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SHORT ARTICLE

Determinants of Capital Structure: Case of Companies Listed on Zagreb Stock Exchange

*Fitim Deari**

*Media Deari***

Abstract: In this article we sought to analyze some factors influencing companies' leverage. To examine such factors, we have selected a sample of companies registered on Zagreb Stock Exchange. The sample is from non-financial companies covering the period of 2002-2006 and comprised 89 listed companies. Tangibility, profitability, size, and growth were confirmed as relevant determinants, and only the non-debt tax shield was confirmed as irrelevant determinant in capital structure decisions. Companies' features as capital origin structure, business industry, and company age were confirmed to play roles in capital structure composition.

Keywords: capital structure, listed companies, leverage

JEL Classification: G320

Introduction

The subject matter of leverage decisions and the factors influencing these decisions has been attracting attention, since the pioneering work of Modigliani and Miller in 50's. After MM work, many studies are done in function of developing capital structure theories. The theories of capital structure are among the most interesting in the field of finance. They give explanations in questions like how much a company should borrow, what is relationship between capital structure and its company value, how a company chooses its capital structure, and so on. Even though there is no exact formula available for establishing optimal target debt and capital ratio, the empirical studies indicate that profitability, types of assets, taxes, differences across industries,

* Fitim Deari is at South East European University, Macedonia.
** Media Deari is at State University of Tetova, Macedonia.

uncertainty of operating income, etc. should be considered when formulating capital structure policy.

Franco Modigliani and Merton Miller (1958) stated that the valuation of a company will be independent from its financial structure under certain key assumptions. In their frictionless world there is no optimal capital structure since debt-equity decisions made by the company can be imitated by the investors. Studies developed since then have gradually incorporated new variables not considered by MM in that initial study and consolidating the idea that there should indeed be an optimal capital structure to maximize the firm value and that this optimal structure should be pursued through long-term policies (Martin et al., 2001).

The purpose of this article is to analyze the determinants of capital structure of companies listed on Zagreb Stock Exchange in the light of the Static Trade-Off theory, Pecking Order theory and Agency cost theory. We attempt to find whether companies' features are important concerning financial borrowing.

This article is organized as follows: Theoretical framework concerning capital structure and determinants of company leverage. The regression model and methodology. Analysis and discussion of results. Conclusions. References.

Theoretical Framework Concerning Capital Structure and Determinants of Company Leverage

Since Modigliani and Miller published their seminal paper in 1958, the issue of capital structure has generated unforeseen interest among financial researchers. Hence it has fulfilment with new elements over the years, such as taxes (Modigliani and Miller, 1963; Miller, 1977), agency costs (Jensen and Meckling, 1976; Myers, 1977), bankruptcy costs (Stiglitz, 1972; Titman, 1984), and the information asymmetry (Myers and Majluf, 1984), the results of which suggested that the determination of the optimal capital structure should take into consideration a trade-off between benefits and debts costs. Thus, theories suggest that the capital structure affects company's value. Among them, we are going to discuss briefly static trade-off theory, pecking order theory and agency cost theory.

Trade-Off theory, imply that company's capital structure decisions involve a trade-off between the tax benefits of debt financing and the costs of financial distress. Cost of financial distress depends on the likelihood of distress and cost of bankruptcy. The implication is that there is no an optimum amount of debt for any individual company. Thus, optimal debt ratio (debt capacity) varies from company to company. Company having safe and tangible assets and plenty of taxable income have high debt ratio. According to Titman and Wessels (1988), tangible assets end up helping companies to accumulate debts, as if the investment proves a failure, the

creditor will charge the guarantee offered. The trade-off theory also clarify that profitable companies take more benefit of the tax shield by debt financing because there is fewer chance for them to go bankrupt. Thus, profitable companies are capable to raise theirs debt ratio more than a less profitable companies.

Although the trade-off theory has dominated corporate finance circles for a long time, interest is also being paid to the pecking-order theory. Pecking order theory is proposed by Myers and Majluf (1984), by explaining the affects of the information asymmetries between insiders and outsiders of company. According to theory, companies follow a preferential order of financing sources, and that before seeking debts, they would use internal funds. Thus, the more profitable companies would tend to have fewer debts and conversely low profitable companies use debt financing due to insufficient resources generated internally.

When a company has debt, conflicts of interest arise between stockholders and bondholders. Because of this, stockholders are tempted to follow self-seeking strategies. These conflicts of interest, which are overblown when financial distress is incurred, impose agency cost of the company. Jensen (1986) argues that debt has to be paid back in cash. Therefore, the amount of free cash flow that could be derived by the manager is reduced by debt. Thus, debt serves as a mechanism to discipline the manager from encouraging in self-serving activities e.g. perquisite consumption, empire building, etc.

Determinants of Company Leverage

We use five explanatory attributes as proxy for the determinants of companies' capital structure and by using them as independent variables in our regression model, we attempt to analyze the reliance of leverage (dependent variable) on these proxies.

Following Rajan and Zingales (1995), we calculate leverage of company as the ratio of total liabilities to total assets.

The proxy used in this study to measure the company profitability is the ratio of earnings before tax (EBT) scaled by total assets.

The proxy used in this study to measure the value of tangible assets of the company is the ratio of fixed assets to total assets.

The proxy used in this study as measure to calculate the company size is the natural logarithm of revenues sale.

The proxy used in this study to measure the company growth rate is the percent change of total assets.

Wald (1999) uses the ratio of depreciation to total assets to measure non-debt tax shield. In this study, we use the same ratio, i.e. depreciation over total assets as proxy to measure non-debt tax shield.

We use also qualitative variables (dummy) and data are divided into three subsamples, i.e. based on capital origin structure, business industry, and company age. According to rules for listed companies on Zagreb Stock Exchange financial statements have to show also the sign of capital origin. So, 10 is given if portion of state capital is above 50%; 20 for portion of domestic juridical persons capital above 50%; 21 for portion of domestic physic persons capital above 50%; 22 for portion of foreign juridical persons capital above 50%; 23 for portion of foreign physic persons capital above 50%. Hence for capital origin structure we give 0 as dummy variable for sign 10, 1 for 20, 2 for 21, 3 for 22, and 4 for 24. For listed companies that are established earlier to year 1920 we give 1 as dummy variable; from 1920 to 1950 we give 2; from 1950 to 1990 we give 3; and later than 1990 we give 4. According to business industry we divide companies in five sectors, i.e. manufacturing for which is given 0 as dummy variable, hotel is given 1, transport and telecommunication is given 2, trade sector is given 3, and for other sectors is given 4.

The Regression Model and Methodology

Using panel data methodology, we attempt to analyze some factors that supposedly determine the level of leverage of companies. Panel data analysis is performed by regression model. It makes combinations of data in cross section with time series data, for treatment of the variables analyzed in this article. We use panel data because of following benefits (Baltagi, 2005; according Hsiao, 2003 and Klevmarken, 1989):

1. Controlling for individual heterogeneity. Panel data suggests that individuals, firms, states or countries are heterogeneous. Time-series and cross-section studies not controlling this heterogeneity run the risk of obtaining biased results.
2. Panel data give more informative data, more variability, less collinearity among the variables, more degrees of freedom and more efficiency. Time-series studies are plagued with multicollinearity.
3. Panel data are better able to study the dynamics of adjustment. Cross-sectional distributions that look relatively stable hide a multitude of changes.
4. Panel data are better able to identify and measure effects that are simply not detectable in pure cross-section or pure time-series data.
5. Panel data models allow us to construct and test more complicated behavioural models than purely cross-section or time-series data.

6. Micro panel data gathered on individuals, firms and households may be more accurately measured than similar variables measured at the macro level. Biases resulting from aggregation over firms or individuals may be reduced or eliminated

7. Macro panel data on the other hand have a longer time series and unlike the problem of nonstandard distributions typical of unit roots tests in time-series analysis.

Profitability, Tangibility, Size, Growth rate and Non-debt tax shield are used as independent variables, while Leverage is the dependent variable. Company age, business industry, and capital origin are used as qualitative variables.

Generalized form of the regression model is:

$$LEV_{it} \qquad {}^{n}_{i} \; {}_{i}X_{it} \qquad {}_{it} \tag{1}$$

Where LEV_{it} is the dependent variable and it is the leverage of company (i) to the period (t). The (i) subscript, therefore, denotes the cross-section dimensions whereas (t) denotes the time-series dimension.

is the intercept of the equation.
is the slope coefficient for Xit independent variables.
X_{it} represents to five independent variables.
represents the error term.

Equation (1) is linear in parameters, but nonlinear in variables since the proxy used in this study as measure to calculate the company size is the natural logarithm of revenues sale. With simple transformation ($Size_{it}$ $\log X_{3it}$) we transfer equation (1) from nonlinear in linear variables. So, we made the model linear in both variables and parameters. Now we can transfer equation (1) to more detailed equation (2) as below:

$$LEV_{it} \qquad {}_{1}\mathrm{Pr}\,ofitability_{it} \quad {}_{2}Tangibility_{it} \quad {}_{3}Size_{it} \quad {}_{4}Growth_{it} \quad {}_{5}Non\text{-}\mathrm{debt\ tax\ shield}_{\mathrm{it}} \quad {}_{it} \tag{2}$$

Where i = 1, 2, 3, …, 89 for the listed companies and t = 1, 2, 3, 5, 6 (respectively 2002, 2003, 2004, 2005, 2006). The model shown above is linear in two senses. The right side is linear in variables because the variables are included exactly as defined, rather than as functions.

The data used for the empirical analysis were derived from companies' annual reports and the panel data methodology has been used. We analyze whether the decisions of the companies concerning the leverage is in conformity with the theoretical expectations proclaimed in previous studies.

The analysis uses a data panel originating from annual reports of the 89 companies listed on Zagreb Stock Exchange. Companies from the financial sector (i.e. banks, insurance companies, etc.) are excluded from the observed sample. For analyzing cross-sectional time series data we used STATA software package.

Hypothesis

In this section we formulate three capital structure respective hypotheses, in light of Agency cost theory, Static Trade-Off theory and Pecking Order theory. First hypothesis is formulated for Agency cost theory. Second hypothesis is formulated for Static Trade-Off theory. Third hypothesis is formulated for Pecking Order theory.

We test these hypotheses to find which of those theories are relevant for companies listed on Zagreb Stock Exchange. Null hypothesis (Ho) is rejected if result is significant at 1 percent or 5 percent, otherwise alternative hypothesis (Ha) is accepted.

Hypothesis 1
Ho: There is negative relationship between leverage and size.
Ha: There is positive relationship between leverage and size.
Hypothesis 2
H2a
Ho: There is negative relationship between leverage and size.
Ha: There is positive relationship between leverage and size.
H2b
Ho: There is negative relationship between leverage and value of tangible assets.
Ha: There is positive relationship between leverage and value of tangible assets.
H2c
Ho: There is negative relationship between leverage and non-debt tax shield.
Ha: There is positive relationship between leverage and non-debt tax shield.
Hypothesis 3
H3a
Ho: There is negative relationship between leverage and growth.
Ha: There is positive relationship between leverage and growth.
H3b
Ho: There is positive relationship between leverage and profitability.
Ha: There is negative relationship between leverage and profitability.
H3c
Ho: There is positive relationship between leverage and value of tangible assets.
Ha: There is negative relationship between leverage and value of tangible assets.

Analysis and Discussion of Results

This section describes descriptive the statistics summary, testing hypothesis, regression tests and discussion of results. Regression analysis is done separately for each company's features in order to see their effects on capital structure decisions, i.e. according to capital origin structure, business industry, and company age.

Descriptive statistics and analysis

Descriptive statistics includes the mean, standard deviation, minimum and maximum values for the period 2002-2006. The data contain the 89 companies listed on Zagreb Stock Exchange. The major listed companies studied in this article are with domestic capital, and established from 1990 year. The table 3 shows that manufacturing companies are the main group (51%) according to business industry subsample, and the others sectors are minority group (8%). We will examine relationship between leverage, capital origin, company age, and business industry to see whether they have affected capital structure.

Based on obtained data we will examine the relationship between leverage and company age factor. There are two explanations. The first one is to expect that older companies would have higher debt ratios since they are positioned in market and are well known for lenders. The second one is to expect that older companies would have lower debt ratios because of financing business activities from owned sources. Many studies are done to see the relationship between leverage and company age. For example, Petersen and Rajan (1994) indirectly suggest that older companies should have higher debt ratios since they should be higher quality companies. They founded a significant and inverse relationship between age and financial leverage. Barton et al., (1989) stated that it is expected that mature companies will experience lower earnings volatility and can be taken as agreeing that, in turn, it is expected that these companies will have higher debt ratios.

It is interesting to see differences across industry sectors and to find relationship between leverage and asset structure composition. For instance, manufacturing companies typically have a greater concentration of tangible assets compared with companies in other sectors (e.g. consulting services). It is reasonable to expect that companies with higher level of tangible assets have greater access to debt financing than firms lacking such assets, but we have to perform a test. Many studies as Van der Wijst and Thurik (1993), Chittenden et al., (1996), Jordan et al., (1998), Michaelas et al., (1999) founded a significantly positive relationship between long-term debt and fixed assets.

Table 4 shows that there is negative value at minimums values, i.e. some companies have operated with losses during the period 2002-2006. Starting from 2002 to 2006 on average leverage of all companies is increase from 0.46 to 0.47, tangibility is decreased from 0.54 to 0.53, profitability is decreased from 0.01 to

-0.01, size is increased from 5.24 to 5.29, non-debt tax shield stay almost unaffected from 0.04 to 0.04, and growth increased from 8.87 to 10.55.

Table 5 shows on average companies in which state capital is above 50% use more debt than others. Results show that older companies use more debt than newer. The mean of companies established earlier to 1920 is 0.83, followed by others companies according to age maturity. In a study for companies in 35 countries was concluded that company age exerts a negative impact on debt ratios, indicating that older companies are relying less on debt than younger ones (Pfaffermayr, Stöckl, Winner, 2008). Our results are explained by the fact that older companies have higher debt ratios since they are positioned in market and are well known for lenders. Companies that belong on trade sector use on average more debt than companies in other sectors. They are followed by manufacturing companies, transport and telecommunication, etc. However, it is clear that differences over time related with leverage between and across industries, company age, and capital origin exist. Figure 2 shows some evidence for debt ratio and company age from 541,483 manufacturing companies in 35 countries and 126 industries. We can see that Switzerland has oldest companies, but is lower in term of debt ratio than United Kingdom or the average. Bosnia and Herzegovina has lowest debt ratio compare with other countries, or transition economies as it is Croatia or Macedonia. Macedonia has lower debt ratio and age is older than in Croatia. But, in booth two countries age is upper than average.

A correlation analysis was performed to verify a possible association between and among the variables, in order to test whether there is any linear correlation between and among the variables. Collinearity explains the dependence of one variable to other. The strong linear dependence might be a source of collinearity problems. The correlation between explanatory variables in our regression model should not be greater than 0.70. Table 6 shows that highest correlation value is 0.2799. Hence collinearity should not appear problem in regression analysis.

However, to be sure furthermore we investigate collinearity problem with Variance Inflation Factors (VIF) for each of the explanatory variables. Following Chatterjee and Price (1991) we evaluate according “rules-of-thumb”: (1) values larger than 10 give evidence of multicollinearity, and (2) a mean of the factors considerably larger than one suggests multicollinearity.

So, based in our results, we can conclude that variance inflation factors are satisfactory.

To test hypotheses that we formulated above, we perform regression tests. Results in table 8 show that while tangibility and profitability are negatively correlated with leverage, size, growth and non-debt tax shield are positively correlated with leverage. Results in table 8 also show that t-statistics for parameters estimated are greater than 2 in absolute values, except non-debt tax shield. This is in conformity with rule of thumb for using t-statistic which declares that if the absolute value of a t-statistic is

greater than or equal to 2, then the corresponding parameter estimate is statistically different from zero. In our case, were confirmed that tangibility, profitability, size, and growth are highly statistically significant.

Parameters for each of variables are as $_1$= -.5425524, $_2$= -.1984402, $_3$= .116154, $_4$= .0015788, and $_5$= .0428721. Interception of equation is statistically insignificant.

P>|t| provides an alternative approach to reporting the significance or regression coefficients. The figures in table 8 columns below give the probability of obtaining the corresponding t statistics as a matter of chance, if null hypothesis Ho: $_{1,2,3,4,5}$ 0 were true. A p-value of less than 0.01 means that the probability is less than 1 percent, which in turn means that the null hypothesis would be rejected at the 1 percent level; a p value between 0.01 and 0.05 means that the null hypothesis would be rejected at the 5 percent, but not the 1 percent level; and a p-value of 0.05 or more means that it would not be rejected at the 5 percent level (Dougherty, 2002). Usually, p-values of 0.05 or lower are considered low enough for researcher to be confident that the estimated is statistically significant. So, based on our p-values in our model just non-debt tax shield is statistically insignificant, and rest determinants are statistically significant. This is verified also by t-statistics.

R-square (coefficient determination) measures the proportion of the variance jointly explained be the explanatory variables, and generally increases, if we add another variable to a regression equation. Adjusted R-square attempts to compensate for this automatic upward shift by imposing a penalty for increasing the number of explanatory variables.

The maximum value of R-square is 1. This occurs when the regression line fits the observations exactly. The closer the R-square is to 1, the "better" the overall fit of the estimated regression equation to the actual data.

With time series data, R-squared are often in excess of .9; with the cross-sectional data, .5 might be considered a reasonable good fit (Baye, 2005). In our case, R-square explains that 24 percent of the variation in leverage can be captured by independent variables for. The rest of leverage's variance is due to factors other than determinants studied in this article.

F-statistic provides a measure of the total variation explained by the regression relative to the total unexplained variation. The greater the F-statistic, the better the overall fit of the regression line through the actual data. Regression that have F-statistics with significance values of 5 percent or less are generally considered significant. In our case, F-statistic shows that overall model is significant.

We performed regression analysis for overall sample, but in table 9 we show t-statistics based on capital origin, company age and business industry. Results show that tangibility, profitability and size are relevant determinants at companies which portion of state capital is above 50%; portion of domestic juridical person's capital

above 50%; and portion of domestic physic person's capital above 50%. Growth is confirmed to be relevant determinants at companies which portion of domestic physic person's capital above 50%, and size at companies which portion of foreign juridical person's capital above 50%. Results show also that as it is increase companies' age, capital structure determinants become more relevant. It means that while examined factors are not considered for capital structure composition at oldest companies, they are at younger companies. On the other hand, at manufacturing companies all factors are relevant except non-debt tax shield. At transport and telecommunication, and trade sector just profitability and growth are considered relevant factors. At hotel sectors, profitability and growth, and at others sectors non-debt tax shield and growth are considered irrelevant factors.

Testing Hypothesis

In this section we test hypothesis formulated above. We compare whether p-values are less than 0.01, between 0.01 and 0.05, and 0.05 or more.

Hypothesis 1-Agency cost theory

Ho: There is negative relationship between leverage and size.

Ha: There is positive relationship between leverage and size.

Since p-value of 0.000<0.01, means that the null hypothesis would be rejected at the 1 percent level in favour of Ha.

Hypothesis 2-Static Trade-Off theory

H2a

Ho: There is negative relationship between leverage and size.

Ha: There is positive relationship between leverage and size.

Results here are same with Agency cost theory. It finds out that larger listed companies tend to borrow more than smaller listed companies.

H2b

Ho: There is negative relationship between leverage and value of tangible assets.

Ha: There is positive relationship between leverage and value of tangible assets.

Since p-value of 0.000<0.01, means that the null hypothesis would be rejected at the 1 percent level in favour of Ha. This conform that at listed companies tangible assets are considerable for borrowing.

H2c

Ho: There is negative relationship between leverage and non-debt tax shield.

Ha: There is positive relationship between leverage and non-debt tax shield.

Since p-value of 0.907>0.05 means that the null hypothesis would not be rejected at the 5 percent level.

Hypothesis 3-Pecking Order theory

H3a

Ho: There is negative relationship between leverage and growth.

Ha: There is positive relationship between leverage and growth.

Since p-value of 0.000<0.01, means that the null hypothesis would be rejected at the 1 percent level in favour of Ha. This conform that listed companies with high growth rate borrow more those to low growth rate.

H3b

Ho: There is positive relationship between leverage and profitability.

Ha: There is negative relationship between leverage and profitability.

Since p-value of 0.000<0.01, means that the null hypothesis would be rejected at the 1 percent level in favour of Ha. It implies that high profitable listed companies borrow less. It seems that they prefer more internal funds and equity to finance their business activities compared to debt.

H3c

Ho: There is positive relationship between leverage and value of tangible assets.

Ha: There is negative relationship between leverage and value of tangible assets.

Since p-value of 0.000<0.01, means that the null hypothesis would be rejected at the 1 percent level in favour of Ha. This conform that listed companies with lower level of tangible assets willing to use more debts to finance their business activities.

Discussion of Results

In this section we discuss obtained results in term of the signs and statistically significance of the coefficients for independent variables.

Table 10 shows obtained observed signs for five independent variables at companies listed on Zagreb Stock Exchange. Results show that while profitability and tangibility are negatively associated with leverage, size, growth and non-debt tax shield are positively associated with leverage. Obtained results for profitability, tangibility, and growth are consistent with implication of Pecking order theory. Obtained result for size is consistent with implication of Static trade-off and Agency theory. Obtained result for non-debt tax shield is consistent with implication of Static trade-off theory. So, major of results are consistent with implication of Pecking order theory. This in turn mean that listed companies follow a preferential order of financing sources, and that before seeking debts, they would use internal funds. Thus, the more profitable companies would tend to have fewer debts and this is consistent with tested hypothesis. It is in line with other studies as Rajan and Zingales (1995), Booth et al., (2001) and Gaud et al., (2005). Profitability was statistically significant and consequently we claim that profitability does have significant role in making debt ratio and determining the capital structure of companies listed on Zagreb Stock

Exchange. Lorena and Marinko (2002) based on a sample of 86 Croatian companies founded that gearing is significantly negatively correlated with size, profitability, and tangibility.

Tangibility is negatively associated with leverage and is consistent with implication of Pecking order theory. According to Gaud et al., (2005) a possible explanation for a negative relation between tangibility assets and leverage could be based on the assumption of Pecking order theory. The authors believe that companies with lower level of tangible assets are more subject to information asymmetry problems, and consequently, more willing to use debts to finance their activities. In our case it is argued by fact that listed companies are evaluated from lenders not just based on tangibility assets, but also from others perspectives, for instance goodwill, etc. Tangibility was statistically significant. Hence we claim that while tangibility does have significant role in determining the capital structure of companies listed on Zagreb Stock Exchange. Thus, we confirm tested hypothesis.

Size is estimated to have positive impact on leverage and is significant. This is consistent with implication of Static trade-off theory and Agency cost theory. Tested hypothesis are confirmed. Hence we claim that size does have significant role for deciding the capital structures decisions of companies listed on Zagreb Stock Exchange and larger companies tend to borrow more than smaller companies. Our result is in harmony with previous empirical studies such as Rajan and Zingales (1995), Wald (1999), Both et al., (2001), which generally founded that leverage, is positively correlated with size.

Growth is positively associated with leverage and is significant. Tested hypothesis are confirmed. Hence we claim that growth does have significant role for deciding the capital structures decisions of companies listed on Zagreb Stock Exchange and companies with high growth rate borrow more those to low growth rate. It is in line with the Pecking Order theory which suggests a positive relation between leverage and growth.

Non-debt tax shield is positively associated with leverage. Tested hypothesis is not verified, but it was founded to have not significant role for deciding the capital structures decisions of companies listed on Zagreb Stock Exchange.

Concluding Remarks

This study sought to analyze some determinants of the capital structure decisions of the sample of listed companies on Zagreb Stock Exchange. Results are examined in light of the Static trade-off theory, Pecking order theory, and Agency cost theory. We have selected five independent variables with purpose to see their effect on capital

structure. The analysis was conducted based on panel of data obtained from the published annual reports for the period 2002-2006.

The results are consistent with implications first of all of Pecking order theory and then of Static-trade off theory. Agency cost theory was not confirmed in our results, except at size variable.

Tangibility, profitability, size, and growth were confirmed relevant determinants, and just non-debt tax shield was confirmed irrelevant determinant in capital structure decisions of companies listed on Zagreb Stock Exchange. It was confirmed that companies listed on Zagreb Stock Exchange are rely on equity financing rather than debt financing. Companies' features as capital origin structure, business industry, and company age were confirmed to play role in capital structure composition.

For future studies it might be interesting to focus on following aspects:

- Including financial crises effects,
- Extension of the data series and macro economic factors should be included, and
- Differentiating between long term and short term debt.

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