Lund University

School of Economics and Management

Master Thesis

Capital structure decisions for financially constrained firms: A pre- and post-crisis analysis

Prepared by:

Petr Cempírek, gfn15pce@student.lu.se 1990-02-14

Georgi Gruncharov, gfn15ggr@student.lu.se 1990-05-27

Supervised by:

Hossein Asgharian

Abstract

The presented thesis focuses on dynamics of capital structure decisions of financially constrained and unconstrained firms listed on Stockholm Stock Exchange. It examines the effect of the global financial crisis on the corporate financing decision. The first chapter introduces the topic, discusses its importance and outlines the contribution to the empirical research. The second chapter the relevant literature is reviewed in two parts – the general capital structure theories and the theory regarding financially constrained firms. The third chapter clarifies the approach taken to answer the research questions the thesis aims to answer, together with description of data and variables used. It also addresses the problem of constraint identification. The fourth chapter then discusses the results obtained from the available dataset. We find that six capital structure determinants are sufficient to explain most of the variation of the corporate capital structure. We provide evidence that the recent global financial crisis had a mild effect on Stockholm-listed companies in terms of capital structure. Further, we discover a change in the capital structure of the firms in the sample during the crisis with no reversion to the pre-crisis values. We identify and contrast significant differences in the behavior of constrained and unconstrained firms. Finally, we conclude the paper by emphasizing the key empirical findings on the selected sample of listed and delisted Swedish companies for the period 2003-2014.

Keywords: capital structure; financial constraints; global financial crisis; leverage

Table of Contents

1. Introduction

The capital structure decision is the centerpiece decision every firm must make in order to compete with other firms on its market and at the same time one of the most studied finance related problems. Should the source of finance be internal or external? Should the firm rely on debt or on equity financing? Although capital structure has been studied over many decades now, the researchers have not yet found the single "true" theoretical model that would explain the empirically observed data (Frank and Goyal, 2009). The foundation of modern capital structure theories was laid by Modigliani and Miller in their Theorem of Capital Structure Irrelevance, stating that under some very strict assumptions the capital structure does not matter. Of course, in real life most of the assumptions do not hold and the financing decision matters (Schiantarelli, 1995). Debt financing provides the benefit of not taxing the interest on loan and this tax shield is then the driver of debt financing popularity. Of course the higher the leverage, the more expensive the debt quickly gets and the probability of default rises. There are many other factors that theoretically affect the capital structure decision such as agency problems, information asymmetry or market/economy cycle causing misalignment between the true and market value.

Another important aspect of the financing structure decision is the funds available to an individual firm. Financially constrained companies do not have the relative freedom of capital structure decision and are tied by strict rules of the lenders and investors, and as a result the cost of financing for such constrained company increases. Not only has this fact effect on the firm in question, financial constraints also have a clear macroeconomic effect because the cash flow and liquidity are correlated with fluctuations of aggregate economy (Fazzari et al., 1988). Our focus on the analysis of pre- and post- effects of the recent financial crisis is motivated by the fact that a period of economic downturn negatively affects the aggregate economy output. Even though a serious economic slowdown affects both the financially unconstrained and financially constrained firms, the constrained firms are affected much more severely – sales of productive assets, cuts of investments, or cancellations of positive NPV projects are often (Campello, Graham and Harvey, 2010). It has been shown, for example by Bond, Soderbom, and Wu (2010), that capital-constrained companies behave differently than companies with access to cheap funds, mainly in terms of investment propensity. Therefore, knowing the individual determinants' behavior with respect to companies and conditional on availability of

financing is also very important for macroeconomic predictions due to the fact that economic development is highly dependent on investment activity.

The aim of the presented thesis is to document the dynamics of the determinants themselves before, during, and after the recent financial crisis and, more specifically, conditional on financial constraints of the companies. One of the first studies in the area of financial constraints - Fazzari et al. (1988) - addresses the importance of cash flow sensitivities to various sources of financing and suggests that, when a firm experiences financial constraints, its investments will tend to vary with the access to internal and external finance and not only with the availability of positive net present value projects. However, this finding was questioned by a paper of Kaplan and Zingales (1995) which states that a higher sensitivity cannot be necessarily interpreted as a proof for greater financial constraints. Based on the definitions of financial constraints, it would be fair to say that financial constraints are highly related to the differences between the cost of internal and external finance, and consequently also the composition of the capital structure. Thus, in order to understand the impact of financial constraints, we have to examine cash flow sensitivities and firm's financing preferences under widely varying economic conditions. We expect to observe a significant number of financially constrained firms in the pre-crisis period not being able to survive the global financial crisis as they were already highly levered and were lacking the collateral necessary to back up their pre-crisis borrowings.

During the recent financial crisis, the aggregate reliance on debt financing was significantly increased. However, by the end of 2010 when the effects of financial crisis had faded away, the debt structure reversed to pre-crisis levels (Fosberg, 2015). Duchin, Ozbas, and Sensoy (2010) find that corporate investment and reliance on external financing declined following the start of the 2008-2009 financial crisis. Further, they document that firms with highly levered structure prior the crisis experience greater constraints to financing sources. Campello et al (2010) assume that financially constrained firms are more affected than less financially constrained firms by systematic exogenous changes in financial constraints. Sweden has not been unaffected by the global financial turmoil. The number of bankruptcies increase dramatically from 2008 to 2009. This increase is comparable to the economic downturn in the Nordic market in the early 2000s, when the number of bankruptcies increased more slowly but stayed at an elevated level for a prolonged period. However, whilst there are indications that Swedish

companies may have experienced a non-negligible reduction of the sources of external financing during the crisis, they seem to have avoided large exposure to the most severe financial difficulties. This fact supports our assumption that this period constituted a significant, adverse economic event that influences to a large extent the capital structure decision.

In this paper we use data for Swedish listed companies and we investigate whether the capital structure decisions of specifically the financially constrained Swedish listed firms have changed as a result of the crisis, and if so, why. Up to our best knowledge, such research has not been in focus of scholars. Our contribution to the economic research refers to identifying meaningful dynamic trends and cross-sectional variation in the corporate behavior of constrained and unconstrained firms. The crisis environment allows us to contrast the financing decisions of firms that are or claim to be financially constrained with those that are less constrained. Another distinguishing feature of our analysis is that we study the dynamics of the corporate strategy of listed and delisted Swedish firms, both prior to and during the 2008 crisis, with differences between constrained and unconstrained firms becoming more significant as the crisis unfolds. The broader question we seek to answer is whether the financing decisions and its underlying drivers vary with external financing constraints and changing economic conditions. We are particularly interested in examining the pre- and post-effects of the global financial crisis on the international firms' propensity to rely on internal financing and to carry more debt under difficult economic circumstances and periods of uncertainty and high volatility. Furthermore, based on our dataset, we provide empirical evidence on dynamics of individual determinants of capital structure decision such as firm size, profitability, industry specifics, tangibility, market to book ratio, and dividend through time.

The study shows that the global financial crisis of 2007-2009 has a mild effect on the capital structure decisions of Swedish firms, due to the fact that Sweden was not hit hard during the financial crisis compared to other developed countries. In consistency with the empirical evidence of Frank and Goyal (2003), we find that significant part of the variation in the leverage preferences for the full sample is explained by the six "core determinants": industry median leverage, tangibility, profits, firm size, market-to-book asset ratio, and expected inflation. We conclude that financial constraints have stronger effect on the Swedish firms' capital structure decisions than the global financial crisis. Further, by exploring listed and delisted firms, we

emphasize the impact of the capital structure decisions, the global financial crisis and the financial constraints these firms have faced, further pushed them into restructuring.

The outcomes that we have built on the results obtained throughout the thesis can be used for mitigation of risks coming from a possible next crisis when it comes. By looking at the conclusions the policymakers may be able to better target the government aid to only those companies that are indeed hit by an economy downturn and therefore moderate the cyclical effect of economy slowdown coming from decreased aggregate firm investment.

The remaining part of the presented thesis is as follows: In Chapter 2 we present the literature review related to our topic and summarize the important theories concerning capital structure decision of financially constrained companies. Our paper raises questions on some of the existing theories which will be investigated in the testing part. Chapter 3 outlines the applied methodology. It focuses on description of available data and its properties, including a detailed explanation of the empirical and statistical methods used for estimation. Chapter 4 presents the individual estimation results and focuses on the discussion of the results, highlights consistencies with previous findings and gives a comparison with our initial expectations on the effect of financial constraints on capital structure decisions before and after the global financial crisis. Chapter 5 summarizes the conclusions of the paper.

2. Literature

The literature relevant for our thesis can be divided into two main parts: literature related to the general capital structure theories and literature related to capital structure of those companies that are financially constrained.

2.1 Capital structure theories

The amount of literature regarding capital structure of firms is very broad. The theoretical foundation of modern capital structure analysis was laid by Modigliani and Miller in 1958. Their outcomes have then been questioned by generations of economists and the results have been used as a foundation of capital structure theories such as tradeoff, pecking order, and market timing, that we can call traditional nowadays. More on the individual theories can be found below.

Modigliani and Miller

Arguably the most influential and founding literature was written by Modigliani and Miller in 1958. Their capital structure irrelevance theorem laid the way economists and financiers have been thinking about firm financing structure over the last decades. The theorem states that "the market value of any firm is independent of its capital structure", given a list of strict market efficiency requirements. Based on the theorem, theoretically, there would be no benefit coming from relying on debt finance, or on issuing stock. Modigliani and Miller argue that "the average cost of capital to any firm is completely independent of its capital structure and is equal to the capitalisation rate of a pure equity stream of its class" (Modigliani and Miller, 1959: 655). In real economy environment, however, the necessary requirements do not hold and the theoretical foundation is generally violated. One cannot expect all of the market players to be perfectly rational or to have complete information about some (in fact about any) asset. Apart from existence of transaction costs, the major violation of the above theory is the tax benefit coming from the fact that interest on debt financing is not taxed and at the same time dividend stream coming from equity financing is taxed. Schiantarelli (1995: 177) therefore concludes that the Capital Structure irrelevance theorem is not valid when, based on his econometric analysis, evidence suggests the violations generate significant departures from the model derived under the assumption of perfect capital markets. The fact that the assumptions for the theorem to be

valid do not hold necessarily means that the capital structure of a company, that is the decision on the source of financing (internal or external, debt or equity), does indeed matter and therefore affects the firm value. Despite the practical shortcomings of the Modigliani-Miller theorem the underlying theory is still used as the foundation and starting point of capital structure-related analyses.

Market timing theory

Although the theory is relatively old, it has gained popularity only recently, mainly after Baker and Wurgler published their paper Market Timing and Capital Structure in 2002 where the authors questioned some of the ambiguities of the popular pecking order and tradeoff theories. The theory heavily relies on market psychology and falls into behavioral finance. It argues that the decision on capital structure comes from imperfect information - firm's managers decide on financing source based on their presumed misvaluation on the markets. If the managers consider the current market value of their firm to be overvalued, they decide to issue equity, if the current market value is low, they issue debt. The theory is inherently psychological because one can assume the managers of a company have more information about the firm's prospects, however, at the same time are prone to managerial discretion, overconfidence, and mass psychology when the markets seem to follow a strong trend. Baker and Wurgler (2002) showed that the market timing effects are very persistent, and as a consequence the capital structure is backward looking and dependent on past market values. They find that fluctuations of market valuations best explain the empirical observation and that the Market Timing theory explains well situations where the pecking order and tradeoff theories fail.

The tradeoff theory

The tradeoff theory of capital structure refers to the idea that a company chooses how much debt financing and how much equity financing to use by balancing the costs and benefits. The classical version of the hypothesis goes back to Kraus and Litzenberger (1973) who considered a balance between the deadweight costs of bankruptcy and the tax saving benefits of debt. Tax benefits and control of free cash flow problems are argued to push firms to carry more debt, while bankruptcy and other agency costs provide firms with incentives to use less. According to the tradeoff theory as a company tries to maximize its value, it increases debt relative to

equity in its capital structure, possibly leading to the increase of expected costs of future financial distress and bankruptcy eventually enough to fully offset the benefit of the tax shield at the margin.

By comparing the tradeoff theory with Miller-Modigliani capital structure irrelevance proposition it can be inferred that the main difference comes from the potential benefit of debt in the capital structure which comes from tax benefits of interest payments. Given that Miller-Modigliani capital structure irrelevance theory assumes no taxes, this benefit is not recognized.

Frank and Goyal (2007) provide a review of the tradeoff theory and emphasize its well known anomaly-in theory predicts a positive relationship between the above-mentioned six core factors and leverage, while the empirical evidence shows the opposite. The authors illustrate that more profitable firms tend to issue debt and repurchase equity while less profitable firms refrain from levering up. In consistency with their findings, Hovakimian et al. (2001), and Gomes and Phillips (2007) show that highly profitable firms are indeed more likely to issue debt. This is also in line with the pecking order theory which stipulates that external financing is costlier and thus less preferred than internal financing. The pecking order theory, however, has been empirically observed to be most used in determining a company's capital structure.

The pecking order theory

The pecking order theory plays a key role in the decision-making process depending on the type of capital structure the company wishes to achieve. The most important principle of the model, developed Myers and Majluf (1984) and presented by Myers (1984) is that firms will not have an optimal capital structure, but will instead follow a pecking order of incremental financing choice. It states that a company should prefer to finance itself first internally through retained earnings. If this source of financing is unavailable, a company should then finance itself through debt. Finally, and as a last resort, a firm should finance itself through the issuing of new equity. This theory is based upon costs derived from asymmetric information between managers and market and the assumption that the tradeoff theory costs and benefits of debt financing are of a second importance when compared to the costs of issuing new securities in the presence of asymmetric information.

Empirical research has found conflicting evidence on the ability of these theories to explain how firms go about their financing decisions but nonetheless, it has substantially improved the understanding of the factors that influence capital structure. The development of a pecking order based upon costs of adverse selection requires an ad hoc specification of the manager's incentive contract (Dybvig and Zender, 1991) and some limitation on the types of financing strategies that may be pursued (Brennan and Kraus, 1987). Despite these theoretical criticisms, the pecking order remains a predominant theory of financing choice. Following their introduction of a pecking order theory test illustrated below where ΔD_{it} is the net debt issued by firm i in period t, and DEF_{it} is the corresponding financing deficit, Shyam-Sunder and Myers (1999) argue that, except for firms at or near their debt capacity, the pecking order predicts that the deficit will be filled entirely with new debt issues.

$$\Delta D_{it} = \alpha + \beta_{PO} DEF_{it} + \varepsilon_{it}$$

Some researchers find evidence consistent with pecking order theory, in particular that *"leverage tends to be positively correlated with the size of a firm and the portion of its assets that are tangible, whereas it tends to be negatively correlated with its profitability and risk"* (Psillaki and Daskalakis, 2008: 324). More profitable firms can finance their capital expenditure internally instead of raising capital externally, as predicted by pecking order theory.

Even though the research described above has provided useful evidence that aids the understanding of capital structure determinants at the micro level, at the macro level the debate on capital structure remains dominated by the tradeoff theory versus pecking order theory argument. Agca and Mozumdar (2004), for instance, argue that the theories should not to be thought of as conflicting but as complementary: *"The conflicting nature of the existing evidence on the pecking order theory is due to the difference between financing practices of large and small firms, and the skewness of the firm size distribution. The theory performs poorly for small firms because they have low debt capacities that are quickly exhausted, forcing them to issue equity. The pecking order theory performs satisfactorily for large firms, firms with rated debt, and when the impact of debt capacity is accounted for"* (Agca and Mozumdar, 2004: 1).

In this sense, they find that trade off theory considerations help firms determine their debt capacity, while pecking order theory describes firm's preferences between different methods of

financing. The pecking order theory seems to explain satisfactorily the financing behavior of larger firms, but not of smaller firms, that are constrained by their limited borrowing capacity. The explicit distinction that this model makes between smaller and larger firms seems like a plausible inference-a firm's size is a key variable that has important consequences for the extent to which the firm has access to capital markets. This is consistent with the empirical findings of Frank and Goyal (2003) that the pecking order performs the worst for small firms, which they argue should have the greatest degree of asymmetric information and therefore the strongest incentives to follow the pecking order.

The theories themselves have been questioned over time, as none of them seems to reliably explain the empirically observed relations. As Frank and Goyal (2003) argue, the disagreement between the theories can be illustrated on the discussion between Harris and Raviv (1991), and Titman and Wessels (1988) where the authors disagree about even the basic facts. While Harris and Raviv find that leverage is generally correlated with non-debt tax shields, fixed assets, and firm size, Titman and Wessels do not find such relationship. Supporters of individual theories often contradict each other, and claim different theories to be valid only for specific subsamples of data. Fama and French (2000, 2002) provide comprehensive papers focused at confirming or rejecting predictions of pecking order and tradeoff theories with respect to size of firm, dividend paying, profitability, and investment. They find that *"confirming predictions shared by the tradeoff and pecking order models, more profitable firms and firms with fewer investments have higher dividend payouts"* (Fama and French, 2002: 2). They, however, find that more profitable firms tend to be less levered, contradicting the tradeoff model. Other authors rather step away from theories as such, and rather focus on relationships and correlations within the observed data in order to identify the basic capital structure factors.

The essence of the literature regarding capital structure determinants was laid by Frank and Goyal (2003, 2004, 2009) who do not attempt to fit the data into a predefined theory-bracket, but rather focus on individual factors affecting leverage. They pick up on the theories laid by Modigliani and Miller, and find that the capital structure of firms is mainly determined by six "core factors": Industry median leverage, Tangibility, Profits, Firm size, Market-to-book ratio, and expected inflation. These six factors explain 27% of variation within their dataset, while 19 other variables together add up to only 2% of additional variation. This outcome will be used as a reference for our thesis.

2.2 Financial constraints theories

The principal focus of our thesis is on individual determinants for decisionmaking of individual firms on their capital structure, and more specifically decisionmaking of those companies that are financially constrained. The literature regarding capital structure of constrained companies is relatively more scarce because the topic has received much less attention. Myers (1984), and Myers and Majluf (1984) found that when market imperfections are introduced into the traditional theories, external financing will become costlier and so firms will prefer internal financing. They introduce insider information of managers, and assume the managers will prefer less risky investments so that in case the information is leaked the change in value is minimal. The notion that internal financing is preferred to external financing was then developed by Fazzari et al. (1988), who argue that there is a significant correlation between available cash flow and capital investment, and that the more is a firm financially constrained the higher will be the sensitivity of investment to change in cash flow. They identify the financially constrained companies based on a dividend ratio.

Kaplan and Zingales (1997) disagree with the outcomes, however. Based on their findings on the same dataset, they state that the relationship should be the other way around - financially less constrained companies should exhibit higher sensitivity to changes in cash flow, as they should have a higher capacity to adjust their investment when economic environment changes, and so does availability of profitable opportunities. Kaplan and Zingales (1997:172) define a financially constrained company as *"a firm for which the wedge between its internal and external cost of funds increases"*. They use a set of determinants to rank the degree to which the companies are constrained, where one of the factors is the Tobin's Q. This has been further questioned mainly by Whited and Wu (2006) who propose their own index because they consider the Tobin's Q measure used by Kaplan and Zingales as noisy and the index parameters unstable in time. Lamont, Polk, and Saá Raquejo (1997), in their article that further develops outcomes of Kaplan and Zingales, come to a conclusion that financially constrained companies are such companies that are limited by financial frictions to accomplish all intended investments.

Financial constraints are unfortunately directly unobservable and therefore the researchers generally use indirect measures of financial constraints. As there is no generally accepted

identification measure the identification of financially constrained firms is still dependent on each author's views and rather arbitrary. Some authors use general ranking based on some proxy - like Fazzari et al. (1988) who use the dividend payout ratio, or Whited (1992) who uses an assigned debt rating. Other authors propose a synthetic index that is sorted and firms above a certain threshold are considered as constrained and firms below a lower threshold are assumed to be unconstrained. The advantage is that the index method takes into consideration more factors to identify the constrained firms and is therefore expected to better capture the companies that really have limited access to capital. The selection of threshold is, however, necessarily arbitrary. Lamont, Polk, and Saá-Requejo (1997) construct an index based on results of Kaplan and Zingales (1997) and consider the top 20% companies as constrained and the lowest 20% as unconstrained. We follow a similar approach in our thesis to identify financially constrained firms in the available sample of Swedish firms. The indirect measures for identification of financially constrained firms are criticized by Farre-Mensa and Ljungqvist (2015), who argue that all of the widely used identification techniques do not necessarily work well. Some of the companies in their sample identified as constrained have no trouble raising capital, and vice versa. We take the fact into consideration, however at the same time and at the time of writing the thesis, we are not aware of any other possibility of identifying financial constraints on a large sample of data.

3. Methodology

Our goal concerning the data is to estimate the effects of the global financial crisis on the financing decision of financially constrained firms. In view to determine whether a firm can be considered as financially constrained and to investigate the impact of financial constraints on capital structure decisions in the pre- and post- financial crisis period, we need to establish a framework for analyzing different firms. Following our intention to select a sample of Swedish companies, we have decided to use a methodology that allows us to compare listed and delisted firms, and also to explore the key determinants of the amount of leverage that a firm can afford to take on. Consequently, by performing standard panel regression tests, we will be able to identify common trends in the dynamics for the pre- and post-crisis period.

The available time period is divided into three sections in order to estimate the effects of the global financial crisis. The crisis period is limited to years 2008 and 2009 when the financial turmoil was the largest not only in the Nordic region. The precise specification of crisis period is unfortunately limited due to usage of yearly data. 2009 was the year when the financial crisis burst, however, the first slowdown was recorded in Fall 2008 when the Swedish exports started decreasing. Although Sweden was one of the fastest countries to recover from the financial crisis, the fall of GDP during the crisis was very deep and didn't leave the Swedish firms unaffected (Goodfriend and King, 2015). The rest of the dataset is therefore divided by the financial crisis into two parts – the pre-crisis period (2003-2007) and post-crisis period of recovery (2010-2014).

3.1 Data description

Our initial data, exported from the comprehensive financial database in Datastream, are composed of approximately 500 currently listed and recently delisted Swedish firms resulting in approximately 6000 company-year observations. The usage of a large panel data sample allows us to control for individual effects. That is, to understand the differences between firms as well as the differences for a given firm pre- and post-crisis. In order to draw up consistent and plausible inferences and avoid biasedness, we decide to use a continuous sample for the period 2003-2014. We begin in 2003 because we intend to examine the firms' behavior and preferences between external and internal financing, both in normal and worsened economic circumstances, and conditional on financial constraints. For the purpose of the study, the list

comprises the so-called "dead firms", that were not able to overcome the severe financial and economic circumstances in the crisis period, and thus, ceased to exist. The idea behind taking into consideration these firms is to analyze the impact of their capital structure decisions and to determine the key financial indicators that further pushed these firms into bankruptcy.

We convert the exported wide panel format into a long panel format and remove the perfect duplicates. We further consider individual firm-years with missing values for the debt or equity issues by assuming that such firm ceased to exist or was acquired. Although the change in variables is easily calculated, we could lose 1 year of observation by doing so. Thereby, after filtering out all the unnecessary data the total sample is reduced by approximately 350 year-company observations. The data has also been converted into real values, using a CPI index provided by Statistics Sweden, in order to remove the effect of inflation.

3.2 Variables and leverage relationship

We commence with an initial selection of 26 financial metrics that we have available and consider relevant for explaining the variations in leverage and for identification of financial constraints. Consequently, based on multiple criteria such as collinearity among variables or endogeneity, we filter down the financial variables to 11. It is worth mentioning that our final choice of variables parallels closely to the ones that have been identified as affecting leverage in the previous literature on capital structure (Rajan and Zingales (1995), Frank and Goyal (2003), and Fama and French (2002)).

$$\begin{aligned} Leverage_{it} = \ & \alpha + \beta_1 DPS_{it} + \beta_2 TotAss_{it} + \beta_3 CAPEX_{it} + \beta_4 TBill_{it} + \beta_5 NetMgn_{it} \\ & + \beta_6 PtB_{it} + \beta_7 Tangibility_{it} + \beta_8 Profitability_{it} + \beta_9 IndustryAvg_{it} \\ & + \beta_{10} R\&D_{it} + \beta_{11} PrVolat_{it} \ + \ \varepsilon_{it} \end{aligned}$$

We expect to observe that the firm size influences the propensity to use external financing since large firms are more active than small firms on capital markets. Asset tangibility is measured as the ratio of fixed assets to total assets. Firms with more tangible assets are expected to have lower costs associated with financial constraints and distress. The market-to-book ratio, also known as Tobin's Q, is used as a proxy for growth opportunities. Myers (1977) argues that firms with more growth opportunities have a greater possibility for underinvestment problems arising from the use of debt. The inclusion of expected inflation variable, as one of the six core

variables and the only macroeconomic variable in the list, is also motivated by findings of Frank and Goyal. One of the authors' findings is that substitution of expected inflation for government Treasury bill rate is unlikely to matter. Therefore, for our convenience and data availability we decided to use the Treasury bill rate. Profitability is measured as the ratio of operating income to total assets. Prior research has found an inverse correlation between profitability and leverage, which has often been interpreted as evidence in favor of the pecking order (Fama and French, 2002). The statistical importance of profitability has been declining over the years. In the 1980's profitability showed large significance for leverage, however in the later periods it is assumed market players started to be more and more willing to finance currently unprofitable firms and the importance of profitability for leverage has declined.

Along with the six proven crucial determinants of the financing decision - industry median leverage, tangibility, profitability, firm size, market-to-book asset ratio and expected inflation, we investigate additional factors that might appear to have an impact on the capital structure choices. In the extended model we include a variable for price volatility that is related to the equity market. All else equal, a firm with more volatile cash flows can borrow less either because the debt overhang problem (Myers, 1977) is more severe or because it is more likely to be unable to meet the payments on its debt obligations.

Variables and expected signs

Variable	***Description***	***Expected effect on leverage***
Industry median leverage	Capital-intensive industries are expected to be higher levered	+
Tangibility	Firms with high share of tangible assets are expected to be more levered	+
T-bill rate	In period of high expected inflation, proxied by high T-bill rate, firms are expected to have higher leverage	+
Profitability	Higher profitable firms are expected to be less levered	-
Price to book ratio	Firms with more investment opportunities tend to be less levered	+
Firm size	Larger firms are expected to have higher leverage	+
Dividends per share	Firms that increase or maintain high dividends are prone to be less levered	-
Net margin	Companies that can hold a higher net margin can be thought as higher profitable firms	-
CAPEX	Firms with significant CAPEX need tend to have higher leverage	+
R & D	High R&D intensity is associated with lower leverage	-
Price volatility	More price-volatile firm can borrow less due to debt overhang or inability to meet its debt payments	-

Table 1Variables and expected signs

We also take into account dividends per share, net margin, R&D, price volatility, and CAPEX. Dividends reflect the information about a company, and an unexpected change in dividend payments could be perceived as a signal to the market about the management's view on the future prospects of the firm (Arnold, 2013: 444). Therefore, a sudden increase of dividends or

dividend cut might impede the firm's access to financing sources. A high net margin sustainable over time naturally leads to higher profitability of a company. The variable can therefore be used as an alternative to our profitability measure. R&D expenditures generally need large amounts of funds. O'Brien (2003) finds that R&D intensity is negatively associated with leverage. In addition, Ou and Haynes (2006) identify that R&D cannot serve as effective collateral to support a high level of debt. Moreover, we anticipate financial constraints to have a substantial impact on R&D expenditures during the crisis. Everything else being equal, more constrained firms invest more during the financial crisis. The CAPEX variable, tied up to long term debt, could lead to the commonly believed conclusion that companies issue non-current debt in order to finance capital expenditures. Finally, provided that we select a continuous period under widely varying market conditions, we will look for consistency with the market timing behavior, where debt issuances and equity repurchases are significantly higher in good times than in difficult economic circumstances whereas firms tend to use less external financing in bad times.

3.3 Financially constrained and unconstrained firms

We have chosen to focus on the hypothesis that financially constrained firms might have less access to external capital financing than unconstrained firms and display higher levels of average leverage. We expect that a firm which is financially constrained will experience problems in obtaining enough finance from the capital markets, and may not have the possibility to take on all the investments it wants to. Smaller firms are usually more constrained than larger firms. The larger firms are less risky and more diversified, therefore the probability of financial distress and respectively bankruptcy is lower (Faulkeder and Petersen, 2005: 58). While on the other hand, small companies are seen as young, more likely to be risky and have short track of accounting records (Guariglia, 2008: 5). Large firms must normally have more alternatives in obtaining external finance. For example, they have better opportunities of raising funds through the equity or bond markets, while smaller firms are usually restricted to bank borrowing. Moreover, in consistency with the original paper of Whited and Wu (2006) we anticipate to conclude that large constrained firms are less levered than small constrained companies.

3.4 Financial constraints measurement

The literature has yet to settle a standard measure of firm's financial constraints. In our study we begin by adopting an index used in the article "Do investment-cashflow sensitivities provide useful measures of financing constraints?" by Steven N. Kaplan and Luigi Zingales (1997). Based on their results, Lamont, Polk, and Saá-Requejo (1997) proposed the Kaplan-Zingales (thereafter KZ) index as a relative measurement of reliance on external financing that remains, despite certain criticism, the most popular measure of financial constraints. The primary restrictions related to the computation of the KZ index are the imposed number coefficients/weights assigned to each constraint fator, taken directly from their paper. In order to make our analysis less vulnerable to the choice of measure, we consider firm size and dividends per share as complementary determinants of financial constraints. A study by Lamont et al. (2001) shows that the size factor complements KZ index as both variables move in the same direction. A standard assumption in the literature is therefore often that firm size is a good proxy for the extent to which a firm is financially constrained, with smaller firms being more constrained. To further strengthen the credibility of the KZ financial constraints measurement, we take into consideration other plausible classifications such as the Whited and Wu index, Hadlock and Pierce SA index and Faulkender and Petersen's debt rating ranking. Due to data unavailability of important variables, the indices alternative to KZ are not used in our paper. The latter two indices require firm age as an important factor, which is impossible to obtain in large sample of data. Unlike KZ index, the Whited and Wu index incorporates firm size along with industry growth and avoids using Tobin's Q which is claimed to contain a measurement error (Erikson and Whited, 2000). Given that we do not have at our disposal a detailed industry codes breakdown and more importantly the number of firms is relatively low, we would have to arbitrarily set industry growth to zero. Such approach would necessarily lead to erroneous results and wouldn't bring any advantage to using the KZ index. The KZ index is higher for companies that are financially constrained and opposite for financially unconstrained. The index incorporates five variables: cash flow to total capital (negative), the market to book ratio (positive), leverage (positive), dividends to total capital (negative), and cash holdings to capital (negative) (Lamont et al., 2001: 532).

$$KZindex = -1.002CashFlow + 0.283Q + 3.139Leverage - 39.368Dividends - 1.315CashHoldings$$

The cash flow component equals the sum of operating profits, depreciation of fixed assets and write-down of fixed and intangible assets. The market to book ratio variable is equivalent to the Tobin's Q which reflects the asset to sales ratio, normalized across industries, and serves as a proxy for investment opportunities available to a firm. Leverage is estimated as the total amount of debt to total assets, while dividends are normalized by dividing them by total assets and finally, cash holdings comprise cash on hand and bank deposits, divided by the total asset base.

After calculating the KZ index for each firm, our study forms portfolios by ranking companies according to the index. The ranking is then used for creation of a dummy variable, that takes on value either zero or one, based on the position of a given form in a given year relative to the other companies in such year. The 20% of companies in the year with the highest KZ ranking are assigned a value of one, i.e. are considered as financially constrained. A similar dummy is then created for unconstrained firms - the 20% of companies in the year with the lowest KZ ranking are assigned a value of one and are therefore considered as unconstrained. These variables then allow us to identify subsamples of our available dataset for observing how constrained companies differ from those that are unconstrained.

3.5 Econometric tests

Based on theory of statistics and econometrics we proceed with a set of standardized econometric tests to ensure we are using suitable methods and our regressions fulfill the required assumptions. Due to the character of our micro panel data with relatively short time period we do not perform a test for cross sectional dependence for is unnecessity (Baltagi, 1995).

In all of our regressions, due to the character of our data, we use the Fixed Effects panel data estimator. This allows us to capture the individual heterogeneity contained in the dataset. It means we will not be able to observe the unobservable individual and time-invariant differences per se, because those are automatically removed from the regression. However, we are not focused on these individual cross-sectional and time-invariant properties, but rather on the impact of the observed variables on leverage over time. The suitability of Fixed Effects model, rather than Random Effects was checked by Hausman test. The test essentially compares both the FE and RE, and tests for the null hypothesis of "both FE and RE are consistent". The

rejection of the null hypothesis therefore favors the alternative – the FE model in our case is preferred due to the inconsistency of the RE model.

3.5.1 Heteroskedasticity

All of our regressions have been tested for heteroskedasticity using the Modified Wald groupwise heteroskedasticity test, and all of them were found to strongly reject the null hypothesis of homoskedasticity. Homoskedasticity, simply said constant variance of errors across the observations, is required to ensure the inference drawn from a regression is correct. The coefficients from a regression with heteroskedastic errors are correct, however the standard errors can be biased in both directions and therefore the conclusions drawn incorrect. Therefore, we apply heteroskedasticity-robust standard errors in all of the regressions to bypass the problem of heteroskedasticity.

3.5.2 Autocorrelation

Serial correlation is mostly an issue for panel data with long time periods, which is not our case. The problem generally arises when the number of time periods is large relative to number of observations, and therefore autocorrelation shouldn't pose a large problem for our regressions. When autocorrelation in errors is found, the standard errors are not correct and the inferences drawn are misleading. However, this issue can be fairly simply avoided by using a fully robust asymptotic variance matrix estimator which is asymptotically (T fixed and N -> infinity) just as valid as the non-robust one. Nevertheless, when we tested for autocorrelation, the null hypothesis of "no serial correlation in errors" was rejected. Based on the above mentioned we use HAC errors in all regressions (Wooldridge, 2002).

4. Results and discussion

In this chapter we document the observed results on the relationship between financial constraints, leverage and the pertaining financial metrics, which are expected to explain a significant part of the variations in the debt to equity ratio. Then, we focus on the interpretation of the estimated results by highlighting consistencies with previous capital structure and financial constraints theories and empirical evidence. We set the outcome of the performed empirical and statistical tests against our initial assumptions by looking for support of our exposed presumptions and also, by contrasting the outcome with our expectations on the effect of financial constraints on firms' financing decisions ex-ante, during and post the global financial crisis within the period 2003-2014. We draw specific attention the distinguishing features of our paper and its underlying contribution to the economic research – to identify meaningful dynamic trends and cross-sectional variation in the corporate financing decisions of constrained and unconstrained firms given a stress period and worsened economic conditions. The framework presented in our thesis may be used by the policymakers for identification of companies that are in severe need of financing and for better targeting the government aid to these companies when serious economy downturn occurs. Moreover, we examine whether the capital structure decisions of firms, headquartered in a low risk country such as Sweden, have succumbed to financial constraints and limited sources of capital financing and thereby have changed substantially during and post the global financial crisis.

4.1 Evidence on full sample

We start off with a comment on relationship between size of company and a few of the important determinants in the full sample period 2003-2014 broken down into size quartiles. We control for industry in view to neutralize the cross sectional sector variations. The general results in Table 6 are, in our case, only useful for checking whether the expected signs and trends in our data hold. Leverage is not surprisingly increasing with size of a company in both definitions of leverage – total debt to assets and total debt to equity. Dividends per share are Table 3also very strictly increasing with size, however, price to book ratio has a negative relationship and decreases with size. This may point at the fact that smaller companies are assumed by the investors to have better investment opportunities. Tangibility is not significantly different across size quartiles. An interesting observation offers the relationship of profitability

of firm and size. On average, the first half of companies in our sample, sorted by size, is generating loss throughout the period, while the larger half of firms generates profits.

In the initial regression we follow up on the general results in Table 7 in order to observe the relationships between leverage and all of the suitable variables. The overall number of 26 variables was brought down to only 10 in order to overcome multicollinearity and endogeneity within the data. For example, Revenues and Total Assets, or Net Profit and Operating Income are highly correlated within the available dataset.

$$\begin{aligned} Leverage_{it} = \ & \alpha + \beta_1 DPS_{it} + \beta_2 TotAss_{it} + \beta_3 CAPEX_{it} + \beta_4 TBill_{it} + \beta_5 NetMgn_{it} \\ & + \beta_6 PtB_{it} + \beta_7 Tangibility_{it} + \beta_8 Profitability_{it} + \beta_9 IndustryAvg_{it} \\ & + \beta_{10} R\&D_{it} + \beta_{11} PrVolat_{it} + \varepsilon_{it} \end{aligned}$$

The results in Table 2 do indicate some of the expected relationships. Size of a company has a positive and significant effect on leverage. Expected inflation, proxied by government T-Bills is also positive and significant, and so is price to book ratio, while profitability has the opposite effect. Industry average shows the opposite effect than initially expected, the coefficient is however strongly insignificant. Dividends per share also have the opposite sign than expected, although the predicted effect is very close to zero. Price volatility did not prove to be a significant factor, the effect has the expected negative sign, however is insignificant. The overall R^2 reported is 36% and the F-test for joint significance shows a correctly stated model.

In the next step we perform a regression of the full sample, but this time with only a limited set of the 6 important "core factors" as identified by Frank and Goyal. The results (see Table 2) indicate that the regression limited to only 6 factors may indeed be more suitable to our data as the output changed only very slightly, yet we are able to save degrees of freedom.

$$\begin{aligned} Leverage_{it} = \ & \alpha + \beta_1 TotAss_{it} + \beta_2 TBill_{it} + \beta_3 PtB_{it} + \beta_4 Tangibility_{it} \\ & + \beta_5 Profitability_{it} + \beta_6 IndustryAvg_{it} + \varepsilon_{it} \end{aligned}$$

The R^2 changed only marginally, significance of individual regressors stayed, and the coefficients also didn't change significantly compared to the previous regression with many factors. Based on these results in Table 2 we use the "six core factors" as a list of independent variables in the remaining main regressions used in the analysis.

Regression results for all factors and for core factors only

Leverage	***2003-2014 – all factors***	***2003-2014 – "core factors"***
Size	0.633** (0.159)	0.543** (0.108)
T-Bill	0.111** (0.019)	0.113** (0.019)
PtB	0.183** (0.014)	0.189** (0.016)
Tangibility	0.485 (0.339)	0.570 (0.385)
Profitability	-1.738* (0.912)	-2.929** (1.229)
Industry Avg	0.013 (0.021)	0.013 (0.019)
Dividends per share	0.027 (0.019)	-
CAPEX	0.216 (0.165)	-
Net margin	-0.192 (0.223)	-
R&D	0.011 (0.087)	-
Price volatility	-0.002 (0.012)	-
Constant	0.102 (0.264)	0.125 (0.198)
R^2	0.36	0.33

** (**) = significant at 10% (5%) level*

Table 2Regression results for all factors and for core factors only

In the next step we perform 3 sets of regressions (for the three time periods – pre, during, and post-crisis) with the same set of relevant factors as above, in order to assess the crisis' effect on the full sample of our data. Comparison of the regression output, summarized in the right side of Table 3 reveals that size of a company has a significant and positive effect on leverage in all time periods, this comes as no surprise as the effect is in line with the summary Table 7. The expected inflation and price to book ratio are also positive and significant factors for leverage.

The higher the profitability of Swedish listed companies, the less levered they were, although the effect apparently diminished over the time period observed. Unexpected results come from tangibility of company's assets – not only is the factor mostly insignificant, but the sign is inconsistent between the respective time periods no matter what definition of tangibility was used (Fixed Assets / Assets, Net PPE / Assets, Tangible Assets / Assets). Based on the results we observed we can conclude the tangibility did not affect company's leverage during the observed time periods.

Regression results of full sample

Leverage	***2003-2014***	***Pre-Crisis***	***Crisis***	***Post-Crisis***
Size	0.543** (0.108)	0.175* (0.092)	0.665** (0.333)	0.862** (0.398)
T-Bill	0.113** (0.019)	0.068** (0.027)	0.088** (0.022)	0.196** (0.069)
PtB	0.189** (0.016)	0.237** (0.023)	0.147** (0.010)	0.188** (0.013)
Tangibility	0.570 (0.385)	-1.452** (0.505)	0.779 (1.043)	-0.160 (1.389)
Profitability	-2.929** (1.229)	-5.181** (0.704)	-1.887** (0.543)	-0.418* (0.265)
Industry Avg	0.013 (0.019)	0.009 (0.011)	Excl.	Excl.
Constant	0.125 (0.198)	0.289 (0.226)	0.761 (0.598)	0.296 (0.199)
R^2	0.33	0.24	0.17	0.16

** (**) = significant at 10% (5%) level; Excl. = Industry Average variable excluded due to collinearity*

Table 3Regression results full sample

4.2 Evidence on financially unconstrained firms

Financially unconstrained firms show strong evidence in equity financing preference throughout the period of interest 2003-2014. Companies, headquartered in Stockholm, such as H&M, Electrolux and TeliaSonera record a heavy reliance on equity financing and maintain the same leverage levels regardless what the economic circumstances are. Despite having access to variety of sources of debt financing, the large sized Swedish companies generally tend

to be reluctant on carrying on more debt (see the right side of Table 8). However, we observe relatively small, but positive relationship between leverage and firm size for financially unconstrained firms. This parallels closely to the findings of Frank and Goyal (2003), Psillaki and Daskalakis (2008) and it is consistent with the pecking order theory that applies to a broader extent especially for large sized companies. An additional argument in favor of the above mentioned positive relationship is the greater involvement of large companies in the capital markets. On the other hand, it contradicts the tradeoff theory, suggesting that the identified unconstrained Swedish companies are not fully exploiting the benefits of debt financing. The market timing theory does not enter into force for the unconstrained firms financing decisions. The latter indicates to be independent of the market timing conditions and Swedish managers appear to follow diligently the established long term financing strategy of the firm. Small unconstrained companies' financing preferences also appears to be independent of the time period. A plausible explanation for the low average leverage levels is the fact that small businesses often exploit options like own funds and venture capital financing.

Surprisingly, the dividends per share ratio for financially unconstrained firms slightly increases during and post the global financial crisis. This is in contrast with our presumptions, but stipulated in the paper of Arnold (2013), suggesting that dividends reflect the information about a company and changes in the dividend policy serves as a signal to the market about the management's view on the future prospects of the firm. Given the absence of constraints, these Swedish firms attempt to keep their good financial profile by raising dividends and might even opt for repurchasing stocks at a later stage. (Lee, Lusk and Halperin, 2013) The authors call this a silver lining hypothesis stating that the storm of economic bad times often creates circumstances that influence dividend payout strategies for unconstrained listed firms and different dividend strategies may be consciously elected to reveal to the market participants a silver lining in cloud of bad times.

In line with the findings of Frank and Goyal (2003), we observe that profitable unconstrained firms are less levered and further, during worsened market conditions, they are not likely to change their financing choices. Yet, we have to point out that the profitability ratios for unconstrained firms deviate around zero and thus, we cannot be firm in our conclusion on the negative correlation between profit margins and the debt portion. This is in conformity with Fama and French (2002) hypothesis that the role of profitability in explaining the variations in

the leverage structure has been declining steadily over the last three decades. We affirm that this statement is also applicable to unconstrained firms.

Regression results of unconstrained firms

Leverage	***Pre-Crisis***	***Crisis***	***Post-Crisis***
Size	0.030* (0.017)	0.035* (0.019)	0.002* (0.001)
T-Bill	0.005 (0.006)	0.009 (0.008)	0.005 (0.003)
PtB	-0.000 (0.001)	0.006 (0.005)	0.000 (0.000)
Tangibility	-0.117 (0.080)	-0.239 (0.221)	-0.017 (0.014)
Profitability	0.097* (0.054)	0.061 (0.041)	-0.001* (0.000)
Industry Avg	Excl.	Excl.	Excl.
Constant	0.201 (0.232)	0.140 (0.319)	0.021 (0.072)
R^2	0.11	0.09	0.10

** (**) = significant at 10% (5%) level; Excl. = Industry Average variable excluded due to collinearity*

Table 4Regression results unconstrained firms

The regression analysis of the available data sample did not bring any new conclusions because most of the variables appear insignificant. The only significant factors appear to be size and profitability, all of the additional are insignificant even after various changes in equation specifications. Therefore, based on the above mentioned, the regression results in Table 4 and descriptive statistics in Table 8, we can conclude the financing decisions of the Swedish companies identified as unconstrained depend only on size and profitability, not on the other main factors that play a role in the general sample. Size of a company has the expected effect on leverage, profitability appeared to be positively correlated to leverage before the financial crisis, not after it.

4.3 Evidence on financially constrained firms

One of the most prominent inferences of our paper stands for financially constrained companies. When we look at the average over the entire period 2003 – 2014, we discover an unlikely negative relationship between leverage and size within the 20% most severely constrained firms of our sample of Swedish listed firms. However, the regression analysis allows us to look closer at the individual effects. From Table 5 we can see that before the financial crisis the effect of size was positive and changed to negative with the crisis. After the crisis the effect is still negative and significant, but relatively close to zero, indicating there may exist a mean-reversion process in the relationship. When we dropped year 2010 from the post-crisis period the negative coefficient further decreased, and dropping 2011 brought the coefficient back to positive figures although its significance decreased, perhaps due to more limited number of observations. The expected inflation, proxied by government T-Bill rate, was significant and positive during the crisis, and significant and negative after the crisis. The post-crisis coefficient contradicts both the tradeoff theory and the market timing theory that expect firms to issue debt when the inflation is expected to increase – the higher the inflation, the lower the real value of the debt is. We suppose the relationship in this period is not to be taken as a general change in trend, rather a spurious regression due to the decreasing rates and growing economic activity in the post-crisis period. Tangibility appears to significantly affect leverage of constrained companies. Fixed asset and current asset base decreases throughout the period 2003-2014. This is related to the common belief that the redeployability of tangible assets is a key determinant of firm capital structure. Consistent with a credit supply view of the capital structure, exposed by Campello and Giambona (2010), asset redeployability is a particularly important driver of leverage for firms that are more likely to face credit frictions (small, unrated, constrained, and low payout firms). Their additional tests show that asset redoployability facilitates borrowing the most during periods of tight credit in the economy. Profitability has the expected negative sign in all three periods, but during the crisis the effect decreases. As suggested by the pecking order theory, highly profitable but still constrained companies tend to reduce their external funding which at the end signals to creditors that they have lower bankruptcy risk (Wald, 1999) and thus, they might appear capable of overcoming the imposed constraints. Our evidence is also in conformity with Titman and Wessels (1988) who argue that constrained firms with low or negative profitability are less likely to be in position to finance their long term investments with retained earnings or to attract external investors. We gauge that the profitability ratio loses

on significance during and post-crisis. Given that the overall profit margins for Swedish firms succumb to the unfavorable effects of the financial crisis, profitability becomes less important determinant of the amount of leverage after 2007.

Regression results of constrained firms

Leverage	***Pre-Crisis***	***Crisis***	***Post-Crisis***
Size	1.374** (0.562)	-3.621* (1.893)	-0.254* (0.138)
T-Bill	0.030 (0.106)	0.090* (0.045)	-0.108* (0.056)
PtB	0.069 (0.060)	-0.031 0.308)	-0.016 (0.014)
Tangibility	3.655** (1.529)	2.393** (0.877)	1.820* (1.012)
Profitability	-4.763** (2.080)	-1.272 (1.008)	-4.379** (0.771)
Industry Avg	-0.061 (0.044)	Excl.	Excl.
Constant	-2.090 (1.057)	4.558 (3.289)	4.610 (4.753)
R^2	0.14	0.11	0.07

** (**) = significant at 10% (5%) level; Excl. = Industry Average variable excluded due to collinearity*

Table 5 Regression results of constrained firms

4.4 Evidence on newly listed and delisted firms

We review the companies listed and delisted from Stockholm stock exchange throughout the period of interest 2003-2014. We launch the hypothesis that delisted are those, that were not able to overcome the severe financial and economic circumstances in the crisis period and ceased to exist under their initial form. We reckon that there might be an impact of the capital structure decisions and the financial constraints these firms have faced, that further pushed them into restructuring. Due to data restrictions, we cannot distinguish a bankruptcy from merger, acquisition, or restructuring. However, by using the comprehensive NASDAQ OMX "Changes List" for Stockholm headquartered companies we can see the greatest number of delistings has

occurred precisely after the beginning of the global financial crisis. In support to the above-mentioned hypothesis that the lowest number of newly listed companies (including IPO, spin-off and equity carve out strategies) has been recorded in the same period. We find that the companies, delisted during and post-crisis, have constraints and leverage that exceed the average level for our selected sample of Swedish firms. This evidence is consistent with our previously stated expectations.

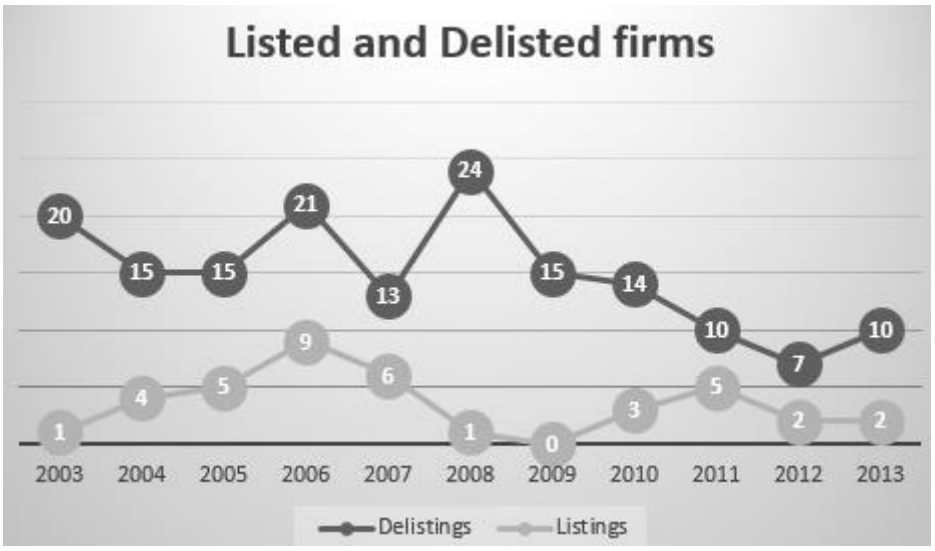

Figure 1 Comparison Listings & Delistings

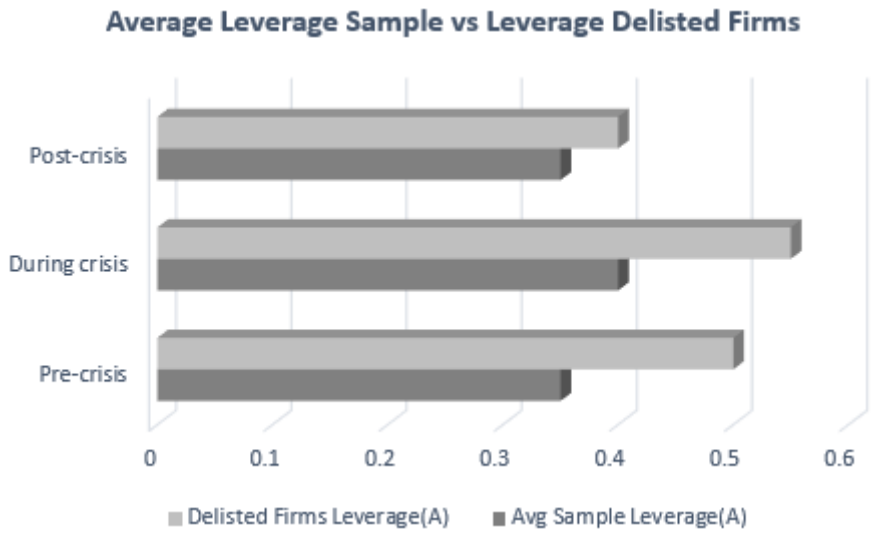

Figure 2 Average Sample Leverage vs Delisted Firms Leverage

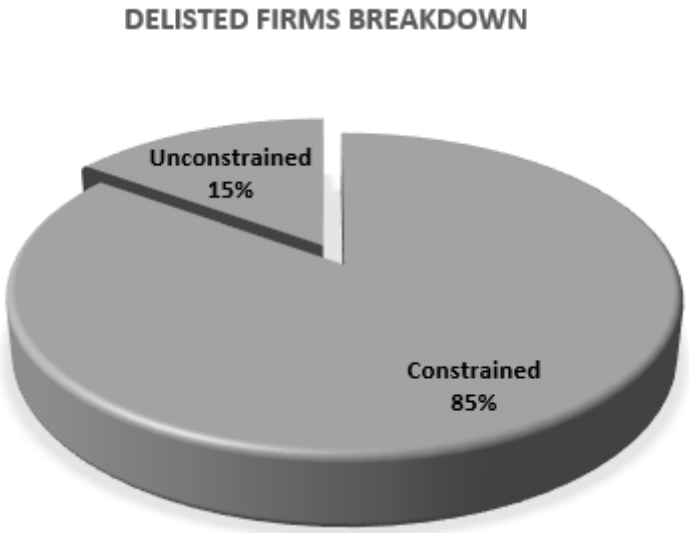

Figure 3 Delisted firms breakdown per constraints

4.5 The effect of the global financial crisis and financial constraints on leverage

The study illustrates that the global financial crisis had mild influence over the capital structure decisions of the Swedish companies. This inference is consistent with previous research on the effect of the global financial crisis on the Nordic region. (Hetland and Mjos (2012), Campello (2009), Osterholm (2009)). Looking at these results further broken down into the three separate periods (pre-, during, and post-crisis), the pattern within each of the important variables is again clearly visible (Table 7). We can, however, observe the effect of the individual time periods. The leverage of an average firm in both of the definitions is the lowest before the crisis, then slightly increases during the crisis. It would be fair to say that Swedish companies tend to be conservative in changing the financing preferences. The country's credit rating throughout the period remains AAA with a stable outlook (ranked at the same level by S&P,Moody's, and Fitch) throughout the entire period of observation. The average Swedish firm's debt capacity in the selected sample is big enough to allow Swedish firms carry on more debt during and post-crisis. The price to book variable increased for the smallest firms the most during the crisis, which may point at an overall low confidence of the investors towards traditional investments and rather a search for alternatives. We cannot identify a clear pattern or a substantial change for the rest of the presented variables across the time periods.

The relationships are, however, more interesting in the sample that is limited to constrained and unconstrained firms only. We conclude that financial constraints have stronger effect on the Swedish firms' capital structure decisions than the global financial crisis. The results can be observed in Table 7 and Table 8 in Appendix A: Descriptive statistics for both the respective subsamples of companies. It is no surprise that the average level of leverage in both definitions for constrained companies is much higher than in the full sample, on the other hand the average leverage of the unconstrained firms is very low. What might come as a surprise is the difference across the individual size quartiles – the larger the company identified as constrained is, the lower the average leverage is in all of the time periods. Although this affirmation might look counterintuitive at a first glance, it explicitly illustrates the substantial effect of capital financing restrictions. These firms face limitations in terms of debt financing sources and are usually rigorously examined before being allocated the desirable external financing. The above mentioned negative relationship with leverage applies also to the least constrained companies. However, the reasoning lies into the well known pecking order theory along with the pure equity preferences of unconstrained large companies like H&M. Further, the least constrained firms maintain a large stock of cash. Our intention to contrast constrained with unconstrained firms moves forward by touching upon the price to book ratio. When it is plotted against firm size, it indicates an opposite relationship for constrained companies than it does for unconstrained companies. The fact that the smaller constrained companies have a lower valuation ratio than larger constrained companies may indicate that the large companies, when in financial problems, are still viewed as somewhat safer to invest compared to small companies. Smaller companies usually publish much less information about their financials and therefore the investors are cautious towards them (Kolb, 2010). Moreover, constrained companies risk earning negative returns on their assets which could further limit their access to financing. We hold the belief that the market timing strategy on the capital structure policy might be appealing for the firms. The ratio for the constrained companies decreased significantly during the crisis, to hover around 1, before increasing again in the post-crisis period, although it remained lower for the small companies.

5. Conclusion

Our paper identifies meaningful dynamic trends and cross-sectional variations in the capital structure preferences of financially constrained and unconstrained firms listed on Stockholm stock exchange. In consistency with the empirical evidence of Frank and Goyal (2003), we find that significant part of the variation in the leverage preferences for the full sample is explained by the six "core determinants": industry median leverage, tangibility, profits, firm size, market-to-book asset ratio, and expected inflation. Further, we illustrate the relatively minor impact on the financing choice of five additional variables – dividends per share, CAPEX, R&D, price volatility, and net margin.

The study shows that the global financial crisis of 2007-2009 has a mild effect on the capital structure decisions of Swedish firms, due to the fact that Sweden was not hit hard during the financial crisis compared to other developed countries. The selected sample of Swedish firms tend to stick to their long term financing strategy and remain conservative in their choices. The leverage of an average Swedish firm in both the debt to equity and debt to assets definitions is the lowest before the crisis, then slightly increases during the crisis.

We conclude that financial constraints have stronger effect on the Swedish firms' capital structure decisions than the global financial crisis. We observe strong equity preference for financially unconstrained firms. Our regression analysis on unconstrained firms outlines significant results for profitability and firm size. Following the outcome, it can be inffered that profitable unconstrained firms are less levered, while large unconstrained confirm the financing postulates of the pecking order theory.

It would be fair to say that the worsened economic circumstances have more significant impact on financially constrained companies. One of the notable points of our analysis emphasizes the unlikely negative relationship between leverage and firm size for the most constrained Swedish companies as per the KZ index. Additionally, the results on tangibility, expected inflation and profitability are significant and parallel closely to Frank and Goyal (2003) empirical evidence. However, the explanatory power of the latter two decreases as the time progresses. On the other hand, leverage levels for constrained firms appear to depend to a larger extent on tangibility and firm size.

Finally, we succeed in obtaining a proof for our hypothesis that the companies delisted during and post-crisis have constraints and leverage that exceed the average level for the selected sample of Swedish firms. Respectively, we stress that, the impact of the capital structure decisions, the global financial crisis and the financial constraints these firms have faced, further pushed them into restructuring.

The conclusions laid in this analysis are limited in two aspects. First and foremost, the identification of the constrained subsample of firms is necessarily arbitrary and subject to authors' individual assessment, as discussed in Chapter 3.4 Financial constraints measurement. The results can therefore vary depending on the index chosen as the decisive factor for identification of constrained firms, and on the quantile of firms selected as constrained or unconstrained. We selected KZ index with specific coefficients of the individual factors for assigning a value to each firm and year based on relevant literature. Changing the weights of the individual factors would therefore necessarily affect the index number assigned. Second, in such large list of companies the data cannot be obtained by going through each company's annual report, but has to be obtained from a database. The availability of variables for each company is therefore dependent on quality of such database; the larger the company is the more data points are available. The topic can be further developed by analyzing capital structure of companies within a country that was harder hit by the global financial crisis than Sweden.

Appendix A: Descriptive statistics

Full sample, quartiles per size

		All Firms					
2003-2014		Leverage(A)	Leverage(E)	DPS	PTB	Tangibility	Profitability
Size quantile	1	0.13	0.47	0.12	5.87	0.65	-0.42
	2	0.14	0.22	0.46	3.11	0.73	-0.02
	3	0.22	0.83	1.11	2.33	0.71	0.06
	4	0.30	1.77	3.10	2.24	0.69	0.07

Table 6Full sample, quartiles per size

Full sample quartiles breakdown, per size and period

		All Firms					
Pre-Crisis		Leverage(A)	Leverage(E)	DPS	PTB	Tangibility	Profitability
Size quantile	1	0.13	0.47	0.12	5.84	0.65	-0.42
	2	0.14	0.21	0.45	3.12	0.73	-0.03
	3	0.22	0.81	1.10	2.34	0.71	0.06
	4	0.30	1.76	3.08	2.25	0.69	0.07

Crisis		Leverage(A)	Leverage(E)	DPS	PTB	Tangibility	Profitability
Size quantile	1	0.13	0.47	0.13	5.92	0.65	-0.42
	2	0.15	0.22	0.45	3.12	0.73	-0.03
	3	0.22	0.80	1.10	2.32	0.71	0.06
	4	0.30	1.78	3.07	2.25	0.69	0.07

Post-Crisis		Leverage(A)	Leverage(E)	DPS	PTB	Tangibility	Profitability
Size quantile	1	0.13	0.46	0.12	5.88	0.65	-0.42
	2	0.15	0.23	0.46	3.08	0.73	-0.03
	3	0.22	0.84	1.14	2.38	0.71	0.06
	4	0.30	1.78	3.13	2.20	0.69	0.07

Table 7Full sample quartiles breakdown, per size and period

Financially constrained and unconstrained firms breakdown, quartiles per size

		Constrained Firms						Unconstrained Firms					
Pre-Crisis		**Leverage(A)**	**Leverage(E)**	**DPS**	**PTB**	**Tangibility**	**Profitability**	**Leverage(A)**	**Leverage(E)**	**DPS**	**PTB**	**Tangibility**	**Profitability**
Size quantile	1	0.410	1.493	0.848	1.379	0.785	-0.031	0.015	0.025	0.050	4.637	0.682	-0.118
	2	0.516	1.788	4.402	1.403	0.667	0.042	0.019	0.040	0.219	4.454	0.781	-0.156
	3	0.362	1.012	4.645	1.193	0.680	0.043	0.007	0.012	0.974	4.414	0.716	0.061
	4	0.268	0.786	2.964	1.768	0.760	0.073	0.010	0.014	2.305	3.598	0.846	0.132
Crisis		**Leverage(A)**	**Leverage(E)**	**DPS**	**PTB**	**Tangibility**	**Profitability**	**Leverage(A)**	**Leverage(E)**	**DPS**	**PTB**	**Tangibility**	**Profitability**
Size quantile	1	0.451	2.070	1.282	0.795	0.786	-0.102	0.007	0.008	0.143	5.857	0.842	-0.322
	2	0.512	1.791	4.528	0.750	0.708	0.029	0.022	0.042	0.377	4.336	0.774	-0.063
	3	0.424	1.246	4.382	1.141	0.579	0.032	0.008	0.013	0.833	2.433	0.662	0.106
	4	0.280	0.844	3.936	1.364	0.761	0.035	0.013	0.020	3.036	2.541	0.737	0.151
Post-Crisis		**Leverage(A)**	**Leverage(E)**	**DPS**	**PTB**	**Tangibility**	**Profitability**	**Leverage(A)**	**Leverage(E)**	**DPS**	**PTB**	**Tangibility**	**Profitability**
Size quantile	1	0.473	2.157	0.641	1.181	0.764	-0.063	0.018	0.018	0.270	3.721	0.757	-0.258
	2	0.496	1.414	0.789	1.374	0.714	0.023	0.006	0.008	1.158	4.534	0.737	-0.040
	3	0.390	1.436	3.582	1.252	0.630	0.038	0.008	0.014	0.948	3.461	0.736	0.117
	4	0.278	0.988	3.996	1.819	0.705	0.064	0.012	0.024	2.634	3.608	0.734	0.157

Table 8Financially constrained and unconstrained firms breakdown, quartiles per size

Appendix B: Listed and delisted firms

Number of newly listed and delisted companies in the period 2003-2014

Year	Delistings	Listings
2003	20	1
2004	15	4
2005	15	5
2006	21	9
2007	13	6
2008	24	1
2009	15	0
2010	14	3
2011	10	5
2012	7	2
2013	10	2

Table 9 Number of newly listed and delisted companies in the period 2003-2014

Bibliography

Agca, S. and Mozumdar, A. (2004). Firm Size, Debt Capacity, and Corporate Financing Choices. *SSRN Electronic Journal*, Vol. 12/2004.

Baker, M. and Wurgler, J. (2002). Market Timing and Capital Structure. *The Journal of Finance, 57: 1–32.*

Baltagi, B. (1995). *Econometric analysis of panel data*. Chichester: Wiley.

Bond, S. R., Soederbom, M, and Wu G. L. (2010). The Effects of Financing Constraints on Firm Investment: A Structural Econometric Analysis. Working Paper.

Campello, M. and Giambona, E. (2010). Asset tangibility and capital structure. EBS Universität, Working paper.

Campello, M., Graham, J. and Harvey, C. (2010). The real effects of financial constraints: Evidence from a financial crisis. *Journal of Financial Economics*, 97(3), pp.470-487.

Duchin, R., Ozbas, O. and Sensoy, B. A. (2010). Costly external finance, corporate investment, and the subprime mortgage credit crisis. *Journal of Financial Economics 97,* pp.418-435.

Erickson, T. and Whited, T. (2000). Measurement Error and the Relationship between Investment and q. *Journal of Political Economy*, 108(5), pp.1027-1057.

Fama, E. F. and French, K. R. (2000). Forecasting Profitability and Earnings. *The Journal of Business, 73(2),* pp.161–175.

Fama, E. F. and French, K. R. (2002). Testing Trade-Off and Pecking Order Predictions about Dividends and Debt. *The Review of Financial Studies,* 15(1), pp.1–33.

Farre-Mensa, J. and Ljungqvist, A. (2015). Do Measures of Financial Constraints Measure Financial Constraints? *Rev. Financ. Stud.*, 29(2), pp.271-308.

Faulkender, M. and Petersen, M. (2005). Does the Source of Capital Affect Capital Structure?. *Rev. Financ. Stud.*, 19(1), pp.45-79.

Fazzari, S., Hubbard, R., Petersen, B., Blinder, A. and Poterba, J. (1988). Financing Constraints and Corporate Investment. *Brookings Papers on Economic Activity*, 1988(1), pp.141-195.

Fosberg, R. (2015). Capital structure and the financial crisis. *Journal of Finance and Accountancy*;2012, Vol. 11, p.46.

Frank, M. Z. and Goyal, V. K. (2002). Testing the pecking order theory of capital structure. *AFA 2001 New Orleans*.

Frank, M. Z. and Goyal, V. K. (2003). Capital Structure Decisions. *AFA 2004 San Diego Meetings*.

Frank, M. Z. and Goyal, V. K. (2009). Capital Structure Decisions: Which Factors Are Reliably Important?. *Financial Management, 38: 1–37*.

Goodfriend, M. and King, R. (2015). Review of the Riksbank's Monetary Policy 2010-2015. *SSRN Electronic Journal ISSN 1653-0942*.

Guariglia, A. (2008). Internal financial constraints, external financial constraints, and investment choice: Evidence from a panel of UK firms. *Journal of Banking & Finance*, 32(9), pp.1795-1809.

Harris, M. and Raviv, A. (1991), The Theory of Capital Structure. *The Journal of Finance*, 46: pp.297–355.

Hetland, O. and Mjos, A. (2012). Credit Shocks harm the unprepared-financing contraints and the financial crisis. *Norwegian School of Economics. Department of Finance and Management Science*, Discussion paper;2012:11.

Kaplan, S. N. and Zingales, N. (1997). Do Investment Cash-Flow Sensitivities Provide Useful Measures of Financing Constraints? *Quarterly J. of Economics*, Vol. 112 No. 1, February 1997.

Kolb, R. (2010). *Lessons from the financial Crisis: Causes, Consequences, and Our Economic Future*. Hoboken, N.J.: Wiley.

Kraus, A. and Litzenberger, R. (1973). A State-Preference Model of Optimal Financial Leverage. *The Journal of Finance*, 28(4), p.911.

Lamont, O., Polk, C. and Saa-Requejo, J. (1997). Financial Constraints and Stock Returns. *Review of Financial Studies*, 2001, v14, pp.529-554.

Lee, C. Lusk, E. and Halperin, M. (2013). The Recent US Financial Crisis: Its Impact on Dividend Payout.Strategy and a Test of the Silver-Lining Hypothesis. *J. Modern Accouning and Auditing,* Vol. 9 Iss. 5.

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

Myers, S. C. (1984), Capital Structure Puzzle. *Journal of Finance*, Vol. 39, No. 3, July 1984, pp.575-592.

Modigliani, F. and Miller, M. H. (1959), The Cost of Capital, Corporation Finance, and the Theory of Investment: Reply. *The American Economic Review*, 49(4), pp.655–669.

O'Brien, J. P. (2003). The capital structure implications of pursuing a strategy of innovation. *Strategic Management Journal*, 24(5), pp.415-431.

Osterholm, P. (2009). The Effect on the Swedish Real Economy of the Financial Crisis. *National Institute of Economic Research,* WP 110, February 2009.

Ou, C. and Haynes, G. (2006). Acquisition of Additional Equity Capital by Small Firms – Findings from the National Survey of Small Business Finances. *Small Bus Econ*, 27(2-3), pp.157-168.

Psillaki, M. and Daskalakis, N. (2008). Are the determinants of capital structure country or firm specific?. *Small Bus Econ*, 33(3), pp.319-333.

Schiantarelli, F. (1995). Financial constraints and investment: a critical review of methodological issues and international evidence. *Federal Reserve Bank of Boston,* vol. 39, pp.177-226.

Titman, S. and Wessels, R. (1988). The Determinants of Capital Structure Choice. *The Journal of Finance*, 43(1), p.1.

Wald, J. (1999). How Firm Characteristics Affect Capital Structure: An International Comparison. *Journal of Financial Research*, 22(2), pp.161-187.

Whited, M. (1992). Debt, Liquidity, Constraints and Corporate Investment. *The Journal of Finance*, Vol.47, No.4. (Sept.,1992), pp.1425-1460.

Whited, M. and Wu, G. (2006). Financial Constraints Risk. *The Review of Financial Studies*, Vol. 19, Issue 2, pp.531-559.

Wooldridge, J. (2002). *Econometric analysis of cross section and panel data*. Cambridge, Mass.: MIT Press.