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Swedish SMEs' Determinants of Capital Structure During the 2008 Financial Crisis

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Abstract

The purpose of this paper is to examine the relationship between capital structure and capital structure determinants for Swedish SMEs during financial instability. The study will focus on the 2008 financial crisis, using data from 2005-2014, which is divided into three separate periods for analysis. The unbalanced panel data set includes observations for 10,713 firms. The determinants of capital structure used in this study are firm's size, tangibility of assets, profitability, liquidity, non-debt tax shields and growth potential. The study uses the theoretical framework of the pecking order theory and the trade-off theory as a base analysis point for the empirical data. We find significant results indicating that firm's size, tangibility of assets, liquidity and growth potential are positively related to firm's capital structure. Profitability indicates a significant negative relationship to firm's capital structure. Tangibility and profitability exert a relatively strong influence on capital structure compared to the other determinants. Overall we find that trade-off theory and pecking order theory are applicable for Swedish SMEs' capital structure decisions during the 2008 financial crisis. Our findings are in accordance with majority of previous studies and provide valuable country specific data.

Keywords: Capital Structure Determinants, Leverage, Financial Crisis, Swedish SMEs

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Table of Contents

1. Introduction 3
2. Sweden and the 2008 Financial Crisis 4
3. Capital Structure Theory 5
   - 3.1 Static Trade-Off Theory 5
   - 3.2 Pecking Order Theory 6
   - 3.3 Financial Crises and Capital Structure 7
4. Measures of Capital Structure 8
5. Determinants of Capital Structure 8
   - 5.1 Firm Size (SIZE) 8
   - 5.2 Tangibility of Assets (TANG) 9
   - 5.3 Profitability (PROF) 11
   - 5.4 Liquidity (LIQ) 12
   - 5.5 Non-Debt Tax Shields (NDTS) 12
   - 5.6 Growth Potential (GROWTH) 13
6. Data and Methodology 16
   - 6.1 Data 16
   - 6.2 Methodology 18
   - 6.3 Descriptive Statistics 21
7. Results and Discussions 23
   - 7.1 General Results 23
   - 7.2 SIZE 25
   - 7.3 TANG 26
   - 7.4 PROF 27
   - 7.5 LIQ 27
   - 7.6 NDTS 28
   - 7.7 GROWTH 28
   - 7.8 Robustness Tests 29
8. Conclusion 31

References 33

Appendix 37
- Appendix A: Variables used from the Serrano database 37
- Appendix B: Testing for Autocorrelation for each individual period 38
- Appendix C: Robustness Regression for SIZE 39
- Appendix D: Robustness Regression for TANG 39
- Appendix E: Robustness Regressions for PROF 40
- Appendix F: Robustness Regression for GROWTH 41
- Appendix G: Robustness Regressions for group relations (e.g. individual, subsidiaries or parent companies) 41
- Appendix H: Robustness Regression with Balanced Panel Data 42
- Appendix I: Robustness Regression with all Robustness Proxies 43
- Appendix J: Testing the Relationship between NDTS and Effective Tax Rate 43

1. Introduction

Capital structure is of importance for companies' potential profitability and solvency. The distinguished authors Modigliani and Miller (1958) are considered to have developed the modern perspective of capital structure. They state that, under strict assumptions, capital structure is irrelevant for the value of a company. With the relaxation of certain assumptions, such as the absence of tax, their findings become more applicable to real firms and factors influencing capital structure can be identified. Two dominant theories, static trade-off theory (Kraus and Litzenberger, 1973) and the pecking order theory (Myers and Majluf, 1984), can help explain how managers determine a company's optimal capital structure.

These theories are predominantly tested on U.S. data samples. Rajan and Zingales (1995) used an international data set where they found that the extent to which firms are levered in different countries are fairly similar. However, complex adjustments had to be made in order to take into account for differences between countries, such as accounting regulations and institutional environments, which impact leverage decisions. More recent studies have also stated that capital structures differ between industries and countries, emphasizing the importance of country specific data (Zietlow *et al.,* 2007; Sibilkov, 2009).

The aim of this study is to empirically examine the relationship between Swedish small and medium-sized enterprises' (SME) capital structure and their determinants during the 2008 Financial Crisis, testing if the static trade-off theory and pecking order theory hold. The determinants of capital structure to be studied are firm's size, tangibility of assets, profitability, liquidity, non-debt tax shields and growth potential. These determinants are the most commonly used in previous literature, allowing for comparison.

Empirical research during periods of financial and economic instability is important because companies are acting under different circumstances, and it cannot be assumed that all previous relationships that have been established will hold. Previous literature has also focused on large public U.S. companies therefore we wish to study Swedish SMEs, which account for majority of Swedish companies. SMEs have more restricted access to funding compared to large public companies, making it vital to test if capital structure theories hold for SMEs. It is also important to provide country specific data due to recent findings of capital structure determinants differing between countries (Zietlow *et al.,* 2007; Sibilkov, 2009). The findings can aid in predicting firms' future capital structure during financial instability.

Our results indicate that the static trade-off theory and pecking order theory have strong explanatory values for Swedish SMEs prior to and during the 2008 Financial Crisis. We find size, tangibility of assets, liquidity, non-debt tax shields and growth potential to have a positive

relationship to long-term leverage. Profitability shows a negative relationship to long-term leverage. The results indicate that firm's tangibility of assets and profitability have the highest explanatory power for an SME's choice of capital structure. All determinants experienced similar relationship to long term leverage before and during the crisis, but their explanatory value on capital structure changed. Tangibility showed an unexpected decreased influence on leverage during the crisis.

The rest of the paper will consist of five parts. Firstly, we introduce the 2008 financial crisis as well as the theories of capital structure. Secondly, we describe the chosen determinants, relevant previous literature and our hypothesis. Thirdly, we describe our data and present summary statistics for the data sample, together with our empirical approach. After this we present and discuss our results as well as their robustness. Lastly, we summarise and conclude our findings, as well as suggest future potential research.

2. Sweden and the 2008 Financial Crisis

The 2008 Global Financial Crisis provides an opportunity to study how capital structure is affected by financial instability and to test the robustness of the static trade-off theory and the pecking order theory. The bursting of the U.S. housing bubble and the vast presence of subprime loans resulted in U.S. securities tied to real estate taking a big loss and creating an unease in the market. The impact of the broken housing bubble was further magnified by Credit Default Swaps (CDS), resulting in the Lehman Brother's filing for bankruptcy, this can be said to have pushed the financial unease into an acute financial crisis, leading to a global financial recession.

Sweden's economy being a small and open economy with extensive international trade, was substantially impacted by the financial and economic downturn. 48% of Sweden's GDP in 2007 came from exports (World Bank, 2016), which explains how the global economic downturn could have a considerable impact on Sweden. Sweden managed the crisis but still experienced a large downturn. The fall in Sweden's GDP during the crisis years of 2008 and 2009 was the greatest recorded since 1931 (Hassler, 2010). Sweden acted quickly to manage the crisis. The Riksbank supplied banks with loans of longer maturities worth 450 billion SEK, in both SEK and U.S. dollar (Öberg, 2009). It also set up a temporary credit facility, based on commercial paper, where companies could fund their operations by issuing commercial papers and selling them to banks (Öberg, 2009). During the Crisis, the National Debt Office met the surge in demand for treasury bills, resulting in the issue of more than 190 billion SEK over the planned loan programme (Öberg, 2009). The government issued an increased maximum sum in deposit

guarantee scheme, and expansionary fiscal policy among many other actions were taken to manage the crisis (Öberg, 2009). It is obvious that the 2008 Global Financial Crisis had a severe impact on Sweden, providing an interesting period to study determinants of capital structure during financial instability.

3. Capital Structure Theory

With the term "capital structure" we are referring to how a company is financed. A company can be financed through either debt, equity, or a mix of the two. In 1958, Modigliani and Miller introduced the irrelevancy proposition, claiming that capital structure was irrelevant to the value of a company in a perfect market, thus initiating the modern theory of capital structure. Their model was highly criticised for being purely theoretical and not applicable to reality due to its strict assumptions, which led them to modify their proposition in 1963. Modigliani and Miller (1963) applied corporate taxes to their theory, presenting debt to have a positive influence on the value of a firm. This relationship derives from the fact that interest costs from debt are tax deductible, creating an interest tax shield, which increases the value of the firm by decreasing the taxes paid. When a company's value is increased due to debt, it is referred to as being leveraged, because the debt leverages the value of the firm.

Since Modigliani and Miller's publications, vast research has been done on the subject of capital structure, and capital structure can today be viewed through many different theoretical lenses. This paper will mainly focus on the static trade-off theory (Kraus and Litzenberger, 1973) and the pecking order theory (Myers and Majluf, 1984), which will to some extent take into account agency costs and asymmetric information problems.

3.1 Static Trade-Off Theory

There are two types of trade-off theories regarding capital structure; dynamic and static. The static trade-off theory suggests that a company sets a target leverage, determined by the balancing of benefits versus costs associated with debt, and gradually moves towards its target (Myers, 1984). All firms have different target leverages as their individual characteristics may cause different benefits and costs.

We will apply the static trade-off theory in this paper, and from now on refer to it as trade-off theory. With Modigliani and Miller's recognition of corporate tax, it enabled a benefit for debt, since interest rates on debt are tax deductible, without there being an opposing cost to

debt (Modgliani and Miller, 1963). This resulted in 100% debt financing being theoretically optimum. Consequently, Kraus and Litzenberger (1973) introduced costs associated with debt, such as financial distress and risk of bankruptcy, counterweighing the benefits proposed by Modgliani and Miller (1963). Thereby implying that the optimum debt level is a trade-off between the benefit of interest tax shields and the increased costs that follow the increased debt (Kraus and Litzenberger, 1973). The trade-off theory has been further extended by Jensen and Meckling (1976) whom went on to include agency costs. The concept of agency costs relate to the principal-agent problem, where if both parties are value maximising it can be assumed that the agent will not always act in a value maximising way for the principal (Jensen and Meckling, 1976). In this case the agents would be the managers, and the principals would be the shareholders. The shareholders can decrease discrepancies in the agent-principal relationship through the use of incentives and applying monitoring costs (Jensen and Meckling, 1976). Debt can act as a monitoring cost as it decreases the amount of free cash flow that managers may use in non value maximising ways for the principals. This relationship between debt and agency costs plays an important role in finding the optimum leverage to maximise a company's value. In this paper we will also take into account non-debt tax shields as proposed by De Angelo and Masulis (1980). De Angelo and Masulis proposed the inclusion of non-debt tax shields, for example depreciation and investment tax credits, which act as substitutes to the interest tax shields (De Angelo and Masulis, 1980). The non-debt tax shields provide an alternative way to increase a company's value by decreasing tax payments.

3.2 Pecking Order Theory

The pecking order theory derives from Myers (1984), whom initially was influenced by Donaldson (1961). It does not propose an optimal leverage like the trade-off theory does, but instead proposes a ranking of financing options. The theory suggests that managers prefer to use retained earnings (internal funds) over debt (external funds), and debt before the issue of new equity. This ranking is supported by the adverse selection model brought forth by Myers and Majluf (1984). The underlying idea of the financing order; (1) retained earnings, (2) debt issuance, (3) equity issuance, derives from the fallacy of asymmetric information. Managers have more information about their company's prospects, risks and value compared to external parties, therefore external financing can be more expensive than internal. The increased costs are due to external parties not having all the information and requiring a discount for the risk associated with asymmetric information, which could result in current shareholders' value being diluted. The

dilution of current shareholders' value is an added cost and internal funds are therefore prioritized when financing projects.

3.3 Financial Crises and Capital Structure

Research regarding the impact financial instability has on capital structure is lacking. So is the research for leverage and general business cycles. The research that does exist can be perceived as fairly contradictory, leaving the relationship between leverage and macroeconomic downturns quite ambiguous. Hackbarth *et al* (2006) whom researched the value maximising leverage ratio during different stages of the business cycle find that the value maximising leverage is countercyclical, ergo it is higher during recessions. Bhamra *et al.* (2010) and Chen (2010) propose pro-cyclicality for leverage. These articles apply slightly different assumptions, reducing their comparability, but the overall understanding we gain is that leverage dynamics over business cycles are ambiguous as various studies conclude different results.

A financial crisis can be predicted to have a more drastic effect on non-public SMEs compared to larger public companies since they are restricted to fewer financing sources (Hall *et al.*, 2004). During a financial crisis the volatility in the markets increase drastically. This increased volatility results in an increased risk for creditors, which increases cost of debt for companies that borrow. Smaller companies may also be more averse to debt due to that the risk is shared between less investors in smaller companies (Proença *et al.*, 2014). This means that internal funds can be assumed to become further prioritized during the crisis.

When considering the trade-off theory during a financial crisis it is found that SMEs have a larger gap from their optimal capital structure compared to larger companies (López-Gracia and Sogorb-Mira, 2008). This can be understood by the fact that SMEs face larger bankruptcy costs and resource restrictions, and will thus have a lower leverage. This gap was significantly large during the 2008 Financial Crisis, leading researchers to believe the pecking order theory was more applicable to the analysis of companies' capital structure decisions (Mostarac and Petrovic, 2013). The increased applicability of the pecking order theory can be because the taxable income of companies decreased during the crisis, and SMEs may even be affected to the extent that they have no taxable income. This removes the possibility to deduct the interest tax shields, thereby removing the benefit of debt financing, which is a major factor in the trade-off theory (López-Gracia and Sogorb-Mira, 2008).

Overall we predict a decrease in long-term debt leverage during the crisis period for SMEs due to the increased costs of debt. Internal funds are predicted to be prioritised as they are

cheaper, and lower debt is obtained due to the costs increasing relatively to the benefits, as argued by the pecking order theory and the trade-off theory respectively. We therefore state the following hypothesis:

H.1: "*Long-term leverage should decrease during the crisis period*"

4. Measures of Capital Structure

In this study, book values are used for the measurements of capital structure. This is most common in empirical finance even though financial theories are primarily based on the usage of market values of debt and equity (Sweeney *et al.*, 1997). Book values of debt are used to proxy market values of debt due to the focus on non-public SME companies in Sweden, which implies that market values for these firms do not exist. The usage of book values instead of market values can be supported by Bowman (1980), whom stated that market values can be represented by book values. We will use both long-term debt ratio (LTDR) and short-term debt ratio (STDR) as measurements for capital structures. LTDR is defined as long-term debt over total assets and STDR is defined as short-term debt over total assets. This paper will focus on the relationship between the capital structure determinants and LTDR, since it is most commonly used in previous studies and is considered to best represent capital structure.

5. Determinants of Capital Structure

5.1 Firm Size (SIZE)

Large firms are usually more diversified in their business compared to smaller firms, implying a lower volatility in earnings (Titman and Wessels, 1988). More constant earnings decrease the risk of not meeting debt obligations and the risk of bankruptcy (Warner, 1977; Frank and Goyal, 2009). This implies lower costs associated with debt financing as the risk of financial distress decreases and lower interest rates are therefore likely (Frank and Goyal, 2009; Ozkan, 2001). As a consequence, higher levels of leverage are favourable for larger firms to fully utilize its benefit (Titman and Wessel, 1998; Frank and Goyal, 2009; Deesomsak *et al.*, 2004).

The agency theory further explains the relationship between size and leverage, since larger firms face more agency costs (Jensen and Meckling, 1976). With higher amounts of debt, external

stakeholders are monitoring managers more closely, decreasing agency costs. This suggests leverage to be positively correlated with size according to agency theory.

Pecking order theory also influences the correlation between leverage and size, through the information asymmetry perspective. Small firms are monitored less and do not publish as thorough financial reports as done by larger companies, and are therefore more exposed to information asymmetry problems (Hall *et al.*, 2004). This limits their possibility to raise long-term debt compared to larger firms (Hall *et al.*, 2004).

The positive correlation between long-term leverage and the company size is consistent with an extensive amount of previous studies (Titman and Wessel, 1988; Rajan and Zingales, 1995; Hall *et al.*, 2004; Frank and Goyal, 2009; Proença *et al.*, 2014). For STDR, previous studies have suggested the opposite relationship. Small firms might exploit the usage of short-term debt in the absence of raising long-term debt. Thereby a negative correlation between STDR and size is assumed (Hall *et al.*, 2004; Proença *et al.*, 2014). Following previous literature we use the natural logarithm of total assets as proxy for the size determinant (SIZE) (e.g. Rajan and Zingales, 1995; Deesomsak *et al.*, 2004; Frank and Goyal, 2009; Harrison and Widjaja, 2014; Proença *et al.*, 2014). We state the following hypotheses:

H2.a: "*Size should have a positive relation to long-term leverage"*
H2.b: "*Size should have a negative relation to short-term leverage"*

5.2 Tangibility of Assets (TANG)

The tangibility of a company's assets as a determinant of capital structure relates to its value as potential collateral and its impact on agency costs. Majority of capital structure theories suggest that a company's asset structure will impact the choice of capital structure. Myers and Majluf (1984) argue that this is due to increased costs of issuing debt brought on by asymmetric information in the principal-agent relationship. Managers of a company have more information than lenders regarding a project, and it is therefore hard for lenders to evaluate a project's value. This lack of security results in an increased risk for the lender, and as can be explained by the Capital Allocation Pricing Model, higher risk requires higher return from the lenders perspective (Galai and Masulis, 1976). A more tangible asset structure increases the collateral value, which is a known and secure value for lenders. As lenders collateralize their lending they reduce their risk and thereby reduce the required return, which reduce the financial distress cost for the company. Managers are also believed to have an incentive to shift risk from equity holders to debt holders, known as risk shifting (Myers, 1977). The use of collateral allows lenders to restrict a company's

use of borrowed funds to specific projects (Myers, 1977). If no collateral is available, lenders may demand more favourable terms, increasing the company's costs. The company may not be able to raise debt since the company is assumed to take on riskier projects, maximising their own return on the creditors expense (Jensen and Meckling, 1976). This predicts a positive relationship to be found.

On the contrary to what has been previously stated, Grossman and Hart (1982) argue that companies with less collateralized capital will raise higher levels of debt in order to monitor their managers, preventing the excess consumption of prerequisites and activities that may not maximise the stockholder's value. They argue that these types of agency costs are greater in less collateralized companies due to it being harder to monitor their capital outlay (Grossman and Hart, 1982). Therefore, debt is raised in order to increase the monitoring from external parties, as well as the increasing debt obligations will reduce managers' unnecessary spending.

The asset structure of a company relates to the trade-off theory as the reduced costs argued by Myers and Majluf (1984), Jensen and Meckling (1976) and Galai and Masulis (1976), allow further debt to be taken on in order to fully maximise its benefit, reaching an optimal balance between the benefits and costs. Grossman and Hart (1982) argue the opposite, that the issue of debt is a method to decrease agency costs, and not the result of decreased asymmetric information brought on from tangible assets acting as collateral. They propose that the increased cost of bankruptcy from the debt is overcome by the reduced agency cost from managers (Grossman and Hart, 1982). Therefore, Grossman and Hart (1982) believe companies with less collateral will take on more debt.

Previous empirical studies on capital structure determinants have dominantly found tangibility to have a positive effect on a company's LTDR (Rajan and Zingales, 1995; Hall *et al.*, 2004; Frank and Goyal, 2009; Harrison and Widjaja, 2014; Proença *et al.*, 2014; Zhang and Mirza, 2015). It has also been found that STDR has a negative relationship with tangibility (Hall *et al.*, 2004; Hwang *et al.*, 2013; Proença *et al.*, 2014; Zhang and Mirza, 2015). This can be explained by the theory that debt length is matched with the investment horizon (Myers, 1977). Fixed tangible assets are intended for longer time horizons, ergo relatively more long-term debt is issued in a company with a larger fraction of fixed tangible assets. We predict that firms with greater tangibility will take on more debt, thereby a positive correlation between tangibility and LTDR is expected, and a negative correlation between tangibility and STDR.

We will use the ratio between tangible fixed assets and total assets as a proxy for tangibility (TANG) (as done in Rajan and Zingales, 1995; Deesomsak *et al.*, 2004; Harrison and Widjaja, 2014; Hall *et al.*, 2004). We state the following hypotheses:

H3.a: "*Tangibility should have a positive relation to long-term leverage"*

H3.b: "*Tangibility should have a negative relation to short-term leverage"*

5.3 Profitability (PROF)

With regards to the trade-off theory, companies will prefer to use as much leverage as possible, up to the point where costs outweigh the benefits (Kraus and Litzenberger, 1973). Firms with higher profitability will face lower risk of financial distress and therefore also lower costs associated with debt financing. This implies that more profitable firms would be able to use higher amounts of debt before reaching the break-even point (Frank and Goyal, 2009. Furthermore, firms with higher profitability are assumed to face free cash flow problems, e.g. unnecessary spending on perquisites. They would thereby gain from the payment obligations and external monitoring that comes with debt financing (Jensen, 1986). Profitability is therefore predicted to be positively correlated with debt, from a trade-off theory perspective.

In contrast, most recent studies have focused on pecking order theory when studying the relationship between leverage and profitability. The core of the pecking order theory suggests that firms prefer to finance their business with internally generated funds over raising external capital (Myers and Majluf, 1984). Pecking order theory focusing on the costs associated with information asymmetry, suggests that more profitable firms will avoid expensive debt financing since they have access to more internal capital. The pecking order theory thereby suggests leverage to be negatively correlated to profitability. This inverse relationship between leverage and profitability have been shown in majority of previous empirical studies and give explanatory power to the pecking order theory (Titman and Wessels, 1988; Rajan and Zingales, 1995; Ozkan, 2001; Deesomsak *et al.*, 2004; Proença *et al.*, 2014). Following majority of these studies, we use earnings before interest, taxes and depreciation (EBITD) over total assets as the proxy for profitability (PROF). We predict a negative correlation to be found between leverage and profitability, as argued by the pecking order theory.

H4.a: "*Profitability should have a negative relation to long-term leverage"*

H4.b: "*Profitability should have a negative relation to short-term leverage"*

5.4 Liquidity (LIQ)

A firm's liquidity ratio measures the firm's capability to pay off its short-term liabilities, defined as the ratio of current assets to current liabilities. The trade-off theory and the pecking order theory provide different views on the relation between leverage and liquidity. Firms with sufficient liquidity can be assumed to have a lower risk of financial distress and bankruptcy, since they are able to cover their obligations easier. Therefore, they face less costs associated with debt financing (Frank and Goyal, 2009). Trade-off theory argues that this will increase a firm's usage of debt and suggests a positive relation between leverage and liquidity (Kraus and Litzenberger, 1973). However, firms with more liquid assets can use these for financing. Since the pecking order theory favours internal funding, it argues that firms with higher liquidity will use it for funding instead of raising debt (Harrison and Widjaja, 2014). This means that a negative relationship between leverage and liquidity would be expected when referring to the pecking order theory.

Previous empirical studies have shown that liquidity has a negative relation to all leverage measurements, supporting pecking order theory (Ozkan, 2001; Deesomsak *et al.*, 2004; Harrison and Widjaja, 2014). In contradiction to these studies, Proença *et al.* (2014) found that Portuguese SMEs' had a positive relation between liquidity and long-term debt, which can be explained by trade-off theory. The ratio of current assets to current liabilities is consistently used in previous literature as the proxy for liquidity (LIQ) and will be used in this study (Ozkan, 2001; Deesomsak *et al.*, 2004; Harrison and Widjaja, 2014; Proença *et al.*, 2014). The following hypotheses for liquidity are stated:

H5.a: "*Liquidity should have a negative relation to long-term leverage"*
H5.b: "*Liquidity should have a negative relation to short-term leverage"*

5.5 Non-Debt Tax Shields (NDTS)

De Angelo and Masulis (1980) continued Modgliani and Miller's research on tax shields, introducing posts that create beneficial tax affects, increasing a company's value through what they call non-debt tax shields (NDTS). With the term "NDTS" we are referring to expenses other than interest from debt that are tax deductible, such as depreciation and investment tax credits. By noting that companies have other alternatives than debt to decrease taxes, it is suggested that debt and NDTS are substitutes, resulting in NDTS being negatively related to debt because they would replace each other (De Angelo and Masulis, 1980). If the use of NDTS

reduces the potential benefit of interest tax shields, an inverse relationship between NDTS and leverage is assumed to be found. During the crisis period we expect an increased explanatory value for NDTS as the increased cost of borrowing and increased bankruptcy costs should lead to companies looking for alternative methods in order to minimise taxes (Deesomsak *et al.*, 2004).

Empirical studies have found varied results as to how NDTS impacts a company's capital structure. Bradley *et al.* (1984) whom were among the first to empirically test De Angelo and Masulis' suggestion, found a positive relationship between NDTS and leverage when defining NDTS as depreciation and investment tax credits over EBITD. This can be explained by the fact that depreciation may also act as a proxy for growth potential and asset structure (Barclay and Smith, 1995). The greater a company's depreciation ratio is, the more tangible fixed assets it will have and arguably more collateral and growth potential. Therefore, it can be suggested that a larger depreciation ratio will be positively related to leverage. Empirical studies have also resulted in a negative relationship being observed when defining NDTS as depreciation over total assets (Deesomsak *et al.*, 2004). Titman and Wessel (1988) note that the use of depreciation and investment tax credits over total assets neglects other tax beneficial expenses that aren't associated with capital equipment, such as research and development. Titman and Wessel (1988) find statistically significant results indicating a negative relationship between NDTS and leverage, which is consistent with De Angelo and Masulis' claim. However, they are sceptical to their findings, because they found that the coefficient's sign changes depending on how the variables used as indicators are scaled.

We follow previous studies in their use of depreciation over total assets as a proxy for NDTS, from which we expect a negative relation between NDTS and LTDR (Titman and Wessel, 1988; Deesomsak *et al.*, 2004; Proença *et al.*, 2014; Zhang and Mirza, 2015), and a positive relation between NDTS and STDR (Proença *et al.*, 2014; Zhang and Mirza, 2015).

H6.a: "*Non-debt tax shields should have a negative relation to long-term leverage"*
H6.b: "*Non-debt tax shields should have a positive relation to short-term leverage"*

5.6 Growth Potential (GROWTH)

Large growth opportunities can at first be believed to increase debt as it will exhaust internal funds and demand external financing to utilise the potential. Ross (1977) claims that the high growth will signal to lenders that the company will not default and will reduce their risk and the company's cost of debt. This allows further debt to be taken on according to the trade-off theory. However, Myers (1977) proposes that leverage is negatively related to the company's growth

opportunities due to the increased moral hazard. Companies in high growth industries are said to have higher agency costs because they have more opportunities to shift risk onto the creditors (Titman and Wessel, 1988; Booth *et al.*, 2001). It relates to the conflict stated by Jensen and Meckling (1976) where the creditors are not able to benefit from the entire gain but they do take on all of the cost, therefore they may require a higher premium on loans. Especially during high growth phases, smaller entrepreneurs will be willing to take higher risks and increase risk for lenders (Myers, 1977) The increased agency costs makes issuing debt expensive, and as suggested by the pecking order theory, companies may turn to internal funds for financing their growth.

The growth opportunities classify as capital assets, but these assets are intangible and cannot be used as collateral (Titman and Wessel, 1988). They will increase the value of the firm but if the company faces bankruptcy the value will rapidly decrease, suggesting more volatility (Williamson, 1988; Myers, 1984; Harris and Raviv, 1990). The increased volatility raises the costs of debt, which is predicted to decrease leverage according to the trade-off theory.

Majority of empirical studies use market value of assets over book value of assets as a proxy for growth potential (Barclay and Smith, 1995; and Rajan and Zingales, 1995; Ozkan, 2001; Deesomsak, 2004; Frank and Goyal, 2009). We do not have access to companies' market values because we focus on non-public firms. We will instead use the percentage change in sales compared to the previous period as our proxy for growth potential (GROWTH), which has been done in for example Proença *et al.* (2014).

Empirical studies have found both negative (Harrison and Widjaja 2014; Ozkan, 2001; Hall *et al.*, 2004; Zhang and Mirza, 2015) and positive (Proença *et al.*, 2014) correlations between growth potential and LTDR.

We predict a negative relationship between GROWTH and LTDR because of the costs discussed above. Especially because of our focus on SMEs, which is argued by Myers (1977) to bring on higher agency costs. A positive relationship is expected between growth and STDR because of the increased need for non-current assets when the firm is growing and becoming larger.

H7.a: "*Growth should have a negative relation to long-term leverage"*

H7.b: "*Growth should have a positive relation to short-term leverage"*

Table I: Predicted Relationships for Capital Structure Determinants

Hypothesis		Expected relation	Supporting theory
H1	Long-term leverage should decrease during the crisis period		
H2.a	Size should have a positive relation to long-term leverage	$\beta>0$	Trade-off
H2.b	Size should have a negative relation to short-term leverage	$\beta<0$	
H3.a	Tangibility should have a positive relation to long-term leverage	$\beta>0$	Trade-off
H3.b	Tangibility should have a negative relation to short-term leverage	$\beta<0$	
H4.a	Profitability should have a negative relation to long-term leverage	$\beta<0$	Pecking
H4.b	Profitability should have a negative relation to short-term leverage	$\beta<0$	order
H5.a	Liquidity should have a negative relation to long-term leverage	$\beta<0$	Pecking
H5.b	Liquidity should have a negative relation to short-term leverage	$\beta<0$	order
H6.a	Non-debt tax shields should have a negative relation to long-term leverage	$\beta<0$	Trade-off
H6.b	Non-debt tax shields should have a positive relation to short-term leverage	$\beta>0$	
H7.a	Growth will have a negative relation to long-term leverage	$\beta<0$	Pecking
H7.b	Growth will have a positive relation to short-term leverage	$\beta>0$	order

The table summaries the hypotheses constructed in the sections 3 and 5, which this study aims to test on Swedish SMEs. The table also includes the theory for which the predicted relationship is mainly based upon.

Table II: Variables and Proxies Used in the Study

Variables	Abbreviations	Proxies
Dependent Variables		
Short-Term Debt Ratio	STDR	Short-term Debt / Total Assets
Long-Term Debt Ratio	LTDR	Long-term Debt / Total Assets
Independent Variables		
Firm Size	SIZE	Ln (Sales)
Tangibility of Assets	TANG	Total Fixed Tangible Assets / Total Assets
Non-Debt Tax Shields	NDTS	Depreciation / Total Assets
Profitability	PROF	EBITD / Total Assets
Growth Potential	GROWTH	Percentage increase in Net Sales (for t and t-1)
Liquidity	LIQ	Total Current Assets / Total Current Liabilities
Explanatory Variables		
Pre-Crisis Dummy	PreD	1 for years 2005-2007, otherwise 0
Crisis Dummy	CrisD	1 for years 2008-2010, otherwise 0
Post-Crisis Dummy	PostD	1 for years 2011-2014, otherwise 0
Full Sample Dummy	FullD	1 for years 2005-2014, otherwise 0

Description of each variable that will be used in this study. The abbreviations will be used as variable names in regressions and other tables presented. The proxy column explains how leverage proxies, determinant proxies and time periods have been defined, referring to the decisions in sections 4, 5 and 6, respectively.

6. Data and Methodology

6.1 Data

All the data for this paper have been collected from the Serrano database, which provides information about Swedish companies gathered from the Swedish Companies Registration Office (Bolagsverket). The database contains annual financial data from the companies' balance sheets, income statements and other supplemental information about the companies.

The data extracted from Serrano contains information from over 500.000 firms for each year from 1998 to 2014. The extracted data was in the form of unbalanced panel data since e.g. companies have been registered or gone bankrupt during the sample period and have thereby not provided information for some of the years. The specific variables used from Serrano can be seen in Appendix A.

Our sample dataset will run between years 2005 and 2014. The following criteria have been used to create the sample dataset used for the regressions and analyses:

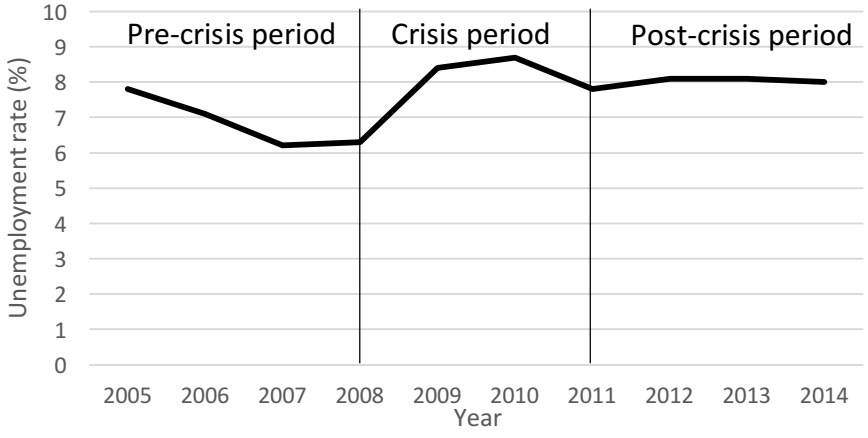
1. Since the study focuses on the capital structures for SMEs, standards from the European Commission (2015) have been used to distinguish those companies. These standards have been translated from EUR to SEK with the currency exchange rate of 9,2 SEK per EUR, which is the historical average[1] (European Central Bank, 2016). This implies that the companies in the study will have:
    a. More than 10 employees, but less than 250 employees.
    b. An annual turnover higher than 18 MSEK but less than 460 MSEK, and/or, a total value of the balance sheet larger than 18 MSEK, but less than 397 MSEK.
2. Financial companies (such as banks, private equity firms, insurance companies and leasing companies) and utility companies (such as electricity and gas companies) have been omitted. This is common when studying capital structures because these companies are regulated differently compared to non-financial companies and have different capital structure characteristics (Rajan and Zingales, 1995; Ozkan, 2001; Frank and Goyal, 2009).
3. Only non-public companies will be used, i.e. companies are not allowed to be listed on any stock exchange market. This has been decided because public companies have a greater access to capital, which askew the results. It is also a fact that 99.7% of companies in Sweden are non-public (Statistics Sweden, 2016) allowing us to focus on the majority. Furthermore, we only investigate independent companies and parent companies to avoid misrepresentative capital structures in subsidiaries. Subsidiaries might for example receive loans and group contributions from parent companies without regards to the company's determinants, which affects their capital structure.
4. All companies must have been active and have total assets higher than zero, during the whole sample period.
5. All variables used in the analyses must exist for every company in the dataset. Companies with missing values are only dropped for the years they miss values and kept the remaining years. This is due to that missing values are not expected to be randomly distributed and would therefore bias the sample if the dataset was converted into a balanced dataset.
6. We remove observations with negative values for long-term debt, short-term debt and sales, as well as observations where leverage ratios are higher than 1. As suggested by previous literature (e.g. Halling *et al.*, 2011).

[1] The historical average was measured with the longest data available from the European Central Bank (1999-2016)

6.2 Methodology

In the empirical analysis of this paper, we define two different dependent variables for leverage to run our regressions on separately. Firstly, LTDR is defined as long-term debt divided by total assets. Similarly, STDR is defined as short-term debt divided by total assets. Our independent variables are firm's size (SIZE) defined as the natural logarithm of sales; tangibility of assets (TANG) defined as total tangible fixed assets divided by total assets; profitability (PROF) defined as EBITD divided by total assets; liquidity (LIQ) defined as total current assets divided by total current liabilities; non-debt tax shields (NTDS) defined as depreciation divided by total assets and growth potential (GROWTH) defined as the percentage change in net sales between year t and t-1. A crisis period variable (CrisD) is defined to separate the years of the financial crisis period and takes the value 1 during the years 2008-2010 and 0 otherwise. We also generate period variables for the pre-crisis period (2005-2007) and post-crisis period (2011-2014) and for the full period (2005-2014). The crisis period is chosen based on previous studies analysing the influence of the 2008 Financial Crisis on capital structures from other countries (e.g. Zhang and Mirza, 2015; Harrison and Widjaja, 2014; Proença *et al.*, 2014). The year-by-year definition of the periods are further supported by Swedish unemployment statistics, used to indicate the crisis period (Graph I). The impact of the crisis is clearly evident at the start of 2008 as seen by the relatively large increase in unemployment from 6.3% in 2008 to 8.4% in 2009 (World Bank, 2016). During 2008-2010, Sweden faced a negative growth in GDP, which it hadn't experienced since the crisis in the beginning of the 90s (World Bank, 2016).

Graph I: The Swedish Unemployment Rate between 2005-2014.



Graph shows the unemployment rate in percentage for Sweden from 2005 to 2014. This data has been used as indicators of the 2008 financial crisis' start and end. Data retrieved from World Development Indicators Online database, provided by the World Bank.

Following previous literature (Frank and Goyal, 2009; Halling *et al.*, 2011), we control for outliers in the dataset by winsorizing all our variables at the 1% and 99% levels. This prevents extreme observations from influencing the regressions.

We use pairwise correlation matrices to test for autocorrelation in our dependent variables over time. The highest value of pairwise correlation that can be accepted is 0.8 (Akdal, 2010; Harrison and Widjaja, 2013). As seen in table III, no value is higher than 0.8, thereby no autocorrelation is detected. Autocorrelation was neither detected in the individual periods (Appendix B). A high value (-0.6271) was found between TANG and NDTS, but it is accepted as it is under the tolerated limit.

Table III: Pairwise Correlations of all Variables (Full period, 2005-2014)

	LTDR	STDR	SIZE	TANG	PROF	LIQ	NDTS	GROWTH
LTDR	1.0000							
STDR	-0.3322*	1.0000						
SIZE	0.1887*	-0.4201*	1.0000					
TANG	0.6034*	-0.3566*	0.1423*	1.0000				
PROF	-0.3388*	-0.0023	-0.1296*	-0.3470*	1.0000			
LIQ	-0.1724*	-0.5448*	0.2124*	-0.2782*	0.1722*	1.0000		
NDTS	-0.2737*	0.1230*	0.0600*	-0.6271*	0.4530*	0.2630*	1.0000	
GROWTH	-0.0029	0.1452*	-0.0250*	-0.0642*	0.1251*	-0.0768*	0.0606*	1.0000

Pairwise correlation matrix for the full time period, to check for autocorrelation between variables used in the study. The data sample has been winsorized at the 1% and 99% levels. The maximum correlation accepted between two variables is 0.8.

To decide which form of regressions we run, a Hausman Specification test is performed. The aim of the test is to identify if unobserved individual abilities should be addressed through random effects or fixed effects regressions (Harrison and Widjaja, 2013). Since Prob>chi2 is lower than 0.05 (Table IV), fixed effects should be used in the regressions. This is in accordance with previous literature as fixed effects are required in order to control for features of the firms that are time-invariant and unobservable (McKay and Phillips, 2005; Lemmon *et al.*, 2008)

Table IV: Hausman Test for Full Period (2005-2014)

Using STDR	
Chi2(6) =	1887,23
Prob>chi2 =	0,0000
Using LTDR	
Chi2(6) =	682,72
Prob>chi2 =	0,0000

Table shows the results from the Hausman Specification test, performed to address whether fixed effects or random effects should be used in the regressions. The data sample has been winsorized at the 1% and 99% levels. The Hausman-command in Stata has been used and it suggests to use fixed effects regressions if Prob>ch2 is below 0.05, i.e. statistically significant.

To test for the presence of multicollinearity among our independent variables we conduct a Variance Inflation Factor (VIF) test. Multicollinearity is the situation where two or more independent variables are linearly related. More severe degrees of this linearity are represented by a higher VIF (Alin, 2010). The highest VIF value tolerated in this test is 5, to avoid that the reliability of our regressions becoming weaker (Harrison and Widjaja, 2013; Kutner *et al.*, 2004). None of our variables show an indication of strong multicollinearity according to our set tolerance of 5 (see table V)

Table V: Variance Inflation Test, to test for Multicollinearity

	Variable	VIF	1/VIF
Pre-crisis period (2005-2007)	SIZE	1.17	0.856216
	TANG	1.83	0.547777
	PROF	1.33	0.751279
	LIQ	1.20	0.835692
	GROWTH	1.03	0.971572
	NDTS	1.95	0.513151
	Variable	**VIF**	**1/VIF**
Crisis period (2008-2010)	SIZE	1.16	0.860417
	TANG	1.83	0.546777
	PROF	1.32	0.760367
	LIQ	1.19	0.839024
	NDTS	1.94	0.514864
	GROWTH	1.03	0.973472
	Variable	**VIF**	**1/VIF**
Post-crisis period (2011-2014)	SIZE	1.17	0.854138
	TANG	1.89	0.530352
	PROF	1.37	0.730469
	LIQ	1.19	0.840472
	NDTS	2.02	0.494789
	GROWTH	1.03	0.968095

The table shows the Variance Inflation Factor test for all periods. This is done to test for multicollinearity between the independent variables. The data sample has been winsorized at the 1% and 99% levels. A higher value represents more severe multicollinearity and the highest VIF value tolerated is 5. Second column specifies 1/VIF and is shown for comparability between other studies.

Previous studies on capital structure determinants have lagged their independent variables one year in order to address the possible problem of endogeneity in the regressions (Frank and Goyal, 2009; Fosberg, 2012; Halling *et al.*, 2011). However, when lagging variables in combination with fixed effects on the short panel data that we have, significant biases might appear in the results (Flannery and Hankins, 2013). Majority of previous studies performing similar regressions as us, on shorter periods around the crisis, have not lagged their variables (e.g. Hall et al., 2004; Proença *et al.*, 2014; Harrison and Widjaja, 2013). Due to the substantial bias that can occur when

combining lagged variables with fixed effects on short panel data, we have chosen not to lag our variables.

The requirements described above have limited our dataset to contain a minimum of 9,476 firms for each period.

Using our variables, the following model can be specified for the empirical analysis, where LEV is either STDR or LTDR:

$$LEV_{it} = \beta_0 + \beta_1 SIZE_{it} + \beta_2 TANG_{it} + \beta_3 PROF_{it} + \beta_4 LIQ_{it} + \beta_5 NDTS_{it} + \beta_6 GROWTH_{it} + \eta_i + \varepsilon_{it} \quad (1)$$

This model (1) is used to test our hypotheses by running OLS regressions on the separate period data samples. The subscripts in the model (1) represent the combination of cross-sectional data and time series data. Whereas *i* accounts for the number of firms (i.e. 1 to 10,713) and *t* represents the time aspect in the analysis (i.e. 2005 to 2014). The betas (β) represent the coefficients of the determinants, η represents firm fixed effects and ε is the error term in our regressions. We run regressions to identify the impact the independent variables have on the dependent variable, which in this study is the leverage ratio. Since our dataset is in the form of unbalanced panel data, we are able to use panel data models for these regressions. Panel data can be seen as having two dimensions of observations, first the cross-sectional dimension represented by the firms and then also the time series dimension with multiple years. As stated in Antonious *et al.* (2008), panel data increases the degrees of freedom concurrent with reducing the risk of collinearity among the explanatory variables, which implies better econometric estimates.

6.3 Descriptive Statistics

The descriptive statistics (table VI) provide evidence of the influence that the 2008 Financial Crisis had on Swedish SMEs capital structures. A decrease in the mean value for both LTDR and STDR can be observed during the crisis period and shows the effects of a decreasing supply of debt during the 2008 Financial Crisis. This confirms our hypothesis H1 as LTDR decreased during the 2008 Financial Crisis. The mean value of LTDR and STDR continues to decrease in the post-crisis period, which can be explained by a continual lack of debt supply together with a precaution towards leverage in the after-crisis period. The profitability determinant decreases during the crisis period and increases in the post-crisis period and thereby shows the impact of the 2008 Financial Crisis on firms' profitability. It also supports our argument as to why pecking order theory may be more applicable compared to trade-off theory, during the crisis.

Furthermore, a decrease in the growth determinant is found and shows that firms experienced less growth in total assets after the crisis-period began, which can be expected.

Table VI: Descriptive Statistics for the Data Sample

		Pre-Crisis Period 2005-2007	Crisis Period 2008-2010	Post-Crisis Period 2011-2014
LTDR	N	21176	22435	30446
	mean	0.1455	0.1438	0.1332
	min	0	0	0
	max	0.6985	0.6985	0.6985
	sd	0.1733	0.1765	0.1716
STDR	N	21176	22435	30446
	mean	0.463857	0.4466809	0.4392891
	min	0.0572951	0.0572951	0.0572951
	max	0.9340153	0.9340153	0.9340153
	sd	0.2055485	0.2068071	0.2085141
SIZE	N	21176	22435	30446
	mean	9.842267	9.881351	9.897404
	min	8.135054	8.135054	8.135054
	max	13.26181	13.26181	13.26181
	sd	0.9213789	0.956285	0.9668628
TANG	N	21176	22435	30446
	mean	0.2477762	0.2477104	0.2356549
	min	0	0	0
	max	0.8801362	0.8801362	0.8801362
	sd	0.2367245	0.2472339	0.2479213
PROF	N	21176	22435	30446
	mean	0.0564324	0.0497701	0.0559037
	min	-0.3869222	-0.3869222	-0.3869222
	max	0.4746124	0.4746124	0.4746124
	sd	0.1263777	0.1412449	0.1462615
LIQ	N	21176	22435	30446
	mean	1.739669	1.805666	1.881921
	min	0.3136748	0.3136748	0.3136748
	max	8.574725	8.574725	8.574725
	sd	1.189379	1.269406	1.361958
NDTS	N	21176	22435	30446
	mean	-0.046349	-0.0470674	-0.0457603
	min	-0.209328	-0.209328	-0.209328
	max	0	0	0
	sd	0.0435703	0.0460647	0.047999
GROWTH	N	21176	22435	30446
	mean	0.2103634	0.1355422	0.1344608
	min	-0.4222019	-0.4222019	-0.4222019
	max	3.00022	3.00022	3.00022
	sd	0.4548951	0.4261409	0.3993777

Descriptive statistics for each variable used in the study over the three periods. The table shows number of observations (N), mean value (mean), minimum value (min), maximum value (max) and standard deviation (sd) for both leverage measurements and all determinants. The data sample has been winsorized at the 1% and 99% levels.

7. Results and Discussions

7.1 General Results

In our results a large coefficient indicates a strong influence on firms' capital structure. If a determinant has a negative coefficient it predicts the determinant to decrease the firms' leverage, and vice versa for a positive coefficient. Table VII shows the regression results for the changes in capital structure determinants on LTDR during our three time periods. Table VIII shows the equivalent regression results for the determinants influence on STDR. For both regressions we observe satisfying R^2-values as they are greater than majority of previous studies that use similar time periods and leverage measurements (Harrison and Widjaja, 2014; Zhang and Mirza, 2015; Trinh and Phuong, 2016). However the R^2-values are low implying that there are other factors not included in the regressions, which influences firms' capital structures. Our stated hypotheses are relatively in line with the results obtained from the regressions and most determinants show the expected sign for the influence on leverage. SIZE, TANG, LIQ, NDTS and GROWTH have positive coefficients, while PROF has a negative coefficient for LTDR. All determinants are significant on a 1% level for LTDR during all periods. For STDR, the variables SIZE and NDTS are insignificant during two of the three periods and the rest of the determinants are significant for all periods.

Table VII: Results from LTDR regression model

VARIABLES	LTDR 2005-2007	LTDR 2008-2010	LTDR 2011-2014
SIZE	0.0304***	0.0304***	0.0360***
	(0.00459)	(0.00458)	(0.00409)
TANG	0.465***	0.428***	0.382***
	(0.0210)	(0.0172)	(0.0153)
PROF	-0.152***	-0.116***	-0.128***
	(0.0103)	(0.00850)	(0.00798)
LIQ	0.0187***	0.0190***	0.0166***
	(0.00212)	(0.00197)	(0.00161)
NDTS	0.530***	0.497***	0.498***
	(0.0558)	(0.0533)	(0.0547)
GROWTH	0.0116***	0.00685***	0.0122***
	(0.00208)	(0.00235)	(0.00169)
Constant	-0.271***	-0.269***	-0.316***
	(0.0451)	(0.0470)	(0.0415)
Observations	21,176	22,435	30,446
R-squared	0.231	0.206	0.178
Number of Firms	9,476	9,798	10,713

$$LTDR_{it} = a_0 + \beta_1 SIZE_{it} + \beta_2 TANG_{it} + \beta_3 PROF_{it} + \beta_4 LIQ_{it} + \beta_5 NDTS_{it} + \beta_6 GROWTH_{it} + \eta_i + \varepsilon_{it}$$

LTDR is defined as long-term debt over total assets; SIZE is defined as the natural logarithm of assets; TANG is defined as total fixed tangible assets over total assets; PROF is defined as EBITD over total assets; LIQ is defined as total current assets over total current liabilities; NDTS is defined as depreciation over total assets and GROWTH is defined as the percentage change in net sales between year t and t-1. In the regression model i accounts for the number of companies, t represents the time period, η represents firm fixed effects and ε is the error term in the regression. The data sample has been winsorized at the 1% and 99% levels. Robust standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1.

Table VIII: Results from STDR regression model

VARIABLES	STDR 2005-2007	STDR 2008-2010	STDR 2011-2014
SIZE	-0.00720	-0.00180	-0.0141***
	(0.00445)	(0.00515)	(0.00441)
TANG	-0.391***	-0.382***	-0.322***
	(0.0163)	(0.0163)	(0.0144)
PROF	-0.199***	-0.160***	-0.177***
	(0.0113)	(0.00947)	(0.00830)
LIQ	-0.0778***	-0.0776***	-0.0678***
	(0.00352)	(0.00301)	(0.00216)
NDTS	0.167***	-0.0375	-0.0168
	(0.0528)	(0.0570)	(0.0501)
GROWTH	0.0160***	0.0222***	0.0179***
	(0.00225)	(0.00243)	(0.00187)
Constant	0.783***	0.702***	0.789***
	(0.0442)	(0.0516)	(0.0443)
Observations	21,176	22,435	30,446
R-squared	0.395	0.389	0.364
Number of Firms	9,476	9,798	10,713

$$STDR_{it} = a_0 + \beta_1 SIZE_{it} + \beta_2 TANG_{it} + \beta_3 PROF_{it} + \beta_4 LIQ_{it} + \beta_5 NDTS_{it} + \beta_6 GROWTH_{it} + \eta_i + \varepsilon_{it}$$

STDR is defined as short-term debt over total assets; SIZE is defined as the natural logarithm of assets; TANG is defined as total fixed tangible assets over total assets; PROF is defined as EBITD over total assets; LIQ is defined as total current assets over total current liabilities; NDTS is defined as depreciation over total assets and GROWTH is defined as the percentage change in net sales between year t and t-1. In the regression model i accounts for the number of companies, t represents the time period, η represents firm fixed effects and ε is the error term in the regression. The data sample has been winsorized at the 1% and 99% levels. Robust standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1.

7.2 SIZE

The size determinant is found to have a positive and significant impact on LTDR, during all periods. The opposite relationship is found for STDR, where size is negatively correlated to STDR, this is however not significant before or during the crisis period. Hypothesis H2.a can therefore be confirmed and is consistent with previous findings (Hall *et al.*, 2004; Proença *et al.*, 2014; Zhang and Mirza, 2015). The results support hypothesis H2.b, but are only significant for the post-crisis period. Trade-off theory provides an explanation for a positive relationship between SIZE and LTDR. Larger firms face lower costs related to debt financing and therefore should use more debt in their capital structures. In contrast, firm size can be explained to have a negative relationship to STDR due to that long-term debt is more costly for smaller firms and they therefore use relatively more short-term debt (Hall *et al.*, 2004; Proença *et al.*, 2014). The coefficient for SIZE in relation to LTDR remains the same for the pre-crisis and crisis periods.

The explanatory value could be expected to increase during the crisis period since creditors will be more conservative and primarily provide credit to larger firms with less risk of bankruptcy (Deesomsak *et al.*, 2004; Trinh and Phuong, 2016).

7.3 TANG

As predicted, the tangibility determinant has a positive relationship with LTDR and a negative relationship with STDR allowing us to accept hypothesis H3.a and H3.b. This indicates that companies with more tangible asset structures will take on more leverage and are in less need for short-term debt. All coefficients have a strong statistic significance as is indicated by their confidence level of 99 percent. The findings are consistent with previous empirical studies (Deesomsak *et al.*, 2004; Hall *et al.*, 2004; Proença *et al.*, 2014; Zhang and Mirza, 2015) and can be explained by the trade-off theory. Tangible fixed assets serve as collateral and ease the risk that occurs between shareholders, thus reduces the agency costs (Jensen and Meckling, 1976). This allows firms with more tangible asset structures to issue more long-term debt, without the costs outweighing the benefits. The results suggest that tangibility has a relatively strong influence on leverage when compared to other determinants as seen by the magnitude of the coefficients, indicating that the tangible assets serving as collateral is an important factor for companies to be able to take on debt. The negative relationship between TANG and STDR can be explained by the idea of matching assets life length with the length of the loan, thus a company that has more tangible fixed assets, which are assumed to have longer life lengths, will require relatively less short term debt (Myers, 1977).

Surprisingly we find that tangibility has less of an influence on companies' leverage during the crisis period. The magnitude of the coefficient decreases by 8% during the crisis period, however it should be noted that tangibility is still very large compared to the other determinants. It was expected that the tangibility coefficient would increase during the crisis period as debt becomes more expensive due to creditors requiring compensation for their increased risk and may demand more collateral (Halling *et al.*, 2011). This has been found to be true in other studies such as Harrison and Widjaja (2014). The decrease is continued into the past crisis period. The 2008 Financial Crisis was a very unique crisis and has resulted in many unexpected scenarios. It can be believed that this decrease in explanatory value for TANG may be due to the trade-off theory loosing explanatory power due to companies having negative taxable income and depleting the benefit of interest tax shields for those periods (López-Gracia and Sogorb-Mira, 2008; Mostarac and Petrovic, 2013)

7.4 PROF

The coefficient of profitability is negative and significant for all periods. These results verify the relationship we expected profitability to have on capital structures, and hypotheses H4.a and H4.b are confirmed. The negative relationship indicates that more profitable firms will have relatively less debt in their capital structures. This confirms the hierarchical choice of financing that Myers (1984) proposed as the pecking order theory, where firms prefer to finance their operations with internal funds. Firms with higher profitability can avoid external financing by instead using their earnings to finance investments. The negative relationship between profitability and leverage is supported by a majority of recent studies (Ozkan, 2001; Deesomsak *et al.*, 2004; Hall *et al.*, 2004; Harrison and Widjaja, 2014; Proença *et al.*, 2014). The explanatory value of profitability weakens during the crisis period as it becomes more positive, approaching zero. A possible explanation is the fact that most firms had lower profitability during the crisis and it was very volatile (Harrison and Widjaja, 2014). Firms were less willing to use internal funds because they had higher transaction costs as a result of the increased risk that firms may become illiquid since profits were fluctuating more. Thereby reducing its negative impact on leverage, which is in accordance with pecking order theory (Harrison and Widjaja, 2014). In the post-crisis period the profitability coefficients for both STDR and LTDR become more negative, closer to its initial value in the pre-crisis period.

7.5 LIQ

Liquidity is found to have a significant and positive relationship to LTDR before the crisis and remains positive during the crisis period as well. For STDR the relationship is the opposite, liquidity has a significant negative correlation to STDR during all periods. These results confirm hypothesis H5.b, which suggests a negative relationship between liquidity and STDR as was seen in previous studies that have used STDR (Proença *et al.*, 2014; Zhang and Mirza, 2015). Hypothesis H5.a regarding liquidity and LTDR cannot be confirmed since the results show a positive correlation. Although we didn't expect a positive relationship between liquidity and LTDR, previous studies have received the same relationship (Proença *et al.*, 2014; Zhang and Mirza, 2015). Proença *et al.* (2014) argues that firms with higher liquidity have a better ability to pay back their debt and therefore, from the trade-off theory perspective, can gain more from higher levels of debt. For both LTDR and STDR the coefficients are almost the same prior to and during the crisis period. Larger negative changes in the liquidity coefficient are observed

during the post-crisis period. The decrease in its relationship to LTDR may be due to companies being more careful taking on loans.

7.6 NDTS

Non-debt tax shields are found to have a statistically significant positive relationship to LTDR, which results in us rejecting hypothesis H6.a. Since the determinant shows a positive relationship to STDR, we find support for hypothesis H6.b. However, this is only for the pre-crisis period, since the crisis and post-crisis periods both have negative but insignificant relationships to STDR. The NDTS has the largest influence on LTDR compared to all determinants we analyse, but this positive relationship contradicts De Angelo and Masulis' proposition (1980). Companies with non-debt tax shields are predicted to have less leverage since there are less benefits to be achieved from the interest tax shield when other tax shields are used to deduct the taxable income (De Angelo and Masulis, 1980). Both positive (Bradley *et al.,* 1984) and negative (Titman and Wessels, 1988; Deesomsak *et al.*, 2004; Proença *et al.*, 2014; Zhang and Mirza, 2015) relationships have been found between NDTS and LTDR. Majority of findings appear to indicate a negative relationship, supporting De Angelo and Masulis' (1980) claim. However, the findings for NDTS should be interpreted cautiously as Titman and Wessels (1988) pointed out that the coefficient sign could change depending on how the variables used as indicators are scaled. Barclay and Smith (1995) also suggest that the NDTS proxy, depreciation over total assets, could be a proxy for tangibility as companies with greater depreciation can be assumed to have more tangible fixed assets, thus creating a mechanical positive relationship. This is further supported when looking at the strong correlation between NDTS and TANG (Table III) The NDTS decreases during the crisis period with 6%, which is similar to tangibility, enforcing the suggestion that the proxy used may be measuring tangibility.

7.7 GROWTH

The growth potential determinant has a positive correlation to both LTDR and STDR, contradicting our theoretical hypothesis for LTDR and several previous studies (Ozkan, 2001; Deesomsak *et al.*, 2004; Harrison and Widjaja, 2014; Zhang and Mirza, 2015). Proença *et al.* (2014) and Hall *et al.* (2004) find the same positive relationship for both STDR and LTDR, but Hall *et al.* (2004) lacks statistical significance for LTDR. We reject hypothesis H7.a and accept H7.b. The results are significant but they are of a small magnitude, which means they have a small impact on a firm's capital structure compared to other determinants, causing us to question

their importance in capital structure decisions. It was expected that growth potential would have a negative impact on capital structure due to the increased agency costs associated with growth (Jensen and Meckling, 1976; Myers, 1977). The positive relationship found could be explained by the fact that increased growth potential signals to creditors that the company has a smaller risk to default, thereby lowering the costs (Ross, 1977). This would give a company more incentives to take on more debt, according to the trade-off theory.

The growth potential determinant's influence on capital structure decreases during the crisis period, which can be expected as the volatility and unpredictability brought on by the crisis removes any reliance on growth predictions. What was once believed to be too big to fail, has now failed, which can put creditors in a scenario where no insecure predictions are made. Therefore, the growth potential has less influence on capital structure decisions during the crisis. In the post-crisis period we see that the magnitude of the GROWTH coefficient increases, clearly marking that the decrease was associated with the crisis.

7.8 Robustness Tests

Table IX: Capital Structure Determinant Proxies used for Robustness Tests

Determinants	Abbreviations	Proxies
Size	R_SIZE	Ln (Sales)
Tangibility	R_TANG	Property, Plants & Equipment / Total assets
Profitability	R_PROF_EBIT	EBITD / Sales
	R_PROF_NI	EBIT/Total assets
Growth	R_GROWTH	Percentage increase in total assets

Description of each robustness proxy that will be used to test the robustness of our results. The abbreviations will be used as variable names in regressions and other tables presented.

As argued in most of the previous studies on capital structure, the choice of determinants and their proxies are very important since different measures might result in different outcomes (Deesomsak *et al.*, 2004). This applies for both the dependent and independent variables. To further assess the robustness of our results we have altered several of our independent variables' proxies to check the implications it might have on our regressions.

We start by replacing the SIZE proxy with the log of total sales (initial proxy was log of total assets), which has been used less frequently in previous studies of capital structure (e.g. Titman and Wessel, 1988; Ozkan, 2001). The result is that the statistical significance of the SIZE determinant decreases, it has less explanatory value to leverage and the determinant's coefficient sign changes to negative (Appendix C). This is also seen in Ozkan (2001), whom argues the inverse relationship it is due to larger companies having lower degrees of asymmetric

information, thereby decreasing the transaction costs of issuing equity compared to debt. This results in equity being preferred over debt, which leads to a lowered leverage. The difference between the two proxies could be due to the proxy of ln(total assets) also being a proxy for the potential to use collateral, which lowers the cost of debt compared to equity, supported by both the trade-off theory and the pecking order theory. While ln(sales) measures size regardless of the potential to use collateral, resulting in the negative relationship predicted by the pecking order theory. While both proxies are statistically significant we will use the natural logarithm of total assets because of its large presence in literature.

For tangibility we implement a proxy used by Titman and Wessel (1988), property, plant and equipment over total assets, instead of total tangible fixed assets over total assets. By doing this we gain the same positive correlation with a relatively high explanatory value (Appendix D). It also decreases during the crisis period and continues to decrease in the post-crisis period (Appendix D), similar to our initial proxy. This leads us to believe our results are robust and the decreased explanatory value for tangibility of assets during the crisis may be due to drastic shortages in lending during the 2008 Financial Crisis.

We try two different proxies for profitability beside our initial profitability proxy PROF, which initially was EBITD over total assets. First we test EBIT over sales turnover, as done in Hall *et al.* (2004), which causes the profitability determinant to loose its significance (Appendix E). Secondly we use net income divided by total assets, following Trinh and Phuong (2016). This gives similar results to our initial proxy, which concludes a robust estimation of profitability in relation to leverage (Appendix E).

When testing the robustness of our results for GROWTH we use the proxy of change in total assets, which results in loss of significance and extremely small magnitudes (Appendix F). Therefore, we rely on our initial proxy (percentage change in net sales between t and t-1). As stated earlier, majority of studies use market value over book value as a proxy for growth potential, but since we are not able to use market value when we only have non-listed companies, we have used the best proxy available to our data (change in sales) and it has significant results.

To investigate the impact of subsidiaries and group relations on the results we check the robustness by running regressions once on only independent companies and once on all companies, i.e. including subsidiaries. These robustness tests provide similar results as our main regressions and the determinants show the similar movements in the periods (Appendix G). An interesting, yet expected, outcome is a higher R^2 for the regressions on only independent companies. This might be explained by less disturbances from e.g. group contributions on the companies' capital structures, which implies that our determinants can explain the leverage levels

more accurately than in our main regressions. To test for differences between using balanced or unbalanced data we run regressions on only companies with data for eleven consecutive years, which results in 1,951 companies in the regressions. The results from this did not differ significantly from our main regressions except for a slightly higher R^2 (Appendix H). This might occur due to that these regressions do not contain companies that have gone bankrupt during the examined period, which might have created disturbance in the main regressions. The unbalanced panel data is used to avoid any survival bias.

When regressing the determinants with all the robustness proxies for our determinants, the results show decreasing R^2 values compared to our original proxies (Appendix I). All, except for the robustness proxy for SIZE, indicate similar relationships, emphasizing the robustness of our results. The SIZE robustness proxy can be interpreted to proxy slightly different features, therefore resulting in different results.

As discussed in the results for NDTS, it has a surprising positive result, which contradicts theory and majority of previous studies. We suggested that this may be due to the proxy, depreciation over total assets, acting as a proxy for tangibility, thereby explaining the positive relationship. In order to further analyse the NDTS proxy, we performed a regression between companies' effective tax rate and NDTS in order to see if it had a correlation with taxes, which is suggested by De Angelo and Masulis (1980). We find a very low correlation between NDTS and the company's effective tax, and a non-existing R^2-value (Appendix J). This verifies that the proxy used for NDTS is not appropriate and explains our unexpected results.

8. Conclusion

This paper analyses Swedish SMEs' determinants of capital structure before, during and after the 2008 Financial Crisis, investigating the determinants' relationship to capital structure during periods of financial instability. We analyse capital structure with reference to the trade-off theory and the pecking order theory. Six determinants were applied in the analysis: Size, Profitability, Liquidity, Tangibility of Assets, Non-Debt Tax Shields and Growth Potential, which were chosen due to their dominance in previous literature (e.g. Rajan and Zingales, 1995; Ozkan, 2001; Harrison and Widjaja, 2014; Proença *et al.,* 2014) allowing for comparability.

Our results are similar to previous studies (e.g. Hall *et al.*, 2004; Harrison and Widjaja, 2014; Proença *et al.*, 2014). Overall we observe a downward trend in leverage during the crisis period, as expected. We identify a positive significant relationship for Size, Tangibility of Assets, Liquidity, Growth Potential. A significant negative relationship is found for Profitability. NDTS

indicates a strong positive relationship, which is believed to be because of the proxy failing to represent NDTS, instead representing tangibility, therefore its results are not acknowledged. Liquidity and growth potential both contradict majority of previous studies (e.g. Ozkan, 2001; Deesomsak *et al.*, 2004; Harrison and Widjaja, 2014), but their relationship can be explained using trade-off theory and are in accordance with Proença *et al.* (2014), which has focused on SMEs. This suggests that SMEs have different relationships for liquidity and growth potential compared to larger companies. The other determinants are found to follow the trade-off and pecking order theory and agrees with majority of past literature. The determinants with the highest explanatory values for companies' capital structure are Tangibility of Assets and Profitability, indicating that they are of the highest importance in capital structure decisions for Swedish SMEs.

All determinants have similar relationships to leverage in all periods, but we observe significant changes in the magnitude of their coefficients. Size remains constant over the crisis period but increases in the post-crisis period. Tangibility has an unpredicted decreased coefficient during the crisis, which drops further during the post-crisis period. Profitability increases, this means it has less of a negative impact on companies' capital structure. It can be assumed that companies save more of their profits during volatile periods due to the increased risk of being illiquid and decreased future profit, causing them to use external instead of internal funds in order to ensure they have a buffer. Liquidity has a minor increase during the crisis period and then decreases during the post-crisis period. This decrease may be due companies more aware of costs of debt resulting in increased caution when taking on loans due to the potential consequences. Growth decreases for only the crisis-period, leading to growth potential loosing importance in capital structure decisions as they may be unreliable in volatile periods.

This paper adds significant results to past literature as it contributes valuable country specific data, as well as empirical results for SMEs, enforcing the trade-off theory and pecking order theory's applicability on Swedish SMEs when predicting firms' capital structure in periods of instability. However, a limitation that should be recognised in our study is the length of the crisis and our data set. Due to this, the crisis may not have been as evident as could be predicted. Further research with longer data sets and additional crisis periods would be suggested to make the results more robust. We also recommend further research into NDTS and its relationship to capital structure with more thorough proxies for the Swedish markets. This is in order to take into account other non-debt tax shields and remove the mechanical positive relationship from the proxy's close relationship with tangibility. It is also recommended to include a variable taking into account firm industry, since industries may experience different forces regarding their capital structure.

References

Akdal, S. (2010), "How do firm characteristics affect capital structure? Some UK evidence", MPRA, Working Paper no. 29657, Kingston University.

Alin, A. (2010), "Multicollinearity", Wiley Interdisciplinary Reviews: Computational Statistics, vol. 2, pp. 370–374.

Antonious, A., Guney, Y. and Paudyal, K. (2008), "The Determinants of Capital Structure: Capital Market-Oriented versus Bank-Oriented Institutions", *Journal of Financial and Quantitative Analysis*, vol. 43, no. 01, pp. 59-92.

Barclay, M. J., and Smith, C. W. (1995), "The Maturity Structure of Corporate Debt", *Journal of Finance*, vol. 50, no. 2, pp. 609–631.

Bhamra, H. S., Kuehn, L. A. and Strebulaev, I. A. (2010), "The aggregate dynamics of capital structure and macroeconomic risk", *Review of Financial Studies,* vol. 23, pp. 4187-4241.

Booth, L., Aivazian, V., Demirguc-Kunt, A. and Maksimovic, V. (2001), "Capital structures in developing countries", *Journal of Finance*, vol. 56, pp. 87-130.

Bowman, R. G. (1980), "The Importance of a Market-Value Measurement of Debt in Assessing Leverage", *Journal of Accounting Research*, vol. 18, no. 1, pp. 242-254.

Bradley, M., Jarrell, G. and Kim, E. (1984), "On the Existence of an Optimal Capital Structure: Theory and Evidence", *Journal of Finance*, vol. 39, no. 3, pp. 857-878.

Chen, H. (2010), "Macroeconomic conditions and the puzzles of credit spreads and capital structure", *Journal of Finance,* vol. 65, pp. 2171–2212.

De Angelo, H. and Masulis, R. (1980), "Optimal Capital Structure under Corporate and Personal Taxation", J*ournal of Financial Economics*, vol. 8, no. 1, pp. 3-29.

Deesomsak, R., Paudyal, K. and Pescetto, G. (2004), "The determinants of capital structure: Evidence from the Asia Pacific region", *Journal of Multinational Financial Management,* vol. 14, pp. 387-405.

Donaldson, G. (1961), "Corporate debt capacity: A study of corporate debt policy and the determination of corporate debt capacity", (Division of Research, Harvard School of Business Administration).

European Central Bank (2016), Data retrieved March 8, 2016.

European Commission (2015), "User Guide to the SME Definiton", (The European Commission).

Flannery, M. J., Hankins, K. W. (2013), "Estimating dynamic panel models in corporate finance", *Journal of Corporate Finance,* vol. 19, no. 1, pp. 1-19.

Frank, M. Z. and Goyal, V. K. (2003), "Testing the Pecking Order Theory of Capital Structure", *Journal of Financial Economics*, vol. 67, no. 2, pp. 217-248.

Frank, M. Z. and Goyal V. (2009), "Capital structure decisions: which factors are reliably important?" *Financial Management,* vol. 38, no. 1, pp. 1-37.

Galai, D. and Masulis, R. (1976), "The Option Pricing Model and the Risk Factor of Stock" *Journal of Financial Economics*, vol. 13, pp. 115-35.

Grossman, S. and Hart, O. (1982), "Corporate Financial Structure and Managerial Incentives", *The Economics of Information and Uncertainty,* pp. 107-140, (National Bureau of Economic Research, Inc.).

Hackbarth, D., Miao, J. and Morellec, E. (2006), "Capital structure, credit risk, and macroeconomic conditions", *Journal of Financial Economics*, vol. 82, pp. 519–550.

Hall, G. C., Hutchinson, P. J. and Michaelas, N. (2004), "Determinants of the Capital Structure of European SMEs, *Journal of Business Finance & Accounting*, vol. 31, no. 5/6, pp. 711-728.

Halling, M., Yu, J, and Zechner, J. (2012), "Leverage Dynamics over the Business Cycle", (AFA Chicago Meetings Paper).

Harris, M. and Raviv, A. (1991), "The Theory of Capital Structure", *Journal of Finance,* vol. 46, no. 1, pp. 297-355.

Harrison, B. and Wisnu Widjaja, T. (2014), "The Determinants of Capital Structure: Comparison between Before and After Financial Crisis", *Economic Issues Journal Articles*, vol. 19, pp. 55-83.

Hwang, D., Robson, G., Wang, T., Lan, Y. (2013), "An Empirical Study on the SME's Capital Structure in Taiwan: the Effect of the Global Financial Crisis of 2007", *Global Awareness Society International 22nd Annual Conference*, Rome.

Jensen, M.C. (1986), "Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers", *The American Economic Review*, vol. 76, no. 2, pp. 323-329.

Jensen, M. C. and Meckling, W. H. (1976), "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure", *Journal of Financial Economics*, vol. 3, no. 4, pp. 305-360.

Kraus, A. and Litzenberger, H. (1973), "A State-preference Model of Optimal Financial Leverage", *Journal of Finance*, vol. 28, pp. 911–922.

Kutner, M., Nachtsheim, C. and Neter, J. (2004), Applied linear regression models (McGraw-Hill, Irwin).

Lemmon, M. L., Roberts, M. R., Zender, J. F. (2008), "Back to the beginning: persistence and the cross-section of corporate capital structure", *Journal of Finance,* vol. 63, pp. 1575–1608.

López-Gracia, J. and Sogorb-Mira, F. (2008), "Testing trade-off and pecking order theories financing SMEs", *Small Business Economics,* vol. 31*,* no. 2, pp. 117-136.

MacKay, P. and Phillips, G. M. (2005), "How does industry affect firm financial structure?" *Review of Financial Studies*, vol. 18, pp. 1433–1466.

Modigliani, F. and Miller, M. H. (1958), "The Cost of Capital, Corporate Finance, and the Theory of Investment", *The American Economic Review*, vol. 48, pp. 261-297.

Modigliani, F. and Miller, M. H. (1963), "Corporate Income Taxes and the Cost of Capital: A Correction", *The American Economic Review*, vol. 53, no. 3, pp. 433-443.

Mostarac, E. and Petrovic, S. (2013), "Determinants of capital structure of Croatian enterprises before and during the financial crisis", *UTMS Journal of Economics*, vol. 4, pp. 153-162.

Myers, S. C. (1977), "Determinants of Corporate Borrowing", *Journal of Financial Economics,* vol. 5, no. 2, pp. 147-175.

Myers, S. C. (1984), "The Capital Structure Puzzle", *Journal of Finance*, vol. 39, no. 3, pp. 575-592.

Myers, S. C. and Majluf, N. S. (1984), "Corporate Financing and Investment Decisions When Firms Have Information that Investors Do Not Have", *Journal of Financial Economics*, vol. 13, no. 2, pp. 187-221.

Ozkan, A. (2001), "Determinants of Capital Structure and Adjustments to Long Run Target: Evidence from UK Company Panel Data", *Journal of Business Finance & Accounting*, vol. 28, no. 1/2, pp. 175-198.

Proença, P., Laureano, R. M. and Laureano, L. M. S. (2014), "Determinants of capital structure and the 2008 financial crisis: Evidence from Portuguese SMEs", *Procedia—Social and Behavioral Sciences,* vol. 150, pp. 182–191.

Rajan, R. G. and Zingales, L. (1995), "What Do We Know About Capital Structure? Some Evidence from International Data", *Journal of Finance*, vol. 50, no. 5, pp. 1421-1460.

Sibilkov, V. (2009), "Asset liquidity and capital structure", *Journal of Financial and Quantitative Analysis*, vol. 44, no. 5, pp. 1173–1196.

Sogorb-Mira, F. (2005), "How SME Uniqueness Affects Capital Structure: Evidence from a 1994-1998 Spanish Data Panel", *Small Business Economics*, vol. 25, no. 5, pp. 447-457.

Statistics Sweden (Statistiska centralbyrån), Data retrieved May 5, 2016, from "Företagsregistret".

Sweeney, R., Warga, A. and Winters D. (1997), "The Market Value of Debt, Market versus Book Value of Debt, and Returns to Assets", *Financial Management,* vol. 26, no. 1, pp. 5–21

Titman, S. and Wessels, R. (1988), "The Determinants of Capital Structure Choice", *Journal of Finance,* vol. 43, no. 1, pp. 1–19.

Trinh, H. and Phuong, T. (2016), "Effects of Financial Crisis on Capital Structure of Listed Firms in Vietnam", *International Journal of Financial Research*, vol. 7, no. 1, pp. 66-74.

Warner, J. B. (1977), "Bankruptcy Costs: Some Evidence", *Journal of Finance*, vol. 32, pp. 337-347.

Williamson, O. E. (1988), "Corporate Finance and Corporate Governance", *Journal of Finance*, vol. 43, no. 3, pp. 567-591.

World Bank (2016), Data retrieved April 18, 2016, from World Development Indicators Online (WDI) database.

Zhang, X. and Mirza, S. (2015), "Determinants of Capital Structure of Firms in Pre-Post Financial Crisis: Evidence from China", *Research Journal of Finance and Accounting*, vol. 6, no. 12, pp. 33-51.

Zietlow, J., Hankin, J. and Seidner, A. (2007), "Financial management for non-profit organizations: Policies and practices" Hoboken, NJ: Wileys.

Appendix

Appendix A: Variables used from the Serrano database

Table A: Variables used from the Serrano Database

Variable	Definition
br02_matanlsu	Total tangible fixed assets
br02a_byggmark	Buildings and land
br03_maskiner	Machinery and equipment
br08_omstgsu	Total current assets
br09_tillgsu	Total Assets
br13_ksksu	Total Current Liabilities
br15_lsksu	Total non-current liabilities
bransch_sni071_konv	Primary SNI07 code, converted
knc_kncfall	Group situation
ny_omsf	Change in net sales
ORGNR	Corporate ID number
rr01_ntoms	Net sales
rr05_avskriv	Depreciation and amortization
rr07_rorresul	Operating profit/loss
rr15_resar	Net profit/loss for the year
ser_aktiv	Company active during the year
ser_namn	Company name
ser_year	Year
bslov_antanst	Number of employees

Summary of all variables from the Serrano database that have been used in this study and their definitions.

Appendix B: Testing for Autocorrelation for each individual period

Table B1: Pairwise Correlation of all Variables (Pre-crisis period, 2005-2007)

	LTDR	STDR	SIZE	TANG	PROF	LIQ	NDTS	GROWTH
LTDR	1.0000							
STDR	-0.3477*	1.0000						
SIZE	0.1735*	-0.4077*	1.0000					
TANG	0.5963*	-0.3801*	0.1365*	1.0000				
PROF	-0.3093*	-0.0084	-0.1050*	-0.3131*	1.0000			
LIQ	-0.1678*	-0.5369*	0.2178*	-0.2913*	0.1685*	1.0000		
NDTS	-0.2355*	0.1275*	0.0830*	-0.5969*	0.4373*	0.2622*	1.0000	
GROWTH	-0.0066	0.1537*	-0.0131	-0.0717*	0.1095*	-0.0763*	0.0776*	1.0000

Pairwise correlation matrix for the pre-crisis period, to test for autocorrelation between variables used in the study. The data sample has been winsorized at the 1% and 99% levels. The maximum correlation accepted between two variables is 0.8.

Table B2: Pairwise Correlation of all Variables (Crisis period, 2008-2010)

	LTDR	STDR	SIZE	TANG	PROF	LIQ	NDTS	GROWTH
LTDR	1.0000							
STDR	-0.3425*	1.0000						
SIZE	0.1894*	-0.4172*	1.0000					
TANG	0.5979*	-0.3593*	0.1350*	1.0000				
PROF	-0.3390*	0.0054	-0.1327*	-0.3421*	1.0000			
LIQ	-0.1660*	-0.5395*	0.2073*	-0.2774*	0.1723*	1.0000		
NDTS	-0.2703*	0.1298*	0.0636*	-0.6300*	0.4405*	0.2629*	1.0000	
GROWTH	0.0000	0.1368*	-0.0222*	-0.0537*	0.1151*	-0.0816*	0.0401*	1.0000

Pairwise correlation matrix for the crisis period, to test for autocorrelation between variables used in the study. The data sample has been winsorized at the 1% and 99% levels. The maximum correlation accepted between two variables is 0.8.

Table B3: Pairwise Correlation of all Variables (Post-crisis period, 2011-2014)

	LTDR	STDR	SIZE	TANG	PROF	LIQ	NDTS	GROWTH
LTDR	1.0000							
STDR	-0.3185*	1.0000						
SIZE	0.2004*	-0.4291*	1.0000					
TANG	0.6119*	-0.3428*	0.1524*	1.0000				
PROF	-0.3580*	-0.0046	-0.1416*	-0.3705*	1.0000			
LIQ	-0.1779*	-0.5527*	0.2114*	-0.2701*	0.1745*	1.0000		
NDTS	-0.3008*	0.1164*	0.0435*	-0.6436*	0.4702*	0.2636*	1.0000	
GROWTH	-0.0067	0.1378*	-0.0317*	-0.0705*	0.1444*	-0.0678*	0.0651*	1.0000

Pairwise correlation matrix for the post-crisis period, to test for autocorrelation between variables used in the study. The data sample has been winsorized at the 1% and 99% levels. The maximum correlation accepted between two variables is 0.8.

Appendix C: Robustness Regression for SIZE

Table C: Regression on the LTDR model, using SIZE robustness proxy

VARIABLES	LTDR 2005-2007	LTDR 2008-2010	LTDR 2011-2014
R_SIZE	-0.00793*	-0.0103***	-0.00685**
	(0.00416)	(0.00366)	(0.00331)
TANG	0.469***	0.430***	0.392***
	(0.0216)	(0.0182)	(0.0157)
PROF	-0.142***	-0.103***	-0.116***
	(0.0105)	(0.00856)	(0.00811)
LIQ	0.0177***	0.0181***	0.0160***
	(0.00210)	(0.00194)	(0.00166)
NDTS	0.614***	0.590***	0.618***
	(0.0605)	(0.0551)	(0.0558)
GROWTH	0.0113***	0.00863***	0.0114***
	(0.00211)	(0.00239)	(0.00171)
Constant	0.117**	0.145***	0.117***
	(0.0468)	(0.0391)	(0.0361)
Observations	21,283	22,552	30,598
R-squared	0.220	0.199	0.164
Number of ORGNR	9,521	9,841	10,767

Results from regression on LTDR using the natural logarithm of net sales as proxy for size (R_SIZE), as a robustness check. LTDR is defined as long-term debt over total assets; TANG is defined as total fixed tangible assets over total assets; PROF is defined as EBITD over total assets; LIQ is defined as total current assets over total current liabilities; NDTS is defined as depreciation over total assets and GROWTH is defined as the percentage change in net sales between two consecutive years. The data sample has been winsorized at the 1% and 99% levels. Robust standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1.

Appendix D: Robustness Regression for TANG

Table D: Regression on the LTDR model, using TANG robustness proxy

VARIABLES	LTDR 2005-2007	LTDR 2008-2010	LTDR 2011-2014
SIZE	0.0324***	0.0322***	0.0383***
	(0.00462)	(0.00483)	(0.00416)
R_TANG	0.409***	0.365***	0.339***
	(0.0206)	(0.0167)	(0.0156)
PROF	-0.160***	-0.125***	-0.133***
	(0.0105)	(0.00872)	(0.00794)
LIQ	0.0161***	0.0165***	0.0148***
	(0.00202)	(0.00188)	(0.00160)
NDTS	0.519***	0.497***	0.498***
	(0.0537)	(0.0539)	(0.0546)
GROWTH	0.0110***	0.00680***	0.0118***
	(0.00208)	(0.00233)	(0.00166)
Constant	-0.270***	-0.264***	-0.323***
	(0.0455)	(0.0492)	(0.0422)
Observations	21,283	22,552	30,598
R-squared	0.204	0.182	0.158
Number of ORGNR	9,521	9,841	10,767

Results from regression on LTDR using property, plant and equipment over total assets as proxy for tangibility (R_TANG), as a robustness check. LTDR is defined as long-term debt over total assets; SIZE is defined as the natural logarithm of assets; PROF is defined as EBITD over total assets; LIQ is defined as total current assets over total current liabilities; NDTS is defined as depreciation over total assets and GROWTH is defined as the percentage change in net sales between two consecutive years. The data sample has been winsorized at the 1% and 99% levels. Robust standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1.

Appendix E: Robustness Regressions for PROF

Table E1: Regression on the LTDR model, using PROF robustness proxy (EBIT/net sales)

VARIABLES	LTDR 2005-2007	LTDR 2008-2010	LTDR 2011-2014
SIZE	0.0264***	0.0247***	0.0318***
	(0.00452)	(0.00465)	(0.00415)
TANG	0.487***	0.448***	0.403***
	(0.0211)	(0.0173)	(0.0156)
R_PROF_EBIT	0.000224*	1.82e-05	1.06e-05
	(0.000121)	(6.18e-05)	(1.47e-05)
LIQ	0.0157***	0.0165***	0.0147***
	(0.00199)	(0.00189)	(0.00160)
NDTS	0.283***	0.334***	0.316***
	(0.0549)	(0.0518)	(0.0527)
GROWTH	0.00771***	0.00209	0.00610***
	(0.00206)	(0.00224)	(0.00162)
Constant	-0.251***	-0.226***	-0.291***
	(0.0445)	(0.0477)	(0.0423)
Observations	21,283	22,552	30,598
R-squared	0.199	0.182	0.150
Number of ORGNR	9,521	9,841	10,767

Results from regression on LTDR using EBIT over net sales as proxy for profitability (R_PROF_EBIT), as a robustness check LTDR is defined as long-term debt over total assets; SIZE is defined as the natural logarithm of assets; TANG is defined as total fixed tangible assets over total assets; LIQ is defined as total current assets over total current liabilities; NDTS is defined as depreciation over total assets and GROWTH is defined as the percentage change in net sales between two consecutive years. The data sample has been winsorized at the 1% and 99% levels. Robust standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1.

Table E2: Regression on the LTDR model, using PROF robustness proxy (net income/total assets)

VARIABLES	LTDR 2005-2007	LTDR 2008-2010	LTDR 2011-2014
SIZE	0.0302***	0.0330***	0.0378***
	(0.00456)	(0.00461)	(0.00424)
TANG	0.472***	0.428***	0.387***
	(0.0212)	(0.0171)	(0.0163)
R_PROF_NI	-0.105***	-0.123***	-0.125***
	(0.0255)	(0.0134)	(0.0175)
LIQ	0.0188***	0.0197***	0.0175***
	(0.00210)	(0.00194)	(0.00159)
NDTS	0.340***	0.368***	0.380***
	(0.0551)	(0.0519)	(0.0552)
GROWTH	0.0103***	0.00465**	0.00941***
	(0.00204)	(0.00228)	(0.00162)
Constant	-0.281***	-0.300***	-0.341***
	(0.0447)	(0.0472)	(0.0428)
Observations	21,283	22,552	30,598
R-squared	0.219	0.204	0.175
Number of ORGNR	9,521	9,841	10,767

Results from regression on LTDR using net income over total assets as proxy for profitability (R_PROF_NI), as a robustness check LTDR is defined as long-term debt over total assets; SIZE is defined as the natural logarithm of assets; TANG is defined as total fixed tangible assets over total assets; LIQ is defined as total current assets over total current liabilities; NDTS is defined as depreciation over total assets and GROWTH is defined as the percentage change in net sales between two consecutive years. The data sample has been winsorized at the 1% and 99% levels. Robust standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1.

Appendix F: Robustness Regression for GROWTH

Table F: Regression on the LTDR model, using GROWTH robustness proxy

VARIABLES	LTDR 2005-2007	LTDR 2008-2010	LTDR 2011-2014
SIZE	0.0287***	0.0304***	0.0353***
	(0.00454)	(0.00458)	(0.00414)
TANG	0.463***	0.426***	0.383***
	(0.0210)	(0.0171)	(0.0154)
PROF	-0.144***	-0.111***	-0.117***
	(0.0100)	(0.00809)	(0.00768)
LIQ	0.0175***	0.0180***	0.0157***
	(0.00204)	(0.00189)	(0.00160)
NDTS	0.525***	0.509***	0.508***
	(0.0555)	(0.0541)	(0.0548)
R_GROWTH	5.63e-05	1.44e-05	1.02e-06***
	(0.000104)	(4.57e-05)	(1.75e-07)
Constant	-0.250***	-0.266***	-0.307***
	(0.0447)	(0.0470)	(0.0419)
Observations	21,283	22,552	30,598
R-squared	0.224	0.204	0.172
Number of ORGNR	9,521	9,841	10,767

Results from regression **on** LTDR using the percentage change in total assets between two consecutive years as proxy for growth (R_GROWTH), as a robustness check. LTDR is defined as long-term debt over total assets; SIZE is defined as the natural logarithm of assets; TANG is defined as total fixed tangible assets over total assets; PROF is defined as EBITD over total assets; LIQ is defined as total current assets over total current liabilities and NDTS is defined as depreciation over total assets. The data sample has been winsorized at the 1% and 99% levels. Robust standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1.

Appendix G: Robustness Regressions for group relations (e.g. individual, subsidiaries or parent companies)

Table G1: Regression on the LTDR model, using only independent companies

VARIABLES	LTDR 2005-2007	LTDR 2008-2010	LTDR 2011-2014
SIZE	0.0216***	0.0318***	0.0312***
	(0.00472)	(0.00535)	(0.00471)
TANG	0.500***	0.472***	0.407***
	(0.0219)	(0.0192)	(0.0177)
PROF	-0.175***	-0.117***	-0.138***
	(0.0124)	(0.0101)	(0.00976)
LIQ	0.0307***	0.0248***	0.0196***
	(0.00280)	(0.00283)	(0.00182)
NDTS	0.586***	0.497***	0.468***
	(0.0601)	(0.0643)	(0.0623)
GROWTH	0.0138***	0.0107***	0.0143***
	(0.00203)	(0.00275)	(0.00183)
Constant	-0.210***	-0.304***	-0.281***
	(0.0475)	(0.0545)	(0.0468)
Observations	15,098	15,892	20,832
R-squared	0.284	0.249	0.218
Number of ORGNR	7,026	7,275	7,845

Results from regression on LTDR on only individual companies as a robustness check compared to allowing parent companies in the regressions too. LTDR is defined as long-term debt over total assets; SIZE is defined as the natural logarithm of assets; TANG is defined as total fixed tangible assets over total assets; PROF is defined as EBITD over total assets; LIQ is defined as total current assets over total current liabilities; NDTS is defined as depreciation over total assets and GROWTH is defined as the percentage change in net sales between two consecutive years. The data sample has been winsorized at the 1% and 99% levels. Robust standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1.

Table G2: Regression on the LTDR model, using all company types (e.g. individual, subsidiaries, parent companies)

VARIABLES	LTDR 2005-2007	LTDR 2008-2010	LTDR 2011-2014
SIZE	0.0412***	0.0444***	0.0417***
	(0.00317)	(0.00339)	(0.00247)
TANG	0.387***	0.339***	0.322***
	(0.0133)	(0.0127)	(0.0107)
PROF	-0.118***	-0.0970***	-0.0850***
	(0.00596)	(0.00469)	(0.00400)
LIQ	0.0284***	0.0253***	0.0229***
	(0.00157)	(0.00141)	(0.00107)
NDTS	0.350***	0.307***	0.277***
	(0.0396)	(0.0374)	(0.0298)
GROWTH	0.00903***	0.00634***	0.00773***
	(0.00129)	(0.00127)	(0.00104)
Constant	-0.398***	-0.423***	-0.397***
	(0.0331)	(0.0355)	(0.0260)
Observations	54,446	59,503	86,431
R-squared	0.158	0.143	0.117
Number of ORGNR	22,251	24,100	27,401

Results from regression on LTDR including independent, subsidiaries and parent companies as a robustness check compared to only using individual and parent companies. LTDR is defined as long-term debt over total assets; SIZE is defined as the natural logarithm of assets; TANG is defined as total fixed tangible assets over total assets; PROF is defined as EBITD over total assets; LIQ is defined as total current assets over total current liabilities; NDTS is defined as depreciation over total assets and GROWTH is defined as the percentage change in net sales between two consecutive years. The data sample has been winsorized at the 1% and 99% levels. Robust standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1.

Appendix H: Robustness Regression with Balanced Panel Data

Table H: Regression on the LTDR model, with Balanced Panel Data

VARIABLES	LTDR 2005-2007	LTDR 2008-2010	LTDR 2011-2014
SIZE	0.0256***	0.0496***	0.0470***
	(0.00758)	(0.00979)	(0.0107)
TANG	0.477***	0.417***	0.348***
	(0.0362)	(0.0302)	(0.0342)
PROF	-0.173***	-0.138***	-0.134***
	(0.0202)	(0.0178)	(0.0183)
LIQ	0.0244***	0.0214***	0.0163***
	(0.00402)	(0.00348)	(0.00229)
NDTS	0.664***	0.580***	0.516***
	(0.0919)	(0.0856)	(0.112)
GROWTH	0.0155***	0.000592	0.00803*
	(0.00450)	(0.00544)	(0.00485)
Constant	-0.255***	-0.497***	-0.459***
	(0.0800)	(0.103)	(0.111)
Observations	5,853	5,853	7,804
R-squared	0.257	0.236	0.163
Number of ORGNR	1,951	1,951	1,951

Results from regression on LTDR using only companies with 11 consecutive years of data, as a robustness check. LTDR is defined as long-term debt over total assets; SIZE is defined as the natural logarithm of assets; TANG is defined as total fixed tangible assets over total assets; PROF is defined as EBITD over total assets; LIQ is defined as total current assets over total current liabilities; NDTS is defined as depreciation over total assets and GROWTH is defined as the percentage change in net sales between two consecutive years. The data sample has been winsorized at the 1% and 99% levels. Robust standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1.

Appendix I: Robustness Regression with all Robustness Proxies

Table I: Regression on the LTDR model, using all Robustness Proxies

VARIABLES	LTDR 2005-2007	LTDR 2008-2010	LTDR 2011-2014
R_SIZE	-0.0110**	-0.0103***	-0.00712**
	(0.00439)	(0.00332)	(0.00321)
R_TANG	0.419***	0.366***	0.350***
	(0.0215)	(0.0176)	(0.0167)
R_PROF_NI	-0.0943***	-0.109***	-0.111***
	(0.0245)	(0.0129)	(0.0166)
LIQ	0.0155***	0.0169***	0.0153***
	(0.00204)	(0.00189)	(0.00161)
NDTS	0.460***	0.481***	0.517***
	(0.0600)	(0.0531)	(0.0558)
R_GROWTH	6.92e-05	2.63e-05	1.11e-06***
	(0.000127)	(4.78e-05)	(2.03e-07)
Constant	0.161***	0.163***	0.131***
	(0.0487)	(0.0360)	(0.0349)
Observations	21,283	22,552	30,598
R-squared	0.179	0.170	0.138
Number of ORGNR	9,521	9,841	10,767

Results from regression on LTDR using all robustness proxies, as a final robustness check of our regression. LTDR is defined as long-term debt over total assets; SIZE is defined as the natural logarithm of net sales; TANG is defined as property, plant and equipment over total assets; PROF is defined as net income over total assets; LIQ is defined as total current assets over total current liabilities; NDTS is defined as depreciation over total assets and GROWTH is defined as the percentage change in total assets between two consecutive years. The data sample has been winsorized at the 1% and 99% levels. Robust standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1.

Appendix J: Testing the Relationship between NDTS and Effective Tax Rate

Table J: Regression on NDTS and companies' effective tax rate

VARIABLES	TAX_W
NDTS	0.135*
	(0.0689)
Constant	-0.197***
	(0.00321)
Observations	80,242
Number of ORGNR	16,946
R-squared	0.000

Results from regressing NDTS on TAX_W. NDTS is defined as depreciation over total assets and TAX_W is the effective tax payed, winsorized at the 1% and 99% level. Robust standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1.