results with findings of other Slovakian research as nobody has ever used similar data. Reasons for that can be different. One of them can be that even if companies are profitable, they cannot use their profit for investment as it is paid out to their shareholders and therefore companies have to rely on external finance.

Previous assumption about profit distribution and subsequently no profit for investment can be confirmed by negative relationship between liquidity and debt ratio whatever debt ratio we use. This supports pecking order theory as Slovakian cash-rich firms do not issue more debt as they use their free cash to invest. It is not in conflict with positive relationship between profitability and debt ratio

due to reason mentioned above – if companies have profit, they usually distribute it but if they are cash-rich, they prefer internal funds.

The sign of the growth rate (*GROWTH_3*) is negative. This supports trade-off theory as high leverage can be a threat to future growth. We get the same results as Rajan and Zingales (1995) and Bevan and Danbolt (2002).

Another important determinant of capital structure is firm size (*SIZE_2, SIZE_3*). The signs of the coefficients are positive in results of regressions. Most researchers experience positive relationship as well – e.g. Bevan and Danbolt (2002), Frank and Goyal (2007b), Friend and Lang (1988), Rajan and Zingales (1995) or Wald (1999). Explanation for positive relationship is straightforward – larger firms have a lower risk of bankruptcy and they are more diversified. Therefore, according to trade-off theory, they can issue more debt.

The next significant variable is non-debt tax shields (*NDTS*). The sign is negative as it contributes to a decrease in taxes. The negative relationship is also confirmed by other researchers (Chaplinsky and Niehaus, 1993; Wald, 1999; Wiwattanakantang, 1999).

An annual adjustment speed of leverage ratio is approximately 52% for total debt and 67% for long-term debt which is still quite a high adjustment in comparison with other research which was performed for different companies. Short--term debt does not depend on the past as it depends on current amount of payables of the company and it does have any memory. Gaud et al. (2005) find adjustment speed to be between 14% and 39% for Switzerland, de Miguel and Pindado (2001) find 21% for Spain, and Ozkan (2001) reports a value of 43% for the UK. The adjustment speed of 52% for total debt, respectively 67% for long--term debt in Slovakia could be explained by the fact that Slovakian companies rely on debt in case of a lack of funds. Also, if they need additional funds, they prefer to use debt to equity. On the other hand, high adjustment rate may signal that companies adjust their capital structure towards their target leverage ratio quite quickly. Therefore, we cannot draw any conclusion about preference of any financing theory. We can only conclude that the current capital structure of Slovakian companies depends upon the past.

Finally, we tested impact of size and profitability on stability of coefficients of the determinants of capital structure of Slovakian companies. We include dummy variables for profitability. Regression results for different sub-samples are nearly the same and they do not provide any ambiguous findings. Therefore, we can conclude that all analyses, in which the total sample is used, are valid and they give correct results as signs of their coefficients are stable.

New conclusions concerning determinants of capital structure of non-financial companies in Slovakia arose from the executed analysis. The specifications of capital structure management could be summarized into the following points:

• There is a negative relationship between assets structure and short-term leverage. On the opposite, there is a positive relationship between assets structure and total debt and long-term debt. The first relationship shows that a there is a higher proportion of fixed assets in total assets – this type of assets require long-term financing (with equity or long-term debt). If a company chooses long--term financing, it would be not convenient to create more debts.

• The next important determinant of capital structure is profitability: In case a firm's goal is higher profitability, the debt financing is preferred over short--term financing. One of the reasons could be that companies can not use their profit to invest, as they have to pay out their shareholders; therefore they have to rely on external financing. This assumption can be explained by negative relationship between liquidity and debt ratio.

• Another interesting finding is that firms with higher profitability tend to have low liquidity. The cash-rich firms do not issue more debt as they use their free cash to invest. It is not in contradiction with positive relationship between profitability and debt ratio due to the reason mentioned above – companies, which have profit, usually distribute it; as opposed to cash-rich companies, which prefer internal funds.

• Another important determinant of capital structure is a size of the firm: research signed positive relationship among debt financing and firm size. The positive relationship could be explained by the fact, that larger firms diversify their activities; therefore they are less prone to bankruptcy. Therefore they can issue more debt. Simultaneously, they have stronger negotiation position against their suppliers, which allows them higher level of indebtedness.

• The next significant variable is non-debt tax shields. It is typical for firms with high non-debt tax shields to have lower debt financing – these firms don't need to use debt tax shield.

• Debt financing (especially long-term financing) is dependent on the past financing of the company. Short-term debt does not depend on the past as it depends on current amount of payables of the company.

Conclusion

The research presents a study of the capital structure of companies in Slovakia. The main objectives are to clarify which determinants control the capital structure of Slovakian companies, and which financing theory prevails – either pecking order theory or trade-off theory. The analysis is performed using panel data from 1 100 non-financial companies during the period 2002 – 2007.

The main findings are in favour of trade-off theory. On the other hand, analysis shows that no financing theory completely explains capital structure. There is a positive relationship between assets structure, profitability, firm size and debt. Whereas, there is a negative relationship between growth opportunities, liquidity, non-debt tax shields and leverage. The dynamic analysis shows that the current capital structure of companies depends upon the past.

Once data for a longer time period is available, research should be aimed at the analysis of dynamic panel regression and the stability of the speed of adjustment. Further, macroeconomics events such as changes in taxation or law should be explored in greater detail as they may also play an important role in capital structure. Another point is the availability of new debt and how difficult it is to issue new equity for smaller companies, which may also significantly determine capital structure.

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