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Financing Decisions and Firm-level Cost of Capital

Finance

Master's thesis

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Abstract of master's thesis

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Abstract

The most notable capital structure theories today are the traditional pecking order theory, trade-off theory and market timing theory. The first two theories hypothesize a semi-strong efficiency in the capital markets, whereas the market timing theory sees the capital market more or less inefficient. Thus, market timing theory allows the idea of managerial persons to be able to time the market, i.e. issue debt when it is cheap and issue equity when it is cheap. This kind of opportunistic behavior is not allowed by the pecking order or the trade-off theory. But then, why do we witness fluctuations in the general securities issuance behavior in the market?

The prior research has been focusing on explaining this behavior with ex post realized returns but it has been recognized by several studies (e.g., Froot & Frankel, 1989; Gebhardt, Lee, & Swaminathan, 2001; Hou, van Dijk, & Zhang, 2012) that such estimates are extremely noisy. Thus, I will be using a new, more robust measure for cost of capital named implied cost of capital (ICC) which equates the market value of equity and the forecasted future earnings of a given firm in a valuation model. In addition, I will be employing a firm-level ICC.

My data is acquired for U.S. based publicly traded companies for each year from 1974 to 2013. Using financial statement data for a period of minimum six years, I compute my own earnings forecasts applying a regression model introduced by Hou, Van Dijk, and Zhang (2012) and Lee, So, and Wang (2010) as opposed to using analyst forecasts that can biased. After computing the forecasts, apply them to three separate valuation models, and solve for the required market return R (discount rate in the models) which represents the implied cost of capital. These three estimates are used to compute a synthetic implied cost of capital index with equal weights after which it is converted into implied equity risk premium by subtracting the real interest rate.

As a result of my statistical models, I find that firm management follows the level of their firm specific cost of capital and make financing decisions based on this. This behaviour has become even more explicit during the last few years. However, they seem to follow the market-level cost of capital more closely. Changes in the tax rate and growth opportunities seem to also affect the financing behaviour which lends power to the traditional trade-off theory. When testing for the importance of the traditional pecking order theory, it seems to have lost most of its power to explain the securities issuance decisions after the late 1970s.

Keywords Capital structure, implied cost of capital, ICC, equity risk premium, market timing, trade-off, pecking order, firm-level cost of capital, ex ante

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Tiivistelmä

Merkittävimmät pääomarakenteeseen liittyvät teoriat ovat tänä päivänä pecking order -teoria, trade-off -teoria sekä market timing -teoria. Kaksi ensimmäistä teoriaa olettaa pääomamarkkinoiden olevan keskivahvasti tehokkaat, kun taas market timing – teorian mukaan pääomamarkkinat ovat enemmän tai vähemmän epätehokkaita. Tämän johdosta market timing–teoria tukee ajatusta, että yrityksen johto pystyy ajoittamaan markkinan niin, että yritys hankkii velkarahoitusta sen ollessa halpaa ja oman pääoman ehtoista rahoitusta kun se on halpaa. Pecking order- tai trade-off–teoria eivät salli tämän kaltaista oletusta. Mutta miksi yritykset käyttävät erilaisia rahoitusmuotoja vaihtelevasti eri aikoina.

Aikaisempi tutkimus on keskittynyt selittämään tätä käyttäytymistä soveltamalla ex post toteutuneita tuottoja, mutta useat tutkimukset (e.g., Froot & Frankel, 1989; Gebhardt et al., 2001; Hou et al., 2012) ovat osoittaneet näiden arvojen tuottavan epätarkkoja ennusteita. Tästä johtuen käytän tutkimuksessani tarkempaa mallia nimeltä implisiittinen pääoman kustannus (implied cost of capital, ICC), joka ratkaistuna asettaa yrityksen markkina-arvon ja tulevaisuuden kassavirrat arvostusmenetelmillä yhtä suuriksi. Lasken nämä arvot yrityskohtaisesti.

Käyttämäni aineisto käsittää yhdysvaltalaiset pörssinoteeratut yritykset vuosina 1974-2013. Käyttäen apunani vähintään kuuden vuoden tilinpäätöslukuja, lasken jokaiselle yhtiölle omat tuottoennusteet regressiomallin avulla, jonka esittelivät Hon, Van Djik ja Zhang (2012) sekä Lee, So ja Wang (2010). Tuottoennusteiden avulla ratkaistaan kolmesta eri arvostusmallista markkinoilla vaadittu tuottovaatimus ”R” (usein tunnettu diskonttokorkona), joka edustaa ICC arvoa. Näistä kolmesta arvosta luodaan synteettinen pääomakustannusindeksi, jossa kullakin ratkaistulla arvolla on yhtäläiset painokertoimet. Tämän jälkeen kustannusindeksi muutetaan oman pääoman riski preemioksi vähentämällä siitä todellinen markkinakorko.

Tilastollisten testien perusteella voidaan sanoa, että yrityksen johto seuraa oman yrityksensä pääomakustannustasoja ja tekee sen perusteella pääomituspäätöksiä. Tämä ilmiö on kasvanut entistä voimakkaammaksi viime vuosien aikana. Näyttää kuitenkin siltä, että yritykset seuraavat makrotason pääomakustannusindikaattoreita vieläkin tarkemmin. Muutokset veroasteessa ja kasvumahdollisuuksissa vaikuttavat myös johdon päätöksiin ja tukevat täten trade-off – teoriaa. Pecking order – teoria näyttäisi menettäneen huomattavasti kykyään selittää yritysten pääomarakenteeseen liittyvää päätöksentekoa 1970-luvun jälkeen.

Avainsanat Pääomarakenne, implied cost of capital, pääomakustannus, riskipreemio, markkinan ajoittaminen, market timing, trade-off, pecking order, yrityskohtainen pääomakustannus, ex ante

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1. Introduction

Maybe one of the better known finance and investing related quotes is the not-as-easy-to-follow rule that you should buy when the prices are low and sell when they are high. A quote usually linked to value investors such like Warren Buffet, sounds simple but requires hard work when trying to comply with. This sort of thinking, is not only unique for the capital market investors such as traders or regular retail investors, but can be linked to companies as well. As the price of external funding, whether it be equity, debt or something in between, changes over time, companies may try to take advantage of these movements are finance their operations and investment opportunities by issuing capital that is the least expensive for the company. This kind of a thinking is commonly referred as the market timing theory, but there are a lot of other theories related to the funding behavior of companies that do not see this sort of behavior relevant or even possible.

The most notable theories of capital structure and securities issuance are the static trade-off theory, the pecking order theory (Elton, 1999), and the market timing theory (Dong, Loncarski, Horst, & Veld, 2012). The initial idea of building a general theoretical framework for companies' capital structuring processes originates from the notion of a trade-off process in which the benefits and costs of securities issuances are compared to find out the perceived optimal capital structure for a given company. According to the pecking order theory a standard hierarchical order of capital sourcing is generally followed when making these decisions. Companies will prefer using the cheapest form of capital, the internally generated funds, as the default first choice. If the internal funding is inadequate or it is not available at all, companies will favor the less expensive (straight) debt capital issues over the more expensive convertible debt. New equity issuance is only considered as a final option, as it is considered to be the most expensive external source for capital. The market timing theory on the other hand, is based on the idea that the managers of firms are able to time the market and issue equity capital when the shares of the respective firm are overvalued in the market, and repurchase the shares as they become undervalued. This view challenges the standard capital sourcing hierarchy implied by the pecking order theory.

In their paper, Huang and Ritter (2009) recorded fluctuations in the time-series patterns of U.S. based firms' financing activities. These fluctuations show that an average firm relied increasingly on external capital market financing during the time period from 1963 to 2001. Especially interesting is that, it was pointed out that the firms issued an increasing amount of external equity securities relative to debt securities. These findings offer insightful evidence against the traditional pecking order theory. As a part of this thesis, I have also studied the time-series patterns of U.S. based publicly traded companies from 1974 to 2013. These findings support the evidence, recorded by Huang and Ritter (2009), which seem to be against the traditional pecking order theory. In my study, the relative amount of net equity issuances has been growing during the sample period from 1974 to 2013. A more exhaustive picture of this development is provided in the latter sections of this paper.

To test these theories and their hypothesized world, a measure reflecting the relative cost of capital has to be computed. It has been recognized by the existing finance and accounting literature that ex post realized returns offer a noisy proxy for the cost of equity capital (e.g., Froot & Frankel, 1989; Gebhardt et al., 2001; Hou et al., 2012). Thus, in this paper I apply an alternative, ex ante, approach on determining the cost of capital, namely the implied cost of capital (ICC) model. Moreover, this ICC measure is used to compute an implied equity risk premium that is used to further track the relative cost of capital implied by the capital market. In contrast to the prior research on the topic, I will be computing a firm-level estimate for the equity risk premium. An ICC model derives the cost of capital as an internal rate of return (IRR) that equates the market value of equity and the forecasted future earnings of a given firm. This approach differs from the models applied in the prior studies by computing a single, market driven figure that can be used to track the historical cost of capital numbers. Furthermore, the computed ICC figures also offer a representation of market based valuation, and thus offer a good proxy on determining whether the company is historically over- or undervalued.

1.1. Academic and practical motivation

In this thesis, I study whether the implied firm-level equity risk premium, computed by the chosen ICC framework, supports the market timing theory. I will also apply additional statistical methods to see whether the two other capital structure theories can explain the way how companies finance their operations. Although, the different capital structure theories are generally relatively well documented and researched, there has only been a couple of studies (see. Gebhardt et al., 2001; Huang & Ritter, 2009) where the implied cost of capital framework is employed to best of my knowledge. As the implied cost of capital framework offers a single simple measure of the company's capital costs, and it is a fairly new concept in the field of finance, the increasing interest in the subject has created a need to explore the relation of such measure and underlying financial theories, here, more precisely, theories of companies' capital structure. The implied cost of capital framework frees the research of these topics from use of ex post expected returns. I will use a modified implied cost of capital calculation methodology, suggested by Hou, van Dijk and Zhang (2010), that, in contrast to the study made Huang and Ritter (2009), does not rely on biased analyst forecasts but uses the corporate financial data to project future earnings that are used to calculate the ICC measure. In addition, my estimates for the ICC are firm-specific in contrast to the market wide measures used by Huang Ritter who compute the ICC figures using only Dow 30 companies and apply this ICC figure as an index to all of the sample companies.

To measure the expected returns, the standard procedure, laid down by the prior research, has been heavily reliable on the ex post realized returns as a proxy for the future patterns. This practice has been recently challenged by several researchers (Gebhardt et al., 2001; Hou et al., 2012), who have pointed out the noisy nature of such data as a proxy for future returns. It has also been shown by Elton (1999) that the average realized returns can differ significantly from the computed, expected return values over a prolonged period of time. Another way to compute ex post expected returns has historically been to use some asset pricing model such as capital asset pricing model (CAPM) or the Fama and French (1993) three-factor model. The problem with these models is that they, too, are based on realized returns and fall for the same fallacy. In addition to the aforementioned problems with the ex post realized returns, it has been shown by several studies (e.g., Schröder, 2007) that these models can be extremely imprecise when predicting the future. Due to these faulty premises in estimating expected returns, recent finance and accounting studies (see e.g., Claus & Thomas, 2001; Gebhardt et al., 2001; Gordon & Gordon, 1997; Ohlson & Juettner-Nauroth, 2005) have been proposing a new kind of methodology to compute the ex post expected returns, namely the implied cost of capital that equates the market value of equity and the forecasted future earnings of a given firm producing an internal rate of return like, ex ante measure that solves the equation and represents the expected return (or the so-called discount rate applied in valuation models). In other words, the market price is seen as reflecting the actual return expectations for the company and by backward engineering the commonly used valuation models, it is possible to solve for the discount rate, or the expected return, that is, on average, applied by the market at a specific point in time.

1.2. Research problem and purpose

It has been shown in the prior literature (Fama & French, 2005) that firms issue external equity increasingly frequently and that firms can issue external equity even when they have internally generated funds at hand or could have issued additional debt. This sort of behavior is essentially against the traditional pecking order theory. Fama and French (2005) contribute this behavior on such factors as, new external equity financing tools (e.g. stock financed acquisitions and employee stock option plans) that are less prone to information asymmetries and therefore lead into increasing amount of external equity financing. However, they fail to offer any explanation on why the likelihood of funding an acquisition with external equity is time-variant (increase in 1990s), and why the popularity of such instruments like employee stock options has increased over time despite the fact that they have been an integral part of financial markets for long. In addition, they fail to provide any explanation on the fact that the financing activities of firms seem to significantly deviate from decade to decade. I arrive at the same notion that the relative amount of debt and equity security issuances vary across the chosen sample period. In addition, I also find that the relative importance of equity financing has in general increased over time.

To empirically analyze the impact of the time-varying relative cost of equity on capital structure decisions made by companies, Huang and Ritter (2009) examined a sample of U.S. based companies during a time period from 1963 to 2001, and hypothesize that the capital structure is affected mainly by changes in the relative cost of capital. To simplify, firms tend to issue external equity (debt) when the relative cost of equity is low (high). In addition, they assume that the static trade-off theory as well as the traditional pecking order theory are of second importance when explaining firms’ funding decisions. Furthermore, these two theories seem to be unable to explain the major time series patterns in capital issuances. The trade-off theory seems to be doing better than the traditional pecking order theory, as the tax shield effect captured from the interest payments on existing debt plays a key role.

In their paper, Huang and Ritter (2009) find that by dropping the underlying assumption about the semi-strong form of financial markets efficiency, the market timing theory offers a better explanation for the observed patterns of financing decisions than the two other aforementioned alternative capital structure theories. For example, they observe that if the implied equity market risk premium increases by 1 percentage point, i.e. from three to four percent, this will result in approximately three percent more of the financing deficit being funded with net debt (i.e. from 32% to 35%). This finding is strongly both economically and statistically significant. However, the calculation method used by Huang and Ritter (2009) to compute the implied cost of capital is somewhat inadequate, as it is not firm-specific but an estimate for the whole market, calculated from extremely large Dow 30 companies that represent only a small part of the existing U.S. based company population. In addition, the calculation method adopted from Ritter & Warr (2002) is outdated and is not supported by the recent models used in the implied cost of capital framework. The computed estimates may also experience some modeling bias, as it is derived by using only one valuation model, namely a version of the residual income model.

Thus, in my study I will focus on a similar set of publicly listed U.S. companies and to further develop the idea laid down by Huang and Ritter (2009), I will introduce an ICC model that is not based on the analyst reports, large Dow 30 companies, nor a single valuation model. The model will apply firm-specific self-forecasted earnings estimates that are based on the fundamental accounting information available for the publicly traded companies, and the final composite cost estimate index will be composed of estimates from three separate ICC models. The applied methodology is based on the recent research on ICC and is widely recognized to be more precise and less biased than the analyst-based ICC models.

1.3. Contribution to existing research

My thesis aims to contribute to the existing literature by providing additional empirical evidence on how well the three main capital structure theories explain the time-series patterns in the financing patterns of the publicly traded U.S. companies when studied by using the most latest cost of capital measuring techniques. In addition, this thesis is the first paper to use the model-based firm-level ICC models to test the aforementioned behavior. The prior research has been mainly based on analyst data, ex post return data or market-level data. In more detail, this thesis contributes to the existing literature mainly in three ways:

1. By testing which of the aforementioned capital structure theories seems to explain the time-varying funding behavior of the publicly traded U.S. companies the best. This examination should provide a well-structured robustness check for the prior analyzes conducted by Huang and Ritter (2009) in their work.
2. By using firm-level implied equity risk premium estimates to see whether companies follow the market wide equity risk premium levels more closely than the firm-level ones. As Huang and Ritter (2009) apply a market wide implied equity risk premium computed by using only the Dow 30 companies, I am able to compare my firm-specific results to theirs on a general level.
3. By using the model-based ICC approach, suggested by the recent research, to test the importance of implied equity market risk premium on capital structure decisions. By applying the model-based ICC measures, the methodology uses the most recent approach suggested by the research and thus gives further validity for the conducted tests.

1.4. Limitations of the study

This study focuses on listed companies in the U.S. and thus does not include observations from other markets, such as Europe, China, or the emerging markets. It is proposed in the paper by Huang and Ritter (2009) that the importance of the implied equity risk premium for corporate financing decisions should be further studied in other locations than the U.S. as their paper is focused on such publicly traded companies. They make this proposition based on the fact that their findings heavily suggest that the time-varying implied equity risk premium explains most of the observed external financing decisions made by the sample firms. As their sample of U.S. based companies does not offer any insight on the relevance of implied equity risk premium in other markets, this limitation in sampling is justified.

There are several different models on which the implied cost of capital measure can be calculated with. These models assume different approaches on calculating for instance the future earnings growth rate patterns and terminal values. This has led to an empirical discussion on whether some of the models perform better in generating expectations of future cash flows. Prior research has been conducted to press this issue and several studies have shown that there is a considerable correlations between the derived implied cost of equity measures. However, the prior literature (e.g., Botosan & Plumlee, 2005; Easton & Monahan, 2005) finds no consensus as to which is the best representation. Thus, to overcome this problem of subjectively choosing the best alternative calculation method, I use a composite ICC estimate that comprises of three individual ICC estimates that are based on three different valuation models commonly used in deriving these estimates. Therefore, the estimates used in my study should not experience any major bias based on the applied valuation method.

There are also additional restrictions concerning the sampling as certain variables are needed in order to compute the required estimates. For instance, when computing the earnings estimates by using the acquired regression coefficients, certain variables are needed to exist to come up with forecasted figures. Also, there needs to be certain number of firm years available in the data set for the company to be included, as for instance the earnings estimate regression requires at least 6 years of data points in order to be applied. Thus, the dataset is somewhat reduced from the initial dataset that can be imported from Compustat, but this should not create any distortions in the remaining data as the deletion of data points is fairly well distributed along the whole dataset. Also each time bucket used seems to have relatively good number of observations so that none single year is suffering from an extremely low number of observations.

1.5. Main findings

Based on my statistical tests using the firm-level model-based implied cost of capital estimates, further leading into computing the firm-level implied equity risk premium, companies seem to time the market as the time-variant cost of equity clearly affects companies' financing decisions. In other words, companies seems to issue more equity when it is relatively cheap and issue less when it is relatively more expensive. This behavior grants power to the market timing theory that in contrast to the other traditional capital structure theories allows for such market inefficiencies to exist.

Furthermore, when comparing my results with the earlier results by Huang and Ritter (2009), I find that their implied market equity premium (calculated only for the Dow Jones 30 constituents) seems to drive this behavior more strongly than the firm-level estimates computed by using the model described in my paper. This could be because of the fact that company management does not have good enough visibility on their firm-level cost of equity, or the data or tools to asses this indicator, and thus they settle to only follow the market based fluctuations in the costs that is easier to follow and asses.

I also find that the so-called pecking order slope coefficient has decreased notably over the whole time period from the beginning of the latter half of the 1970s to 2014. The slope coefficient is initially based on the work by Shyam-Sunder and Myers (1999) who introduced an empirical test for the pecking order theory. The pecking order slope coefficient provides information on what proportion of a one unit increase in the financing deficit is financed by debt. Based on pecking order theory, companies prefer debt as a mean of external financing and thus the slope coefficient should be close to unity. My findings are in line with the prior studies where a similar pattern has been spotted (e.g., Huang and Ritter, 2009; Frank and Goyal, 2003). The slope coefficient was around 0.9 for the second half of the 1970s and has decreased to around 0.25 in 2013.

1.6. Structure of the thesis

The rest of this paper is structured as follows. Section 2 presents the theoretical background and the previous empirical findings explaining the different capital structure theories in more detail and the implied cost of capital framework. I discuss my main hypotheses in Section 3. Section 4 describes the sampling methods, the data characteristics and the methodology used in the study. In Section 5, I show and analyze the empirical results relating to the links between the capital structure theories and implied cost of capital. I further show which theories are relevant and which are not when analyzing the time-series patterns of capital issuances and cost of equity. I will also show how the explanatory power of these theories has evolved over time. Finally, Section 6 concludes the paper and gives suggestion for further research.

1.7. Terminology definitions

Table 1 below explains the key terms used in this paper in order to ensure that the reader is aware of exact meanings and definitions of these frequently used terms and also to make the reading of this paper easier. I have only chosen the most relevant terms that are used throughout the whole paper. Further explanation on these terms and other relevant ones is provided in different parts of this paper. In addition, I have provided self-explanatory tables and figures that contain also some less detailed explanations on the terms relevant to the object in question. The presented terms in Table 1 are the basic concepts underlying some more sophisticated terms, i.e. firm-level implied equity risk premium is a more refined and specified equity risk premium measure that is derived by using firm-level information in order to solve for the implied cost of capital that is used to compute the final estimate for equity risk premium.

Table 1: Definitions of key terminology

In Table 1 the glossary of the key terms used in this paper are presented. In addition an abbreviation is offered, if there exists one, also a brief description of the used term is provided.

Term	Abbreviation	Description
Implied cost of capital	ICC	ICC is the firm's internal rate of return that equates the firm's share price to the present value of expected future cash flows.
Equity risk premium	ERP	Additional return required over the risk-free rate for the additional risk associated with equity financing.
Internal rate of return	IRR	Discount rate that makes the net present value of cash flow equal to zero.
Discount rate	R	Interest rate used in valuation models to account for time value of money and the riskiness of the investment.
Ex-Ante	-	Forecasted estimates prior the event

Ex Post	-	Using past data to estimate future.
Firm-level estimate	-	An estimate calculated for one specific company using the financial data of the same company.
Market wide estimate	-	In contrast to the firm-level estimate, this estimate is more or less common for the whole market in question.

2. Literature review

This section provides an overview on the prior, existing literature on the relevant topics for my paper. First, I discuss the capital structure theories in general and how these theories explain capital issuances decisions. Next, I discuss how these theories are tested in the existing research. Then I introduce the concepts of implied cost of capital and implied market risk premium. Finally, I bring up some problems with the current research methods and link new developments in the research of implied cost of capital framework to the existing models.

2.1. Selected capital structure theories

Value of a firm is derived from its ability to generate cash flows from its existing assets. These assets are financed by issuing debt or equity capital, or a mix of these two. This mix of capital sources, accompanied by the firm's retained earnings, is often referred as the capital structure of a company. The foundations for the modern capital structure theory were created by Modigliani and Miller (1985) who argued that in a perfect world, with no friction such as transaction costs and taxes, the capital structure of a company is irrelevant. The so-called "proposition 1" states that it is not possible to adjust the total value of firm's securities by dividing its cash flows into separate streams. This implies that the actual value of the company is determined only by the real assets owned by the company and not by its securities issued. Thus, in the Modigliani and Miller (MM) world, it is possible to completely separate investment and financing decisions as the company is indifferent with the source of capital it issues. Furthermore, the "proposition 1" suggests that the firm-level cost of capital does not depend on the issued securities, i.e. the cost of capital is the same for an all-equity financed firm and for a firm that uses a mixture of debt and equity.

The requirements of the MM world are however extremely strict and do not correspond to the real life challenges and opportunities that are created by interruptions in the perfect market model, e.g. tax levy on corporate earnings and the potential bankruptcy costs arising from the possibility of corporate insolvency. The theorem has been later revised by Modigliani and Miller (1963) as they find that due to the tax deductibility of debt, or the so-called tax shield effect, firms will prefer debt over equity to reach the capital structure that is perceived as optimal. Now it is rather widely recognized that the so-called optimal capital structure is indeed less than 100% of pure debt financing. The prior studies have had emphasis on such factors that are assumed to reflect the possible benefits and costs related to certain capital structure situations. Among others, maybe the most relevant papers have found such factors as firm size, profitability, growth rate, firm risk and industry characteristics to be the most influential factors when talking about the determination of an optimal capital structure (see. Michaelas, Chittenden, & Poutziouris, 1999; Titman & Wessels, 1988 etc.)

Following the set up proposed by Modigliani and Miller, several other theories have been developed to add frictions to the initial model trying to explain how the capital structure is constructed in a more realistic world. The three capital structure theories presented next explain why the actual capital structures observed in the market deviate from the proposed MM set up.

2.1.1. Static trade-off theory

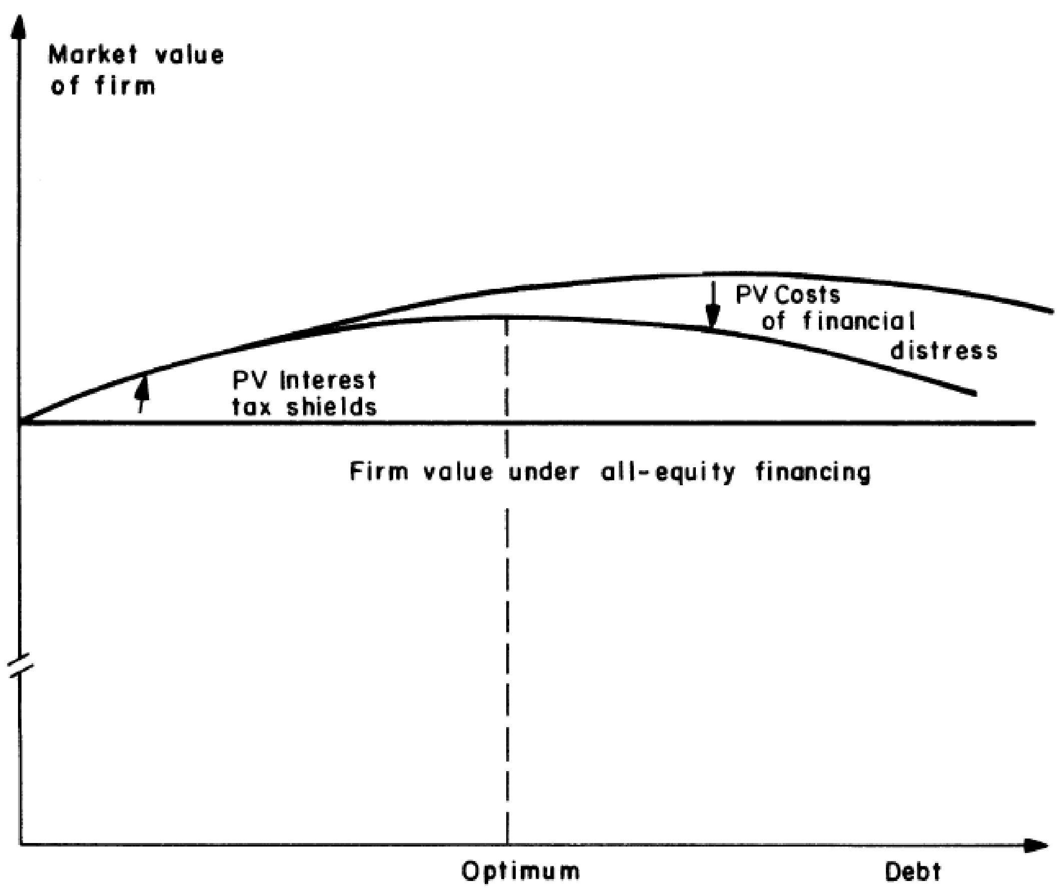
The static Trade-off Theory is based on the idea proposed by DeAngelo and Masulis (1980) that the existing capital structure is a product of comparing the cost of debt and the benefits of debt. They state that if the interest paid on debt shields the profits from taxation, i.e. the paid interest is tax deductible, profitable companies with low levels debt financing should issue more debt to benefit from the increased tax deductions. Furthermore, the theory suggests that the debt financing could be increased to the level where the risk of bankruptcy and the related costs become relevant. The static trade-off theory is also incorporated with the idea of a firm-specific optimal capital structure that is known and pursued by the management. Visualization of this idea is presented in Figure 1. In Figure 1, first the gains from the tax shield increase the company's market value, but as the relative amount of debt increases, the financial distress costs start to affect the company's value. Thus, in order to maximize the company's value, an optimal point has to be reached by balancing these benefits and costs.

However, the evidence supporting the static trade-off theory is somewhat mixed. Many of the studies find that lower leverage is associated with higher profitability and thus is inconsistent with the view that more profitable companies should borrow more to increase the benefits gained from the tax shield (e.g., Fama & French, 2002; Rajan & Zingales, 1995; Titman & Wessels, 1988). Based on a survey conducted on corporate executives by Graham and Harvey (2001), the firm-specific leverage targets are more or less soft.

Alternatively, several studies (e.g., Hovakimian, Hovakimian, & Tehranian, 2004; Korajczyk & Levy, 2003; Marsh, 1982) find that there exists a firm-specific target level for leverage that is used as part of the capital issuance and repurchase decision making processes. Leary and Roberts (2005) confirm that although most of the time firms appear to be inactive towards their financial policies, their securities issuances and buy backs appear to happen in clusters to adjust the capital structure toward the set target leverage level. Myers (1984) shows that the costs of adjusting the corporate capital structure are the main reason for non-optimal capital structures observed in the market. The absence of these costs would result in most of the companies converging the optimal capital structure implied by the trade-off theory.

Figure 1: Static trade-off theory

Figure 1 depicts the optimal capital structure target hypothesized by the traditional static trade-off theory. The optimal capital structure assumption is built around the idea the a firm balances its marginal values of interest tax shields against the costs of financial distress from the increased debt levels on the firm's balance sheet.



2.1.2. Pecking order theory

The pecking order theory is based originally on the papers by Myers (1984) and Myers and Majluf (1984). According to Myers and Majluf, the pecking order of capital sources is based on informational asymmetries between the external investors and creditor, and the firm's management. Thus, the outside investors are willing to buy the issued securities only if they are sold at a discount. Furthermore, as the managers are aware of such behavior the firm tends to follows a certain hierarchy of capital sources as it needs to finance its operations and investments. Firms prefer the internally generated funds, also known as the retained earnings, and adjust their dividend payout policies so that there is no need for more expensive external funding. If the internal funds are inadequate to cover firm's capital requirements, additional external funding has to be raised. In this situation, the firm will favor the less expensive straight debt financing, followed by the more expensive convertible debt. As debt financing is more secured from the stand point of the investor, they will require lower discount. Additional equity is issued only as the final source of capital as it is associated with the highest costs for the company.

However, information asymmetries are just one possible explanation for this hierarchy of capital sources, the existing literature has found several other reasons for this phenomenon, such as transactions costs (Donaldson, 1961), managerial optimism (e.g., Heaton, 2002; Lee, 1997) and hidden information costs (MacKie-Mason, 1990).

Like the static trade-off theory, pecking order theory has received mixed support from several prior studies. In a study conducted on recent IPO companies Helwege and Liang (1996) find that the probability of raising external capital is unrelated to the shortage of internal funds, although companies with excess cash reserves are inclined to not issue additional external capital. Fama and French (2005) show that, in contrast to pecking order theory, firms issue, repurchase equity or do both regularly and it does not seem act as a last resort for financing the investments and operations of a company. It is also suggested by Fama and French that modern financing tools can be used to raise external capital as there are securities which involve less informational asymmetry.

Shyam-Sunder and Myers (1999) tested the pecking order theory against the preceding capital structure theory, the static trade-off theory. In their study they find that the pecking order model, predicting external debt financing to be driven by financial deficit, has greater explanatory power than the model suggested by the static trade-off theory.

2.1.3. Market timing theory

In addition to these two more traditional capital structure theories, a more behavioral based model of market timing has been developed to capture the time varying nature of corporate debt ratios. The market timing theory suggests that in contrast to the semi-strong market efficiency assumption incorporated in both the static trade-off theory and pecking order theory, the market can be somewhat inefficient. Thus, observable 'windows of opportunities' emerge in the capital markets. Furthermore, to minimize the cost of capital, Stein (1996) suggests that firms need to take advantage of these time varying market inefficiencies.

The inefficiencies in the market creates fluctuations in equity and debt security prices. Due to these fluctuations, the market timing theory suggests that the corporate management may perceive the market to misvalue its securities. If the relative market price of issuing equity is low (high), the company issues equity (debt) conditional to its existing and prevailing financing requirements (see Table 1. as reference). It has been debated in the prior literature how the management judges the relative price of such funding. It has been proposed, on the other hand, that the company management has superior insight on the prevailing cost of the company itself and better understanding of the whole industry's costs. On the other hand, prospect theory suggests that certain reference points, such as the historical 52-week highs or lows[1], are followed by the corporate management and these, psychological patterns, may act as underlying triggers for such behavior.

In contrast to the other two theories, market timing theory does not assume the semi-strong form of market efficiency. Due to this fact, it is possible to assume that the external equity can be cheaper to issue than the external debt. Thus, the firm can take advantage of such misvaluation and raise capital according to the prevailing market conditions before this inefficiency in the market disappear. Furthermore, this implies that in contrast to the traditional pecking order theory, equity issuances are not that rare. Huang and Ritter (2009) show that the original pecking order theory is actually a special case within the market timing framework. The different financing hierarchies

[1] The special role of the 52-week highs and lows is well research topic in the field on finance and economics. Benartzi and Thaler (1995) and Heath et al. (1999) shows that investors on average seem to evaluate their investments against a historical moving period of approximately one year. In addition, interviews with financial experts show that the 52-week backward evaluation period is also well established among the bankers working with mergers and acquisitions. This sort of behavior leads into evaluating the relative cost of equity against the historical movements in the cost within the preceding 52-week period.

based on different market scenarios are summarized in Table 1. When it is cheaper for the firm to issue external equity than it is to issue debt securities, firms prefer external equity if they seek external financing. When external equity becomes really cheap, issuing equity is perceived even as the first choice when it comes to funding the company. Likewise, when issuing debt securities becomes really cheap, issuing debt securities is seen as first choice. Companies may issue equity or debt even if they do not have any direct financing requirements or do not need to regulate their company capital structure. This is due to the fact that issuing securities that are overvalued in the market are is themselves positive NPV yielding projects.

Table 2: Financing hierarchies

Illustration of different financing hierarchies as the relative cost of capital changes and issuing certain securities becomes more favorable.

Normal market conditions	When external equity is less expensive than debt	When external equity is really cheap, and debt is expensive
1) Internal equity	1) Internal equity	1) External equity
2) Debt	2) External equity	2) Internal equity
3) External equity	3) Debt	3) Debt

When external equity is really cheap, and debt is cheap	When debt is really cheap, and external equity is expensive	When debt is really cheap, and external equity is cheap
1) External equity	1) Debt	1) Debt
2) Debt	2) Internal equity	2) External equity
3) Internal equity	3) External equity	3) Internal equity

Only recently researchers have been starting to link the cost of equity to the development of capital structure. It was found in a paper by Baker and Wurgler (2002) that the external finance-weighted average of historical market-to-book ratios correlates negatively to existing market leverage, which can be interpret as evidence for market timing. Moreover, Aydogan (2004) and Kayhan and

Titman (2004) study market timing further and find evidence supporting the timing assumption of security issuance.

The prior literature has been focused on testing these theories by using historical realized returns as a proxy for cost of equity. However, it has been concluded by Fama and French (1997) that the procedure to compute the cost of equity measures using realized returns is imprecise as it is difficult to identify the appropriate asset-pricing model and the process used to estimate the factor loadings, as well as the factor risk premium, are somewhat imprecise. In addition, it can be easily argued that the past does not necessarily offer a good enough proxy for the future. Thus, another, alternative way, to compute the implied equity risk premium has been developed. The time-variations and the general decline during the last few decades in the historical implied equity risk premium can be argued to have been caused by several irrational and rational factors. Regardless of the rationality or irrationality, the market timing theory simply implies that the changes in the relative cost of equity have central importance when analyzing the capital structure of companies.

2.2. Implied cost of capital framework

To compute cost of equity measures for companies, the prior research has been heavily reliant on historical realized returns. As earlier discussed in this paper, the realized returns are somewhat inconsistent at best for forecasting the future expected returns (see e.g., Elton, 1999; Gebhardt et al., 2001; Hou et al., 2012). To overcome deficiencies related to realize returns based measures, the existing literature has proposed an alternative method to compute these figures, namely implied cost of capital. ICC is the firm's internal rate of return that equates the firm's share price to the present value of expected future cash flows. Simply put, it is the discount rate that the market uses to discount the projected cash flows from the firm to value the company's stock. This process overcomes the problem of using a specific asset pricing model and the noisy nature of realized returns as the expected returns are derived from the share price and cash flow forecasts.

In the prior ICC literature, the future cash flow expectations are estimated using the analysts' earnings forecasts (Huang & Ritter, 2009). One of the reasons, alas, why this method has been so widely accepted is its simplicity as the cash flow expectations can be taken as given in the analyst reports. However, several recent studies (e.g., Easton & Monahan, 2005; Gebhardt et al., 2001) have found that the analyst-based ICC figures do not perform well when taking a deeper look how they are able to predict the future realized returns. Easton and Monahan (2005) show more specifically that after controlling for cash flow and discount rate related news, the analyst-based ICC measure has only little predictive power for the future realized returns. They also state that due to the heavy reliance on the analysts' earnings forecast quality, the analyst-based ICC model significantly lacks reliability.

There are also other concerns with the analyst-based ICC model. One reason why the analyst-based ICC model lacks reliability, is the fact that the earnings forecasts produced by analysts suffer from considerable biases. Several studies (e.g., Easton & Sommers, 2007; Francis & Philbrick, 1993; Lin & McNichols, 1998) show that the when making earnings forecasts, analyst tend to be overly optimistic about the future developments. Thus, the analyst forecasts are not objective enough to reveal the real expected future earnings. Furthermore, Easton and Sommers (2007) record the average upward bias in these reports to be 2.84%, which is a considerable deviation when compared to the recorded average equity premium in the vicinity of %, which could be eliminated by purely removing the average bias. In addition, the lack of coverage concerning the small and financially distressed firms in the analyst databases may govern the data.

To address this problem related to the analyst-based ICC model, Hou, van Dijk and Zhang (2012) have produced a new way to compute the necessary ICC figures by using earnings forecasts generated by a cross-sectional model to proxy firms' cash flow expectations. This new approach estimates model-based earnings forecasts for up to five years into the future and then use those earnings forecasts to compute the ICC figure for the selected group of firms. This method is backed up by prior literature (e.g., Fama & French, 2000; Hou & Robinson, 2006) that show cross-sectional models to be able to explain a large fraction of the variation in expected profitability across firms.

The above described "model-based" method owns much of its advantages to the fact that it is able to use even the largest cross-sectional data of individual firms to produce the required earnings forecast numbers. Moreover, this procedure offers additional statistical power for the model while imposing it only to minimal survivorship requirements. As the model-based ICC requires only a limited amount of accounting data and price of the publicly traded stock, the coverage offered by this model is substantially more comprehensive than the coverage offered by the analyst-based model. In addition, the model-based approach opens a possibility to cover firm records that go further back in time than any database recording the analyst earnings forecasts.

Hou, van Dijk and Zhang (2012) also show that although their model generates earnings forecasts that are on average less accurate than analysts' forecasts in terms of R^2, they exhibit substantially lower forecast bias levels and, most importantly, much higher earnings response coefficient (ERC) levels than the forecasts made by analysts. The fact that the ERC levels are much higher than those related to the analyst forecasts, suggests the cross-sectional model-based earnings forecasts work on average as a better proxy for market expectations of the firms' future profitability.

2.3. Implied cost of capital models

To compute the final ICC measure, a model, from which the internal rate of return (or the applied discount rate R) representing the implied cost of capital is solved by using the computed firm-level earnings forecast, has to be chosen. There are several different sort of models presented in the prior literature on implied cost of capital that are originally based on different valuation tools. The most relevant models are the CT (see e.g., Claus & Thomas, 2001), Modified price-earnings growth, also known as MPEG (Easton, 2004), G, Gordon (Gordon & Gordon, 1997) and OJ (Ohlson & Juettner-Nauroth, 2005). Although all of these models aim for the end result of a company valuation output, they are notably different in terms of applied time periods and input data for example. These five models can be broadly divided into three groups based on the initial valuation method that they originate from. The broad division is visible from Table 3 that divides the models under residual income valuation method, abnormal earnings growth-based valuation method and Gordon growth model valuation method. There exists additional models to do these calculations, but the ones chosen here are widely used in the prior literature and research on their validity and other features has been already been conducted.

Table 3: ICC model classification

Illustration of the different ICC models divided under the traditional valuation model that is used to derive the internal rate of return representing the implied cost of capital.

Residual income valuation	Abnormal earnings growth-based valuation	Gordon growth model valuation
Claus & Thomas (CT)	Ohlson & Juettner-Nauroth (OJ)	Gordon
Gebhardt, Lee & Swaminathan (GLS)	Modified price-earnings growth (MPEG)	

Residual income valuation (RIV) based methods calculate the current stock price by using two main components: 1) the present value of expected dividends per share over a short or medium-term time horizon, and 2) a discounted terminal value, which represents the present value of the expected share price at the end of the chosen time period, assuming that dividends then grow at a constant rate in perpetuity. The CT model uses this framework with forecasting time horizon set to four years and the terminal growth rate set to the same level as the prevailing expected inflation rate. The other model based on RIV is GLS, which has two main differences when compared to the CT model described earlier. In contrast to the CT model, GLS uses a longer forecast time horizon of twelve years after which the residual income becomes perpetuity. In addition, after three years, the expected return on equity (ROE) is set to mean-revert to the historical industry media value by the eleventh year. The advantage of this method is that only few years of forecasted earnings figures are required as the forecasts lose their predictive power when going further in to the future.

Abnormal earnings growth-based valuation models on the other hand assume that the change in abnormal earnings grows from year to year at a constant rate into perpetuity. Furthermore, it is assumed that the forecasted change in growth is constant. To compute the OJ model-based cost of equity, the relation between the stock price, next year's earnings per share (EPS) estimate and the next year's expected dividends per share has to be solved. The MPEG model is a special case of the OJ model where the growth rate in the change of dividends is set to zero so that the dividends grow at the same growth rate into perpetuity.

The Gordon growth valuation model is the simplest of the models. The model is based on a special case of the traditional Gordon growth model where a constant earnings growth rate is assumed to continue into perpetuity. The problem with this method is the fact that the long-term constant growth rates are hard to define or soundly reason. In addition, the growth rate cannot be larger than the long-term expected GDP growth rate as this would result in earnings, at some point in future, larger than the whole economy.

In order to compute the implied equity market risk premium from the output of chosen ICC models, I need to subtract the prevailing risk-free rate from the calculated internal rate of return. In this paper I use the annualized nominal rate of return on one month U.S. treasury bills (T-bills) as the risk-free rate to denote the default-free (U.S. government) bond rate. These numbers are published by the U.S. Department of the Treasury.

3. Hypotheses

In this study I test whether the traditional capital structure theories play a role in the financing decisions made by U.S. listed companies. In more detail, I will be focusing on the implied cost of capital framework, or more specifically the implied equity risk premium, and its time-variant nature. The time-variant nature of this variable might be explaining the equity issuance patterns that are observed. Unlike the previous studies that have been trying to explain these theories, my study focuses on the ex-ante returns that do not experience the same problems as ex-post realized return-based proxies. Also my proxy for the implied equity risk premium is not a market wide variable, but a firm-level estimate that has been calculated for each of the firms in the sample. This section outlines the main hypotheses that are tested to answer my research questions provided earlier in this paper. I also provide a brief theoretical background to back up these hypotheses. The results are presented in the empirical section of this paper, namely chapter 5.

The main goal of this paper is to study the time series patterns of external financing in the U.S. market. It has been shown in a prior study conducted on the U.S. publicly traded firms by Huang and Ritter (2009) that the time-variations in the relative cost of equity (market wide estimate), described by market timing theory, explain the year-to-year variations in the use of debt and external equity financing better than the pecking order or the trade-off theory. In this paper, I instead apply a firm-level estimate for the relative cost of capital but do not anticipate this to offer results of entirely different nature. Thus, I state my first hypothesis as follows:

H1: Market timing theory explains better the observed time-series patterns of external financing decisions than the two alternative theories of capital structure.

Neither the static trade-off theory nor pecking order theory provide a sufficient answer to why variations in the time-series patterns of firms' capital structures are observed. Huang and Ritter (2009) show that firms adjust extremely slowly towards their target leverage ratios, which is inconsistent with the static trade-off theory. They also show that the assumption of the semi-strong form of market efficiency does not hold as such and thus variations in the relative cost of equity lead into adjustment of firms' capital structure. This observation undermines the explanatory power of the pecking order theory that assumes the semi-strong form of market efficiency. Regardless of these prior results, I assume the trade-off theory to be able to better explained the observed results due to the importance of the tax shield. Thus, my second hypothesis is as follows:

H2: Due to the tax shield effect arising from the interest payments on debt, the trade-off theory explains the financing decisions made by companies better than the pecking order theory.

The elimination of the semi-strong market efficiency assumption leads into the market timing theory that is based on the idea that when the relative cost of equity is high (low), companies issue less (more) external equity in relation to other financing means. Following the results from the previous studies, the implied cost of equity should play a key role when the companies are making their capital structure decisions. Following the paper by Huang and Ritter (2009), I will use the implied equity risk premium as the proxy for relative cost of equity. In contrast to Huang and Ritter, I will not be using a market wide estimate for the equity risk premium as it does not reflect the firm-level characteristics. Instead of using applying the implied market equity risk premium, calculated only from the Dow Jones 30 companies, I will be applying a firm-level estimate of equity risk premium that should account for the company specific characteristics in more detail. Therefore, my second hypothesis is as follows:

H3: The implied firm-level equity risk premium is off high importance when companies make decision on adjusting their capital structure.

In addition to the aforementioned hypotheses, the availability of a prior study using the market-level implied equity risk premium allows me to compare the effect of a firm-level cost estimate and the effect of a market-wide cost estimate on companies' funding behavior. Based on the study by Graham and Harvey (2001), I expect the management to be more sensitive to changes in the firm-level cost of capital. Graham and Harvey find in their qualitative study that firm-level indicators of capital costs are of the highest priority, although the based mainly on ex-post realized returns employed by such models as CAPM and arithmetic average historical returns. As the firm-level equity risk premium might be more challenging to observe than the existing macro level equity risk premiums, companies might react weaker to changes in the firm-level levels. Regardless, I set my fourth and final hypothesis according to the prior research as follows:

H4: Changes in the firm-level implied equity risk premium affect companies' funding behavior stronger than changes in the market-level implied equity risk premium.

To test the above stated hypotheses, I use data from firms' financial reports and stock market price data for selected U.S. based listed companies. The data is used to create firm-level earnings estimates that are further applied to solve for the implied cost of capital. The implied cost of capital data is used in the statistical tests alongside with additional macroeconomic data. The data, calculation methods and statistical test methodology is further described in the coming sections of this paper.

4. Data and methodology

This section starts with the presentation of the sample selection process and descriptive statistics, and then continues to illustrate the methodology used to test the aforementioned hypotheses.

4.1. Data

4.1.1. Sample selection

In this study I use annual pricing information of the publicly traded companies listed in the U.S. markets. The final sample for companies assigned an implied cost of capital estimate consists of firms from 1974 to 2013. In order to acquire estimates for firm-years from 1973 to 2013, an initial sampling is required to include firm-years starting from year 1968 as the minimum years required to compute the earnings estimate is six years. From the sample population I will exclude companies characterized as utilities or financial firms as they were regulated heavily during most the sample period and their observed capital structures do not reflect the real capital structure decisions. In addition, I compute the ICC estimates by using fundamental data available for these companies on the Compustat database. The variables based on the firm-level fundamental data are winsorized annually at the 1st and the 99th percentile to account for extreme values that can otherwise distort the result and therefore cause misleading results.

4.1.2. Sample characteristics

I have described the final data in Table 4 by year as the yearly fluctuations of financing decisions are of interest in my paper. I have defined the debt and equity issuance in a similar manner that has been used by the prior literature (see. Fama & French, 2002; Huang & Ritter, 2009). Thus, net debt is defined as the change in book debt and net equity is defined as the change in book equity minus change in retained earnings. Here, book debt is total liabilities plus preferred stock, minus preferred taxes and convertible debt, and book equity is total assets minus book debt. In Table 4, the percent of issuers is defined as those firms that within a single year are net securities issuers. A net securities issuer is defined a firms that within a given year has a debt or an equity increase larger than 5%.

Table 4: Percentage of Firms in Different Financing Groups across Time

An individual firms is defined to issue debt if ΔD scaled with the beginning of the year total assets is at least 5%, where ΔD is change in debt and preferred stock from year t-1 to t. Firm is issuing equity if ΔE scaled by beginning of year assets is at least 5%, where ΔE is the change in equity and convertible debt minus change in retained earnings. The percentages of debt and equity issuers do not necessarily add up to 100 because firms can issue both debt and equity or neither debt nor equity.

Year	Number of firms	Debt issues (%)	Equity issues (%)
1974	143	62.2 %	56.6 %
1975	237	42.2 %	27.4 %
1976	271	38.7 %	12.5 %
1977	349	45.6 %	13.5 %
1978	807	45.1 %	20.8 %
1979	888	50.8 %	11.6 %
1980	1 075	40.3 %	15.9 %
1981	1 114	39.2 %	16.2 %
1982	1 187	27.0 %	11.3 %
1983	1 211	33.6 %	22.2 %
1984	1 222	38.0 %	13.5 %
1985	1 334	40.3 %	22.1 %
1986	1 272	34.5 %	16.3 %
1987	1 206	38.6 %	14.8 %
1988	1 156	36.4 %	11.2 %
1989	1 127	34.9 %	12.2 %
1990	1 175	33.9 %	11.5 %
1991	1 236	25.0 %	12.9 %
1992	1 268	30.9 %	14.7 %
1993	1 333	34.7 %	23.2 %
1994	1 321	36.8 %	15.1 %
1995	1 420	35.8 %	18.9 %
1996	1 438	34.5 %	21.8 %
1997	1 400	38.2 %	19.7 %
1998	1 413	42.7 %	19.9 %
1999	1 424	40.9 %	20.1 %
2000	1 408	38.0 %	21.3 %
2001	1 408	24.8 %	21.2 %
2002	1 426	28.8 %	21.2 %
2003	1 472	30.8 %	24.4 %
2004	1 531	34.9 %	28.3 %
2005	1 631	34.3 %	27.0 %
2006	1 656	38.8 %	28.2 %
2007	1 712	39.5 %	27.3 %
2008	1 831	34.0 %	22.7 %
2009	1 860	21.8 %	22.5 %
2010	1 862	33.6 %	23.6 %
2011	1 921	36.0 %	23.1 %
2012	1 976	34.1 %	22.7 %
2013	1 656	30.0 %	23.3 %

From Table 4 it is visible that the amount of net securities issuers is generally higher than the number of firms that are not net securities issuers. For instance the amount of net debt issuers never falls under 20% of the total firms within a given year and also net equity issuers represent every year at least 11% of the total sample. Even at this point, it is observable from Table 4 that net equity issues are relatively common. This observation is against the traditional pecking order theory that predicts these issues to be relatively rare and to be used by companies as a last resort due to their high costs. I contract to the pecking order theory's predictions, the minimum proportion of net equity issuers is more than 11%, peaking at 28.3% in 2004, and staying above 20% from 2000 onwards. This general finding of ever increasing amount of equity issuers has been also documented by Fama and French (2011) in their study. Their time period ends in 2009 but based on my observations, the same trend has prevailed and the issuing of equity securities has remained strong.

The total number of firm-year observations through the whole period from 1974 to 2013 is 51 377. This number is notably lower than the number of firm-year observations in paper by Huang and Ritter (2009). The main reason why this difference in firm-year observations exist, is the fact they use the implied equity risk premium derived only from the Dow 30 companies and apply this same market wide estimate for each of the firms in the sample. Due to this computational method, the availability of firm-level information to calculate these estimates does not restrict the sample size. The computational method applied in my paper is also more complicated in the way that I use the future earnings forecasts. As I do not apply the analyst reports and corresponding earnings forecasts, I need additional data to be used in the regression model described later in this paper in order to make my own earnings forecasts. Due to all these additional steps required in my firm-level model, my sample size is set to be smaller than the one used by Huang and Ritter. Regardless of this, my sample is still quite extensive and for each of the years there is at least 140 observations including companies with different industry specifications, different sizes, earnings models, capital expenditure requirements and geographical reach. Thus, I conclude that the data set is extensive enough to draw the results explained in the latter parts of this paper.

Table 5: General data characteristics

In table below the yearly means for general firm-level characteristics are presented for each year. Income is the firm's income before extraordinary items that presents the real income generation of a single company. Total assets are presented to illustrate the general size of chosen companies. Both of the variables are winsorized in 1st and 99th percentile.

Year	Number of firms	Income (before extraordinary items)	Total Assets
1974	143	109.1	1 638.3
1975	237	87.2	1 487.7
1976	271	97.8	1 587.4
1977	349	85.8	1 440.0
1978	807	51.6	858.8
1979	888	59.3	901.6
1980	1 075	54.0	866.9
1981	1 114	56.2	963.2
1982	1 187	40.7	917.1
1983	1 211	44.0	952.7
1984	1 222	49.6	1 002.5
1985	1 334	54.6	1 378.7
1986	1 272	53.8	1 468.1
1987	1 206	73.2	1 603.9
1988	1 156	86.3	1 714.1
1989	1 127	87.7	1 741.6
1990	1 175	80.6	1 837.7
1991	1 236	61.3	1 792.8
1992	1 268	68.1	1 800.8
1993	1 333	67.5	1 830.3
1994	1 321	86.5	1 907.2
1995	1 420	88.9	1 890.6
1996	1 438	102.4	2 045.0
1997	1 400	106.1	2 214.1
1998	1 413	95.8	2 319.8
1999	1 424	109.6	2 466.2
2000	1 408	120.4	2 811.2
2001	1 408	87.8	2 933.1
2002	1 426	96.3	3 024.4
2003	1 472	124.9	3 238.9
2004	1 531	147.2	3 248.9
2005	1 631	164.0	3 312.4
2006	1 656	186.1	3 504.8
2007	1 712	198.1	3 818.2
2008	1 831	141.9	3 675.8
2009	1 860	144.6	3 841.0
2010	1 862	207.5	4 165.6
2011	1 921	218.5	4 430.3
2012	1 976	204.8	4 726.7
2013	1 656	224.0	5 188.1

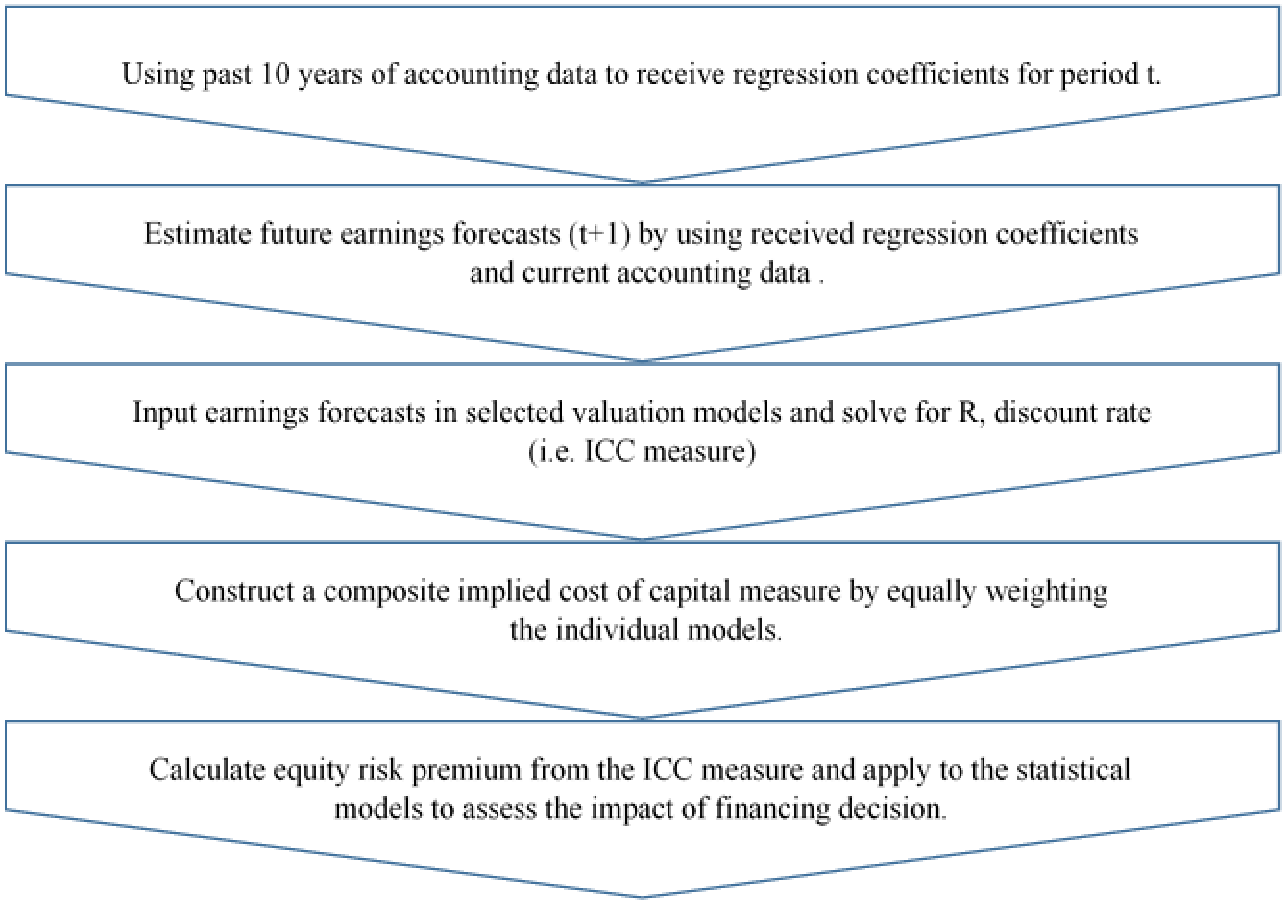
The general characteristics of the dataset used in this study is illustrated on a yearly basis in Table 5 above. The variables are chosen to show the mean profitability levels and size of the chosen companies after winsorizing in the 1st and 99th percentile. There seems to be some fluctuation in the variable over time but the general trend seems to be that the generated income levels are rising towards the end of the chosen time period. This holds also for the average size of companies' balance sheet as the yearly average of total assets rises towards the end of the time period as well. The economic downturns seem also to drive the data as during these distressed periods, both the general profitability and size of companies' balance sheet seems to be highly fluctuate.

4.2. Methodology

In this section, I present a summary of the different methods employed in this study. Due to the several steps contributing to the final statistical models, I will go through the underlying models and the reasoning behind choosing the in question model over other available models. First, I go through the earnings forecast model that is required to create firm-level earnings forecasts to be able discard the more biased earnings forecasts of company analysts. Second, I show the reasoning behind the choice of certain valuation models to solve for the cost capital used as the discount rate in the models. After explaining the reasoning for these choices, I go through each of the models in more detail. Third, I introduce the statistical models that the solved cost of capital estimates are applied to in order to see whether companies do time their capital raising to the time periods when the form of capital in question is cheaper in relation to the other forms and, thus creates additional value for the company in terms of lower capital expenses.

Figure 2: Process to calculate the statistical models chosen

Figure 2 shows the process of acquiring all the relevant variables to test the hypothesis.



4.2.1. Earnings forecast model

In this section, I present a summary of the different methods employed in this study. In calculating the ICC measures, this study follows the earnings estimation approach established in Hou, Van Dijk, and Zhang (2012) and Lee, So, and Wang (2010). The main difference and advantage of this model over other models used in the prior literature is that rather than using analysts' forecasts of earnings, this approach is based on a pooled cross-sectional earnings forecasting model. The proposed model also differs from the cross-sectional models that are commonly used in prior studies (e.g. Fama and French, 2000) by equating the earnings forecasts in dollars and not in profitability (dollar earnings scaled by total assets). To be able to control for extremely high income levels in the sample, the data is, as described above, winsorized.

The following model is being estimated for each individual year, for each individual company in the dataset, using the past 10 years of observations of selected variables (minimum of 6 years):

$$E_{i,t+1} = \beta_0 + \beta_1 A_{i,t} + \beta_2 D_{i,t} + \beta_4 DD_{i,t} + \beta_5 E_{i,t} + \beta_6 NEGE_{i,t} + \beta_7 AC_{i,t} + \varepsilon_{i,t+1} \qquad (1)$$

where $E_{i,t+1}$ denotes the earnings before extraordinary items of firm *i* in year t + 1, and all explanatory variables are measured at the end of year t: $A_{i,t}$ is the total assets, $D_{i,t}$ is the dividend to common shareholders, $DD_{i,t}$ is a dummy variable that equals 0 if $DIV_{i,t}$ is positive and 1 otherwise, $NEGE_{i,t}$ is a dummy variable that equals 1 for firms with negative earnings before extraordinary items and 0 otherwise, and $AC_{i,t}$ is total accruals. Prior to 1988, I will be using the so-called balance sheet method to calculate accruals. The balance sheet method calculates the accruals as the change in non-cash current assets less the change in current liabilities excluding the change in short-term debt and the change in taxes payable minus depreciation and amortization expense. From 1988 onwards, I will be applying the cash flow statement method where the accruals are calculated as the difference between earnings and cash flows from operations. $E_{i,t}$ is the earnings before extraordinary items for firm i in year t. I will be using winsorizing at the 1^{st} and 99^{th} percentile to mitigate the effect of outlier observations.

The earnings estimates are computed for each firm i and each year t in the sample by multiplying the independent variables as of year t with the regression coefficients from the pooled regression computed from the 10 year period of observations. Companies with missing variable values are excluded from the sample in order to keep the estimates robust. These earnings estimates are then applied to the valuation models described in the coming section to solve for the cost of capital.

4.2.2. Valuation models applied to derive the implied cost of capital

After computing the earnings forecasts for t + 1, these figures are employed in three different valuation models to solve for the discount rate or the so called implied cost of capital (R). In this paper, I will use the following three commonly used models: CT (based on Claus and Thomas (2001)), MPEG (Easton (2004)) and Gordon (Gordon and Gordon (1997). The chosen three models are chosen to represent all commonly used valuation method categories that are used to solve for ICC.

Table 6: Chosen Valuation Models and Valuation Method Categories

The wide categories for the commonly used valuation methods used in solving for the implied cost of capital. Categories are chosen based on the underlying valuation model that is applied in the specified method in question. For instance, CT and GLC are both based on the idea of valuation based on residual income accounting but differ in such specifications as terminal year accounting and number of years data required. The chosen valuation models for this study are presented as bolded in the table. There are several modification of these models and to further specify the exact chosen models, a more in detail description is provided after this table.

Residual Income Valuation	Abnormal Earnings Growth-Based Valuation	Gordon Growth Model Valuation
Claus & Thomas (CT)	Ohlson & Juettner-Nauroth (OJ)	**Gordon**
Gebhardt, Lee & Swaminathan (GLS)	**Modified Price-Earnings Growth (MPEG)**	

Residual income model (CT)

The first valuation model is based on the approach introduced by Claus and Thomas (2001). This so called CT model is based on cash flow forecasts up to a terminal period and the determination of a terminal valued at the terminal period that captures the residual valued reaching beyond the terminal period. The model is implemented as follows:

$$M_t = B_t + \sum_{k=1}^{5} \frac{E_t[(ROE_{t+k} - R) \times B_{t+k-1}]}{(1+R)^k} + \frac{E_t[(ROE_{t+5} - R) \times B_{t+4}](1+g)}{(R-g) \times (1+R)^5} \qquad (2)$$

where M_t is the market equity in year t, R is the implied cost of capital measure, B_t is the book equity, $E_t[]$ denotes market expectations based on information available in year t, and $(ROE_{t+k} - R) \times B_{t+k-1}$ is the residual income in year t+k, defined as the difference between the return on book equity and the ICC multiplied by the book equity in the previous year. I estimate the expected

ROE in years t+1 to t+3 using the model-based forecasts and book equity. Book equity is determined based on clean surplus accounting (B_{t+k} = B_{t+k-1} + E_{t+k} – D_{t+k}, where E_{t+k} is the earnings in year t+k, D_{t+k} is the dividend in year t+k, computed using the historical dividend payout ratio).

Abnormal Earnings Growth model (MPEG)

The final model applied is based on the abnormal earnings growth model initially proposed by Easton (2004). In this paper I will apply a special case of the general model with T=2 and D = 0. The implied cost of capital is solved from the following equation:

$$R = \sqrt{(ROE_{t+2} - ROE_{t+1})} \,/\, M_t \qquad (4)$$

where ROE_{t+i} (where i = 1 or 2) is the return on book equity in year t + i computed using the forecasted earnings forecasts and book equity of each single firm. R is the implied cost of capital measure and M_t is the market value of the company in year t.

Gordon growth models (GGM)

The second category of models, namely Gordon growth models, is based on the work of Gordon and Gordon (1997). In their model the firm value (M_t) is defined as the present value of expected returns. The models differ from each other based on the time period used in each model. I will be using EPR, that is a Gordon growth model with T=1. The model is structured as follows:

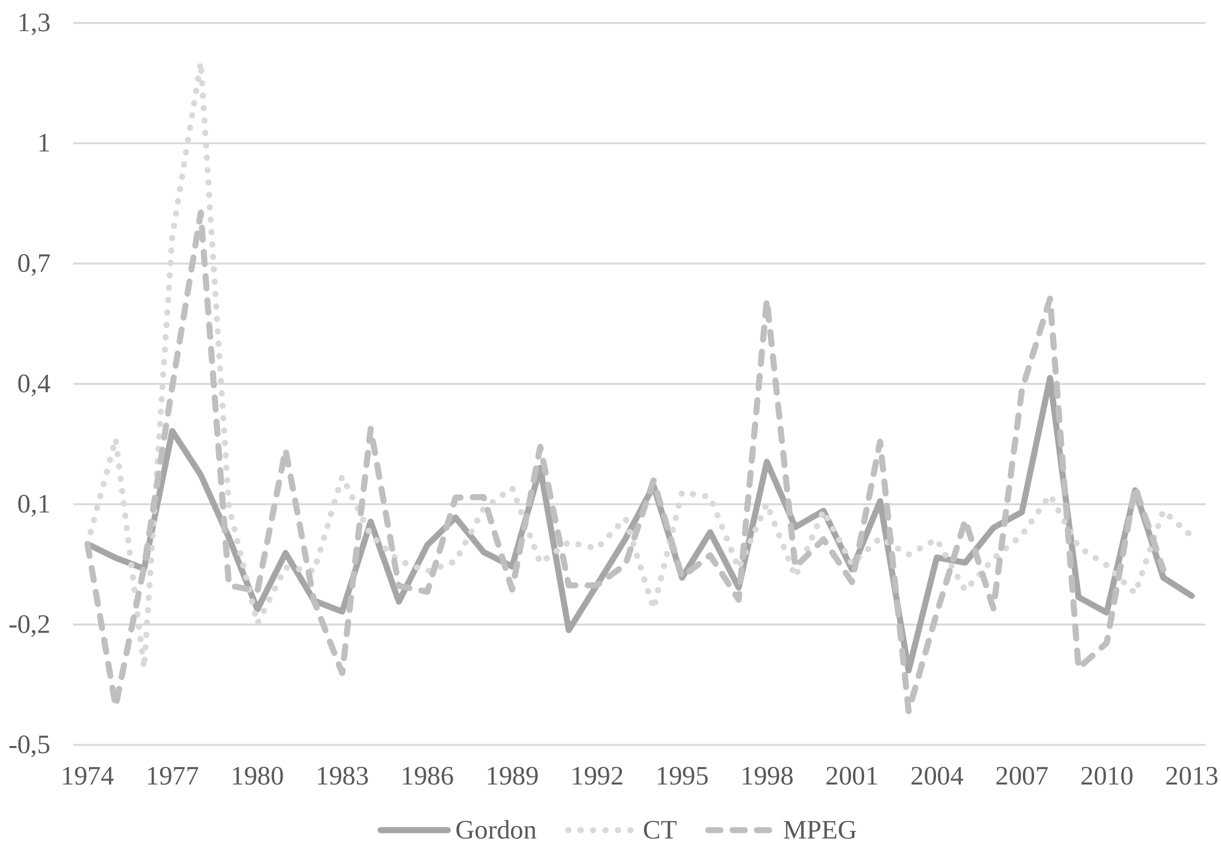
$$M_t = \frac{ROE_{t+1}}{(1+R)} \qquad (3)$$

where ROE_{t+1} is the return on book equity in year t+1 computed using the forecasted earnings forecasts and book equity for each single firm. R is the implied cost of capital measure and M_t is the market value of the company in year t.

To get a better understanding on how well these different measures of ICC move through the chosen time period, I have constructed a graph where the co-movements become visible. Figure 3 shows how each of the cost of capital estimate move. It is clearly observable that the estimates gotten as products of the above described models do move quite similarly. There are major movements in each of the cost of capital measures during the late 1970s, and during the mid-2000s. In general, it seems that outside the late 1970s, the residual income model (CT) seems to be the least volatile measure as during the whole sample period the standard deviation of the measure is around 0.008. The most volatile estimates are produced by the Gordon growth model with a standard deviation over the sample period of 0.035. The abnormal earnings growth model (MPEG) experiences a standard deviation of 0.013 during the same period of time.

Figure 3: Co-movements of the different ICC estimates through time

Figure 3 shows the yearly movements of the Implied Cost of Capital estimates, calculated with the three different models explained above, Gordon growth model (Gordon), Residual income model (CT) and Abnormal Earnings Growth model (MPEG).



4.2.3. Models to test capital structure theories

In this section I present the statistical models and the variables that are being used to test i) static trade-off theory, ii) pecking order theory and iii) market timing theory. I start by following the methodology presented by Shyam-Sunder and Myers (1999) to estimate the pecking order slope coefficient for each year to see how the historical coefficient has changed within the set sampling period. To do this, I compute:

$$\Delta D_{i,t} = \beta_0 + \beta_1 DEF_{i,t} + \varepsilon_{i,t}, \tag{5}$$

where $\Delta D_{i,t}$ is the net debt issued for firm i in year t, and $DEF_{i,t}$ is the financing deficit of firm i in year t. Both of the variables are scaled by total assets. Here the estimated slope coefficient, $\widehat{\beta_1}$, represents the value that is better known as the pecking order slope coefficient.

In order to further investigate the effects of market conditions on the financing decisions made by companies, I focus on the positive financing deficits by pooling the firm years and computing:

$$\Delta D_{i,t} = \beta_0 + \beta_1 NDEF_{i,t} + (\beta_2 + \beta_3 ERP_{t-1} + \beta_4 RIR_{t-1} + \beta_5 DSP_{t-1} + \beta_6 TSP_{t-1} + \beta_7 TAXR_t + \beta_8 RGDP_t) \times PDEF_{i,t} + \varepsilon_{i,t}, \tag{6}$$

where $NDEF_{i,t}$ is equal to $DEF_{i,t}$ if $DEF_{i,t} < 0$ and zero otherwise, $PDEF_{i,t}$ is equal to $DEF_{i,t}$ if $DEF_{i,t} > 0$ and zero otherwise, ERP_{t-1} is the computed implied market equity risk premium at the end of year t-1, RIR_{t-1} is the expected real interest rate at the end of year t-1, DSP_{t-1} is the default spread at the end of year t-1, TSP_{t-1} is the term spread at the end of year t-1, $TAXR_t$ is the statutory corporate tax rate during year t, and $RGDP_t$ is the real GDP growth rate during year t.

To make the applied statistical methods clearer and easier to understand, I will next go through the used independent variables in more detail. In the following sub-sections, the calculation methods and rationale behind each variable is explained and in the end of this part, a summary table will be provided to illustrate general information collectively about the chosen datasets.

Financing deficit variables

In both of the models described above I apply a measure of firm-specific yearly net financing deficit as an independent variable. The idea of a financing deficit is further developed in the second regression, where the independent variable of net financing deficit is divided into two separate variable to account for both negative and positive deficit separately. The basic idea behind researching these variables comes from the simple thought that when firm's internal cash flows are inadequate for the company to finance its real investments requires and/or to meet its dividend commitments, the company has to find external financing solutions (Shyam-Sunder & Myers, 1999). Here the company has to make a decision on what securities to issue, debt, equity or both. The traditional pecking order, for instance, suggests that in these situations, the company issues debt and only issue equity when the debt financing is extremely costly and the cost of financial distress is high.

The financing deficit is calculated as shown by Shyam-Sunder & Myers (1999), $DEF_{i,t}$ = $\Delta D_{i,t}$ + $\Delta E_{i,t}$, where $\Delta D_{i,t}$ is defined as the change in debt and preferred stock from year t-1 to year t as a percentage of beginning of the year assets for company i, and $\Delta E_{i,t}$ is defined as the change in equity and convertible debt minus the change in retained earnings as a percentage of beginning of the year assets. Negative financing deficit variable, $NDEF_{i,t}$, used in the second regression, is defined to equal $DEF_{i,t}$ when $DEF_{i,t}$ is negative and zero otherwise. Positive financing deficit variable, $PDEF_{i,t}$, used in the second regression, on the other hand is defined to equal $DEF_{i,t}$ when $DEF_{i,t}$ is positive and zero otherwise.

The traditional pecking order is one implication of the Myers–Majluf (1984) analysis on how investments and financing decisions are affected by asymmetric information. The main two results of the analysis lead into the conclusion that a broader concept of the pecking order hypothesis would accommodate some equity issuance by these companies. According to Myers-Majluf (1984) these equity issuances are due to of increased financial distress forcing the companies to use other sources of financing than debt. Thus, a company may try to finance its real investments or repayment of debt with equity if managers' information at hand is sufficiently favorable and the issue price of an equity issuance is low enough.

The reasoning by Myers-Majluf works also in reverse when the financing deficit represents a surplus ($DEF_{i,t}$ is positive). In these situations the company may want hold on to the excess cash or it may want to return cash to the investors by paying the investors cash dividend, by repurchasing shares, or by paying down the debt. If there are tax or other such costs of holding excess cash or paying cash dividends, the company may want to consider repurchases or paying down the debt. Less optimistic company managers prefer paying down debt rather than repurchasing shares with that they see to be too highly valued. The managers that are more optimistic, and inclined to repurchase shares, force up their stock prices if they try to repurchase. Faced with these ever rising prices, the number of optimistic managers decreases and the impact of attempted repurchase on stock prices increases. Thus, if information asymmetries are the only imperfection in the market, the repurchase price should be significantly too high for managers to repurchase stock and therefore end up paying down their existing debt. Therefore, it can be concluded that pecking order's predictability does not depend on the sign of the variable $DEF_{i,t}$.

Equity risk premium and the real interest rate

As described above, I have constructed an estimate for the equity risk premium using the computed implied cost of capital measures acquired using the forecasted earnings estimates. The idea behind estimating an equity risk premium is to capture the additional return requirements that equity investments face generally in the market. Riskier investments, in this case equity financing, should face higher expected returns than safer investment vehicles like debt of an unstressed company. Thus, the overall required rate of return can be thought as a sum of the risk free rate and an additional, extra return to compensate for the riskiness of such an investment. Therefore, I calculate the yearly equity risk premium by subtracting the real risk free rate from the computed cost of capital estimates for each firm i. The nominal risk free rate is calculated using the annualized nominal rate of return on one month T-bills published by U.S. Department of the Treasury. In order to convert the nominal risk free rate into real interest rate, I use the U.S. GDP deflator as published for each year by The World Bank.

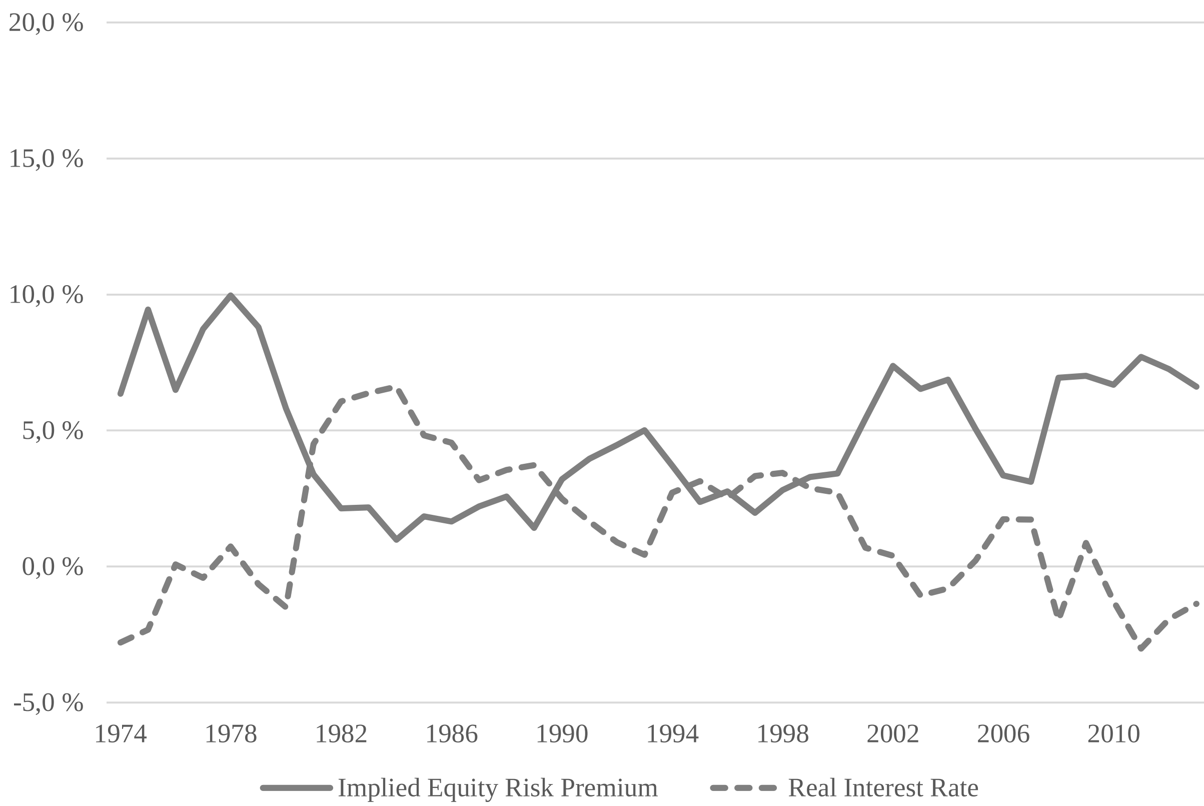
In Figure 4, the real interest rate and the implied equity risk premium are presented for each year in the dataset. As it can be seen from the graph, the equity risk premium fluctuates substantially through the whole selected time span. The time-variant nature of the equity risk premium is mainly due two reasons, either due the so-called rational reasons or the so-called irrational reasons. Rational reasons can be seen as a denominator for such phenomenon as time-variation in the risk or in the risk aversion of investors. Investor sentiment and the experienced timely variations in it, are regarded as the so-called irrational reasons.

Only by just looking at Figure 4, one can get an idea when firms, at least in theory, should issue certain securities and when they should issue other. When the equity risk premium is high, companies should be, on average, issuing less equity. Furthermore, the combination of high price on equity financing and requirement of external financing lead into issuing cheaper debt financing instruments. This applies also vice versa. This phenomena is visible from Figure 2, the two measures, equity risk premium and real interest rate, are in general negatively correlated and usually move in the opposite directions.

Historically the equity risk premium has been high from the mid-1970s to the beginning of the 1980s. During this period, from 1974 to 1979 the equity risk premium averaged around 8.3 %. After this, the premium fell close to zero and remained low until the early 1990s when the premium began to rise incrementally. From 1980 to 1990, the average equity risk premium was only around 2.5 %, considerably lower when compared to the prior period. There has been a rising trend in the equity risk premium during late 1990s and the beginning of the 21st century with a major drop during the most recent financial crisis (3.1 % in 2007), but the premium bounced back swiftly after the initial drop. The average equity risk premium from 1974 to 2013 has been 4.8 % with the median premium at 4.2 %. Based on my analysis, the firm-level equity risk premium average has never fell below zero and become negative. This is in contrast to the results by Huang and Ritter (2009) who find that the historical equity risk premium was negative during the period from 1996 to 2001. But as previously discussed, their model in estimating this figure differs substantially from my methodology. They also state in their work they might have overstated the downtrend of the premium during this period because of their model's setup.

Figure 4: Implied Equity Risk Premium and Real Interest Rate

Figure 4 shows the yearly movements of the Implied Equity Risk Premium, calculated from the implied cost of capital measure, and the Real Interest Rate, calculated from the one year T-Bills. The data is recorded for the whole period from 1974 to 2013.



Default and term spread

As laid down by the prior research (see. Baker, Greenwood, & Wurgler, 2003; Huang & Ritter, 2009), I will apply default and term spreads in my regression model as proxies for the different costs faced by different forms of debt financing available for companies. As these measures are time-variant, they may explain some parts of the time-varying financing decisions made by individual companies. In this paper, I have calculated the default spread as the difference in yields between the corporate bonds assigned with a Baa and Aaa ratings by Moody's as recorded in the Bloomberg database. The term spread is calculated here as the difference in yields between 10-

year and one-year U.S. Treasuries as recorded in the Bloomberg database. Term spread should capture the attractiveness of issuing long term debt securities when the term spread is historically at low levels.

Statutory tax rate and real GDP growth rate

The above described model also includes the historical statutory tax rate in the U.S. and the real growth rate of the U.S. GDP as independent variables. The statutory tax rate is an interesting and important variable to the model since the corporate tax rate may have major influence on how companies finance their operations. As previously discussed in the literate review, the tax rate and tax shield on debt are key players in the world of Modigliani and Miller. Companies take into account the tax shield received from debt financing resulting in deductibility of interest payments from company's income as they are planning on how to finance their operations. As highly leveraged firms face increased financial distress, the tax shield cannot be fully employed. Nevertheless, taxation should play at least some role in the financing decisions made by corporations.

The real growth rate of the U.S. GDP is included as an independent variable in the regression in order to control for growth opportunities along with the growing economy. The interaction of GDP and the positive financing deficit (financing surplus) tells us about how the companies on average finance their growth opportunities as the economy as a whole grows and offers additional possibilities. The real GDP is calculated by using the data provided by the Bureau of Economic Analysis, Department of Commerce.

The summary statistics of each variable presented here and their correlations with each other are presented in the above table, Table 7. The statistics show that the implied equity risk premium is positively correlated with the default spread, term spread and statutory tax rate. In contrast, the implied equity risk premium is negatively correlated with the real interest and the real growth rate of the GDP.

Table 7: Summary statistics of the main independent regression variables

ERP is the implied market equity risk premium, estimated using the composite implied cost of capital index that employs the model based earnings forecasts computed from the accounting data available from the Compustat database. RIR is the nominal interest rate minus realized inflation, where the nominal interest rate is the yield on one-year T-bills in the secondary market, and inflation is the rate of change of the consumer price index. DSP is the default spread, defined as the difference in yields (weekly series) between Moody's Baa rated and Aaa rated corporate bonds. TSP is the term spread, defined as the difference in yields (daily series) between 10 year and one year constant maturity Treasuries. TAXR is the statutory corporate tax rate. RGDP is the real GDP growth rate from the Bureau of Economic Analysis, Department of Commerce.

	ERP	RIR	DSP	TSP	TAXR	RGDP
N	40	40	40	40	40	40
Mean	0.048	0.014	0.012	0.013	0.426	0.027
Std Dev	0.025	0.026	0.006	0.010	0.047	0.021
Min	0.010	-0.030	0.006	-0.005	0.386	-0.027
Median	0.042	0.013	0.011	0.012	0.394	0.030
Max	0.100	0.066	0.034	0.034	0.498	0.072
Correlation						
ERP	1					
RIR	-0.847	1				
DSP	0.077	-0.078	1			
TSP	0.056	-0.078	0.140	1		
TAXR	0.040	0.231	0.422	-0.035	1	
RGDP	-0.275	0.388	-0.512	-0.339	0.090	1

5. Results

The results section is divided into 2 main sub-sections. First I will go through the results related to the traditional Shyam-Sunder and Myers (1999) model. Second, I go deeper to this model by dividing the independent regression variable of financial deficit into two parts, namely negative and positive deficit, and add the estimate for implied equity risk premium as well as additional controlling variables. Third, I will divide the whole time series into shorter time spans to see whether the effect of implied equity risk premium has significantly changed over time, and to verify the results of Huang and Ritter (2009) using similar time period. In addition, I will show how the effect has evolved after the testing period applied by Huang and Ritter.

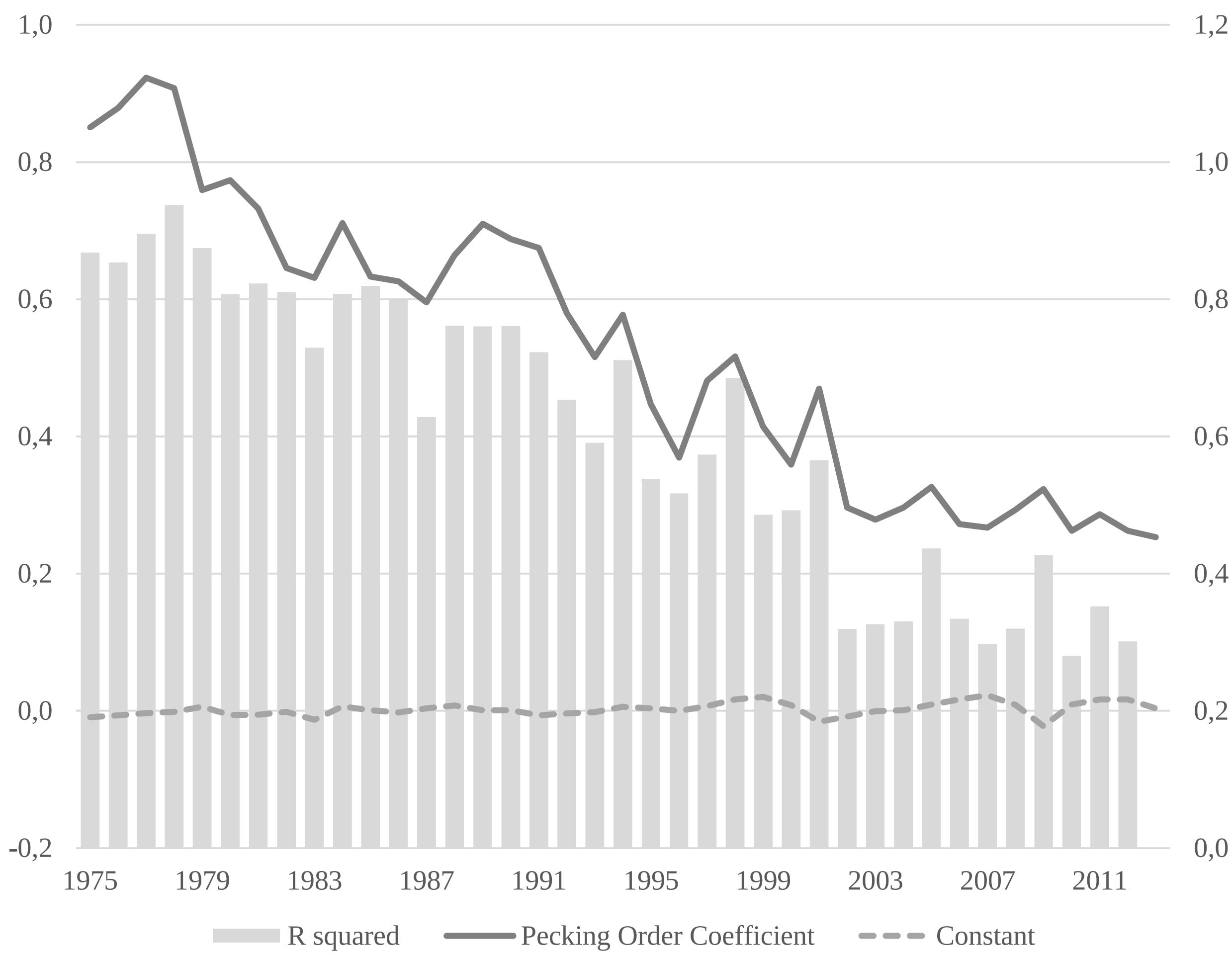
5.1. Results on the traditional pecking order test

In this section, I will go through the results related to the traditional pecking order test introduced by Shyam-Sunder and Myers in their prior research. In this test, the regression coefficient for financial deficit is also called the *pecking order coefficient*. According to the strict pecking order model, this coefficient should equal one, or at least be very close to it. The results for this test are presented in Figure 5.

A certain trend is clearly visible from Figure 5 and Table 8, as the pecking order slope coefficient significantly decreases over the whole time period from 1975 to 2013. A similar trend has been found by Huang and Ritter (2009), Frank and Goyal (2003) as well as Fama and French (2011). They all find in their research that the general trend of the slope coefficient has been downward facing and that the traditional pecking order theory has lost some of its power to explain how the companies finance their real investments. As earlier discussed, Fama and French (2011) also find that the general level of issuing new equity capital has been increasing. In the beginning of the of the period, the slope coefficient reached its maximum value of 0.923 in 1977 and was on average above 0.8 during the second half of the 1970s. Also the measure for the model's general fit to the observed data, namely R squared, was at high levels during this time, reaching levels close to 0.9 with maximum in 1978 of 0.937. During the 1980s, the slope coefficient continued to decreased and averaged only at 0.672, significantly lower than during the second half of 1970s. The slope coefficient continued decreasing during the 1990s averaging around 0.526. During the 1990s, the slope coefficient faced significant deviations as the within-the-decade standard deviation equaled around 0.11 (0.06 during the 1980s).

Figure 5: Results from the Traditional Pecking Order Regression Formula

Figure 5 shows the yearly movements of the regression coefficients from the traditional pecking order test by Shyam-Sunder and Myers (2009). Pecking order coefficient is the regression coefficient β for financial deficit, previously noted as DEF. Constant is the constant term, α, from a the regression. R squared is the annual estimate on how well the actual data fits the statistical model created.



The 21st century has been also a period of decrease in the slope coefficient but the pace has slowed down during this period. The lowest point is also, at the same time, the most recent point in the dataset, as the slope coefficient in 2013 equaled 0.253. When comparing the maximum level in 1978 and the lowest point in 2013, a total proportional decrease of a staggering negative 72.6 %

can be observed. This leads into a CAGR (compound annual growth rate) of -3.5%, meaning that on average, the slope coefficient has decreased by 3.5% a year during the recorded period of time. As predicted by the traditional pecking order theory, the intercept term has remained at the same levels, close to zero. As the traditional pecking order theory predicts the slope coefficient to be close to one, it can be see that its explanatory power over the companies' financing decisions has decreased over time.

Table 8: Pecking order slope coefficient during 10 year time buckets

Slope coefficient is the regression coefficient from the Shyam-Sunder and Myers traditional pecking order regression.

	1975-1979	1980-1989	1990-1999	2000-2009	2010-2013
Slope coefficient	0.864	0.672	0.526	0.318	0.266
Std Dev	0.065	0.057	0.105	0.060	0.014

When comparing Table 8 and Figure 5, the general trend is visible, but at the same time there exists some fluctuations within decades themselves which cannot be explained by the general trend itself. As there are ups and downs within decades, and the frequency, as well as the magnitude of these changes varies, this phenomenon could be interpreted as a result of changing environment in the relative cost of capital. In the next section, I will introduce additional independent variables to the traditional pecking order regression formula and, at the same time, divide the financial deficit variable into two separate variables, namely negative and positive deficit. This modification of the formula helps to understand the underlying forces that might be driving the companies' behavior when making decisions on what securities to issue.

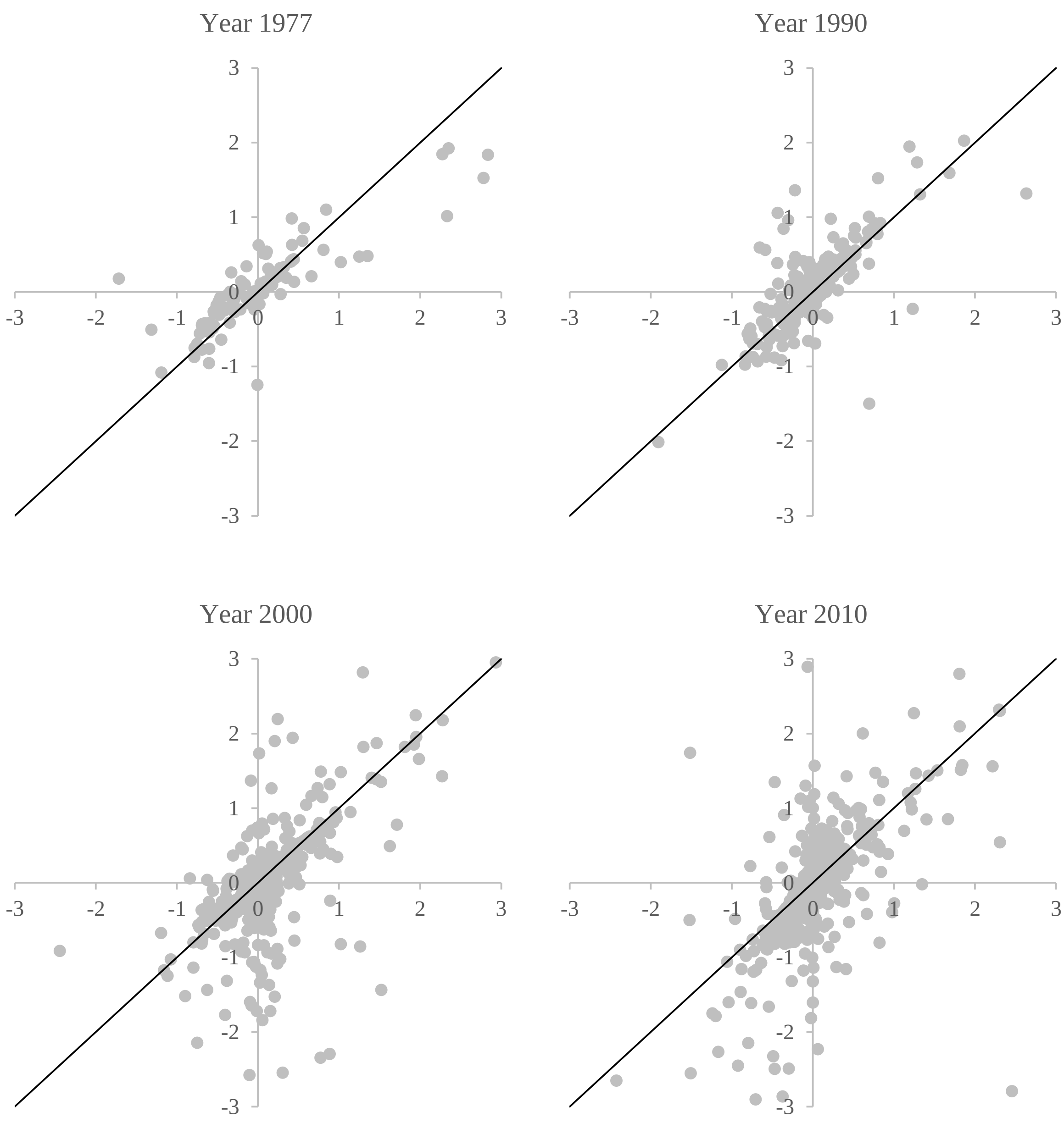
In addition, I have tested the general robustness of the underlying model by visually examining the observations in the sample, not for one year, but for four years in order to see if they also exhibit the same deterioration than the initial statistical model. In order to do this, I have conducted a deep dive into the pecking order slope coefficient and its deterioration over the selected time span. To visualize this, I have prepared four separate scatter plots to be treated as visual robustness checks. Figure 6 shows scatter plots for four selected years, namely 1977, 1990, 2000 and 2010. All the others but 1977 were chosen as random, with enough time between each other. Year 1977 was chosen due to pecking order slope coefficient peaking during this time. I have also drawn a hypothetical 45-degree line in each of the graphs as this represents the financing behavior proposed by the pecking order theory. Thus, if the traditional pecking order theory would dictate, all the observation points would lie on this 45 degree line.

To better understand the scatter plot graphs and to be able to interpret the pattern I will offer a brief explanation on the graph's background next. As predicted by the pecking order theory, the company will use debt as the external source for financing its deficits. Thus, if a company should finance 100% of its financing deficit with net debt, all of the observation points in the scatter plot would lie on the graphed 45-degree line. If a company would have negative net equity issuance, it would lie on the left side from the 45-degree line. In contrast, a company with positive net equity issuance would lie on the right side of the graphed 45-degree line.

In contrast to the predicted outcome hypothesized by the pecking order theory, it is observable that the observations do not lie on this graphed 45-degree line. Furthermore, when looking at all the four scatter plots, a certain pattern can be observed as the observation points seem to be less tightly grouped around the 45-degree line when moving away from the situation in 1977. When comparing 2010 to 1977, a much more scattered group can be observed around the 45-degree line.

Figure 6: Net debt and net external financing scatter plots for selected four years as visual robustness check

In each of the presented scatter plot figures the horizontal axis denotes net external financing and the vertical axis denotes net debt. Both of the measures are scaled by beginning-of-the-year assets. The 45 degree line is hypothetical and represents the state implied by the traditional pecking order theory.



5.2. Results on the expanded regression model

In this section, the results for the expanded regression models are presented. I will first go through the partly expanded model, with the divided financing deficit variable (positive and negative deficit) and the equity risk premium as the only macroeconomic independent variable. Second, I will go through the fully expanded model with additional macroeconomic variables to see what happens when certain variables are controlled for, and how these variables affect the companies' financing decisions as a whole.

I have presented the results for the partly expanded regression model in Table 9, where the actual coefficient, t-stat, model fit (R^2) and number of observations are visible. As expected, both the negative and positive deficit variables have positive sign that is consistent with the traditional regression model. Also the sign for the interaction between the positive financing deficit and the implied firm-level equity risk premium is positive granting power to the market timing theory. This effect is also highly significant statistically. The positive sign in the interaction of the positive financing deficit and the equity risk premium implies that as the relative cost of equity financing increase, the company prefers debt. This notion works also vice versa, when the relative cost of equity is low, companies tend to prefer equity instruments over debt.

In economic terms, if the equity risk premium is to go up by one unit (one percentage point), the change would be associated with 0.998% more of the financing deficit being finance with debt securities issuances (for instance from 60% to 62.47%). The recorded economic impact is smaller than the results recorded by Huang and Ritter (2009) and Elliott, Koeter-Kant and Warr (2007) who find that a change of one unit in the equity risk premium (one percentage point) is associated with 2.9 percentage point change in the financing behavior. As earlier discussed, their calculation method of equity risk premium only creates market-level estimates that do not account for firm-level variables. Thus, it seems that the market-level changes in the equity risk premium have a larger impact on the financing decisions made by individual companies than the change in the firm-level equity risk premium. This result is in contrast to my fourth hypothesis that assumes firm-level changes to affect the financing behavior more the market-level changes. I will discuss this result in the coming concluding section in more detail.

Table 9: Results for the partly expanded regression tests

In Table 9, the following equation is estimated: $\Delta D_{i,t} = \beta_0 + \beta_1 NDEF_{i,t} + (\beta_2 + \beta_3 ERP_{t-1}) \times PDEF_{i,t} + \varepsilon_{i,t}$. In Table 5, the financing deficit, DEF_{it}, is defined as the sum of ΔD_{it} and ΔE_{it} , where ΔD_{it} is the change in debt and preferred stock from year t-1 to year t as a percentage of beginning of year assets for firm i, and ΔE_{it} is the change in equity and convertible debt minus the change in retained earnings as a percentage of beginning of year assets. In the table, $NDEF_{it}$ equals DEF_{it} if the deficit is negative and zero otherwise. $PDEF_{it}$ equals DEF_{it} if the deficit is positive and zero otherwise. ERP_{t-1} is the implied firm-level equity risk premium at the end of year t-1. The implied firm-level equity risk premium macroeconomic variables are measured in decimal form (i.e., a 5% equity risk premium is measured as 0.05). Both the dependent variable and the financing deficit are measured as percentages.

	1975–2013	
Variable	Coefficient	t-stat
NDEF	0.086	48.26
PDEF	0.167	232.47
ERP × PDEF	0.998	151.59
Constant	0.011	1.95
Adj. R^2	0.715	
N	46 343	

In order to study whether the importance of the firm-level equity risk premium to companies' funding decisions has changed over time, I have constructed additional two separate regression for time periods from 1974 to 2001, and from 2002 to 2013. These regressions are both presented in Table 10 with the corresponding regression coefficients, t-stats, adjusted R^2 and number of observations. It is visible from these time buckets that the sign in the interaction between the firm-level implied equity risk premium and financing deficit is positive and the effect is statistically significant. Furthermore, the signs and significances of each independent variable seem not to be changing notably. What is noteworthy here, is the increase of the coefficient in the interaction of the firm-level implied equity risk premium and the financing deficit. During the time period from 1975 to 2001, the regressions coefficient was notably lower than it was during the time period from 2002 to 2013. This difference is also economically significant when moving from 0.105 to

1.004. The increase in the coefficient could indicate towards a rise in the relative importance of the cost of certain capital and, thus could be interpreted as support for the market timing theory and its growing relevance in explaining how the capital structure of firms is actually constructed. This phenomenon needs to be studied in more detail in order to understand it better and draw more precise conclusions on whether the importance of such measures has increased during the past decades.

Table 10: Partly expanded regressions during different time buckets

In Table 10, the following equation is estimated: $\Delta D_{i,t} = \beta_0 + \beta_1 NDEF_{i,t} + (\beta_2 + \beta_3 ERP_{t-1}) \times PDEF_{i,t} + \varepsilon_{i,t}$. In Table 10, the financing deficit, DEF_{it}, is defined as the sum of ΔD_{it} and ΔE_{it} , where ΔD_{it} is the change in debt and preferred stock from year t-1 to year t as a percentage of beginning of year assets for firm i, and ΔE_{it} is the change in equity and convertible debt minus the change in retained earnings as a percentage of beginning of year assets. In the table, $NDEF_{it}$ equals DEF_{it} if the deficit is negative and zero otherwise. $PDEF_{it}$ equals DEF_{it} if the deficit is positive and zero otherwise. ERP_{t-1} is the implied firm-level equity risk premium at the end of year t-1. The implied firm-level equity risk premium macroeconomic variables are measured in decimal form (i.e., a 5% equity risk premium is measured as 0.05). Both the dependent variable and the financing deficit are measured as percentages. The regression if executed on for two separate time periods, from 1975 to 2001, and 2002 to 2013 in order to see if the importance of the firm-level implied equity risk premium has changed.

	1975–2001		2002-2013	
Variable	Coefficient	t-stat	Coefficient	t-stat
NDEF	0.680	84.83	0.085	30.91
PDEF	0.593	191.84	0.166	150.70
ERP × PDEF	0.105	3.19	1.004	99.52
Constant	0.003	1.85	-0.021	-1.49
Adj. R^2	0.621		0.725	
N	27 669		18 674	

In Table 11, additional macroeconomic variables (the real interest rate, default spread, term spread, statutory tax rate and the real growth rate of the GDP in the U.S.) are added to the regression model to control for certain movements in the market and also to get a better understanding on how the financing decisions are made as a whole. It is visible form Table 11 that the coefficient on the interaction between positive financing deficit and implied firm-level equity risk premium changes only by little after controlling for the additional macroeconomic variables, namely the real interest rate, default spread, term spread, statutory tax rate and the real growth rate of GDP. Also the statistical significance remains at high levels.

Table 11 shows also that an increase in the statutory tax rate leads into firms funding their financing deficits with higher amount of debt, which is consistent with the hypothesis of the trade-off theory that states that companies will try to benefit from the tax shield created by interest payments on debt. As companies face an increased taxation environment, they will try to benefit from this by issuing more debt securities. The tax rate in my data set is the statutory tax rate and it is used as a macroeconomic variable that is not firm specific but same for all of the companies. The tax rate was set as a macroeconomic variable due to the fact that all of the companies are U.S.-based publicly listed companies that should, more or less, share same sort of taxation environment. In addition to the previous point, the same approach has been employed in the prior research (see. Huang and Ritter, 2009), and in order to make the results more comparable I will be using the same fundamental setting in the main tests.

At the same time, the coefficient seems to be positive on the interaction between positive financing deficit and the real growth rate of GDP. This is in line with the prior research suggesting that firms, on average, seem to finance their growth opportunities with debt rather than equity. Thus, in addition to the results from the interaction between the statutory tax rate and the positive deficit, this somewhat give support to the traditional trade-off theory. While this may be the case, the regression coefficient on the interaction is not statistically significant.

The regression models presented in this section do share their advantages and disadvantages. One of the most important advantage of these regressions models is the fact that they are able to analyze a large number of companies over a long period of time. In addition, they allow for controlling for several factors, in this case macroeconomic variables such as spreads and GDP growth rate. One of the biggest disadvantages is the relatively large reaction to outliers that need to be extremely carefully controlled for and the data has to be correctly setup at all the required steps during the regressions analyses.

Table 11: Results of the expanded regression model

In Table 6, the following equation is estimated: $\Delta D_{i,t} = \beta_0 + \beta_1 NDEF_{i,t} + (\beta_2 + \beta_3 ERP_{t-1} + \beta_4 RIR_{t-1} + \beta_5 DSP_{t-1} + \beta_6 TSP_{t-1} + \beta_7 TAXR_t + \beta_8 RGDP_t) \times PDEF_{i,t} + \varepsilon_{i,t}$. In Table 6, the financing deficit, DEF_{it}, is defined as the sum of ΔD_{it} and ΔE_{it} , where ΔD_{it} is the change in debt and preferred stock from year t-1 to year t as a percentage of beginning of year assets for firm i, and ΔE_{it} is the change in equity and convertible debt minus the change in retained earnings as a percentage of beginning of year assets. In the table, $NDEF_{it}$ equals DEF_{it} if the deficit is negative and zero otherwise. $PDEF_{it}$ equals DEF_{it} if the deficit is positive and zero otherwise. ERP_{t-1} is the implied firm-level equity risk premium at the end of year t-1. RIR_{t-1} is the nominal interest rate minus inflation in year t. DSP_{t-1} is the default spread, defined as the difference in yields between Moody's Baa rated and Aaa rated corporate bonds at the end of year t-1 as noted in the Bloomberg database. TSP_{t-1} is the term spread, defined as the difference in yields (daily series) between 10 year and one year constant maturity T-bills at the end of year t-1. $TAXR_t$ is the statutory corporate tax rate during year t. $RGDP_t$ is the real GDP growth rate during year t. All of the macroeconomic variables are measured in decimal form (i.e., a 5% equity risk premium is measured as 0.05). Both the dependent variable and the financing deficit are measured as percentages.

	1975–2013	
Variable	Coefficient	t-stat
NDEF	0.086	48.51
PDEF	0.176	207.04
ERP × PDEF	0.912	114.82
RIR × PDEF	-4.088	-20.85
DSP × PDEF	-10.970	-3.11
TSP × PDEF	-23.016	-10.88
TAXR × PDEF	1.307	6.20
RGDP × PDEF	1.118	0.83
Constant	-0.000	-0.04
Adj. R^2	0.719	
N	46 309	

6. Conclusion

The main goal of this paper was to gain better understanding on the decision variables that affect a company's financing decisions. I find that the cost, implied by the capital markets for a single firm, is a key decision variable when making capital structuring decisions. However, the overall state of the market reflected by the market-level implied costs affects the management's decisions even more. In addition to the cost levels, tax rate has an important role as predicted by the trade-off theory. It also seems that the pecking order theory has lost most of its explanatory power over companies' security issuance behavior during the last few decades.

The time variant nature of security issuances offer a perfect setting to study the hypothesized world implied by these theories, and in order to understand companies' behavior on firm-level, more than just market wide macro variables are required. As new methodology of calculating the cost of capital has risen in the field of finance and accounting, this is the perfect time to sharpen our expectations based on these theories and study certain phenomena from a different angle. In my study this new angle is to look at the cost of capital as a firm-level variable that takes into account the unique characteristics of a given company and is not only a macroeconomic estimate shedding light on market wide events and trends. As stated in one of my hypothesis, I do not expect the effect to disappear when moving from market-level to firm-level. I was expecting a clear reaction by the companies' management on the fluctuations in the cost of capital and was also expecting, contrary to the traditional trade-off theory, that the companies would be issuing equity more frequently than just as a last resort when the company is already financially distressed.

Using the computed implied cost of capital estimates to come up with an estimate for firm-level equity risk premium, I find that the companies' managers do follow the fluctuations in the relative cost of capital and seek to finance their operations with equity when equity financing is relatively cheaper. This, of course, works vice versa. In addition, I find that companies tend to finance their general growth prospects with debt capital and that the tax rate plays a key role in when making financing decisions. This notion about the importance of the tax rate is in line with the prior research and the trade-off theory. Although, trade-off theory has the tax shield effect incorporated as one of its main components, it still fails to explain the opportunistic behavior of companies to finance their operations with cheap equity and the actual frequency of issuing equity based securities. Thus, the trade-off theory can be seen as an underlying component that is able to explain some of the aspects that the companies' management seems to face.

I also find that the traditional pecking order theory seems to have lost most of its explanatory power over the companies financing behavior. The so-called pecking order slope coefficient was at high levels during the second half of the 1970s but has since decreased notably. As companies' management seems to be acting as an opportunistic entity when it comes to making financing decisions, the idea of a more-or-less universal pecking order of capital sources does not seem to fit the picture. Based on my results, I see pecking order theory as a simplified rule of thumb that fails to incorporate the management's ability to follow the cost assigned for different classes of capital that the company is facing. The pecking order is more like a status quo that is broken when the financial environment starts to fluctuate.

When compared to the prior research conducted by Huang and Ritter (2009), I find, contrary to one of my hypothesis, that although the companies' management seems to be following the firm-specific cost of capital levels, the economic importance of these movements is lesser than the movements in the market-level cost of capital. My initial hypothesis was set mainly based on the qualitative study conducted by Graham and Harvey (2001) where they find that company management uses such analytical tools to estimate their cost of capital that account for company specific characteristics (e.g. CAPM and historical averages). However, a further analysis of such models as CAPM, offer support to finding in this paper as it is essentially based on market-level data that is then adjusted with betas that account for firm-specific characteristics. Thus, the CAPM –model is fundamentally affected significantly by changes in the market-level return requirements. In addition, this phenomenon could exist because company management could find it easier to follow the general movements in the capital markets and reflect these movements on their own businesses. The management is faced with this information from various sources subconsciously and also consciously through news, market reports and discourses. Following the companies' own market implied cost of equity levels can be more challenging and especially labor-consuming for smaller companies who do not have resources dedicated to these purposes. Thus, in the future research the size of the company should be used as one of the variables to see how it affects the general financing behavior.

In addition, it seems that the importance of firm-level implied equity risk premium in the financing decisions made by the management has been increasing. This could be a result of several different factor, such as technological development or the availability of data and tools to follow certain indicators. It would interesting to study this phenomenon in more detail in order to see how the importance has actually been developing. In order to study the underlying reasons for such behavior, it would be interesting, and at the same time very important, to conduct a survey study on the company management to see if something has changed in the procedures of following company's own cost of capital levels.

As the search for the underlying reasons why the economic importance of the movements in the implied equity risk premium differs between my paper and the paper by Huang and Ritter (2009) is not in the scope of this paper, I would like to see further analysis on this. In addition to this, although the implied cost of capital framework is still relatively new concept and the overall number of papers written about it is relatively low, the research is heavily concentrated on the U.S. based companies and the U.S. equity market. It would be extremely interesting and, at the same time, important to study the same phenomena in other markets like the Europe, Asia and the developing markets. This way more could be learned about the differences between these markets and whether the behavioral factors found in the U.S. based markets are also present when studying other capital markets. Although we are living in a globalized world and investors act not only in their domestic capital markets, some underlying differences in these markets might cause some interesting local phenomena.

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