

## Capital structure choice in the Baltic countries

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### ABSTRACT

The data set consists of 58 companies listed on the Baltic Stock Exchange over the period from 2005 to 2012. The study analyses the trade-off and the pecking order theories of capital structure by using regression analysis. The empirical results indicate that Baltic listed companies do not apply pecking order to their capital structure. Speed of adjustment varies for long-term debt and short-term debt. Short-term debt is adjusted more quickly than long-term debt. Speed of adjustment also depends on company size and country. Large companies and companies from Estonia adjust their capital structure more quickly than medium companies and companies from Lithuania.

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## 1. INTRODUCTION

Capital structure choice has been analysed and discussed by both academics and managers for several decades. The starting point for the subject of capital structure is the irrelevance proposition of Modigliani and Miller (1958, 1963). Since then two capital structure theories have prevailed – the trade-off theory and the pecking order theory. The pecking order theory states that companies prioritize their sources of financing – at first they prefer to use internal funds, then to borrow, and finally issue equity as a last resort (Myers and Majluf, 1984). The trade-off theory argues the companies choose the debt and equity mix by balancing the benefits and costs of debt. If a company increases its leverage, the tax benefits of debt increase as well. At the same time, the costs of debt also rise (Kraus and Litzenberger, 1973).

The aim of the research is to evaluate the pecking order and trade-off theories of capital structure and determine which one of these performs better for a sample of companies from the Baltic states.

The tasks of the paper are as follows:

- To overview the results of previous research made in this field;
- To evaluate the pecking order and trade-off theories on a sample of 58 listed companies;

- To determine which theory performs better for a sample of companies from the Baltic states.

Analysis is conducted on a sample of 58 listed companies (Baltic Stock Exchange) over the period from 2005 to 2012. The following qualitative and quantitative methods of research are applied in the research paper: the monographic method and panel data regression analysis. The research is based on published papers on the trade-off theory and the pecking order theory, as well as information provided by the Baltic Stock Exchange. Panel data regression performed in STATA.

The remainder of the paper is organized as follows. The following section provides the review of recent studies on the subject of the present paper. Then the methodology and sample of the study is discussed. After the methodology section, empirical results are described. The final section concludes the paper.

## **2. LITERATURE REVIEW**

The pecking order theory states that companies prioritize their sources of financing – at first they prefer to use internal funds, then to borrow, and finally to issue equity as a last resort. The reason of such hierarchy is the information asymmetry, since managers know more about the company performance and future prospects than outsiders do. Managers are unlikely to issue company shares when they believe that shares are undervalued, however they are more inclined to issue shares when they believe they are overvalued. Shareholders are aware of this and they may interpret a share issue as a signal that management thinks the shares are overvalued, and in response shareholders might increase the cost of equity. There is no clear target debt-equity mix.

The trade-off theory states that the company chooses a debt and equity mix by balancing the benefits and costs of debt. If the company increases its leverage, the tax benefits of debt increase as well. At the same time, the costs of debt also rise. The original version of the trade-off theory grew out of the debate over the Modigliani-Miller theorem. Kraus and Litzenberger (1973) formally introduced the tax advantage of debt and bankruptcy penalties into a state preference framework. The trade-off theory predicts that target debt ratios will vary from enterprise to enterprise. Companies with safe, tangible assets and plenty of taxable income ought to have high target ratios. Unprofitable companies with risky, intangible assets ought to rely primarily on equity financing.

According to Myers (1984), a company that follows the trade-off theory sets a target debt-to-value ratio and then gradually moves towards it. The target is determined by balancing debt tax shields against costs of bankruptcy. Frank and Goyal (2005) break Myers' definition into two parts:

Definition 1 – the static trade-off theory – a company is said to follow the static trade-off theory if the leverage is determined by a single period trade-off between the tax benefits of debt and the costs of bankruptcy.

Definition 2 – target adjustment behaviour – a company is said to exhibit target adjustment behaviour if the company has a target level of leverage and if deviations from that target are gradually removed over time.

Target adjustment behaviour has been widely tested empirically (Leary and Roberts, 2005; Alti, 2006, Flanery and Rangan, 2006; Hovakimian, 2006; Kayhan and Titman, 2007; Huang and Ritter, 2009). Some papers analyse the determinants of optimal interval of capital structure (Fischer, Heinkel and Zechner, 1989; Dudley, 2007) and determinants on how fast companies can adjust their leverage (Dang, Kim and Shin, 2012; Leary and Roberts, 2005).

Most empirical results show a medium adjustment speed. Shyam-Sunder and Myers (1999) report an adjustment speed of 0.75. De Jong, Verbeek and Verwijmeren (2010) show that adjustment speed is different for small and large companies. They used a sample of companies from 1990 to 2005 and the speed of adjustment was 0.21 for small companies and 0.67 for large companies. The adjustment speed differs for different types of countries. For example, Seifert and Gonenc (2010) found that the leverage adjustment speed for emerging countries is 0.49, whereas for US companies the result is only 0.19. Another determinant is the company life-cycle stage. Bulan and Yan (2010) show that growth companies basically do not adjust their leverage (0.08), however mature companies achieved a different result (0.42).

Previous empirical research on evaluating the efficiency of both the pecking order and trade-off theories has provided mixed results.

Shyam-Sunder and Myers (1999) find that the pecking order is an excellent descriptor of corporate capital structure and the target adjustment model also performs well. When both models are tested together, the pecking order results change hardly at all, however performance of target adjustment model decreases.

The study carried out by Sanchez-Vidal and Martin-Ugedo (2005) used a panel data analysis of Spanish companies. The results show that the pecking order theory holds for most subsamples analysed, particularly for the small and medium-sized companies and for the high-growth and highly leveraged companies. Seppa (2008) investigated 260 Estonian non-financial enterprises, using financial statements of 2002/2003 and 2003/2004 and found support for the pecking order theory, however in the long run the evidence supporting this remains weak. The results provide no or very weak support for the fact that the trade-off theory is followed in the long-run. Cotei and Farhat (2009) find that managers tend to adjust toward target leverage but this does not prevent them from deviating from this target to take advantage of the equity market conditions and the information asymmetry problem. Mazen (2012) used French panel data to examine the validity of the static trade-off theory and the pecking order theory. This study cannot formally reject either one of the two theories; however it confirms the importance of considerations provided by the static trade-off theory. Amaral *et al.* (2012) used a sample of non-financial Brazilian companies from 2000 to 2010. The study concluded that the companies follow the pecking order theory; however no evidence was detected concerning the trade-off theory.

Though many research studies have been undertaken in the field of the pecking order and trade-off theories, the results are still unclear. Some studies support the pecking order theory and some support the trade-off theory, while other studies support both of them or none at all.

### 3. SAMPLE AND RESEARCH METHODOLOGY

The study is based on the financial data collected from financial statements of 58 Baltic listed companies over the period from 2005 to 2012. The sample consists of 22 companies from the Baltic Main List and 36 companies from the Baltic Secondary List. Distribution by countries is as follows: 29 companies from Latvia, 7 from Estonia and 22 from Lithuania.

All companies had all the necessary data for the whole period analysed, therefore a balanced panel of data is achieved. The financial companies were excluded, because their characteristics are different due to the specific balance sheet structure. Data are obtained from the NASDAQ OMX Baltic. Total number of observations is 464.

Although capital structure has been researched for several decades by now, there is still no consensus regarding the best debt ratio to use. Many studies use liabilities against total assets or total capital, however the authors of this study argue that this ratio is not applicable. Both interest bearing debt and non-interest bearing debt is included in the liabilities. Two companies can have the same liabilities/total assets ratio, but the structure of the liabilities can be different. For example, at an extreme one company might have only interest-bearing debt in liabilities, whereas another company might have no interest-bearing debt at all. Therefore it is not correct to consider that both companies have the same capital structure. The use of total liabilities can overestimate the company leverage.

Total assets, total capital or equity is usually used as a denominator. Since in the Baltic countries equity might be a negative due to the accumulated losses, the authors of this study do not use these ratios.

Capital structure variables which are used in this study are shown in Table 1. Only interest bearing debt is used for the nominator and total capital is calculated as the sum of equity, long-term interest bearing debt and short-term interest bearing debt.

**Table 1:** Used variables in the study

Variable	Abbreviation
Short-term debt to assets	STD/A
Short-term debt to capital	STD/C
Long-term debt to assets	LTD/A
Long-term debt to capital	LTD/C
Total debt to assets	TD/A
Total debt to capital	TD/C

*Source: prepared by the authors*

This study uses not only the total debt ratios, but also the long-term debt ratios and the short-term debt ratios, since any analysis of leverage based on total liabilities may miss the important differences between long-term and short-term debt (Sogorb-Mira, 2005).

Table 2 shows capital structure variables for all three Baltic countries over the period from 2005 to 2012.

**Table 2:** Capital structure variables in the Baltic countries from 2005 to 2012

Country	2005	2006	2007	2008	2009	2010	2011	2012	Average
<b>Latvia</b>									
STD/A	6	6	10	9	14	9	8	11	<b>9</b>
STD/C	10	11	18	16	14	13	11	16	<b>14</b>
LTD/A	8	11	10	12	14	14	18	18	<b>13</b>
LTD/C	13	17	16	18	19	18	22	19	<b>18</b>
TD/A	14	17	20	21	22	23	26	28	<b>21</b>
TD/C	23	28	34	34	33	31	34	35	<b>31</b>
<b>Estonia</b>									
STD/A	8	7	6	8	19	6	5	5	<b>5</b>
STD/C	19	21	15	18	19	14	12	13	<b>16</b>
LTD/A	17	14	16	18	19	19	22	18	<b>18</b>
LTD/C	39	31	36	40	39	35	42	40	<b>38</b>
TD/A	25	22	21	26	26	25	27	23	<b>24</b>
TD/C	58	52	51	58	58	50	53	53	<b>54</b>
<b>Lithuania</b>									
STD/A	9	9	11	16	10	12	13	17	<b>12</b>
STD/C	16	17	20	27	27	19	22	27	<b>22</b>
LTD/A	18	17	15	15	10	11	10	8	<b>13</b>
LTD/C	26	28	26	22	15	19	15	13	<b>20</b>
TD/A	27	27	26	30	27	23	23	24	<b>26</b>
TD/C	42	45	46	49	42	38	37	40	<b>42</b>

*Source: results calculated by the authors of the paper, using Baltic Stock Exchange data*

If capital structure ratio TD/C is analysed, it can be concluded that companies from Estonia have the highest ratio of interest-bearing debt in their capital structure. TD/C for companies in Estonia fluctuated from 50% to 60%. Companies from Latvia started with a small ratio of 23% in 2005, however this debt ratio increased up to 35% in 2012. Debt ratio TD/C for companies from Lithuania was between 40% and 50% from 2005 to 2008. From 2009 to 2011 the debt ratio decreased by more than 10 percentage points, however during last year – in 2012 – this debt ratio showed an upward tendency once again.

In addition some differences regarding the short-term and long-term debt can be recognized. In the case of Estonia most debt is long-term. When examining the situation during the period from 2005 to 2012 it can be stated that the long-term debt for companies from Estonia makes around 70% of its total debt ratio. For companies from Latvia long-term debt proportion in total debt fluctuated more and it was

between 47% and 65%. Finally, with regard to companies from Lithuania the long-term debt proportion in the total debt varied between 33% and 62%.

Therefore it can be concluded that all three Baltic countries show different tendencies regarding the debt ratios and debt allocation between long-term and short-term debt.

In order to test the pecking order and the trade-off theory, the methodology by Shyam-Sunder and Myers (1999) is used in this study.

Shyam-Sunder and Myers propose the time-series hypothesis for the pecking order theory. The funds flow deficit is:

$$DEF_t = DIV_t + X_t + \Delta W_t + R_t - C_t, \quad (1)$$

where

$DIV_t$  – dividend payments,

$X_t$  – capital expenditures,

$\Delta W_t$  – net increase in working capital,

$R_t$  – current portion of long-term debt at start of period,

$C_t$  – operating cash flows, after interest and taxes.

Then tested the following regression:

$$\Delta D_{it} = \beta_0 + \beta_1 DEF_{it} + e_{it}, \quad (2)$$

where  $\Delta D_{it}$  is the amount of debt issued (or retired if DEF is negative). The pecking order coefficient is  $\beta_1$  and is expected to be 1.  $\beta_0$  is the regression intercept and  $e_{it}$  is the error term.

As pointed out by the authors, this does not include equity issues or repurchases, since the pecking order theory predicts that the enterprise will only issue or retire equity as a last resort. They admit that this equation cannot be generally correct, but it is a good description of financing.

For the trade-off theory they propose the following target adjustment model and regression specification:

$$\Delta D_{it} = \beta_0 + \beta_1 (D_{it}^* - D_{it-1}) + e_{it} \quad (3)$$

$D_{it}^*$  is the target debt level for enterprise  $i$  at time  $t$ .  $\beta_1$  is target-adjustment coefficient. The hypothesis to be tested is  $\beta_1 > 0$  (indicates adjustment towards the target) and also  $\beta_1 < 1$  (implies positive adjustment costs).  $\beta_0$  is the regression intercept and  $e_{it}$  is the error term.

Since the target debt level is unobservable, empirically different proxies are used. Different studies use the average leverage ratio (Jalilvand and Harris, 1984; Shyam-Sunder and Myers, 1999), three year

moving average (Jalilvand and Harris, 1984), industry average ratio (Lev, 1969) or leverage ratio which is derived from the regression model (Kokoreva and Stepanova, 2012). The authors of this study use average leverage ratio and three year moving average.

This methodology has already been extensively used and modified. For example, the test of the pecking order theory is used by Amaral *et al.* (2012), Mazen (2012), Cotei and Farhat (2009), Byoun and Rhim (2003) and the test of the trade-off theory is used by Mazen (2012), Cotei and Farhat (2009), Byoun and Rhim (2003).

In order to estimate the panel regression model, two alternative methods were used: the fixed effects model and random effects model. The pooled regression may distort the true picture across companies. The two most prominent models are fixed effects model (FEM) and the random effects model (REM). In FEM the intercept in the regression model is allowed to differ among individuals in recognition of the fact that each company may have some special characteristics of its own. In order to distinguish the preferable model, F-test and Hausman test is employed.

Models are also evaluated by their R-squared, F-statistics, p-values, White test for heteroscedasticity and Breusch-Godfrey test for autocorrelation.

#### **4. EMPIRICAL ANALYSIS AND DISCUSSION OF RESULTS**

The authors of the paper test the trade-off theory and the pecking order theory by using the methodology proposed by Shyam-Sunder and Myers (1999) which has been widely tested empirically.

The tests of trade-off theory were done several times. At first, companies were divided into three equal groups by their total assets. Three year moving average debt ratio was used as target leverage. Regression models showed positive coefficients, F-statistics and p-values of coefficients were less than 0.05. However, one must note that coefficients were significantly larger than 1 and that applies to all debt ratios. If the trade-off coefficient is more than 1, it means that companies over-adjust their debt ratio. Based on the data from Table 2, it can be determined that coefficients of value more than 1 are not justified. In addition almost all models had heteroscedasticity and autocorrelation problems.

Then the company allocation was changed and all companies were divided into three equal groups by their moving three year average. Results were similar to the previous output. Almost all regression models had coefficients of value more than 1, F-statistics and p-values less than 0.05 and showed both heteroscedasticity and autocorrelation problems.

Finally the authors changed the proxy for the target leverage. The results of these regression models differ significantly. Almost all models are statistically significant (F-statistics less than 0.05), coefficients are statistically significant as well (p-value less than 0.05) and there is also no heteroscedasticity and autocorrelation. Results are presented in Table 3.

**Table 3:** Results of the trade-off theory regression in the Baltic countries, 2005-2012 (results divided by company size)

Variable	Model	Coefficient	P-value	Comments
<b>Small companies</b>				
TD/A	RE	-0,2728100***	0,000	Heteroscedasticity, autocorrelation
TD/C	FE	0,7136315***	0,000	autocorrelation
LTD/A	RE	-0,1718654***	0,001	Heteroscedasticity
LTD/C	FE	0,5708472***	0,000	Autocorrelation
STD/A	FE	0,7387245***	0,000	Heteroscedasticity, autocorrelation
STD/C	FE	0,7001989***	0,000	Heteroscedasticity
<b>Medium companies</b>				
TD/A	FE	0,4798671***	0,000	
TD/C	FE	0,4335767***	0,000	
LTD/A	FE	0,5098621***	0,000	
LTD/C	FE	0,6185725***	0,000	
STD/A	FE	0,9137532***	0,000	
STD/C	FE	0,6878322***	0,000	Heteroscedasticity
<b>Large companies</b>				
TD/A	FE	0,3580199***	0,000	
TD/C	FE	0,6898459***	0,000	
LTD/A	FE	0,6012408***	0,000	
LTD/C	FE	0,7090288***	0,000	
STD/A	FE	0,9748274***	0,000	
STD/C	FE	0,8544689***	0,000	

Note: \*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10% confidence level

Source: results calculated by the authors of the paper, using Baltic Stock Exchange data

Heteroscedasticity and autocorrelation can be found only for small companies. However, the results of medium and large companies are consistent to the dynamic trade-off theory of capital structure. Acquired coefficients are between 0.35 and 0.97 and correspond to the rational behaviour. Since the acquired coefficients are positive and statistically significant, it can be concluded that leverage has a tendency to move to the average ratio.

Speed of adjustment is the highest for short-term debt. For example, large companies have a regression coefficient of 0.97 for STD/A ratio, which implies that companies decrease the gap between the actual and target leverage by 97% within a year. Speed of adjustment is a little lower for long-term debt and it varies between 0.50 and 0.70. If long-term debts and short-term debts are analysed separately, it can be concluded that large companies adjust their capital structure faster than medium companies. For example, LTD/A speed of adjustment is 0.51 for medium companies, whereas it is 0.60 for large companies. The achieved results can be explained as follows. Short-term debt can be adjusted in a faster and easier manner. Companies usually use such loan products as credit line and overdraft in their short-term liabilities. Companies can adjust the usage of these products quickly and with no significant adjustment costs. Larger companies adjust their capital structure faster, because they might use their scale of size in negotiation with the creditors.

Table 4 presents the results of regression models if companies are divided by their allocated country.

**Table 4:** Results of the trade-off theory regression in the Baltic countries, 2005-2012 (results divided by country)

Variable	Model	Coefficient	P-value	Comments
<b>Latvia</b>				
TD/A	RE	-0,2084323***	0,000	Heteroscedasticity, autocorrelation
TD/C	FE	0,6255866***	0,000	
LTD/A	RE	-0,1153097***	0,007	Heteroscedasticity
LTD/C	FE	0,5304346***	0,000	Autocorrelation
STD/A	FE	0,8727210***	0,000	Heteroscedasticity, autocorrelation
STD/C	FE	0,7999403***	0,000	Heteroscedasticity
<b>Estonia</b>				
TD/A	FE	0,6194594***	0,000	
TD/C	FE	0,9951138***	0,000	
LTD/A	FE	0,5361976***	0,000	
LTD/C	FE	1,0698260***	0,000	Autocorrelation
STD/A	FE	0,9464656***	0,000	
STD/C	FE	0,9146956***	0,000	
<b>Lithuania</b>				
TD/A	FE	0,3132576***	0,000	
TD/C	FE	0,3959670***	0,000	
LTD/A	FE	0,4735342***	0,000	Heteroscedasticity
LTD/C	FE	0,6454209***	0,000	
STD/A	FE	0,8399109***	0,000	
STD/C	FE	0,6618735***	0,000	

Note: \*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10% confidence level

Source: results calculated by the authors of the paper, using Baltic Stock Exchange data

Companies from Latvia have heteroscedasticity and autocorrelation problems, which cannot be stated about the companies from Lithuania and Estonia. The only capital structure variable that can be compared for all three Baltic countries is TD/C. The highest speed of adjustment of capital structure variable TD/C is shown by companies from Estonia (0.99). Companies from Latvia show a medium adjustment speed (0.63), whereas companies from Lithuania indicate a speed of adjustment of 0.40. The results specify that companies from Estonia have financial flexibility and they are able to make capital structure adjustments quickly.

If long-term debts and short-term debts are analysed separately for companies from Estonia and Lithuania, one must conclude that short-term debt is adjusted more quickly than long-term debt. This can be explained with several arguments. First, short-term debt might not include the collateral (for example, bank overdraft). This can be applied to large companies which are listed on the stock exchange due to the low information asymmetry. It implies that granted means can be used faster, since no collateral has to be registered. Second, companies use such bank loan products as overdraft and credit line as their short-term liabilities. These uses of the respective loans can be changed quickly. Third, companies can use their scale of size and competent management team in order to negotiate a better agreement with the creditors.

The static trade-off theory states that an optimal capital structure exists where the company value is maximized. On the other hand, the dynamic trade-off theory states that companies use a specific optimal capital structure interval. In this interval companies allow their leverage to fluctuate and they make adjustments only when the high or low of the interval is achieved. The authors of this paper argue that companies should use an optimal interval and not the single optimal leverage point. First of all, an interval is easier to maintain. Second, it is very costly to try to maintain a single specific capital structure point. Third, one must note the lag factor as well. While the company management identifies the capital structure, makes the decision and applies it all in practice, the current capital structure might have moved once again.

The pecking order theory is tested two times. First, companies were divided by their size or total assets. Second, companies were allocated based on their three year moving average debt ratio. Results for these models did not differ significantly. Most models have both heteroscedasticity and autocorrelation problems. In addition p-values are often higher than 0.05. Nevertheless, the pecking order coefficient is close to 0, which implies that the pecking order theory of capital structure cannot be stated for Baltic listed companies.

## 5. CONCLUSION

The research covered 58 Baltic listed companies during the period from 2005 to 2012. The study used panel data regression analysis to determine if companies follow the pecking order or the trade-off theory of capital structure. The study finds that:

- Though many research studies have been undertaken in the field of the pecking order and trade-off theories, the results are still unclear. Some studies support either the pecking order theory or the trade-off theory, while other studies support both of them or none at all.
- Listed companies in Latvia can be characterized by the lowest debt ratio, however an increase in the average debt ratio can be observed as well, therefore the gap has been reduced in the recent years. Companies in Estonia have the highest total interest-bearing debt to total capital ratio and most of the debt is long-term.
- There is no evidence that the Baltic countries support the pecking order theory of capital structure.
- Short-term debt is adjusted more quickly than long-term debt. This can be explained with the use of flexible loan products – overdrafts and credit lines.
- Large companies listed on the stock exchange adjust their capital structure more quickly than medium companies. This can be attributed to the high negotiation skills of large companies.

- The speed of adjustment of capital structure variable TD/C is the highest for companies from Estonia (0.99). Companies from Latvia show a medium speed adjustment (0.63), whereas companies from Lithuania indicate a speed of adjustment of 0.40.
- Companies from Estonia adjust their capital structure more quickly than companies from Lithuania. That might be explained by the higher financial flexibility of companies in Estonia.

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