Testing the static trade-off theory and the pecking order theory of capital structure: Evidence from Dutch listed firms

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This paper aims at testing static trade off and pecking order theory predictions on capital structure in a Dutch context. Hypotheses derived from the static trade off and pecking order were tested by using an OLS regression model.. Moderate support has been found for the both theories. This paper makes use of two types of debt ratios as the independent variable: Long term debt ratio and total debt ratio. Both ratios are book values. Firm size and asset tangibility were found to significantly explain a part of the long term debt ratio. While firm size, asset tangibility, profitability and liquidity were found to significantly account for a part of the total debt ratio.

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1. INTRODUCTION

One of the most debated issues in the theory of finance during the past years is the theory of capital structure. The debate started after the famous theorem proposed by Modigliani and Miller in 1958. Before Modigliani and Miller, there was no generally accepted theory of capital structure. The Modigliani and Miller Theorem was in fact an irrelevance theory. In their 1958 paper they basically stated that the way a company is financed in perfect capital markets, does not affect the value of a firm. However, capital markets are not perfect at all in reality. A lot of researchers have tried to solve the capital structure puzzle by tackling essential assumptions made in the Modigliani and Miller Theorem that do not hold in the real world. At the moment, there are three dominant theories that try to explain the capital structure decisions of firms: The trade off theory, the pecking order theory and the agency cost theory. Due to the limited time available to complete this paper, only the first two theories will be tested. The static trade-off theory says that firms seek debt levels that balance the tax advantages of additional debt against the costs of financial distress. The pecking-order theory says that firms prefer internal funding over external funding and that they prefer debt over equity. (Myers, 2001)

There has already been done a lot of research on the trade off theory and the pecking-order theory. However a lot of research is limited to the US and other big countries. For example the study of Rajan and Zingales (1995) in which they observed the debt versus equity choices in large firms in Canada, France, Germany, Italy, Japan, the UK and the U.S. In their study they have found both good news for the trade of theory as for the pecking order theory. Both theories seem to be right in specific instances. Since then a lot of research has tried to run horse races between the two theories. The results however are far from conclusive. Shyam-Sunder and Myers (1999) found evidence in favour of the pecking-order theory. However they were not able to reject the static trade-off theory. Fama and French (2002) found that shared predictions of the two theories do well but both theories have their shortcomings. More recently Frank and Goyal (2008;2009) found evidence that seems to be consistent with some versions of the trade off theory of capital structure. It seems that the dilemma between the two theories has not been solved yet.

De Jong, Kabir and Nguyen (2008) found that firm-specific determinants of capital structure differ across countries. This implies that the results from studies in for example the US are not necessarily generalisable to the Netherlands. Therefore this paper focuses on Dutch listed firms to see whether the theories are applicable to the Dutch context. The question that will be answered in this paper is:

To what extent do the static trade-off theory and the pecking-order theory explain capital structure of Dutch non-financial listed firms?

In terms of scientific relevance this paper will add to the existing evidence on both the static trade off theory as the pecking order theory. Literature on capital structure theories limits itself for a big part to the US and other large countries. Therefore it is good to gain more knowledge on the capital structure specific for Dutch listed firms. In terms of practical relevance, it has been widely acknowledged that capital structure decisions might have important effects on the value of the firm and its cost of capital.

In order to give a sound answer to the research question, existing literature will be reviewed in the next section. The existing literature will be used to make a theoretical framework in which both theories are included. Section three will discuss the used methodology. The model will be explained, variables will be defined and the data source will be discussed. In section four I will discuss the results. Section five consists of the conclusion.

2. LITERATURE REVIEW

According to Villamil (2008) Modigliani and Miller made two fundamental contributions. " In the context of the modern theory of finance, it represents one of the first formal uses of a no arbitrage argument (though the "law of one price" is longstanding). More fundamentally, it structured the debate on why irrelevance fails around the Theorem's assumptions: (i) neutral taxes; (ii) no capital market frictions (i.e., no transaction costs, asset trade restrictions or bankruptcy costs); (iii) symmetric access to credit markets (i.e., firms and investors can borrow or lend at the same rate); and (iv) firm financial policy reveals no information." These assumptions that do not hold in the real world are the foundation of the theories that followed after Modigliani and Miller's irrelevance theorem.

The original version of the trade off theory grew out of the debate over the Modigliani and Miller theorem. In 1963 Modigliani and Miller added corporate income tax to the original proposition. Since interest payments are tax deductible, this results in debt being cheaper because it can serve to shield earnings from taxes. Because they did not include offsetting costs of debt this would lead to the very unrealistic prediction that all firms should be financed for 99,99 percent by debt. To avoid this unrealistic prediction and to account for the moderate leverage levels observed, an offsetting cost of debt is needed. Kraus and Litzenberger (1973) work is the basis for what is now called the trade off theory. They emphasize that the optimal capital structure involves a trade off between the tax advantage of debt and bankruptcy costs. The static trade off theory can be distinguished from the dynamic trade off theory (Frank and Goyal, 2008). This paper will focus on the static trade off theory. According to the static trade-off theory, firms have a target debt ratio, which is determined by balancing the costs and benefits of debt versus equity. (De Bie and de Haan, 2007)

The pecking-order theory has been popularized by Myers and Majluf (1984). The pecking-order theory starts with asymmetric information. This means that managers from a firm know more about their companies' prospects, risks and values than do outside investors. Outside investors can only guess these values. If the manager offers to sell equity, then the outside investor must ask why the manager is willing to do so. In many cases the manager of an overvalued firm will be happy to sell equity, while the manager of an undervalued firm will not. This results in adverse selection. According to the theory, asymmetric information affects the choice between internal and external financing and between new issues of debt and equity securities. This should lead to a pecking-order in which investments are first financed with internal funding, then by new issues of debt and as a last resort with new issues of equity.

2.1 Firm specific determinants

Existing literature has given several determinants that are ought to be important for capital structure decisions and that can be linked to either the static trade off theory, the pecking-order theory or both. Rajan and Zingales (1995) found four main factors that are important for capital structure decisions by large firms in Canada, France, Germany, Italy, Japan, the UK and the U.S. They found: 1) Large firms tend to have higher debt ratios.

2) Firms with relatively more tangible assets tend to have higher debt ratios. 3) Firms that are more profitable have lower debt ratios. 4) Firms with higher ratios of market to book value have lower debt ratios. Their findings are supported by other research. (De Jong *et al*. ,2008) As stated in the introduction, their results convey good news for both the static trade off theory as the pecking-order theory.

Regarding firm size, the static trade off predicts a positive relation with leverage. Larger firms are often more diversified and thus are ought to have less bankruptcy risks (Chen, 2004) This implicates that larger firms can have higher levels of debt before the risk of getting into financial distress is becoming too big. Bankruptcy costs are also a smaller proportion of total value of larger firms. Predictions of the pecking order are rather ambiguous. Rajan and Zingales (1995) argue that the pecking order predicts a negative relationship since firm size can be seen as a proxy of information asymmetry: Larger firms have more complex organizations which increases the costs of information asymmetries. Increased costs of information asymmetries make it more difficult for firms to raise external finance. Chen (2004) also argues that there is a negative relationship because informational asymmetries between insiders within a firm and capital markets are expected to be lower for larger firms so larger firms should be more capable of issuing informational sensitive securities like equity. Larger firms are also longer around and better known then smaller firms, this provides them better access to capital markets. De Jong et al. (2008) take another stance on the topic by stating that the pecking order predicts a positive relationship between firm size and financial leverage. So according to the literature it is not completely clear what relationship is predicted by the pecking order theory. The following hypotheses can be derived from both theories. Hypotheses 'a' can be derived from the static trade off theory while hypotheses 'b' can be derived from the pecking order theory.

H1a: Firm size has a positive impact on financial leverage.

H1b: Firm size has a negative impact on financial leverage.

Much research supports the relationship Rajan and Zingales (1995) found on the relation between asset tangibility and financial leverage. (De Jong, *et al*., 2008; Chen, 2004) Both the static trade off and the pecking-order theory predict a positive relationship. The static trade off theory predicts a positive relationship because tangible assets are easier to collateralize on debt. Intangible assets sustain more damage when financial distress is encountered. (Myers, 2001) The pecking order predicts also a positive relationship because information asymmetry results in new equity issued being underpriced. Debt issued with tangible assets as collateral can reduce these agency costs (Chen, 2004). Firms that are unable to provide collateral will have to pay higher interest, this makes equity issues relatively less expensive and more attractive. This gives the following hypotheses for asset tangibility.

H2a+b: Asset tangibility has a positive impact on financial leverage.

Profitability can be seen as the most controversial determinant of capital structure. It has been argued that the static trade off theory fails in explaining capital structure in terms of profitability. (Fama and French, 2002; Frank and Goyal, 2009). It has been widely held that the static trade off theory presumes a positive relationship while evidence points in the opposite direction. The static trade off theory says that more profitable firms have higher taxable earnings and so should benefit more from debt tax shields. Profitable firms are also less likely going bankrupt and so it should reduce the risk of bankruptcy costs. However, recent research states that the rejection of static trade off models based on the empirically observed relationship between profitability and leverage is false. Frank and Goyal (2009) argue that 1) more profitable firms experience an increase in both book value as market value of equity. Without any offsetting actions this generates lower debt ratios. 2) Empirically, firms act in line with the static trade off theory: Profitable firms issue debt and repurchase equity while low profit firms reduce debt and issue equity. The pecking order theory says that more profitable firms have lower debt ratios because they have more retained earnings and are thus less in need of external financing. The following hypotheses can be derived from both theories.

H3a: Profitability has a positive impact on financial leverage

H3b: Profitability has a negative impact on financial leverage.

Most authors are in consensus about the relationship predicted by the static trade off theory between market to book ratio and financial leverage . The static trade off theory predicts a negative relationship because growth firms could face high costs of financial distress (Fama and French, 2002). Growth firms lose more of their value when they get into financial distress Pecking order advocates are less in agreement about the predicted relationship and its causes. Some of them state a negative relationship due to the fact that for firms with positive NPV projects the negative aspects of an equity issue may be overwhelmed by the good news of the acceptance of the project. So the costs of asymmetric information in an equity issue can be reduced by the expectation that the market has with regard to the profitability of the projects. The expected profits of new projects are reflected in the value of the growth opportunities (De Jong, Verbeek and Verwijmeren, 2011). Others see the market to book ratio as just another measure of profitability. There are also authors who state that the pecking order theory predicts a positive relationship between market to book ratio and financial leverage. Frank and Goyal (2005) argue that firms with more investments, holding profitability fixed, should accumulate more debt. However, this view is not widely spread among other authors. The hypotheses to be tested are therefore:

H4a+b: Growth opportunities have a negative impact on financial leverage.

Fama and French (2002) emphasize that when testing the theories on shared predictions it is very hard to attribute causation. When the theories predict the same relation it is very hard to tell if the results are due to trade-off forces, pecking-order forces, combination of the two or other factors overlooked by both theories. This is why it is very important to identify some factors on which they do not both give the same prediction. The remainder of this section will therefore focus on three more, often used firm specific determinants of capital structure: The non-debt tax shield, business risk and liquidity. The non-debt tax shield and business risk will be used to test the static trade-off theory. Liquidity will be used to test the pecking-order theory.

The non-debt tax shield has been used by a lot of other researchers as a determinant to account for financial leverage. The static trade off theory predicts a negative relationship between a firms non-debt tax shield and debt ratios (Fama and French, 2002). Examples of non-debt tax shields are expenses on R&D and depreciation which can shield income from taxes the same way as debt interest expenses can do. So firms with higher expenses on R&D and more depreciation are less likely

to hold great amounts of debt. This is because they have less taxes to shield left.

H5a: Non-debt tax shields have a negative impact on financial leverage.

Business risk is the risk of a firm going bankrupt. Higher business risk indicates higher volatility of earnings which raises the probability of bankruptcy (De Jong *et al*., 2008). According to Myers (2001) Higher business risk increases the odds of financial distress. It can be derived from common sense that there has to be a negative relationship between business risk and the debt ratio of a firm. When a firm finances with debt, it has the obligation to pay interest even when the firm is not able to make such a payment. When financed with equity, the firm is free to choose whether to pay out dividends or not. Firms with more business risk are more likely to default on their debt interest payments and therefore incur costs of financial distress and bankruptcy costs. Therefore it is likely that business risk reduces the debt ratios of firms.

H6a: Business risk has a negative impact on financial leverage.

De Jong *et al.* (2008) found limited significant results for liquidity although conventional theories suggest a negative relation between liquidity and leverage. The logic behind this negative relationship according to the pecking order is that firms first use their liquid assets before they issue new debt. They also found that in countries with better law enforcement and more healthy economies, the effects of liquidity on leverage is reinforced. This makes it more likely that there will be a significant negative relationship between liquidity and leverage in the Dutch context.

H5b: Liquidity has a negative impact on financial leverage.

3. METHODOLOGY

This section will start with the method of analysis. The section will proceed with definitions of all the used dependent and independent variables. At last, the sample and time period will be discussed.

3.1 Method of analysis

In order to test the theories, ordinary least squares (OLS) regression analyses will be performed. OLS regression analysis is a very common technique in testing static trade off and pecking order theories (Chen, 2004; Deesomsak *et al*., 2004; Frank and Goyal , 2009; De Jong, 2002; De Jong *et al.*, 2008). OLS is used to estimate a linear relationship between the independent and the dependent variable. The regression analysis assumes a causal relationship, meaning that the values of the dependent variable are caused by the values of the independent variables. The basic approach in this paper to find values for the independent variables is by using proxies for the unobservable theoretical attributes. Titman and Wessel (1988) explained that this method certainly has its limitations. First of all there may be some attributes which cannot be well represented by available proxies or there may be several proxies that can be used for a certain attribute. Secondly, variables themselves can be related, so the proxies chosen may actually measure the effects several different attributes. Thirdly, measurement errors in the proxies may be correlated with measurement errors in the dependent variables thus creating spurious correlations. In the next section I will first review descriptive statistics of the variables, after that, correlations between the firm specific independent variables and the dependent variables are analyzed. At last, multivariate regression analysis will be performed. To check for the robustness of the results comparisons will be made with regression results per year. Also regression results including outliers and results using three standard deviations to exclude outliers are compared with the results found in this paper. The basic model that will be used for this regressions comes from Frank and Goyal (2009), De Jong et al. (2008) use a similar model but they also include dummy variables. Dummy variables are not presented in this study. Therefore the model used is:

$$Y_{it} = \alpha + \beta_1 SIZE_{it-1} + \beta_2 TANG_{it-1} + \beta_3 PROF_{it-1} + \beta_4 GROWTH_{it-1} + + \beta_5 NDTS_{it-1} + \beta_6 RISK_{it-1} + \beta_7 LIQ_{it-1} + \varepsilon_{it}$$

In this model Y_{it} is the financial leverage of firm i at time t. The term α is a constant in the model. The beta's are the regression coefficients of the independent variables. ε_{it}'s are unobserved errors which account for the discrepancy between the actually observed responses and the "predicted outcomes". In the next section the results of the regression analyses will be discussed.

3.2 Dependent variables

The dependent variable for this study is financial leverage. Throughout the literature there are a lot of different definitions of financial leverage. Common definitions are debt to equity ratios, long term debt to total assets and total debt to total assets. There is also a distinction between book leverage and market leverage (Fama and French, 2002; Kayo and Kimura, 2011). In this paper I will use the book leverage due to a variety of reasons. First of all Barclay, Smith and Morellec (2006) argue that book leverage is a better measure because it captures the value of assets in place and not growth options reflected in market values. Secondly, Titman and Wessels (1988) argue that market value measures induce spurious correlation with the market to book ratio, which is used as an explanatory variable in this study. As a third reason for the choice for book leverage an argument from de Jong (2002) can be given. De Jong (2002) found that most Dutch firms measure their capital structure in book values. It would be therefore logically that firms base their capital structure decisions on the book value of their capital structure. Long term debt is used because short-term debt consists largely of trade credit which is under the influence of completely different determinants, the examination of total debt ratio is likely to generate results which are difficult to interpret (De Jong et al., 2008). Thus financial leverage in this paper is defined as the book value of long term debt divided by the book value of total assets (LLEV). To check for robustness I will also make regressions between the total debt ratio and the independent variables. The total debt ratio is calculated by dividing total debt and liabilities by total assets (LEV). An important shortcoming of this leverage measure is that it also includes items like accounts payable. Accounts payable may be used for transaction purposes rather than for financing so it may overstate the amount of leverage. Total debt divided by total assets might be a better proxy but direct data for total debt could not be found in the ORBIS data base.

3.3 Independent variables

3.3.1 Firm size

In this paper I use the natural logarithm of total sales as indicator of firm size (SIZE). This is a common indicator of firm size among other researchers (De Bie and The Haan 2007; De Jong et al., 2008; Kayo and Kimura, 2011)

3.3.2 Asset tangibility

As indicator of asset tangibility (TANG) this paper will use fixed assets divided by total assets. This indicator is also used by among others Deesomsak *et al.* (2004), Kayo and Kimura (2011)

3.3.3 Growth opportunities

The indicator used for growth opportunities (GROWTH) is market-to-book ratio. This is defined as (the balance sheet total−Book value of equity+ Number of stocks × Stock price) /Balance sheet total (De Bien and De Haan, 2007).

3.3.4 Profitability

As an indicator of profitability (PROF) this paper will use the ratio of earnings before interest, taxes and depreciation to total assets (Deesomsak, 2004; De Bie and De Haan, 2007).

3.3.5 Non-debt tax shield

. As a proxy for the non-debt tax shield (NDTS) this paper will use depreciation divided by total assets. Depreciation is used since it is the most significant element of the non-debt tax shield (Chen, 2004).

3.3.6 Business risk

Firms with higher business risk (RISK) are assumed to have more volatile earnings. I will therefore adopt the indicator defined by de Jong (2002) of earnings volatility. It is defined as the standard deviation of the change in operating income over a time period for four years. As a result of this formula, every firm has got business risk values that do not change throughout the years of the data period. It is not likely that business risk is a constant value and does not change over the years. Therefore results on business risk in this paper should be interpreted with caution.

3.3.7 Liquidity

As an indicator of liquidity (LIQ) the conventional definition will be used: The ratio of current assets to current liabilities (De Jong *et al.,* 2008).

3.4 Data sample, source and time period

Because this paper aims at the capital structure of Dutch non-financial listed firms, the sample used in this study consists of 72 firms that are listed at the stock exchange Euronext in Amsterdam. Financial Firms are excluded from the sample because other factors influence their capital structure. There capital structure is influenced by investor insurance schemes such as deposit insurance. Furthermore, their debt-like liabilities are not strictly comparable to the debt issues by industrial firms And as third reason, regulations such as minimum capital requirements may directly affect their capital structure (Rajan and Zingales, 1995; Deesomsak *et al*., 2002). The data used in this paper comes from the ORBIS database. In order to exclude financial firms, only industrial companies are analyzed. In Orbis 109 Dutch listed industrial firms were available for analysis. However, Firms with insufficient information available on one or more of the variables were also dropped out of the sample. I started with 288 firm year observations. After removing outliers, firm year observations dropped to 227. Outliers were removed because they can lead to inflated error rates and distortion of parameter and statistic estimates when using parametric tests. Values are considered being outliers when they are more than two standard deviations higher or lower than the mean value. Furthermore, this paper uses data from 2007 untill 2013. Data on the independent variables are lagged one period in order to isolate the analysis from the potential reverse causality between independent and dependent variables (Deesomsak *et al*., 2004). Data on financial leverage is from 2009-2012 while the data for the explanatory variables are from 2008-2011.

4. RESTULTS

This section will start with a brief overview of the descriptive statistics of the variables and a comparison with summary statistics of other studies. Second, correlations between the variables will be discussed. At last, OLS regressions analyses will be performed and the results will be compared with the results found in previous studies.

4.1 Descriptive statistics

A summary of the descriptive statistics can be found in table 1. The average of the long term debt ratio found in my study is 0.122. De Jong (2002) found an average of 0.132. However, De Jong (2002) used data from 1992-1997 whereas I use data from 2009-2012 on leverage to find the value for financial leverage. Both studies used the long term debt ratio as a proxy for financial leverage. My findings indicate a lower mean because I excluded outliers with high values from the analysis. When looking at the total debt ratio I find a mean value of 0.582. Outliers with long term debt values of higher than two have been excluded. The mean total debt value is slightly different than the mean total debt ratio showed by de Bie and de Haan (2007). They found a total debt ratio of 0.595. The average for SIZE in my study is 12,88 measured as the natural logarithm of sales. De Bie and de Haan (2007) found an average of 13.1 while using data from 1983 until 1997. This paper thus reports a slightly lower value for firm size. This seems counterintuitive since firms are ought to grow bigger and bigger every year. Differences in the samples and the effects of the financial crisis might explain this result. Also a growing number of relatively smaller companies being listed might account for the result. The average for asset tangibility found in my research is 0,555. This is highly comparable with the findings of De Jong (2002) who found an average of 0.556. The slight decrease in asset tangibility might be due to the fact that we live in a highly innovative world and intangible assets such as intellectual property become more and more important. The average growth opportunities in my paper have a value of 1.225 whereas De Bie and De Haan report a value of 1.336. In the analysis observations with growth opportunities values of higher than 3,3 have been excluded due to being considered as outliers. It seems like growth opportunities have diminished, it is likely that growth opportunities have diminished due to the ongoing crisis. The average profitability I find is 0.046. while De Bie and De Haan (2007) found an average profitability of 0.088. The decreased profitability is the direct effect of the financial crisis. For the Non-debt tax shield I report an average value of 0,0383. This value cannot be compared to the value reported by De Haan and Hinloopen (2003) since they make use of an entire different proxy for the non-debt tax shield. For business risk I report a mean value of 2.281 and a median value of 1.131. De Jong (2002) reports a far smaller value for mean business risk. He reports a mean value of 0.034. A plausible explanation for this drastic change could be derived from the effects of the financial crisis that started in 2007. Which is the beginning year of the time period of this study. Another explanation could be that I wrongly interpreted his formula for business risk leading to outcomes that are by definition different from the outcomes found in his study. At last I report a mean of 1.311 on liquidity. This is far lower than the value of 2.584 reported by De Jong *et al.* (2008). De Jong et al. used data from 1997-2001 thus it can be said that the liquidity of Dutch listed firms has decreased since then.

Table 1. Summary statistics

	Mean	Median	STD	Min.	Max.	N
LLEV	0.122	0.112	0.093	0.000	0.338	274
LEV	0.582	0.569	0.176	0.147	1.454	282
SIZE	12.88	13.22	2.322	5.814	17.71	284

TANG	0.555	0.560	0.174	0.208	0.982	283
GROWTH	1.225	1.121	0.498	0.282	3.288	282
PROF	0.046	0.062	0.109	-0.34	0.413	278
RISK	2.281	1.131	3.244	0.033	14.92	272
NDTS	0.038	0.030	0.028	0.001	0.148	272
LIQ	1.311	1.239	0.622	0.027	3.092	279

LLEV is long term debt divided by total assets. LEV is total debt and liabilities divided by total assets. SIZE is the natural logarithm of total sales. TANG is fixed assets divided by total assets. GROWTH is the market to book ratio, defined as (total assets – book equity + outstanding shares * market price)/ total assets. PROF is the operating income divided by total assets. NDTS is depreciation divided by total assets. RISK is the standard deviation of the change in operating income over a time period of four years. LIQ is current assets divided by current liabilities

4.2 Bivariate correlations

For all variables bivariate correlations have been calculated using SPSS. Table 2 on the next page summarizes the Pearson correlation coefficients between all variables used in this paper. Noteworthy to mention is that my results show a weak but highly significant correlation between the long term debt ratio and the total debt ratio. The correlation is highly significant at the 1% level, meaning that there is a possibility of lower than one percent that the correlation is created by chance. Furthermore, correlations between long term debt ratio and the independent variables on the one hand and the correlations between total debt ratio and the independent variables on the other, differ a lot. This implies that the long term debt ratio is driven by other factors than the total debt ratio. Long term debt ratio

4.2.1 Long term debt correlations

When looking at the correlations with the long term debt ratio, it can be seen that there exist highly significant correlations with the independent variables size and asset tangibility. These correlations are significant at the 1% level. The results indicate a moderate positive relationship between long term debt ratio and asset tangibility. This contains good news for both the static trade off theory and the pecking-order theory since both theories predict a positive relationship. A weak to moderate positive relationship can be found between firm size and the long term debt ratio. This result is in favour of the static trade off theory and contradicting the pecking order theory. Furthermore, I report a negative correlation between business risk and long term debt ratio. The correlation coefficient is in line with the static trade off theory but not significant. The correlation between long term debt and the non-debt tax shield is also supporting the static trade off theory. However, the correlation coefficient is not significant at the five percent level. In short, the long term debt correlations are in favour of the static trade off theory. The correlation between liquidity and long term debt ratio is in line with the pecking order theory, however not very strong and not significant. Profitability being the second determinant on which the static trade off theory and the pecking order theory disagree is also in favour of the static trade off theory. However the coefficient is not strong and neither significant. In short the correlations between total debt ratio and the firm specific determinants convey good news for both static trade off as pecking order theory. However, on firm specific determinants where both theories disagrees, the static trade off theory prevails.

Table 2. Bivariate Pearson correlation matrix.

	LTD	TD	SIZE	TANG	GROWTH	PROF	RISK	NDTS	LIQ
LTD	1.000								
TD	0.334**	1.000							
SIZE	0.317**	0.103	1.000						
TANG	0.224**	0.018	-0.059	1.000					
GROWTH	0.076	0.131*	-0.002	0.019	1.000				
PROF	0.048	-0.160**	0.244**	-0.173**	0.338**	1.000			
RISK	-0.069	-0.084	-0.353**	0.043	-0.125*	-0.394**	1.000		
NDTS	-0.14	-.119	-0.224**	0.186**	0.053	-0.002	0.175**	1.000	
LIQ	-0.018	-0.334**	0.151*	-0.620**	0.032	0.307*	0.003	-0.114	1.000

For a definition of the variables see table 1. * correlation is is significant at the 5% level. ** correlation is significant at the 1% leve

4.2.2. Total debt correlations

The results further indicate highly significant correlation coefficients between the total debt ratio on the one hand and profitability and liquidity on the other hand. The results are this time strongly in favour of the pecking order theory. I found a highly significant negative correlation between total debt ratio and profitability which is in line with the pecking order theory and in contradiction with the static trade off theory. For liquidity the correlation has become highly significant and a lot stronger than it was for the long term debt ratio. It is surprising that asset tangibility and size are not strongly and significant correlated to total debt ratio. The correlation between business risk and total debt ratio is a bit strong than between business risk and long term debt and not as significant. The only correlation coefficient between total debt ratio and the independent variables that contradicts both theories is the coefficient for growth opportunities. Indicating a significant positive correlation.

4.2.2 Correlations among independent variables

It is important to check if there are strong correlations between the independent variables because this can mean that there exists multicollinearity. Multicollinearity is the undesirable situation where the correlations among the independent are strong. This is a problem because multicollinearity increases the standard errors of the coefficients. Increased standard errors in turn mean that coefficients for some independent variable may be found not to be significantly different from 0, whereas without multicollinearity, the same coefficients might have been found to be significant. If looking at table 1. There are a few correlation coefficients between independent variables that could be problematic. To check for multicollinearity I have checked variance inflation factor (VIF) values in SPSS. VIF quantifies the severity of multicollinearity in OLS regression models. As a general rule of thumb VIF values of higher than four warrant further investigation and VIF values above ten are signs of serious multicollinearity. My data shows VIF values of no higher than 1.7 indicating that there is no severe multicollinearity among the independent variables.

4.3 multivariate regression analysis

To conclude this section I have performed two multivariate linear regressions between the two debt ratios and the explanatory variables mentioned in section two and three. The first regression model includes all mentioned variables from the static trade off theory and pecking theory. Long term debt ratio is the dependent variable in model 1. The second regression is basically the same. The only difference lies in the dependent variables being the total debt ratio instead of the long term debt ratio. The results of model 1 are in table 3 on the next page. Results of model 2 are displayed in table 4.

4.3.1 Long term debt regression model

The regression model for the long term debt ratio gives most explanatory power to firm size and asset tangibility. Both regression coefficients are in line with the prediction derived from the static trade off theory. However, the positive coefficient for asset tangibility has also been predicted by the pecking order theory. This is making it hard to say what theory is the driving factor behind the positive impact of asset tangibility on the long term debt ratio. The coefficient for asset tangibility is also highly significant at the 1% level. Making the coefficient estimate reliable. For the non-debt tax shield a low positive coefficient has been found but the coefficient is not significant with a p-value of 0.704. This tells us that based on this data set the chance of non debt tax shields not having an impact on long term debt ratios is 70,4%. For the firm specific determinant growth opportunities I reports a very small positive coefficient which is not significant. Profitability shows a very small positive coefficient which is highly insignificant. So on this part there is not much evidence for both theories. The highly significant positive coefficient for firm size shows some evidence in favour of the static trade off theory. However, some authors argue that the positive relationship can also be explained by the pecking order theory (Frank and Goyal, 2005) They argue that the pecking order is usually interpreted as predicting a negative relationship between financial leverage and firm size. The argument is that larger firms have been around longer and are better known. This means that large firms face lower adverse selection costs and can more easily issue equity than smaller firms who face higher adverse selection. They state that there is one important caveat. Larger firms also have more assets and so the adverse selection may become more important if it impinges on a larger base. Because the relationship between firm size and financial leverage is rather ambiguous the positive significant coefficient cannot be seen as evidence in favour of the pecking order theory, nor can it be seen as evidence against the pecking order theory. The coefficient for business risk is negligible and thus not supporting the trade off theory. At last, for liquidity a very small positive insignificant coefficient can be found. This finding is not much in support of the pecking order theory. At the bottom of the table the adjusted R^2 is mentioned. R^2 measures the percentage of variance in the dependent variable that can be explained by the explanatory variables. It has been adjusted for the amount of explanatory variables and gives a value of 0.203 indicating that the explanatory variables can only account for 20.3% of the variance in the dependent variable long term debt. The results can be compared to the results of De Jong et al. (2008). Similar results have been found on asset tangibility, firm size and growth opportunities. De Jong et al., (2008) did not include non-debt tax shields as explanatory variable. For profitability and business risk I have reported negative coefficients in line with their results but the coefficients I report are weaker and not as significant. For liquidity they report a very small negative relationship whereas I report a very small positive relationship.

Table 3. Regression models

	Predicted relationship	Long term debt	Total debt
		(1)	(2)
(constant)		**-0.235**[a]	**0.674**[a]
		(0.000)	(0.000)
SIZE	+/-	**0.018**[a]	**0.024**[a]
		(0.000)	(0.000)
TANG	+	**0.174**[a]	**-0.359**[a]
		(0.000)	(0.000)
GROWTH	-	0.006	0.009
		(0.623)	(0.647)
PROF	+/-	0.028	**-0.211**[b]
		(0.665)	(0.037)
NDTS	-	0.077	-0.315
		(0.704)	(0.326)
RISK	-	0.000	0.004
		(0.993)	(0.224)
LIQ	-	0.019	**-0.158**[a]
		(0.108)	(0.000)
Adj. R		0.203	0.295
Obs.		226	236

The superscripts a, b and c indicate statistical significance at 1%, 5% and 10% level, respectively. P-values are reported in parentheses. Obs. is the number of firms year observations in the regression. Adj-R^2 is the value of adjusted-R^2. No clear signs of heteroskedasticity have been observed in SPSS.

4.3.2 Total debt regression models

The results from the total debt regression model gives a quite different view than the long term debt regression model. This is in line with my expectations since total debt is under the

influence of other factors than long term debt (De Jong *et al.*, 2008). The coefficient for firm size is similar to what we have seen in the long term debt regression model. The coefficient for asset tangibility is surprisingly negative and highly significant. This finding is contradicting both static trade off as pecking order theory. The growth opportunities coefficient is again positive and not significant. For the firm specific determinant profitability model 2 reports a significant negative coefficient. This indicates evidence on the presence of the pecking order theory explaining total debt ratios. The coefficient for the non-debt tax shield is this time quite strong and negatively significant at the 5% level. That model 2 reports a stronger coefficient for the non-debt tax shield is surprising since long term debt is typically the sort of debt a firm pays tax deductable interest on. It would be fair to expect that the non-debt tax shield would have a bigger effect on long term debt than on total debt. The coefficient for business risk is this time positive but very small and not significant. For liquidity a relatively high negative coefficient can be observed which is highly significant. The regression coefficients for tangibility, size, growth opportunities and profitability found in this study can be compared to the coefficients found by De Bie and De Haan (2007). For asset tangibility they report a coefficient -0.141 which is significant at the 5% level. I found a stronger coefficient but in the same direction. For fir size they found a coefficient of 0.017 whereas I found a coefficient of 0.024. Both coefficients are highly significant at the 1% level. Their coefficient for profitability is -1.282 which is much stronger than the coefficient I found but in the same direction. At last they report a positive insignificant coefficient of 0.083 for market to book ratio. This finding is in line with my own finding which is also positive and insignificant. To check if the results are robust, regressions have also been performed per year instead of over the full time period. The results of those regressions are in table 4 which can be found in the appendix. It can be observed that the results are very much in line with the results found in table 3.

4.4 Data limitations

The results should be handled with caution since there are quite some data limitations. First of all not enough information could be retrieved from the ORBIS database for all Dutch listed industrial firms. This increases the risk that the results reported in this paper are not representative for the group of firms that were excluded due to their missing data. Secondly, outliers have been removed at the start of the analysis. The removal of outliers is very arbitrary and should be handled therefore with caution. The removal of outliers has especially affected the non-debt tax shield coefficient in the long term debt regression model. Without removing outliers there exists a positive coefficient indicating a positive impact of non-debt tax shields on long term debt. After I removed outliers this coefficient changed into a negative one. The results on the effect of non-debt tax shields should therefore be taken with extra caution. Comparing the regression model for total debt with and without outliers a very big difference can be spotted in the explanatory power of the model. With outliers the R^2 reports a value of 0.098. This is much lower than the value 0.343 reported when excluding outliers from the analysis. This difference is partly caused by the non-debt tax shield coefficient. Including outliers it reports a highly significant positive value while when excluding outliers it reports a negative value. Some argue that to exclude outliers three standard deviations should be used instead of two. A third limitation is that the explanatory variables are not capturing the attributes perfectly. Since the explanatory variables consist of attributes that are not directly observable, proxies have been used. As has been argued in section 3.1, the use of proxies brings its own limitations.

5. CONCLUSION

The aim of this paper was to contribute to the evidence on the presence of the static trade off theory and pecking order theory in explaining financial leverage of Dutch listed industrial firms. The results are mixed and consist of moderate support for both theories. Only the explanatory variables firm size and asset tangibility seem to play a big role in explaining long term debt ratios. It is hard to say which theory is dominating in explaining long term debt ratios since both theories predict the same relationship between asset tangibility and financial leverage. Only the coefficients found for growth opportunities and profitability contradict the static trade off theory predictions on the relationship between the explanatory variables and long term debt ratios. Coefficients found for firm size, growth opportunities and liquidity are contradicting the pecking order theory, contradictions were not found to be significant except for firm size. The pecking order theory cannot be rejected due to the positive firm size coefficient because the pecking order itself is very ambiguous in predicting a relationship between firm size and long term debt ratios. The coefficient found for growth opportunities is the only coefficient that contradicts both the static trade off as pecking order theory. The positive coefficient seems to be odd, since most previous research indicate a negative impact of market to book ratio on debt ratios and this negative impact is explained by the theories. However, the positive coefficient for market to book ratio is in line with previous studies on Dutch listed non financial firms (De Bie and De Haan, 2007; De Jong et al., 2008) This paper also analyzed the relationships between the firm specific determinants and the total debt ratio. The results indicate that the firm specific determinants have higher power in explaining total debt than long term debt. Firm size has a significant coefficient in line with static trade off predictions. Profitability and liquidity have significant coefficients in line with the pecking order theory. For asset tangibility also a significant coefficient has been found, only this time its sign contradicts with predictions from both theories. In short, this paper contributes to the existing literature on capital structure determinants explained by trade off and pecking order theories. The results indicate only moderate support for both theories and are not able to point out the theory which is dominating capital structure of Dutch listed industrial firms. It seems that static trade off theory works better for long term debt while the pecking order theory is more dominant in explaining total debt. In line with previous literature on the subject, flaws in both theories have been found. An important imitation is that only OLS regression analysis has been used in this paper. This method only measures whether there exists a linear relationship between the variables. Other regression methods are also available which can possibly lead to different conclusions. Examples are panel data regression models as has been used by Chen (2004) in which a cross-section dimension is included. When problems of multicollinearity or heteroskedasticity are apparent Generalized Least Squares regression method can be of great use. Further research should be conducted on the development of other theories and in search of other determinants of capital structure. In the future, a unifying model should be created which can account for multiple theories of capital structure. For example determinants derived from agency costs theory and country specific determinants can be included. However in this paper only firm specific determinants were analyzed, country specific determinants seem to play an important role in capital structure decisions (De Jong *et al.*, 2008). Their evidence suggests that creditor right protection,

bond market development, and GDP growth rate have a significant influence on corporate capital structure.

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7. APPENDIX

Table 4. Regression models per year.

Year	Expected Relationship	LLEV 2009	LEV 2009	LLEV 2010	LEV 2010	LLEV 2011	LEV 2011	LLEV 2012	LEV 2012
(constant)		**-.292** [a]	**.507** [a]	-.131	**.851** [a]	**-.247** [b]	**.872** [a]	**-.286** [b]	**.559** [a]
		(.008)	(.000)	(.186)	(.000)	(.024)	(.000)	(.020)	(.006)
SIZE	+/-	**.019** [a]	**.025** [a]	**.017** [a]	**.017** [c]	**.019** [a]	**.026** [b]	**.018** [b]	**.031** [a]
		(.003)	(.002)	(.006)	(.055)	(.002)	(.014)	(.011)	(.008)
TANG	+	**.229** [a]	**-.248** [b]	.112	**-.432** [a]	.150	**-.412** [a]	**.198** [b]	**-.398** [a]
		(.009)	(.023)	(.183)	(.001)	(.126)	(.006)	(.025)	(.006)
GROWTH	-	-.007	-.009	.004	.047	.003	**-.069** [c]	.039	.069
		(.811)	(.827)	(.867)	(.218)	(.896)	(.085)	(.159)	(.138)
PROF	+/-	.095	-.041	-.117	**-.798** [a]	.114	.294	-.050	**-.409** [c]
		(.440)	(.797)	(.458)	(.001)	(.468)	(.246)	(.727)	(.090)
NDTS	-	.115	.177	-.209	-.674	.341	-.417	-.042	-.329
		(.779)	(.739)	(.478)	(.237)	(.451)	(.569)	(0.933)	(.689)
RISK	-	.005	**.012** [b]	-.002	-.011	-.003	.002	-.002	.004
		(.268)	(.041)	(.656)	(.130)	(.464)	(.747)	(.590)	(.585)
LIQ	-	**.036** [c]	**-.110** [a]	-.008	**-.186** [a]	.014	**-.244** [a]	.015	**-.165** [a]
		(.090)	(.000)	(.720)	(.000)	(.669)	(.000)	(.557)	(.000)
Adj. R		.177	.236	.120	.427	.247	.296	.135	.266
Obs.		59	61	57	59	54	57	56	59

The superscripts a, b and c indicate statistical significance at 1%, 5% and 10% level, respectively. P-values are reported in parentheses. Obs. is the number of firms year observations in the regression. Adj-R^2 is the value of adjusted-R^2. No clear signs of heteroskedasticity have been observed in SPSS.