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TRADE-OFF THEORY VS. PECKING ORDER THEORY – EMPIRICAL EVIDENCE FROM THE BALTIC COUNTRIES[3]

Abstract

Capital structure is of particular importance in estimating the company value; an accurately estimated and selected equity and debt ratio can maximize the company value and minimizes the cost of capital; therefore, this issue is especially significant in the changing conditions of economic development. The main purpose of this study is to simultaneously evaluate the pecking order and trade-off theories of capital structure and determine which one performs better for a sample of companies from the Baltic states. Analysis is conducted on a sample of 75 listed companies (Baltic Stock Exchange) over the period from 1998 to 2011. The authors test theories using panel data and regression analysis. The empirical results show that listed companies in Latvia, compared to the other countries, can be characterized by the lowest debt ratio, however an increase in the average debt ratio can be observed, therefore the gap has been reduced in the recent years. The study did not find evidence supporting pecking order theory, but results show that companies adjust their debt levels according to target debt.

Keywords

Capital structure, Debt ratio, Leverage, Pecking order theory, Trade-off theory

1. Introduction

Capital structure is of particular importance in estimating the company value; an accurately estimated and selected equity and debt ratio can minimize the cost of capital and maximize the company value, and, consequently, the value for shareholders.

The starting point for the subject of capital structure is the irrelevance proposition of Modigliani and Miller (1958, 1963). Since then, enormous number of papers were published on optimal capital structure and capital structure theories. Although in recent decades many compliance tests have been carried out in various countries and various industries, there are still many unanswered questions and problems.

In capital structure literature, two capital structure theories prevail – the trade-off theory and the pecking oder theory. Pecking order theory states that companies prioritize their sources of financing – at first they prefer to use internal funds, then to borrow, and at last to issue equity as a last resort; consequently there is no clear target debt-equity mix (Myers

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and Majluf, 1984). Trade-off theory argues that company chooses debt and equity mix by balancing the benefits and costs of debt. If 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 pecking order theory expects a negative relationship and the trade-off theory expects a positive relationship between profitability and leverage.

The aim of the research is to simultaneously evaluate the pecking order and trade-off theories of capital structure and determine which one 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 75 listed companies;
• To determine which theory performs better for a sample of companies from the Baltic states.

The research methods used in the paper include the following qualitative and quantitative methods: the monographic method, descriptive statistics, regression analysis, graphical method. The research is based on published papers on the pecking order and trade-off theories, as well as information provided by the Baltic Stock Exchange (financial statements). Analysis is conducted on a sample of 75 listed companies (Baltic Stock Exchange) over the period from 1998 to 2011.

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 at last 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. 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 reponse, shareholders might increase the cost of equity. There is no clear target debt-equity mix. The pecking order theory does not deny that taxes and financial distress can be important factors, however they are less important than manager's preference for internal over external funds and for debt financing over new issues of common stock.

The trade-off theory states than an enterprise chooses debt and equity mix by balancing the benefits and costs of debt. If the enterprise 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 preferance 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 the target. 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.

Previous empirical research of 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 performs good as well. When both models are tested together, the pecking order results change hardly at all, however performance of target adjustment model decreases.

Frank and Goyal (2002) test the pecking order theory on publicly traded American enterprises from 1971 to 1998. According to the results, net equity issues track the financing deficit more closely than do net debt issues.While large enterprises show some aspects of pecking order behavior, the evidence is not robust.

Byoun and Rhim (2003) conclude that enterprises adjust their debt levels according to target debt ratios, as well as the pecking order.

De Medeiros and Daher (2005) tested the pecking order theory in Brazilian companies. It was concluded that in its weak form the theory is applicable to Brazilian companies, but not in the strong form.

The study done 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 analyzed, 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 or 2003/2004 and found the support for pecking order theory, however in the long run the evidence supporting this remains weak. The results provide no or very weak support 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.

Mukherjee and Mahakud (2012) conclude that the trade-off theory and pecking order theories are not mutually exclusive. The companies do have certain target ratio and the costs and benefits of debt as well as asymmetric information costs play a significant role for the determination of optimal leverage ratio for Indian manufacturing companies.

Mazen (2012) used a French panel data to examine the validity of the static trade-off theory and the pecking order theory. This study can not 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 copmanies from 2000 to 2010. The study concluded that the companies follow the pecking order theory, however, no evidence was detected, which states the trade-off theory.

Though many research studies had 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 or the trade-off theory, while other studies both of them or none at all.

3. Sample description

The data used is taken from the NASDAQ OMX Baltic (financial statements). The financial companies were excluded, because their characteristics are different due to the specific balance sheet structure. Data used are from the period of 1998–2011. Chart 1 shows the allocation of companies used in this study.

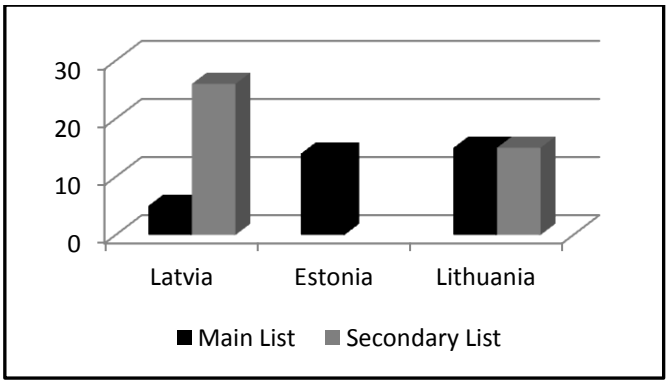

Chart 1: *Baltic listed companies (NASDAQ OMX Baltic) on 18.11.2012*

Companies represent different industries. Most represented industries are consumer goods (27 companies or 36%) and industrials (12 companies or 16%).

Table 1 provides descriptive statistics of the companies included in the study:

• Average debt ratio in Latvian listed companies increased from 10.8% in 1998 to 20.2% in 2011, however debt ratio of Estonian and Lithuanian companies fluctuated in a narrower range. Debt ratio of Estonian companies varied from 20.0% to 35.4% (average 28.8%) and debt ratio of Lithuanian companies changed even less - from 23.9% to 29.8% (average 26.6%);

• The median debt ratio also differs. In Latvia from 1998 to 2004 median debt ratio was mostly less than 10% (except 2003), however, it increased in the following years. Companies in Estonia show much higher median debt ratio; the smallest median debt ratio observed in 1999 (19.5%) and the highest in 2003 (46.0%). In Lithuania the median debt ratio fluctuated less so – from 20.9% (2002) to 30.7% (2008);
• Maximum debt ratio in two cases exceed 100% - this is due to negative equity (Latvia and Lithuania, 2010).

Year	Latvia			Estonia			Lithuania		
	Average	Median	Max	Average	Median	Max	Average	Median	Max
1998	10.8	8.7	25.7	28.0	26.9	40.1	23.9**	23.9**	23.9**
1999	14.5	0.3	45.7	20.0	19.5	30.4	28.8**	28.8**	28.8**
2000	15.7	7.7	46.6	24.5	24.5	39.3	26.2**	26.2**	26.2**
2001	11.7	4.5	54.8	27.0	28.3	45.4	27.1**	27.1**	27.1**
2002	13.1	6.8	54.6	34.1	41.4	54.7	25.1	20.9	77.8
2003	13.5	11.7	33.6	35.4	46.0	59.9	24.9	25.1	70.5
2004	15.7	9.1	60.8	34.5	44.4	65.6	26.8	25.9	88.3
2005	15.5	14.6	60.4	32.1	32.7	55.4	27.9	24.8	80.2
2006	18.3	13.7	64.8	26.8	28.6	57.7	26.0	27.6	58.9
2007	23.0	14.2	75.1	24.5	19.3	55.8	25.6	23.5	57.2
2008	22.7	17.2	73.6	29.3	27.7	59.0	29.8	30.7	61.3
2009	23.3	20.3	78.5	31.3	32.6	60.7	28.9	25.8	69.2
2010	23.3	15.0	153.5*	28.2	27.3	57.1	26.8	21.7	138.3*
2011	20.2	17.2	61.9	27.5	26.8	53.3	24.4	23.5	68.1

*Max debt ratio exceeds 100% due to negative equity.
**Only one Lithuanian company included in the sample (1998–2001).

Table 1: *Descriptive statistics of the debt ratio for a sample of companies from Baltic countries, 1998–2011 (Data calculated by the authors of the paper, using NASDAQ OMX Baltic data)*

Chart 2 provides information on the average debt ratio for Baltic listed companies from 1998 to 2011. If one compares the three Baltic countries, then the average debt ratio was the smallest for Latvian listed companies for all period in question. The average debt ratio for Lithuanian and Estonian listed companies was similar, except for the period from 2002 to 2005, when the average debt ratio for companies in Estonia was considerably higher than for companies in Lithuania. It can be pointed out that, in Latvia, one can observe an increase in the average debt ratio – three years moving average increased from 13.7% to 22.3% (for example, the same average for companies in Estonia increased by five percentage points from 24.2% to 29.0%). At the end of the period in question, the average debt ratio in listed companies in Latvia is close to the average ratios in other Baltic countries.

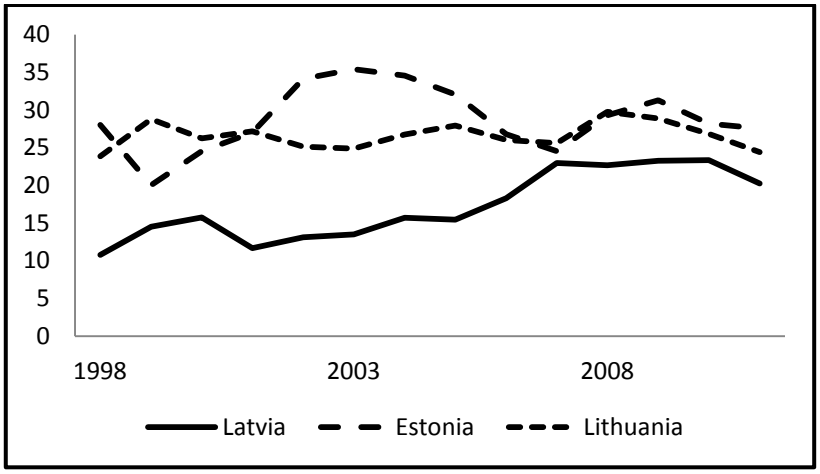

Chart 2: *Baltic listed companies – debt ratio, 1998–2011 (Data calculated by the authors of the paper, using NASDAQ OMX Baltic data)*

In general, 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. The average debt ratio for companies in Lithuania and Estonia was similar for the most number of periods and it fluctuated and increased less than in Latvian companies.

4. Methodology

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

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

$$DEF_t = DIV_t + X_t + \Delta W_t + R_t - C_t, \qquad [1]$$

where
DIV_t – dividend payments,
X_t – capital expenditures,
ΔW_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:

$$\Delta D_{it} = \beta_0 + \beta_1 DEF_{it} + e_{it}, \qquad [2]$$

where ΔD_{it} is the amount of debt issued (or retired if DEF is negative). The pecking order coefficient is β_1 and is expected to be 1. β_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. β_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). Target debt level is unobservable, the authors use three-year moving average. β_0 is the regression intercept and e_{it} is the error term.

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), Frank and Goyal (2002) and the test of the trade-off theory is used by Mazen (2012), Cotei and Farhat (2009), Byoun and Rhim (2003).

5. Analysis of results

Table 2 summarizes the results on the pecking order theory in the Baltic countries. Aim of the test was to state whether the companies follow pecking order theory.

Year	Adjusted R Square	Regression Significance	Regression Coefficient	
			DEF	Sign.
1999	0.41*	0.04	1.03*	0.04
2000	0.84*	0.00	0.64*	0.00
2001	0.08	0.15	0.25	0.15
2002	0.99*	0.00	0.74*	0.00
2003	-0.01	0.45	0.02	0.45
2004	0.42*	0.00	-0.07*	0.00
2005	0.08*	0.01	-1.14	0.01
2006	0.88*	0.00	0.73*	0.00
2007	0.06*	0.02	0.08*	0.02
2008	0.51*	0.00	0.22*	0.00
2009	0.40*	0.00	0.12*	0.00
2010	0.21*	0.00	-0.06*	0.00
2011	-0.01	0.82	-0.02	0.82

*An asterisk indicates significance at the 5% confidence level.

Table 2: *Results of the pecking order theory regression in the Baltic countries, 1999–2011 (Data calculated by the authors of the paper, using NASDAQ OMX Baltic data)*

In ten out of the thirteen periods analysed, regression is significant, however the adjusted R square varies from 0.06 to 0.99. Only in three periods the adjusted R square is more than 0.80 (2000, 2002, 2006) and the corresponding regression coefficient values are 0.64, 0.74 and 0.73 (significance 0.00). Therefore there is not enough evidence that the companies in the Baltic countries follow the pecking order theory.

In Table 3, the data are summarized for each country. In the case of Latvia, for eleven periods the regression is significant, however in seven periods the regression coefficient is negative or close to 0 (this coefficient should be 1 if the companies follow the pecking order theory). Similar situation is in Estonia – regression is significant in ten periods, in seven periods adjusted R square is more than 0.80, however the regression coefficient is not 1, but, just like in Latvia, in most cases close to 0 or negative. In Lithuania only data from 2003 are available for pecking order theory analysis. In five periods out of nine, regression is significant. Even though the regression coefficient is not 1, it is not negative (common occurence in Latvian and Estonian data).

Overall, even though there is no evidence that the Baltic countries support the pecking order theory, there is a conclusion of another kind - Lithuanian financing patterns differ from Latvia and Estonia, since Lithuanian DEF coefficient is only positive.

Year	Adjusted R Square	Regression Significance	Regression Coefficient	
			DEF	Sign.
Latvia				
1999	0.98*	0.01	-1.53*	0.01
2000	-0.17	0.64	-0.06	0.64
2001	-0.01	0.36	-0.40	0.36
2002	0.71*	0.00	-0.12*	0.00
2003	0.34*	0.00	-0.12*	0.00
2004	0.23*	0.00	0.12*	0.00
2005	0.11*	0.04	0.03*	0.04
2006	0.41*	0.00	0.31*	0.00
2007	0.92*	0.00	0.40*	0.00
2008	0.70*	0.00	0.19*	0.00
2009	0.62*	0.00	-0.03*	0.00
2010	0.93*	0.00	-0.11*	0.00
2011	0.59*	0.00	0.48*	0.00
Estonia				
1999	-0.05	0.45	-0.19	0.45
2000	0.73*	0.02	0.60*	0.02
2001	-0.25	0.98	0.01	0.98
2002	0.99*	0.00	0.75*	0.00
2003	0.36	0.07	-0.02	0.07
2004	0.76*	0.00	-0.08*	0.00
2005	0.88*	0.00	-9.8*	0.00
2006	0.99*	0.00	0.83*	0.00
2007	0.59*	0.00	-0.10*	0.00
2008	0.94*	0.00	0.19*	0.00
2009	0.88*	0.00	0.11*	0.00
2010	0.82*	0.00	-0.08*	0.00
2011	0.94*	0.00	-0.31*	0.00
Lithuania				
1999	Not enough data.			
2000				
2001				
2002				
2003	0.80*	0.00	0.77*	0.00
2004	-0.03	0.49	0.07	0.49
2005	0.21*	0.01	0.19*	0.01
2006	-0.04	0.81	-0.01	0.81
2007	0.69*	0.00	0.36*	0.00

2008	0.35*	0.00	0.40*	0.00
2009	0.37*	0.00	0.28*	0.00
2010	-0.04	0.79	0.01	0.79
2011	0.03	0.17	0.36	0.17

*An asterisk indicates significance at the 5% confidence level.

Table 3: *Results of the pecking order theory regression in Latvia, Estonia and Lithuania, 1999–2011 (Data calculated by the authors of the paper, using NASDAQ OMX Baltic data)*

The results on the trade-off theory in the Baltic countries are shown in Table 4 below. The analysis is done for different periods of time: 1999–2010 (all periods included in the study) and this period divided into 1999–2007 and 2008–2010 due to the economic crisis – company financial data changed considerably due to the business cycle; and if one data set (1999–2010) were to be used, it could distort the results and conclusions.

The adjusted R square in the regression is good (0.66) and in accordance to F-Anova test all regressions are significant. In all cases the regression coefficient is between 0 and 1 (in accordance to the theory).

Period		**1999-2007**	**2008-2010**	**1999-2010**
Adjusted R Square		0.66*	0.46*	0.62*
Regression Significance		0.00	0.00	0.00
Regression Coefficient	Coefficient	0.88*	0.56*	0.82*
	Significance	0.00	0.00	0.00

*An asterisk indicates significance at the 5% confidence level.

Table 4: *Results of the trade-off theory regression in the Baltic countries, 1999–2010 (Data calculated by the authors of the paper, using NASDAQ OMX Baltic data)*

In table 5 summarizes the data for each country. In Latvia, regression for period of 2008-2010 is not significant (adjusted R square negative, significance level is higher than 0.05). For the whole period in question, the regression coefficient is 0.65. In Estonia regression results are significant for all three periods and the coefficient is 0.88. Overall, it can be concluded that all three Baltic countries show similiar financing behaviour in terms of target adjustment. All three regressions are significant and the regression coefficients are 0.65 (Latvia), 0.88 (Estonia) and 0.67 (Lithuania). Since these coefficients are positive and less than 1, it indicates adjustment towards the target and implies positive adjustment costs.

Period		**1999-2007**	**2008-2010**	**1999-2010**
Latvia				
Adjusted R Square		0.67*	-0.003	0.34*
Regression Significance		0.00	0.36	0.00
Regression Coefficient	Coefficient	1.26*	0.03	0.65*
	Significance	0.00	0.36	0.00
Estonia				
Adjusted R Square		0.67*	0.62*	0.67*
Regression Significance		0.00	0.00	0.00
Regression Coefficient	Coefficient	0.88*	1.05*	0.88*
	Significance	0.00	0.00	0.00
Lithuania				
Adjusted R Square		0.62*	0.47*	0.52*
Regression Significance		0.00	0.00	0.00
Regression	Coefficient	0.89*	0.57*	0.67*

Coefficient	Significance	0.00	0.00	0.00

*An asterisk indicates significance at the 5% confidence level.

Table 5: *Results of the trade-off theory regression in Latvia, Estonia and Lithuania, 1999–2010 (Data calculated by the authors of the paper, using NASDAQ OMX Baltic data)*

To sum up, while there is no evidence that the Baltic countries support the pecking order theory, all three Baltic countries show similar financing behaviour in terms of target adjustment.

The authors propose for companies from the Baltic countries to continue adjust their debt ratios and follow the trade-off theory, because:

- Debt is cheaper than equity, therefore, company reduces financial costs;
- Tax shield – company deducts interest paid on debt from their tax liability and the company gains the so-called tax shield, which also increases company value;
- Theory implies a concrete optimal capital structure, however company can end up with a very high debt ratio if followed the pecking order theory, since equity issuance is as a last resort.

6. Conclusions

The research evaluates the pecking order and trade-off theories of capital structure and determines which one performs better for a sample of companies in the Baltic countries. Analysis is conducted using descriptive statistics and regression analysis. 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 the pecking order theory or the trade-off theory, while other studies 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. The average debt ratio for companies in Lithuania and Estonia was similar for the most number of periods and it fluctuated and increased less than in Latvian companies.

• Even though there is no evidence that the Baltic countries support the pecking order theory, there is a conclusion of another kind - Lithuanian financing patterns differ from Latvia and Estonia, since Lithuanian DEF coefficient is only positive.

• All three Baltic countries show similiar financing behaviour in terms of target adjustment. All three regressions are significant and the regression coefficients are

• debt ratios and follow the trade-off theory.

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