Determinants of capital structure

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Abstract

The capital structure of companies are all different. Are there common factors that are explaining this ratio? There are several theories written about this, but the theories are sometimes contradicting. To see which factors determine capital structure, I will look more closely into the existing literature and will perform a regression analysis. The regression shows that only a little part of the variation in the debt to equity ratio is explained by the model. Liquidity, profitability, tangibility and growth opportunities were significant and are good determinants of capital structure. The theory that was supported by the data was the pecking order theory.

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Chapter 1 Introduction

Investment decisions are happening all over the world every day. But what is the best way to finance these decisions? The first possibilities that come into your mind are own capital and borrowing, but there are a lot more alternative financing methods. Issued equity can consist of common stock, preferred stock and warrants, while debt financing ranges from banks loans to issued bonds. The total of all these decisions make the capital structure. The impact of the investment decision can be large on the company, so how do companies decide? There are several theories that describe in which way companies choose their way of financing. Modigliani and Miller,(1958) were the first ones who made a theory for this topic, the static trade-off theory. Other theories came later and were the agency theory (Jensen and Meckling 1976 and Myers 1977), pecking order theory (Myers and Majluf, 1984), incentive theory (Ross 1977), market timing theory (Hovakimian, Opler and Titman 2001) and the free cash flow theory (Jensen 1986 and Zwiebel 1996). These theories all use determinants of companies, but what are the determinants of capital structure in reality? To take this research into the current situation, there is also going to be researched if the determinants changed during the crisis.

This thesis will be based on several studies that researched the determinants of capital structure. Baxter and Cragg (1970) were one of the first who did an empirical study that investigated the debt to equity ratio. After that there have been done a lot of research about this topic. Many of these studies have the topic what the determinants of the capital structure of a firm are, but all studies have different results. Several studies say that the capital structure is not only based on firm specific determinants but is also country specific. That is why this research only is going to look at the Netherlands and there cannot be anything said about other countries.

The main research question of this thesis will be; <u>What are the determinants of capital structure now?</u>

- What is already been studied about capital structure? (Literature review)
- Which models indicate the determinants that are useful?
- Did the determinations changed during the crisis?

This chapter was an introduction about the subject. The next chapter, chapter two will contains a literature review of the different theories. Chapter three will cover the model that will be used and to make the model the determinants will be established. In chapter four will cover a part about the model. The data results from the model will be in chapter five. In chapter six will be the conclusion of the paper.

Chapter 2 Literature review

In this chapter the available theories of capital structure are discussed. The first theory is the trade-off theory in 2.1 then 2.2 agency theory, 2.3 pecking order theory, 2.4 Incentive theory, 2.5 market timing theory and last 2.6 free cash flow theory.

2.1 Trade-off theory

The trade-off theory is derived from Modigliani and Miller's (1958) hypotheses. The first one of the propositions of Modigliani and Miller is the irrelevance theorem this means that:

The market value of any firm is independent of its capital structure.

This means that the value of the firm does not depend on how the company is financed (only equity or also partly debt). But this proposition only hold in a perfect market. A perfect market is a market with securities that are infinitely divisible, were information is costless and available to all agents, were there is no transaction costs or taxes in the issuance of securities and last all agents are price takers in the capital markets. The irrelevance proposition is based on the idea that every investor can offset the company investment decision so that he can get the same cash flow as before. In this way the shareholder is indifferent to changes in the firm's capital structure.
The second proposition of Modigliani and Miller is accounting for the fact that while leverage is added by the firm this should not have influence on the market value but it does increase the risk to stockholders of the company. When the company is leveraged it can have bigger returns but also worse returns in bad states. Because of this the shareholders require a higher expected return when the proportion of debt in its capital structure increases. The second proposition is:

The expected return on equity is equal to the expected return for a pure equity stream , plus a premium related to the financial risk, equal to the debt to equity ratio times the spread between expected return for a pure equity stream and expected return on debt.

If there are no bankruptcy states (default-free debt) risk free debt is not a function of leverage. Then shareholders bear all the risk from changes in asset values because of the expected return on equity is a linear function of the debt to equity ratio. But if default is possible, then shareholders bear part of the risk (from changes in asset values) with debt holders. Then the expected return on equity is a concave function of the debt to equity ratio, because expected return on debt is now a positive function of leverage ratio. This can be seen in figure 1.

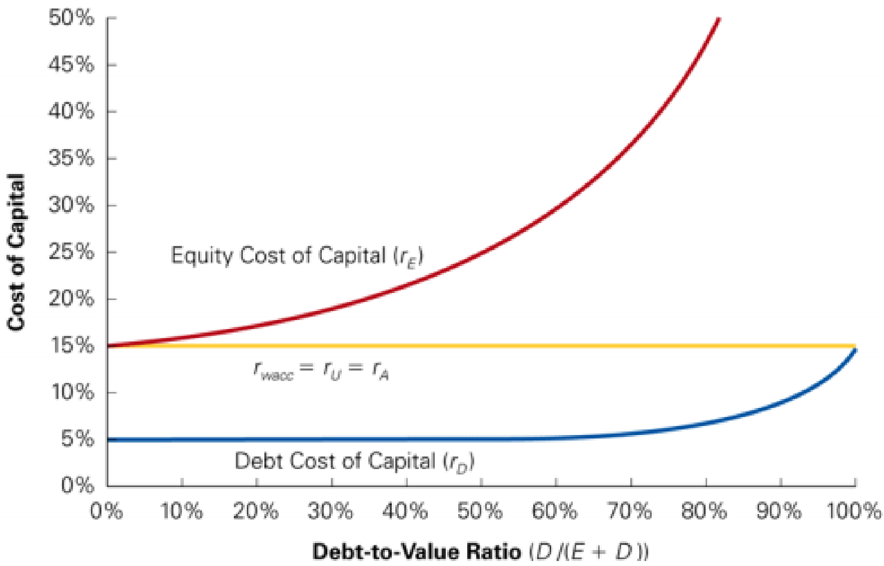

Figure 1: leverage in Modgliani Miller (Berk and DeMarzo 2011 page 462)

The trade-off theory is based on that companies are choosing a optimal debt to equity ratio so that there is an optimal trade-off between cost and benefits from debt and equity. The benefits are deriving from interest deductibility and the cost are deriving from bankruptcy and agency costs. This trade-off is suggesting that there is an optimal capital structure that companies try to reach.

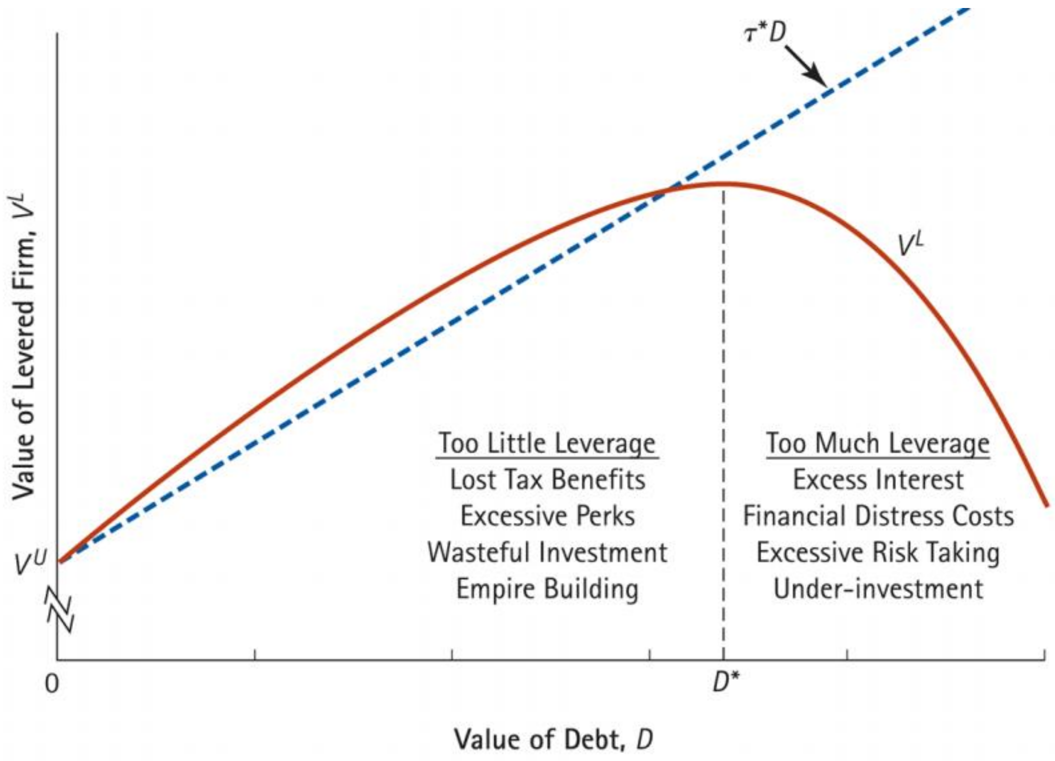

Figure 2: Optimal leverage with taxes, financial distress and agency costs (Berk and DeMarzo 2011 page 532)

2.2 Agency theory

The trade-off theory only accounts for cost of distress but there are also agency costs. This theory is developed by Jensen and Meckling (1976). There are two types of agency cost; debt agency costs and equity agency costs. Debt agency cost arise when managers choose to benefit shareholders more than bondholders. This is possible by taking project with more profit but also more risk. In this way the shareholders get more gains if the best state is coming true but when the bad state is realized and the company is bankrupt the debt holders are getting less. This is because when the company is bankrupt first the debt holders are getting back their money, if that is possible, and when there is any money left then the shareholders. But most of the time that is not the case or a really small part of their investment. In this way shareholders get a lot when the good case is coming true but nothing when the bad case is coming true. Equity agency cost arise when there is a conflict of interest between managers and shareholders. Managers are hired to maximize the shareholders value. In general when the company is growing the shareholders value also is growing, but managers want to benefit their selves and most of the time it is at expense of the shareholders. To prevent this there are two types of cost namely monitory cost and cost of implementing control devices. These cost are called agency cost of equity. The agency theory is saying that more debt needs to be taken on to transfer the wealth from the company to the investors. In this way the managers have to pay the interest from the incoming cash flows and it is controlling the opportunistic behavior from managers. The manager is only focusing on activities to meet these obligation and will do what is best for the company.

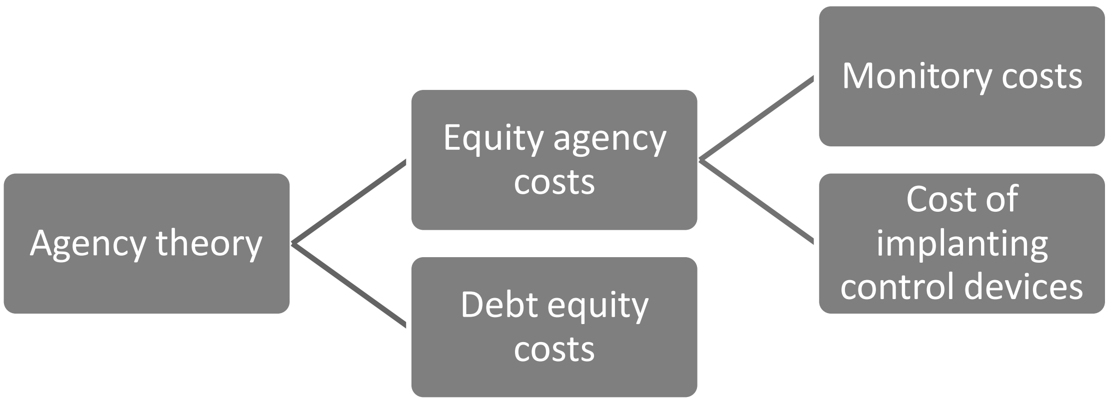

Figure 3: agency theory

2.3 Pecking order theory

The pecking order gives an interpretation in which way companies choose their financing. Myers and Majluf (1984) have argued that debt is better than new equity and internal funds is better than debt. In this way there is a pecking order new equity, debt, retain earnings. In this way the order is, when looking at the outside, from low risk up to high risk. Retain earnings has the highest risk because shareholders bare almost all the risk of bankruptcy and therefore ask a higher return on their investment. Also managers know more about the value of the company then outsiders, so they avoid issue equity when the shares are undervalued. When a company is issuing equity then it looks like the company is undervalued (there is unfavorable information) because shareholder look at the share price as an indication of the value of the company. This is another reason why businesses first use retained earnings than debt and then new equity.

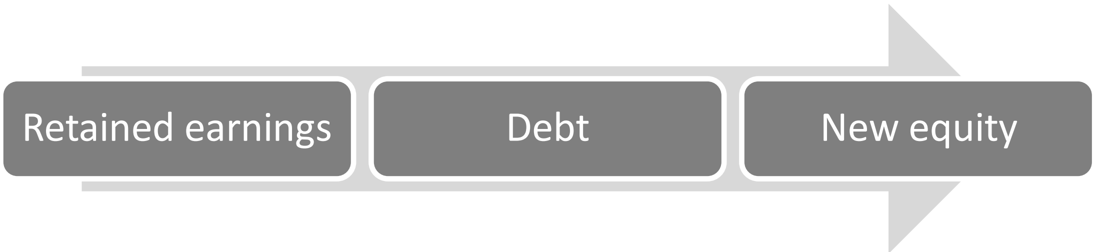

Figure 4: pecking order

2.4 Incentive theory(signaling model)

Modigliani and Miller (1958) assumed with the irrelevance theory that all information is available to all parties. But managers can have information about the company that outsiders don’t know, like if the firm is over- or undervalued. Ross (1977) has argued that it is possible to let the true value of the company shine through. This is possible when managers get rewarded if the market value of the company is higher and get to bear a lost when the market value is lower. The bankruptcy cost are low when the firm is in a good state, the manager is intent to take on more debt because there is no intention to fail. If the bankruptcy cost are higher then he would not take the risk of taking debt because he risk his reward. In this way the company can signal their good position by having a high debt ratio.

2.5 Market timing theory

Hovakimian, Opler and Titman (2001) found that the traditional theory are not significant to some extent. They showed that a lot of companies are not at the perfect debt to equity ratio suggested by the trade-off theory. These companies did not have the perfect trade-off between the cost and benefit from the debt and equity. They found that companies tendency is to move the optimal debt ratio when the company has to choose between debt retirements and equity repurchase then if they have to choose between equity and debt issuing. In this research they also found that when a company's stock price increases they are more likely to issue equity and repay debt then firms who has a drop in stock price. Baker and Wurgler (2002) found that the current capital structure is related to the historical market values of the company. They found that when the market value is high the company is intended to issue equity instead of debt. So the market timing theory implies that the moment of attracting more equity or debt is more important than a perfect trade-off between benefits and cost of equity and debt.

2.6 Free cash flow theory

Zwiebel's (1996) model is based on cash flows that managers have the control over. When a company is making good investment decisions and does well in the market the manager has a lot of money to his disposal. This is a risk because the manager can invest it in projects that are not optimizing the shareholders value but the managers value. Zwiebel states that when the value of the manager is maximizing instead of the shareholders the manager is taking better decisions. This is in line with Jensens (1986) free cash flow theory. This theory takes into consideration that managers tend to invest in negative net present value (NPV) project because then the profit is high and they get a higher reward. But when it's negative they don't bare the loss. This is especially important for companies with expected low growth or even a shrink. To counteract this debt can be attracted so that the free cash flow is used to pay the interest and don't waste it on unprofitable projects.

Chapter 3. Model variables

This chapter will cover all the variables used in the model. To assess the determinants of capital structure the variables are based on the trade-off theory, agency theory and the pecking order theory. The model will be as followed :

Y_{it} (Debt/equity) = constant + β_1 * Size$_{it}$+ β_2 * Liquidity$_{it}$ + β_3 * Profitability$_{it}$ + β_4 * Tangibility$_{it}$ + β_5 * Growth opportunities$_{it}$ + β_6 * Payout ratio$_{it}$ + β_7 * Tax shield$_{it}$ +β_8 * Income variability$_{it}$ + β_9 * Product uniqueness$_{it}$ + β_{10} * Dummy crisis$_t$ + ε

Every dependent variable is a different subchapter.

3.1 Debt to equity ratio

The debt the equity ratio is the dependent variable that this research tried to explain by other variables. In this way there is tried to understand why businesses use debt or equity to finance their investments. Maybe there are factors that influence the level of the debt to equity ratio. The variables are chosen from the theory and are the most common. The equity is measured by all shareholders funds and any reserves or capital. For the debt all different debt is taken into account from long term debt to current liabilities. All the equity is added up the same as the debt and then the debt is divided to equity so that the debt to equity ratio is calculated.

3.2 Size

According to the trade-off theory and the agency theory size of a company is positively related to the leverage ratio because of five reasons. The first one is that the impact of direct bankruptcy cost is diminishing when the company gets bigger. The direct bankruptcy cost stays the same but the company gets bigger in this way the ratio is decreasing.(Warner 1977) The second reason is that bigger firms are more diversified in this way the risk is spread. When firms are diversified it means that assets are not synchronous moving up or down, but there is a difference between that. So one goes up and the other goes up also but not at the same level, or it will go down. In this way risk is minimized. (Titman and Wessels 1988) Third reason is that bigger firms have easier access to the capital market and can borrow at better rates. The market has more confidence that a big firm will pay back there loan, and the higher the confidence the easier to borrow and the lower the rate. (Ferri and Jones, 1979) The fourth is that Myers and Majluf (1984) are saying that with big firms the information asymmetries are smaller, in this way they have more incentives to issue equity instead of debt. Last reason is that bigger companies have lower agency cost which arise with conflict of interest between shareholders and managers. (Chung 1993) There is also one reason why size should be negatively related to the leverage ratio. This reason is that the company has smaller information asymmetries and that is way some investors would be holding back. In the model the size of the company is measured by operating revenue.

3.3 Liquidity

Liquidity is measured by the <u>ratio of current assets to current liabilities(current ratio)</u> also called the current ratio. In this way the ratio is measuring if the company is able to cover its short term debt by its short time assets. So if the company can quickly pay back there short term debt. The relationship between leverage and liquidity should be negative for the pecking order theory. When the debt is getting bigger their will not be enough assets to cover these liabilities. When the relationship is positive the trade- off theory is in place.

3.4 Profitability

The profitability ratio is measured by <u>operating revenue over book value of total assets</u>. According to the pecking order theory first the company is start with profit, then use debt and last option is to get new equity. So this theory suggest that the relationship should be negative. The agency theory is saying that there should be a positive relationship between debt ratio and profitability. But the trade-off theory is saying that more profitable firms having higher book leverage because the agency and bankruptcy cost are pushing it higher, so this theory says that there is a positive relationship for the agency costs.

3.4 Tangibility

Titman and Wessels (1988), Rajan and Zingales (1995), and Fama and French (2000) have sad that tangibility is an important factor in leverage ratio. The tangibility is measured by the <u>ratio of fixed assets on total assets.</u> So tangibility is how much of the fixed assets are total assets. According to the trade-off theory and the agency theory the relationship should be positive and the pecking order a negative relationship. The agency theory is showing a positive relationship because when there is enough assets to cover the debt the agency cost off debt will be lower.

3.5 Growth opportunities

Jensen and Meckling (1976), Myers (1977), and Stulz (1990) all have researched that growing firms have more opportunities to invest in risky project at the cost of creditors. In this way leverage is related to growth opportunities. According the trade-off theory growth opportunities should have a negative relationship on leverage ratio. This because of growth the cost of financial distress increase what is making managers to reduce the debt. The pecking order theory said that firms issue debt before equity. So according to the pecking order the ratio should be negative. This is also the case with the agency theory because Stulz (1990) have showed that if firms have big investment opportunities (when they have big growth opportunities) managers tend to gain profit over the shareholders back. So in this way the agency cost are bigger. Growth opportunities can be measured in different ways. The one that was use the most in other papers was the <u>return on total assets</u>.

3.6 Payout ratio

Martin and Scott (1974) showed in their paper that the payout ratio and capital structure are closely related. The payout ratio is depending on the impact of agency cost, information asymmetries, tax laws of the country and ownership structure. To measure the payout ratio the stock turnover is used. Because of the payout the equity flows out and more external funding is needed. That is why a positive relation is expected.

3.7 Tax shield

Modigliani and Miller (1963) state that, when certain proposition hold, firms should aim that the entire firm is financed by debt. The interest, that needs to be paid over the debt, is tax deductable so in this way the company is having the highest tax deduct. DeAngelo and Masulis (1980) showed that the non debt tax shield can serve as a replacement for debt tax shield. The non debt tax shield are all the deductions made to lower the taxable income such as depreciation expenses. In the trade-off theory a positive relationship is expected between effective tax rate and leverage. The effective tax rate is measured by total tax on total taxable income(EBITDA) of the company.

3.8 Income variability

Income variability is the income over years and what the variance is in comparing of the mean. According to the trade-off theory the income variability should be negatively related to leverage. But if the income variability is higher than the underinvestment problem is stern because this is reducing the agency costs of debt. This showed Myer's (1977) in his study. So when the income variability is higher a positive relation is showing between income variability and the leverage ratio. Income variability is measured by the standard deviation of operating income.

3.9 Product uniqueness

The trade-off theory is saying that companies who are producing unique products are having lower debt ratios. This because product uniqueness is linked to higher bankruptcy costs. Product uniqueness is best measured by the part of research and development over sales. But there is a lack of data of research and development. But Titman and Wessels (1988) have found that when companies are spending more on promotion and selling their products than they are having unique products. That is way in this research uniqueness is measured by EBITA(Earnings before interest, taxes, depreciation and amortization.

3.10 Dummy crisis

A part of this research is to look if during the last crisis the capital structure has changed. To measure this a dummy is made. The crisis started in October 2008 and is still going on. This research is taken the years into account from 2000 until now, so the years 2008 until now had a crisis. When a year had a crisis that year will be indicated with a one and if it was another year it will be indicted with a zero. In this way a distinction is made between a crisis year and a normal year. If this variable would be negative will that mean that the debt to equity ratio went down. So that companies had more equity then debt, what is possible because banks were more cautious with lending out money. There is also a possibility that the relation would be positive because during the crisis the interest rates were very low so it was interesting to borrow money.

3.11 Summary of the variables

Here down a overview is given about the expected positive or negative relationship from the variable to the debt to equity ratio. When in the theory nothing is said about the variable the sign +/- is used.

Table 1: summary of the variables

Variable	Trade-off theory	Agency theory	Pecking order theory
Size	+	+	+
Liquidity	+	+/-	-
Profitability	+	+	-
Tangibility	+	+	-
Growth opportunities	-	-	-
Payout ratio	+/-	+	+/-
Tax shield	-	+/-	+/-
Income variability	-	+/-	+/-
Product uniqueness	-	+/-	+/-
Dummy crisis	+/-	+/-	+/-

The dummy crisis is added by looking if there is a relationship to the crisis. Nothing is said in the different theories about crisis and the expected debt to equity ratio. And there can be a negative and a positive relationship. A positive relationship is possible because the interest rates are very low, so it is interesting for companies to borrow money. There also can be a negative relationship because the banks were cautious lending out money during the financial crisis up to now. That is why all the theories got +/- by dummy crisis.

4. About the model

In this chapter the data that is used will be explained. All the data are downloaded from WRDS, within WRDS the database Bureau van Dijk is used. First the country selection will be discussed in 4.1 and then the fixed and random effects in 4.2

4.1 Country selection

In the database not all variables were available for the Netherlands. Because of that another country has to be selected. This country has to have the same economic environment as the Netherlands and all the variables should be filled. The possibilities were Spain, Finland and the United Kingdom. In the next table a comparison between Finland, Spain, England and the Netherlands is made.

Netherlands	Finland	Spain	England
	life expectancy[1]		
80.9	80.1	81.8	80.5
	Human development index[2]		
0.910	0.904	0.878	0.863
	GDP per capita[3]		
133	115	100	112
	Price levels indicates[4]		
109	123	96	102
	Unemployment rate[5]		
4.9%	7.4%	23.6%	8.3%
	Foreign long term country rating[6]		
AAA	AAA	A	AAA
	Inflation[7]		
2.38%	2.30%	1.90%	3.47%
	Corruption index[8]		
8.9	9.4	6.2	7.8
	Government bonds 10 year[9]		
2.332%	2.144%	6.005%	2.124%

Table 2: comparison countries

Because the United Kingdom is not in the Euro zone there is a big difference, they are not having the same fluctuations with their currency. Also the crisis was there different, because of their own currency they can devaluate the currency in order to stimulate the foreign investments. This is what the Netherlands cannot do because they are in the Euro zone and that is operating as one. The unemployment rate is

[1] "Mortality and life expectancy statistics" ec.europa.eu
[2] "Human Development Report 2011" hdr.undp.org
[3] "GDP per capita, consumption per capita and price level indices" ec.europa.eu
[4] "GDP per capita, consumption per capita and price level indices" ec.europa.eu
[5] "Unemployment statics" ec.europa.eu
[6] "Standard and poor country ratings" www.standardandpoors.com
[7] "Worldwide inflation data" http://www.inflation.eu/i
[8] "Corruption perceptions index 2011" cpi.transparency.org
[9] "Government generic bonds – 10 Yr note at 2012-04-23" www.bloomberg.com

higher than in the Netherlands by 3% and their inflation is rather high. When the inflation is high the value of money is decreasing. This is bad for the economy. Spain is one of the weaker countries of the Euro zone. They are having difficulties to loan money because the Spanish government bonds are very high, namely 6.005% for 10 years and the Netherlands is only 2,332%. This is a huge gap and that is because people are afraid that Spain will go bankrupt, that is why Spain has got an A status and the Netherlands a triple A status. Also the unemployment rate is enormous in comparison with the Netherlands. In Spain the unemployment was up to 23.6% that is highest unemployment in the whole European union. That is way Spain is not the best option to choose. The last option is Finland and this is the most compatible one. It is an European country with the Euro, it is also a triple A status country with a comparable government bond rate and around the same inflation. Only the unemployment rate is a bit higher but the Netherlands has one of the lowest unemployment rates of the European union. So the best country to replace the Netherlands in this research is Finland.

4.2 Fixed and random effects

When a quantity is random it means that it is fluctuating over units in some population; which particular unit is being looked at is depending on chance. When said that a model is random, it means that population the unites were drawn is random and not the particular units themselves. Modeling use the normal distribution for the random effect, this is usual but not always necessarily. But sometimes not every model has the normal distribution and it will lead to biased results.

The fixed effect model is a linear regression, such as the model used in this research. This model intercept terms vary over the individual units. A general linear regression is: $y_{it} = a_i + x'_{it}\beta + \varepsilon_{it} \quad \varepsilon_{it} \sim \text{IID}(0, \sigma^2_\varepsilon)$

In this model there is assumed that all the x_{it} are independent from the error (ε_{it}). This means that the variables are not correlated with the errors. And IID is standing for that the errors are independent and identically distributed. There is no correlation in the errors and when the population is large enough that the mean will tend to zero.

It is assumed that in a regression analysis is that all factors affect the dependent variable, can be appropriately summarized by a random error term. In this case it leads to the assumption that a_i are random factors, independently and identically distributed over individuals. The random effects model will be:

$$y_{it} = \mu + x'_{it}\beta + a_i + \varepsilon_{it} \quad \varepsilon_{it} \sim \text{IID}(0, \sigma^2_\varepsilon); \quad a_i \sim \text{IID}(0, \sigma^2_a)$$

In this model $a_i + \varepsilon_{it}$ is treated as an error term which is consisting of two components namely an individual specific component. Namely an individual component, that is not vary over time, and a remainder component, which is assumed to be uncorrelated over time. That is, all correlation of the error terms over time is attributed to the individual effects of a_i. So the random effects assumption is that the independent variables are uncorrelated with the individual specific effects.

The problem with the individual effects a_i and the variables x_{it} can by handled by using the fixed effects approach. This eliminated the a_i from the model, and thus eliminates any problems that they may cause. This is done in this case that is why the fixed effects approach is used. (Verbeek, M (2004))

4.3 Descriptive statistics

Descriptive statistics are describing the basic features of a database study. In the following table the mean, standard deviation (sd) the minimum(min) and the maximum(max) is shown on the horizontal axes and the different variables on the vertical axis.

	mean	sd	min	max
deratio	8.68	25.76	-40.6	389
Size	51466359.78	1.05e+08	19.0	999353000
Liquidity	2.47	5.32	0.0	99
Profitability	2.10	17.58	0.0	2790
Tangibility	0.44	0.29	0.0	1
Growth	7.36	14.69	-99.8	100
Payout	40.21	101.38	0.0	987
Tax sield	0.20	13.10	-840.0	1464
Incomevar	19146922.91	46956068.85	337.2	555988416
Uniqueness	4667454.49	13105427.10	-1.9e+08	433117000
Dumcris	0.33	0.47	0.0	1
N	40765			

Table 3: descriptive statistics

5. Results

In this chapter the results from the dataset will be discussed. First in 5.1 the results from STATA of the reduced model will be talked about and then the interpretation in 5.2. The full model can be seen in 5.3 and the interpretation of that model is in 5.4.

5.1 Reduced model

First a reduced model is looked at. For the regression the dataset was declared as a penal data in STATA. This means that the multiple companies are looked over a larger panel period of time on the same variables. When there is looked at the total model some variables measure the same, so there can be some eliminations. Looking at size (measured by operating revenue) and product uniqueness (measured by gross profit) is both measured by earnings. The operating revenue is without deductions and the gross profit with deductions. This is why only size (operating revenue) is used and product uniqueness is dropped. Income variation is dropped because this is the standard deviation of the operating revenue. By using this there will be collinearity. Profitability (measured by operating revenue over book value of total assets), growth opportunities (measured by return on total assets) and payout ratio (stock turnover) are also partly the same. Profitability and growth opportunities are both measuring return over the total assets. Operating revenue and the return is the same and that is why they can be combined. The payout ratio is measuring profit over the total stock. So it is also measuring profit over something. In this way profit is taken into account three times, that is why this will be reduced to only profitability. How many taxes is paid is depending on how much operating revenue is earned. To eliminate this connection tax shield is dropped. This leads to the following model;
Y_{it} (Debt/equity) = constant + β_1 * $Size_{it}$,+ β_2 * $Liquidity_{it}$ + β_3 * $Profitability_{it}$ + β_4 * $Tangibility_{it}$ + β5 * Dummy $crisis_t$ + ε. This model is entered in STATA and the results from that are shown in the next table:

	Size	Liquidity	Profitability	Tangibility	Dummy crisis	Constant
Debt to equity ratio	-3.12e-10 (-0.16)	-0.0765** (-2.95)	-0.0562*** (-3.40)	-0.749 (-0.76)	-1.139*** (-5.207)	9.618*** (19.92)

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Results from STATA reduced model

5.2 Interpretation reduced model

At first it will be examined whether the variables are significant. When a variable is significant there is a strong relationship found between the debt to equity ratio and the variable. Looking at the significantly liquidity, profitability and dummy crisis are significant. The constant is also significant but that has to be significant because that is the base. Liquidity is significant with an α of 1% and profitability and dummy crisis even with an α of 0.1%. The coefficient or the beta(β) is -0.0765 for liquidity this means that when liquidity will go up with one then the debt to equity ratio will go down on average with 0.0765. The beta(β) of profitability is -0.0562 this means that when the tangibility goes up with one the debt to equity ratio will decrease with 0.0562. Dummy crisis is significant with a beta(β) of -1.139. This means that when it is a crisis the debt to equity ratio is 1.139 lower then when there is no crisis. About size and tangibility cannot be said anything because they are not significant. The R^2 is 0.0003 this means that 0.03% of the variation in the debt to equity ratio is explained by the variables.

5.3 Results from STATA whole model

Now there is going to look at the whole model, the whole model is as followed:

Y_{it} (Debt/equity) = constant + β_1 * $Size_{it}$,+ β_2 * $Liquidity_{it}$ + β_3 * $Profitability_{it}$ + β_4 * $Tangibility_{it}$ + β_5 * Growth $opportunities_{it}$ + β_6 * Payout $ratio_{it}$ + β_7 * Tax $shield_{it}$ +β_8 * Income $variability_{it}$ + β_9 * Product $uniqueness_{it}$ + β_{10} * Dummy $crisis_t$ + ε.

The results of the regression can be found in the following table:

	Size	Liquidity	Profitability	Tangibility	Growth	Payout
Debt to equity ratio	-1.76e-10 (-0.07)	-0.137*** (-3.61)	-0.571*** (-6.02)	-4.294*** (-3.67)	-0.139*** (-12.23)	-0.000238 (-0.15)

	Taxshield	Income variety	Uniqueness	Dummy crisis	constant
Debt to equity ratio	-0.00200 -(0.07)	(omitted)	2.29e-08 (1.27)	-0.932*** (-4.00)	11.42*** (19.72)

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5: Results from STATA whole model

The variable income variability is dropped automatically by STATA. This is because there is collinearity. Collinearity means that there are two variables highly correlated. Probably the variability is highly correlated with size, what is measured by operating revenue, because there both measured on operating revenue.

5.4 Interpretation of the results

Looking at the model the variable liquidity, profitability, tangibility, growth and dummy crisis are significant with an α of 0.01. So these variables are a good indication of the debt to equity ratio. The coefficient or beta (β) of liquidity is -0.137 this means that when on average tangibility is going up or down by 1 the debt to equity ratio is going down with -0.137. Profitability has a beta (β) of -0.571, so when profitability is going up the debt to equity ratio is going down with an average 0.571. Tangibility has a larger beta of -4.294. When tangibility ratio is going up with one then the debt to equity ratio is on average going down with 4.294. Growth opportunities has a beta(β) of -0.139 so when profitability is going up the debt to equity ratio is going down with an average 0.139. Last dummy crisis, this has a beta(β) of -0.932. When there is a crisis then the debt to equity ratio is on average 0.932 lower.

The R^2 in this model is 0.0069 this means that 0.069% of the variation in the model is explained by the variables. This is very low and is certain not enough for a good model but there can be some conclusions about the variables, and which theory is working for this data.

6. Conclusion

A lot of researchers searched for a good model to explain why companies has a certain debt to equity ratio. Several theories are made but they are contradicting each other, sometimes the opposite of the variable is expected in another theory. So there is not one good model for indication why companies have a certain debt to equity level but several. The theories that are researched are the trade-off theory, agency theory and the pecking order theory. The variables that were used in this research were based on previous research(most used) and on the different theories. The expected relationships between the variables and the different theories are shown in the next table.

Variable	Trade-off theory	Agency theory	Pecking order theory
Size	+	+	+
Liquidity	+	+/-	-
Profitability	+	+	-
Tangibility	+	+	-
Growth opportunities	-	-	-
Payout ratio	+/-	+	+/-
Tax shield	-	+/-	+/-
Income variability	-	+/-	+/-
Product uniqueness	-	+/-	+/-
Dummy crisis	+/-	+/-	+/-

Table 6: summary of the variables

It is found that liquidity, profitability, tangibility, growth opportunities and dummy crisis are good determinations of capital structure. In the reduced model the variables the liquidity, profitability and dummy crisis are significant and they all have a negative relationship. This negative relation is what the pecking order theory is predicting. In the whole model these variables and also growth opportunities are significant. In this model also all the variables have a negative beta. So looking at the theories the pecking order theory is definitely the theory that is applicable in this dataset of Sweden. The R^2 of the model was very low, this means that not a lot of variation is explained by the model. So the variation in debt to equity ratio coming from something that is not in this research. This can be another determinant but maybe there are no good financial determinants and are companies choosing their debt to equity ratio based on outside influence or good feeling. But 0.0069% of the variation in the debt to equity ratio is described by liquidity, profitability, tangibility and growth opportunities.

To conclude; there are several models that explain the debt to equity ratio. These models are sometimes contradicting on different variables. That is because there is not one good model that is working for companies all over the world. In this research the model explained a really small part of the debt to equity ratio. The R^2 was very small but liquidity, profitability, tangibility and growth opportunities were significant and are a good determinants of capital structure.

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