

THE IMPACT OF THE FINANCIAL CRISIS ON THE DETERMINANTS OF CAPITAL STRUCTURE: EVIDENCE FROM DUTCH LISTED FIRMS

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This study has provided insights in the impact of the 2008 financial crisis on the relationships between firm-specific determinants and capital structure. Ordinary least squares (OLS) regression techniques have been used, analyzing data over a period from 2004 to 2013. The 2008 financial crisis was defined in this study as a five year period from 2008 to 2012, and referred to the subprime crisis and European sovereign debt crisis. The sample consists of 39 Dutch firms that are listed on the Euronext Amsterdam stock exchange. Five different firm-specific determinants have been examined; firm size, profitability, tangibility, growth and income volatility. Hypotheses have been formulated on the basis of these determinants, following the assumptions of the trade-off and pecking-order theory. Some significant relationships between firm specific determinants and the capital structure have been revealed, showing a small preference for the pecking order theory. Furthermore, some of these relations are affected by the crisis. The results also indicate that over the full sample period, the level of short-term debt is mostly influenced by a firm's asset tangibility, while its long-term debt is mostly influenced by the firm's size. Also a considerable rise in short-term and long-term debt was found in the starting year of the crisis.

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1. INTRODUCTION

The decisions regarding the optimal capital structure choice are crucial in maximizing firm value and hence, in stimulating the growth of the existing shareholders' benefits. The study of capital structure attempts to explain the mix of securities and financing sources used by corporations to finance real investment (Myers, 2001).

The most suitable capital structure for a firm is a much debated question. There is a large body of research about capital structure and what its firm-specific determinants are (Titman and Wessels, 1988; Myers, 1977; Harris and Raviv, 1991). Finance experts do not agree on one 'best' capital structure, as Myers (2001) states: "There is no universal theory of the debt-equity choice, and no reason to expect one." But there are several useful conditional theories. The main theories on this subject are the trade-off theory and the pecking order theory, but none have gathered enough conclusive evidence to be taken as the universal theory. Based on these two theories, many empirical studies have been conducted to analyze the determinants of capital structure choice.

As the literature suggests, there are two categories of determinants that might affect the capital structure of a firm: (a) the external determinants reflecting country-specific macroeconomic conditions (Lane & Milesi, 2000) and (b) the internal determinants specific to the firm, such as the profitability, the company's size, the tangibility of its assets, the liquidity, the profitability, etc. (Harris & Raviv, 1991; Rajan and Zingales, 1995). The differences between the national environments of firms motivates the study of firm-specific determinants on a national level, as a countries' external determinants can be quite different from country to country (de Jong, Kabir, and Nguyen, 2008).

The global financial crisis of 2008 could show how external determinants impact the capital structure of Dutch firms, as the crisis had a major impact on the macroeconomic environment. The international monetary fund (IMF, 2014) defines two distinct crises in the recent period; the global financial crisis and the European sovereign debt crisis. An overall effect of both crises is that the lending conditions to firms have been strongly tightened since the crises started. Recent studies found that the consequences of the disruption of the capital markets caused by the financial crises significantly increased the amount of short term debt in firm capital structures (Fosberg, 2012; Custódio, Ferreira, & Laureano, 2013). A decline in long-term debt was found, some of the decline in long term debt could reflect a drop in demand as firms scale back expansion plans during a crisis. However, Ivashina and Scharfstein (2010) show that there may be a supply effect as well. Both effects might have a huge impact on the capital structure choice, as both firms and banks take into account the economic instability in their business activities. If significant relationships between the Dutch firm-specific determinants of capital structure and the financial crisis are found, they may be of predictive value for Dutch firms, and therefore, useful for corporate finance managers. This arises the interest of knowing the impact of the financial crisis on Dutch listed firms' capital structure. Thus, the following research question is formulated:

What is the impact of the financial crisis on the influence of the firm-specific determinants of the capital structure of Dutch listed firms?

The recent financial crisis provides an opportunity to investigate how an unstable macroeconomic environment has an impact on capital structure of Dutch listed firms. Many studies have been carried out in order to explain the relationship between

firm specific determinants and capital structure. There are also a some studies performed in the Netherlands in order to investigate the determinants of capital structure of Dutch firms (de Bie and de Haan, 2007; de Haan and Hinloopen, 2003; Degryse et al, 2012; de Jong, 2002; de Jong and Veld, 2001). However, these studies offer mixed results and focus on different theories, variables or samples. Furthermore, these studies do not focus on the impact of the financial crisis. In other countries, some researchers studied the impact of the financial crisis on the determinants of capital structure (Alves & Francisco, 2014; Iqbal & Kume, 2013; Zarebski & Dimovski, 2012). In addition, earlier financial crises like the Asian crisis of 1997 (Deesomsak et al., 2004) also received scientific attention. Some of the results of the above mentioned studies are used as comparability material for this study.

The sample consists of 39 Dutch firms that are listed on the Euronext Amsterdam stock exchange. This study adopted five firm-specific determinants from the above mentioned studies on the impact of the financial crisis on capital structure, in order to provide comparability. The following five different firm-specific determinants have been examined; firm size, profitability, tangibility, growth and income volatility. Hypotheses have been formulated on the basis of these determinants, following the assumptions of the trade-off and pecking order theory. The results showed a small preference for the pecking-order theory. Some significant relationships between firm specific determinants and the capital structure have been revealed. Furthermore, some of those relations showed considerable changes when comparing the pre-crisis period with the crisis period.

An introduction is given in this first section. In the second section, the capital structure literature, the firm-specific determinants of capital structure and the hypotheses are discussed. The third section describes the method of analysis, the samples, and will be concluded with an overview of the descriptive statistics. An analysis and discussion of the results will be given in the fourth section. The fifth and last section will provide conclusions, limitations and recommendations for future research.

2. LITERATURE REVIEW

In the late 50's Modigliani and Miller (1958) proposed that the financing decisions are irrelevant to firm values under the condition of a perfect capital market. In a perfect market there are no agency costs, taxes, financial distress costs and bankruptcy costs. Under these assumptions, internal and external financing may be seen as perfect substitutes. After these influential findings, capital structure research has focused on whether financial decisions become relevant if the assumptions are more relaxed (Kraus and Litzenberger, 1973; Myers, 1977). Multiple views have been advanced in which the method of financing matters, these theories will be discussed in the next sections.

2.1 Trade-off theory

In their second paper, Modigliani and Miller (1963) changed the elemental assumption of their classical proposition of capital structure. They integrated the corporate income tax and argued that the value of a levered firm equals the value of the unlevered firm plus the value of the obtained tax benefit. Interest on debt is tax-deductible, this incentivizes companies to issue debt. Modigliani and Miller's (1963) tax model suggests that the firm can maximize its value by using as much debt as possible.

Because of the assumed perfect capital market, Modigliani and Miller ignore the agency and bankruptcy costs of debt. Agency and bankruptcy costs of debt may outweigh the tax benefit in a

more realistic setting. Because of these costs, there is a trade-off between equity and debt, which suggests that there is some threshold level of debt. There is a certain amount of debt with which the firm's value is maximized. Jensen and Meckling (1976) identify two kinds of agency conflicts which incur costs: conflicts between managers and shareholder and conflicts between bondholders and shareholders.

Bankruptcy costs

Bankruptcy costs are the direct and indirect costs associated with bankruptcy. The direct costs include legal fees and managerial time spent in administering bankruptcy. The indirect costs include a possible inability of the firm to obtain credit or to issue securities, and a loss of sales due to fear and doubt from customers and suppliers (Warner, 1977). As a company increases its debt, the cost to finance the debt becomes higher as the debt becomes riskier to the investor. When a firm goes bankrupt, debtholders have a high chance of losing part or all of their investment and ask therefore a higher rate of return. This higher costs of capital can in turn lead to financial distress, which occurs when promises to creditors are broken or honored with difficulty (Brealey et al., 2010).

Manager-shareholder conflicts

Harris and Raviv (1991) argue that conflicts between shareholders and managers arise because managers hold less than 100% of the residual claim. Because of the separation of ownership, managers do not obtain the full gain of their profit improvement activities, but they do bear certain costs of these activities. Because of this, agents have an incentive to pursue their own interest, without taking into account the interest of the principal. This means that managers have an incentive to devote less effort to manage the firm's resources and they may be able to pursue and transfer firm resources to their own personal benefit (Jensen & Meckling, 1976). This can be done by going after perquisites such as building empires, corporate jets, elegant offices, etc. These inefficient activities can be mitigated by aligning the interests of managers and shareholders. In terms of capital structure, this can be done by increasing the portion of the firm's equity owned by the managers or by favoring debt finance, while holding constant the manager's absolute investment in the firm. Increases in the portion of debt will at the same time increase the manager's relative share of the equity. Furthermore, as identified by Jensen (1986), debt forces the firm to pay out cash. This reduces the amount of free cash available to managers and thus makes it harder to pursue the things mentioned above.

Shareholder-bondholder conflicts

Harris and Raviv (1991) argue that conflicts between shareholders and debtholders arise because the debt contract gives shareholders a tendency to invest in a sub optimal way. The rate of return for debtholders is the in advance agreed upon interest rate, while the rate of return for shareholders is dependent of the firm's profit and thereby variable. What follows is that if an investment yields higher returns than the face value of the debt, shareholders obtain most of this gain. But, if the investment fails, debtholders bear most of the consequences. This is because of the limited liability of shareholders. As a result, shareholders have an incentive to invest in risky projects (Myers, 1977). This effect, commonly called the "asset substitution effect," is an agency cost of debt financing. Rational lenders price debt issues with taking into account this effect.

2.2 Pecking-order theory

The pecking order theory of capital structure is among the most influential theories of corporate capital structure. According to Myers (1984), due to adverse selection and information asymmetries, firms prefer internal to external finance. The theory states that there is no optimal debt ratio. When outside funds are unavoidable, firms prefer to use debt instead of equity because of lower information costs which are associated with debt.

The result of information asymmetry is that firm insiders have more information than outsiders and they will use this information by timing the equity and debt issuance. It is suggested that insiders will issue equity when they perceive stocks are overvalued while debt becomes a better choice when stocks are perceived as undervalued. This is also known as the market timing theory, which was firstly proposed by Baker and Wurgler (2002). Accordingly, they propose that there is no optimal capital structure, as they indicate that decisions are made based on market valuations. Investors recognize this and they see the finance decisions as a quality signal. Ross (1977) therefore argues that debt issuance is associated with positive performance, while equity incurs negative stock performance.

2.3 Hypotheses

The most important developments in regard to capital structure literature have been discussed in the previous paragraphs. This has provided an understanding of the trade-off and pecking order theory. This last paragraph focuses on the firm-specific determinants of capital structure. Due to limited time, only a small selection of all determinants examined in literature are included in this study. In the selection process of the most important determinants of capital structure, studies which focused on the impact of the financial crisis on the firm-specific determinants of capital structure are used. These studies focused on; the capital structure of UK, French and German firms from 2006 to 2011 (Iqbal & Kume, 2013), the capital structure of Australian real estate investment trusts from 2006 to 2009 (Zarebski & Dimovski, 2012) and the capital structure of firms in 43 countries worldwide from 2000 to 2011 (Alves & Francisco, 2014). These studies all have investigated firm size, asset tangibility, growth and profitability as determinants of capital structure. Furthermore, income volatility as a measure of business risk has been examined by two of the three studies (Iqbal & Kume, 2013; Zarebski & Dimovski, 2012). This study adopts the above mentioned determinants in order to provide comparability, and therefore the following determinants will be used: firm size, profitability, tangibility, expected growth and income variability. Other researchers may provide other determinants of capital structure decisions. In addition, the trade-off theory and pecking-order theory provide different predictions for certain determinants, about whether they are positively or negatively related to the debt ratio. There are some contradictions which make it difficult to make one hypothesis for some of the determinants. Therefore, those determinants are linked to two different hypotheses, based on the trade-off theory and the pecking order theory. The results may provide proof for a strong influence for one of the two hypotheses, indicating that one of the two theories prevails in the Netherlands.

According to the trade-off theory, larger firms are expected to have a higher debt capacity. Literature offers multiple reasons why larger firms can access credit markets more easily and can borrow under better conditions. Examples are: lower chance of bankruptcy, relatively lower monitoring costs for investors easier access to credit markets, etc. (Deesomsak et al., 2004; Myers and Majluf, 1984). However, Rajan and Zingales (1995) predict, following the assumptions of the pecking-order theory, a negative relationship by arguing that a larger firm size results in

higher costs of information asymmetry, since larger organizations are more complex and therefore harder to monitor. The high costs of information asymmetries make it difficult for firms to raise external finance, which implies a negative relation between firm size and debt ratio. The different assumptions of the two theories result in an ambiguous relationship between firm size and debt ratio, therefore the first hypotheses are:

H1a: The size of the firm is positively related to the debt ratio

H1b: The size of the firm is negatively related to the debt ratio

A profitable firm, which has higher tax rates than a less profitable firm, is expected to have a higher level of debt financing to offset taxes. However, according to the pecking order theory, firms will use retained earnings first and then move to bonds and equity. This suggests a negative relation between profitability and debt. Empirical studies on the determinants of capital structure in the Netherlands suggest a preference for internal financing and therefore a negative relationship between profitability and leverage (Degryse et al., 2012; de Haan and Hinloopen, 2003). According to the pecking-order theory, firms have preference for internal financing over external financing. Therefore profitable firms, which have retained profits, are inclined to use these for financing instead of using external funds. So the expectation, in line with the pecking order theory is; the more profitable the firm is, the less likely is the need of that firm to borrow. Because of this ambiguous relationship between profitability and debt ratio, the following hypotheses are formed:

H2a: Profitability is negatively related to the debt ratio

H2b: Profitability is positively related to the debt ratio

The level of asset tangibility of a firm indicates how secure its debt is, since lenders can use those assets as collateral. The tangible assets of a firm can be considered as guarantees to debt holders. A high level of asset tangibility minimizes agency costs, which means that firms with a high amount of tangible assets can expect a lower level of interest (Baker and Martin, 2011). This results in a positive relationship between asset tangibility and debt ratio, therefore my third hypothesis is:

H3: Tangibility is positively related to the debt ratio

As mentioned previously, the debt contract gives shareholders a tendency to invest in a sub optimal way. Titman and Wessels (1988) argue that the cost associated with this agency relationship is likely to be higher for firms in growing industries, because they have more flexibility in their choice of future investments. Rational lenders price debt issues with taking into account this effect. In addition, Myers (1977) argues that in case of bankruptcy, the loss of firm value is higher for firms with high growth opportunities. This results in a negative relationship between firm growth and debt ratio. However, most high-growth firms have considerable outside financing needs, while internal finance is often insufficient to finance the high growth process (Michaelas et al., 1999). The pecking-order of firms favors debt above equity, and therefore this would result in a positive relationship between growth and debt. This results in another ambiguous hypothesis:

H4a: Growth is negatively related to the debt ratio

H4b: Growth is positively related to the debt ratio

Income volatility shows the risk a firm faces. Higher variability in earnings increases the probability of financial distress, since it's harder to predict if firms may be able to fulfil their commitments in regard to debt obligations (Deesomsak et al., 2004). This results in a negative relationship between income volatility and debt ratio, therefore my fifth hypothesis is:

H5: Income volatility is negatively related to the debt ratio

Investors and financial intermediaries became more risk averse during the financial market turmoil of the financial crisis. This led to a decline in the syndicated loans and corporate bond markets. This resulted in a significant increase in the costs of long-term debt. The benefits of long-term debt decreased, which led to an increase in the issuance of short-term debt (Ivashina and Scharfstein, 2010; Santos, 2011). In this sense, the increase in information asymmetries during the recent financial crises affected capital markets, leading firms to replace long-term debt by short-term debt. Because of these changes as a result of the crisis, changes in the relations between firm-specific determinants and the capital structure are also likely to occur. Therefore, my last hypothesis is:

H6: The recent financial crisis affects the relations between the firm-specific determinants and the capital structure of Dutch firms.

3. METHODOLOGY AND DATA

In this section, the methodology is introduced. This study is carried out by doing a quantitative analysis, which is the process of using statistical methods to describe, summarize, and compare numerical data.

3.1 Method of analysis

In previous literature about the determinants of capital structure, a cross sectional ordinary least squares regression (OLS) is often used (Deesomsak et al., 2004; de Jong and Veld, 2001; Rajan & Zingales, 1995). With this regression analysis one can investigate if and to what extent the dependent variables are influenced by the independent variables. The extent to which the dependent variables are influenced can be measured by using the coefficients of the independent variables.

First, a univariate analysis is carried out in order to provide some descriptive statistics. After that, correlations between the firm specific independent variables and the dependent variables are analyzed. At last, the OLS method is used to estimate the linear relationship between the dependent and independent variables described in the section 3.2; Variables.

As discussed in section 3.3; Data, the crisis period is defined as a five year time period from 2008 to 2012, while the pre-crisis period is defined as the four year period from 2005 to 2007. The dependent variables are estimated as a function of the firms-specific independent variables by carrying out OLS regressions over the pre-crisis period and the crisis period. By averaging the values of the variables over these certain periods, the effect of random fluctuations in the variable is reduced. The possibility of reversed causation is present. To tackle this problem, the data of the independent variables are lagged one year behind the dependent variable (Deesomsak et al., 2004).

The model is specified as follows:

$$LEVi_t = \alpha + \beta_1 SIZEi_{t-1} + \beta_2 PROFi_{t-1} + \beta_3 TANGi_{t-1} + \beta_4 GROWi_{t-1} + \beta_5 VOLi_{t-1} \epsilon_{it}$$

Where;

$LEVi_t$ = long-term (LTD) or short-term (STD) debt ratio of firm i , averaged over the period t

$SIZEi_{t-1}$ = size of firm i , averaged over the period t

$PROFi_{t-1}$ = profitability of firm i , averaged over the period t

$TANGi_{t-1}$ = asset tangibility of firm i , averaged over the period t ,

$GROW_{it-1}$ = growth opportunity of firm i , averaged over the period t ,

VOL_{it-1} = income volatility of firm I , averaged over the period t .

The term α is a constant in the model, the β 's 1-5 are the regression coefficients of the independent variables, ϵ_{it} is the standard error and t is one of two time periods or the whole time period.

3.2 Variables

The proxies for the variables are derived from studies of firm-specific determinants of capital structure in the Netherlands (de Bie and de Haan, 2007; Degryse et al., 2012; de Haan & Hinloopen, 2003; de Jong, 2002; de Jong & Veld, 2001). Furthermore, the proxies are also derived from studies about the impact of the financial crisis on the firm-specific determinants of capital structure (Alves & Francisco, 2014; Iqbal & Kume, 2013; Zarebski & Dimovski, 2012). At last, the paper of Deesomsak et al. (2004), who studied the impact of the Asian crisis of 1997 on capital structure, is also used in deriving the proxies. None of these studies used the exact same measures for all the variables, therefore I will use the proxies which are mostly used. The data derived from these proxies is compared only with the studies which used the same measures.

Dependent Variables

This study considers the long-term and short-term debt ratios as dependent variables. The two variables are separated because both are affected by the financial crisis in a different way (Ivashina and Scharfstein, 2010; Santos, 2011).

The literature on capital structure comes up with a number of proxies for leverage. The most extensive measurement of leverage is the ratio of total liabilities to total assets. With this variable one can measure what is exactly left over for shareholders in case of bankruptcy. But total liabilities also include costs like accounts payable, which may be used for transactions purposes rather than for financing. Adding those items to leverage may overstate the total amount (Rajan and Zingales, 1995) and is under the influence of completely different determinants (Degryse et al., 2012). Therefore, the following measures will be used:

Long-term debt ratio = long-term debt / total assets (Degryse et al., 2012; de Jong, 2002)

Short-term debt ratio = loans and other short-term debt / total assets (Degryse et al., 2012)

Independent Variables

The firm-specific determinants are considered as the independent variables.

The determinant firm size is identified by the natural logarithm of total assets (LnTA) (Alves & Francisco, 2014; Deesomsak et al., 2004; Degryse et al., 2012; de Haan & Hinloopen, 2003; Iqbal & Kume, 2013; Zarebski & Dimovski, 2012).

The profitability is calculated as; EBITD / total assets (Deesomsak et al., 2004; Degryse et al., 2012; de Jong & Veld, 2001).

Asset tangibility is defined as; tangible fixed assets / total assets (Deesomsak et al., 2004; Degryse et al., 2012; Rajan & Zingales, 1995; Zarebski & Dimovski, 2012).

Firm growth will be measured as; total assets (t) - total assets ($t - 1$) / total assets ($t - 1$) (Degryse et al., 2012; Iqbal & Kume, 2013; Zarebski & Dimovski, 2012)

Income volatility is measured as the absolute difference between the annual percentage change in EBIT and the average of this change over the sample period (Deesomsak et al., 2004).

To measure the effect of the financial crisis, the results of the tests for the firm-specific determinants in different time periods are compared.

Table 1: Proxies

Proxy Factor	Definition	Expected relationship: Trade-off, Pecking-order
Dependent variables		
Long-term debt ratio (LTD)	long-term debt / total assets	
Short-term debt ratio (STD)	loans and other short-term debt / total assets	
Independent variables		
Firm size (SIZE)	natural logarithm of total assets	+, -
Profitability (PROF)	EBITD / total assets	-, +
Asset tangibility (TANG)	tangible fixed assets / total assets	+, +
Growth (GROW)	total assets (t) - total assets ($t - 1$) / total assets ($t - 1$)	-, +
Income volatility (VOL)	Absolute difference between the annual percentage change in EBIT and the average of this change over the sample period	-, -

3.3 Data

The data is gathered from Orbis. Orbis is a database which contains annual report data from public and private companies worldwide. In this study, only the data of 39 Dutch firms that are listed on Amsterdam Euronext will be used. Because of the lagged independent variables, data of the independent variables is gathered from 2005 to 2012, while the dependent variables are gathered from 2006 to 2013. Because some proxies are measured by using the data of a year before (e.g. growth and income volatility), also data from 2004 is gathered. In this study, the financial crisis is considered as a four year period from 2008 to 2012. The year 2008 is the starting year of the crisis period in this study, as in this year the global stock markets crashed after the fall of the Lehman Brothers. The capital structure literature is unclear about a post-crisis period. Alves and Francisco (2014) used the time periods 2007-2008 and 2010-2011 as subprime crisis and European sovereign debt crisis. Zarebski and Dimovski (2012) define the crisis period as 2008-2009, instead of 2007-2008. Accordingly, Iqbal and Kume (2013) used 2008-2009 as the crisis period for their study on UK, German and French firms. In addition, they used 2006-2007 and 2010-2011 as pre-crisis and post-crisis periods, not taking into account the European sovereign debt crisis. This study takes the European sovereign debt crisis into account, therefore a post-crisis period is not defined, although economic developments are assumed to be present in the years after 2010. Given that the European sovereign debt crisis is still present at the time of writing, and because of the unclear definitions of the crisis periods, a post-crisis period will not be examined in this study.

Not all Dutch listed firms will be included in this study, for the sake of validity, there are some minimum requirements;

1. Firms operating in the financial and governmental sector are excluded from this research. Those firms have a different capital structure compared to other firms.
2. When vital information is missing for a certain year, the firm will be excluded from this study.
3. All the companies have to be listed on the Amsterdam Euronext stock exchange.

Table 2 provides an overview of the search criteria that are used in Orbis.

Table 2: Search criteria

Step	Search criteria	Number of results
1	All active companies and companies with unknown situation	1,584,232
2	World region/Country/Region in country: Netherlands	31,622
3	Type of entities: Industrial companies	16,061
4	Operating P/L [=EBIT]	2,779
5	Tangible fixed assets	2,660
6	Total assets	2,660
7	Long term debt	335
8	Loans	196
9	Depreciation	151
10	Main stock exchange: Euronext Amsterdam	39

3.4 Descriptive statistics

The following section compares the descriptive statistics with the findings of other capital structure studies. However, comparisons with other studies must always be taken with caution, as different researchers often use different samples, variables and definitions of variables. This sample is composed of 39 Dutch listed companies, and have been listed on the Amsterdam Euronext stock exchange during the period of 2004 to 2013.

Table 3: Descriptive statistics

	Mean	Median	STD	Min	Max	N
SIZE	12,761	12,740	2,131	8,482	17,419	312
PROF	0,090	0,105	0,158	-1,161	0,655	312
TANG	0,187	0,157	0,159	0,003	0,764	312
GROW	0,115	0,047	0,380	-0,607	4,098	312
VOL	2,105	0,496	5,707	0,001	73,326	312
LTD	0,109	0,108	0,100	0	0,469	312
STD	0,065	0,037	0,074	0	0,417	312

Table 4: Yearly averages of debt ratios

Year	STD	LTD
2005	0,053	0,091
2006	0,067	0,109
2007	0,076	0,119
2008	0,082	0,141
2009	0,073	0,118
2010	0,056	0,112
2011	0,056	0,100
2012	0,055	0,099

Table 3 presents the descriptive statistics for the firm specific variables, while table 4 presents the average debt ratios per year. It is interesting to see that the short-term and long-term debt ratios are both remarkably higher in 2008, which may indicate a higher risk aversion of firms and investors during the crisis as both firms and banks take into account the economic instability in their business activities. This is in line with Fosberg's (2012) findings for the US market. However, the debt ratios seem to return to their normal numbers starting in 2009.

In table 3 one can see that the mean of the firm size is 12.761, which comes very close to the samples of Deesomsak et al. (2004) and Iqbal and Kume (2013), who found means between 11.5 and 14.5, depending on the countries. The mean of profitability in the sample is 0.090, while Degryse et al. (2012) found an average profitability of 0.153 with their study on Dutch SMEs in the period from 2003 and 2005. The decreased profitability could be an effect of the financial crisis, since

Deesomsak et al. (2004) find profitabilities of 0.106, 0.067, 0.083 and 0.076 during the Asian crisis in Thailand, Malaysia, Singapore and Australia respectively.

The mean of the asset tangibility is quite different than the asset tangibility of other studies which used the same definitions. In this sample, the mean of the asset tangibility is 0.187, while in the study of Degryse et al. (2012) the mean is valued at 0.490. This difference can be explained by the focus on different types of firms. However, Deesomsak et al. (2004) find means of 0.433, 0.380, 0.351 and 0.334 in Thailand, Malaysia, Singapore and Australia respectively.

Firm growth has a mean of 0.115 in this sample. By comparison, the growth of Dutch SMEs observed by Degryse et al. (2012) is 0.133. Iqbal and Kume (2013) find means of 0.567 and 0.170 for UK and French firms during the crisis, while Zarebski & Dimovski (2012) find a mean of 0.606 for Australian Real Estate Investment Trusts during the crisis. These differences could be explained by country-specific factors which might influence firm growth rates.

The income volatility mean is 2.105 and comes close to the findings of Deesomsak et al. (2004) on Malaysian (2.639) and Singaporean (2.3613) firms, while Thailand (3.277) and Australia (4.095) score quite differently. One could say that this determinant also might be influenced by country-specific factors.

The mean long-term debt to total assets ratio in this study is 0.116. The Dutch capital structure studies of de Degryse et al. (2012) and de Jong (2002) report a mean long-term debt to total assets ratio of 0.308 and 0.132. In addition, the study of de Degryse et al. (2012) reports a mean short-term debt to total assets ratio of 0.184, while in this study the mean of short-term debt to total assets ratio is 0.064. The difference between the leverage ratios in this study and the study of Degryse et al. (2012) can be explained by the focus on different types of firms; this study examines publicly listed firms, while the Degryse et al. (2012) examined small and medium-size enterprises. In this study, the total leverage ratio is 0.180, while Iqbal and Kume (2013) find ratios of 0.264, 0.324 and 0.331 for UK, French and German firms respectively and Deesomsak et al. (2004) find ratios of 0.444, 0.270, 0.240 and 0.186 in Thailand, Malaysia, Singapore and Australia respectively.

4. RESULTS

This section provides the results of the bivariate and OLS analyses. A bivariate analysis is carried out in order to test whether there are relationships between all the variables, this is done by using Pearson correlation coefficients. Three separate analyses are made; one for the pre-crisis period (table 5), one for the crisis period (table 6) and one for the whole period (table 7). The number of * marks show how significant the relationship between the two variables is. So ** means that the correlation is significant at the 0.01 level, which means that the possibility that there is no true correlation is less than 1%.

The results show that the firm size is correlated significantly with long-term debt (correlation = 0.403; $P < 0.01$) and becomes even stronger in the crisis period. Which means that bigger firms tend to borrow more for the long-term in times of crises. This finding is in accordance with the trade-off and agency theories, confirming that larger firms tend to have better borrowing capacity relative to smaller firms. It could mean that smaller companies, which have not the same borrowing benefits as bigger companies, are seen as riskier investments, especially in times of crises. However, the relationship with short-term debt is significantly negative (correlation = -0.630; $P < 0.01$).

Table 5: Bivariate Pearson correlation matrix pre-crisis period (2005-2007)

	SIZE	PROF	TANG	GROW	VOL	LTD	STD
SIZE	1						
PROF	0,093	1					
TANG	0,057	0,208*	1				
GROW	0,003	0,008	-0,262**	1			
VOL	0,017	-0,278**	-0,183*	0,295**	1		
LTD	0,311**	-0,195*	0,061	-0,026	-0,073	1	
STD	-0,229*	0,065	0,246**	-0,008	-0,013	-0,041	1

****.** Correlation is significant at the 0.01 level (2-tailed).

*****. Correlation is significant at the 0.05 level (2-tailed).

Table 6: Bivariate Pearson correlation matrix crisis period (2008-2012)

	SIZE	PROF	TANG	GROW	VOL	LTD	STD
SIZE	1						
PROF	0,073	1					
TANG	0,124	0,120	1				
GROW	0,015	0,306**	-0,032	1			
VOL	0,070	-0,075	-0,114	0,062	1		
LTD	0,571**	0,022	0,258**	0,122	-0,023	1	
STD	-0,113	0,051	0,113	0,110	-0,007	-0,023	1

****.** Correlation is significant at the 0.01 level (2-tailed).

*****. Correlation is significant at the 0.05 level (2-tailed).

Table 7: Bivariate Pearson correlation matrix total period (2005-2012)

	SIZE	PROF	TANG	GROW	VOL	LTD	STD
SIZE	1						
PROF	0,070	1					
TANG	0,157**	0,150**	1				
GROW	0,015	0,176**	-0,117*	1			
VOL	0,119*	-0,115*	-0,041	0,058	1		
LTD	0,403**	0,059	0,153**	-0,085	-0,085	1	
STD	-0,630**	0,076	0,163**	-0,006	-0,006	-0,045	1

****.** Correlation is significant at the 0.01 level (2-tailed).

*****. Correlation is significant at the 0.05 level (2-tailed).

This negative relationship becomes weaker during the crisis, which could mean that short-term debt, and therefore debt in general, becomes more attractive for bigger firms, although smaller firms still tend to choose more for short-term debt since the relationship stays negative.

The determinant profitability is significantly negatively correlated with long-term debt (correlation = -0.195; $P < 0.05$) during the pre-crisis period, which is in accordance with the trade-off theory. However, the relationship is positive in the other periods, although not significantly. This could mean that banks see some sort of safety in profitable firms when many firms may be facing financial distress during a crisis period. However, the variable is rather unpredictable since the correlation values are low.

In accordance with the trade-off theory, tangibility is in all periods positively related with long-term and short-term debt (correlation = 0.153; $P < 0.01$ and correlation = 0.163; $P < 0.01$). It is interesting to see that tangibility is significantly correlated with short-term debt during the pre-crisis period, while during the crisis period it is significantly correlated with long-term debt. An explanation could be that because of the higher risk awareness of

banks during the crisis, banks favor firms with high collateral and could therefore provide those firms more attractive long-term lending conditions.

Growth and income volatility doesn't seem to have a significant relationship with either long-term or short-term debt, although the relationship between growth and debt is much stronger during the crisis. Before the crisis the correlation is very weak and negative, while it becomes stronger and positive during the crisis. Income volatility doesn't seem to change much during the crisis. Correlations between independent variables should also be checked, as strong correlations could mean that multicollinearity is present. Multicollinearity is the undesirable situation where the correlations among the independent variables are strong. This suggests that several of the independent variables are closely linked in some way. This can disturb the process of assessing the impact of an individual independent variable on the dependent variable. In table 4, 5 and 6 are some significant relationships between independent variables that could be problematic. To check for multicollinearity, the variance inflation factor (VIF) values are checked in SPSS. VIF quantifies the severity of multicollinearity in OLS regression models, and as a rule of thumb, VIF values of higher than 4 would trigger further investigation while VIF values above 10 are signs of severe multicollinearity. The data of this study show VIF values of no higher than 1.2, indicating that there is no severe multicollinearity among the independent variables (Field, 2000).

Table 8 and 9 provide the results of the OLS analyses with long-term debt ratio and short-term debt ratio as dependent variables. Also in these tables, the number of * marks show how significant the relationship between the two variables is.

The first hypothesis predicts an ambiguous relationship between firm size and leverage. The findings of the OLS regressions are in accordance with the trade-off theory, implying a positive relationship between firm size and leverage. It is also consistent with the findings of Deesomsak et al. (2004), Iqbal and Kume (2013,) Degryse et al. (2012), confirming that larger firms tend to have better borrowing capacity relative to smaller firms. The crisis seems to have influenced the role of firm size on capital structure decision. The coefficient changed from 0.335 to 0.560, indicating a stronger positive relationship during the crisis. This may imply that during the crisis firms became more concerned with their survival and bankruptcy risk. It is also possible that after the crisis lenders became more inclined to lend to larger firms in an attempt to decrease default risk (Deesomsak et al., 2004). Furthermore, short-term debt is negatively related with firm size. This may indicate that banks perceive smaller firms as riskier, and therefore have an incentive to provide them with short-term debt. However, this effect seems to decrease during the financial crisis, which is counter intuitive. Banks could also perceive some larger firms as riskier because of the crisis, and may therefore have an incentive to provide them with short-term debt.

The second hypothesis also predicts an ambiguous relationship; the relationship between profitability and leverage. The findings of the OLS regressions show negative relationships, only significant during the pre-crisis period with long-term debt as dependent variable. The negative relationship is consistent with the predictions of the pecking order theory, showing that firms prefer to use internal sources of funding when profits are high. However, the crisis seems to have influenced the role of profitability on capital structure decision. During the crisis the relationship is weaker and not significant anymore. This may indicate that profitable firms have a lower chance of financial distress, implying that those firms are less risky and therefore attractive for the more risk averse banks or other debt investors.

Table 8: OLS regression of the long-term debt ratio

	Pre-crisis			Crisis period			Total period		
	Coefficients	t Stat	P-value	Coefficients	t Stat	P-value	Coefficients	t Stat	P-value
Intercept	-0,070	-1,196	0,234	0,206***	-6,683	0,000	-0,134***	-4,427	0,000
SIZE	0,335***	3,862	0,000	0,560***	9,518	0,000	0,410***	7,849	0,000
PROF	-0,288**	-3,116	0,002	-0,077	-1,268	0,206	-0,114*	-2,139	0,033
TANG	0,085	0,924	0,358	0,185**	3,148	0,002	0,110*	2,091	0,037
GROW	0,044	0,468	0,641	0,095	1,579	0,116	0,094	1,795	0,074
VOL	-0,156	-1,648	0,102	-0,088	-1,494	0,137	-0,148**	-2,84	0,005
Observations	117			195			312		
Adjusted R Square	0,138			0,363			0,191		

***. Correlation is significant at the 0.001 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 9: OLS regression of the short-term debt ratio

	Pre-crisis			Crisis period			Total period		
	Coefficients	t Stat	P-value	Coefficients	t Stat	P-value	Coefficients	t Stat	P-value
Intercept	0,161***	3,848	0,000	0,105**	3,517	0,001	0,130***	5,413	0,000
SIZE	-0,238**	-2,68	0,008	-0,139	-1,911	0,057	-0,195**	-3,474	0,001
PROF	-0,102	-1,078	0,283	-0,101	-1,341	0,182	-0,075	-1,314	0,190
TANG	0,306**	3,261	0,001	0,141	1,195	0,053	0,219***	3,85	0,000
GROW	0,084	0,879	0,381	0,148*	1,99	0,048	0,117*	2,064	0,040
VOL	0,020	0,208	0,836	0,032	0,437	0,663	0,011	0,194	0,847
Observations	117			195			312		
Adjusted R Square	0,098			0,028			0,064		

***. Correlation is significant at the 0.001 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

However, the relationship stays negative, implying that profitable firms prefer internal finance. The results for the short-term debt ratio are not significantly related, are negative and does not seem to change much during the crisis. The negative relationship is in accordance with the findings of Deesomsak et al. (2004), Iqbal and Kume (2013) (only their findings on French firms), Degryse et al. (2012), de Jong and Veld (2001) and de Haan and Hinloopen (2003).

The third hypothesis assumes that asset tangibility is positively related to leverage. The findings of the OLS regressions are in accordance with the hypothesis, indicating that lenders use a firm's assets as collateral and therefore provide a lower level of interest. The most striking result is the influence of the crisis on this relationship. Before the crisis, tangibility does not seem to influence the long-term debt ratio, while during the crisis, it does. The exact opposite holds for the short-term debt ratio, which shows a strong positive relationship before the crisis and a weak positive relationship during the crisis. An explanation could be that because of the higher risk awareness of banks during the crisis, banks favor firms with high collateral and could therefore provide those firms more attractive long-term lending conditions. Deesomsak et al. (2004) support these findings, since they also find a strong positive change in the relationship between tangibility and debt ratio with their pre-crisis and post-crisis samples, although this finding was solely present with their sample of Australian firms. Furthermore, Iqbal and Kume (2013), de Jong (2002), Degryse et al. (2012), de Bie and de Haan (2007) all find a positive relationship between tangibility and total debt.

The fourth hypothesis assumes that the relationship between firm growth and leverage is ambiguous. The results show a positive weak relationship with the long-term debt ratio. Furthermore, the positive relationship is significant with the short-term debt ratio during the crisis period. The findings

provide support to the predictions of the pecking-order theory, namely that high growth firms are inclined to issue debt, since retained earnings might not be sufficient to finance the growth process. Degryse et al. (2012) and Iqbal and Kume (2013) also find a positive relationship between growth and long-term debt, while other researchers (Deesomsak et al., 2004; Zarebski & Dimovski, 2012) find a negative relationship. One could say that this determinant might be influenced by country-specific factors.

The fifth hypothesis predicts that income volatility is negatively related to leverage. The results of the OLS regressions show a negative relationship when it comes to long-term debt, while it shows a very weak positive relationship with short-term debt. Only the result of the total period shows a significant negative relationship on long-term debt, the other values are weak and do not seem to have an impact on leverage. Deesomsak et al. (2004) support this findings by explaining that firms may ignore the volatility of earnings when the risk of financial distress and the costs of bankruptcy is low. This may occur if the borrowing level of firms is well below their debt servicing capacity, which might be the case in the Netherlands. The level of total leverage, described in section 3.4; Descriptive Statistics, is rather low in the Netherlands compared to other countries.

The sixth hypothesis assumes that the financial crisis affects the relations between the firm specific determinants and the capital structure. This hypothesis can be partially approved, since the impact of most determinants showed considerable changes in their values from before and during the crisis. First, the positive impact of firm size on long-term debt becomes much stronger during the crisis, while the negative impact on short-term debt becomes weaker and even insignificant. Second, before the crisis, profitability had a significant negative impact on long-term debt. This effect weakened during the crisis and became insignificant. The impact on short-term debt did not change much. Third, the positive impact of tangibility on long-term debt

became much stronger during the crisis, while the opposite holds for the positive impact on short-term debt. Fourth, the positive impact of growth only changed and became stronger on short-term debt during the crisis. It did not have a considerable effect on long-term debt. Lastly, the impact of income volatility did not change over the whole period on both long-term and short-term debt.

The adjusted R-squared can be used to test the explanatory power of the model and to check whether the independent and the dependent variables are linearly related. The adjusted R-squared for table 7 are 0.138 during the pre-crisis period, 0.363 during the crisis period and 0.191 over the whole period, while table 8 shows values of 0.098 during the pre-crisis period, 0.028 during the crisis period, and 0.064 over the whole period. These values are low compared to other studies on the impact of a crisis on the determinants of capital structure (Deesomsak et al., 2004; Iqbal & Kume, 2013; Zarebski & Dimovski, 2012). These low values suggest that only a small proportion of the variation in the dependent variables can be explained by the independent variables.

5. CONCLUSIONS AND IMPLICATIONS FOR FUTURE RESEARCH

This study has examined the impact of the 2008 financial crisis on the relationships between firm-specific determinants and capital structure. The goal was to identify the potential impact of the 2008 financial crisis on the firm-specific determinants of Dutch capital structure. By using ordinary least squares (OLS) regression techniques, data over a period from 2004 to 2013 was analyzed. The sample consists of 39 Dutch firms that are listed on the Euronext Amsterdam stock exchange. Five different firm-specific determinants have been examined; firm size, profitability, tangibility, growth and income volatility. A small preference for the pecking-order theory has been found, since two out of the three ambiguous relationships have shown support for the assumptions of this theory. The results revealed some significant relationships between firm specific determinants and the capital structure, furthermore some of those relations are affected by the crisis. The results indicate that over the full sample period, the level of short-term debt is mostly influenced by a firm's asset tangibility while its long-term debt is mostly influenced by the firm's size. Also a considerable rise in short-term and long-term debt was found in the starting year of the crisis, which may indicate a higher risk aversion of firms and investors during the crisis, this is in accordance with Fosberg's (2012) findings.

The first limitation of this study is the small amount of samples. Therefore the results are less statistically reliable, while the samples may not be representative for all Dutch listed firms on the Euronext Amsterdam stock exchange. Second, the application of additional methods of analysis could provide more consistent results and could verify the found relationships in the OLS regressions. Third, the low adjusted r-squared values suggest that only a small proportion of the variation in the dependent variables can be explained by the independent variables.

Due to limited time, only a small portion of all potential firm-specific determinants are examined, a recommendation for future research would be to include additional independent variables in order to provide a broader picture. Only one crisis period has been examined in this study. To better investigate the impact of a financial crisis on the capital structure of Dutch firms, more crisis periods should be examined in a future study. Third, this study mostly focused on capital structure theory and firm-specific determinants, while analyzing macroeconomic

information in a more specific way and discussing its potential impact could provide more useful information for firms and investors.

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