Equity Market Timing and the Capital Structure of Swedish Firms

Johan Bolte* and Anton Truvé**

Bachelor Thesis in Finance

Stockholm School of Economics

May 19, 2014

ABSTRACT

We test the equity market timing hypothesis using yearly data from 1994-2013 for a sample of Swedish firms listed on Stockholm OMX. We do not find any support for market timing when using Kayhan and Titman's (2007) market timing measures. Our analysis of the effect on leverage following significant equity issues shows that the mean and median firm neutralize the effect from significant equity issues within one to three years. We find a positive relationship between market-to-book and the change in book leverage and also a negative relationship between market-to-book and equity issues during certain periods of time, in contrast to previous findings for the American market. As a final test we replace Kayhan and Titman's (2007) market timing measures with Baker and Wurgler's (2002) measure, which assigns weights to market-to-book ratios, and find an inverse relationship between this measure and both book and market leverage. Due to the short-lived effects on leverage following significant equity issues, it is possible that the inverse relationship is not attributable to market timing theory. Our findings combined are more in line with dynamic trade-off theory with adjustment costs.

JEL Classification: G32

Keywords: Capital Structure, Equity Market Timing, Trade-off Theory, Leverage Ratio, Equity Issues

Acknowledgements: We would like to thank our tutor Michael Halling for valuable insights and comments on our thesis.

* 22363@student.hhs.se

** 22356@student.hhs.se

Table of Contents

1 Introduction

According to the trade-off theory of capital structure, each firm has a target debt ratio, determined by trade-offs between costs and benefits for debt and equity. However, as proposed by a multitude of authors and papers, certain factors will cause firms to deviate from these target debt ratios. Such factors might be free cash flows, investment expenditures, and past stock prices of the firm. Depending on the sensitivity to deviations in leverage ratio, and the level of costs to adjust leverage ratios for firms, reactions to the aforementioned variables should differ in influence and persistency.

In contrast to the trade-off theory, pecking order theory assumes that there is a preference among firms for, in turn, internally generated funds over debt and debt over equity. Market timing theory, on the other hand, assumes that managers try to time the market when issuing equity, thus capitalizing on the fluctuations of the market.

In our paper, we examine the effects on leverage of a set of variables derived from firm histories based on the three theories mentioned above for a sample of Swedish publicly traded firms. We estimate the effects for a short-term period, and proceed to examine the persistence of the changes induced by these variables. We test for influence on leverage by the following variables:

1. **Financial deficit**. Firms with higher financial deficits tend to increase their leverage, according to pecking order theory and the Myers and Majluf (1984) adverse selection model.
2. **Yearly and long-term timing**. As suggested by Baker and Wurgler's (2002) theory of market timing, managers tend to issue more equity in times where the market is perceived as favorable, as measured by market-to-book ratio. When managers issue new equity, leverage ratios should decrease, implying a negative relationship between market timing and leverage. In line with Kayhan and

Titman (2007), we split the Baker and Wurgler measure into yearly timing and long-term timing parts.

3. **Past stock returns**. The market timing theory as well as several different studies suggest that firm managers tend to issue equity following stock price increases since they believe that they can raise equity on more favorable terms. This implies that leverage ratios should be negatively related to stock returns such as documented by Welch (2004).
4. **Profitability**. According to earlier research, firms with higher past profitability tend to show a lower leverage ratio. This is consistent with the Donaldson (1961) and Myers' (1984) pecking order theory proposition that internally generated funds are cheaper than those externally raised.
5. **Leverage deficit and change in target ratio**. According to trade-off theory, as suggested by Hovakimian et al (2001), the difference between observed leverage ratio and the target leverage ratio predicted by some trade-off theory variables, is effective in predicting whether firms issue equity or debt. Since the target might be changing, the change in predicted target ratio should also explain some of the changes in observed leverage ratio.

We regress the change in leverage on our measures for two different length time periods, in order to understand the short-term effects as well as the persistence of these effects. Our study is generally consistent with the approach taken by Kayhan and Titman (2007), although we are looking at a sample of Swedish firms. We have extended the analysis by looking deeper at the effect on leverage following equity issues and also included some alternative methods to look at how leverage and equity issues are affected by some of the factors included in our other analyses. The objective of our study is to test the equity market timing theory, and to provide some evidence as to whether the results from studies on the American market are applicable also on the Swedish market with its differences in culture, regulation and behavior.

We find that leverage ratio is indeed strongly related to both financial deficit and the leverage deficit measure. This could be interpreted as evidence in favor of trade-off and pecking order theory. We are however unable to find evidence in favor of market timing through our yearly and long-term timing measures as well as our stock return measure. Due to our data not being able to support the market timing hypothesis through these measures, we proceed to look at the change of book leverage due to equity issues, retained earnings, and residual asset growth in order to get a broader understanding of the Swedish market. We also look at the effects from significantly large equity issues on leverage, and find that the effects on leverage caused by equity issues are neutralized by firms in a short period of time. Thus, we do not find support for Baker and Wurgler's (2002) theory that a firm's capital structure is the result of previous attempts to time the market. We conclude our research by replacing Kayhan and Titman's (2007) market timing measures with Baker and Wurgler's (2002) *EFWAMB* measure, and find an inverse relationship between *EFWAMB* and leverage. However this finding is more in line with dynamic trade-off theory due to the short-lived effect of equity issues on leverage.

Our results might be attributable to differences in the Swedish market compared to the American market, and we conclude that the findings concerning market timing by Kayhan and Titman (2007) and others based on the American stock market may not be easily applicable on the Swedish market. The fact that our data includes two financial crises may also influence the result. We propose that the effects of market timing are not necessarily visible in all markets and through all measures. Another explanation to our somewhat inconclusive evidence for market timing theory may be that historical market-to-book ratios are not an optimal proxy to determine market timing effects in all cases, as suggested by Mahajan and Tartaroglu (2008).

2 Previous Literature

2.1 Theory

2.1.1 The Capital Structure Puzzle

In his paper, Myers (1984) discusses what he calls the "capital structure puzzle": the contrasting views of static trade-off theory and pecking order theory of capital structure.

According to static trade-off theory there is a debt-to-value ratio set by the company, towards which the company continuously adjusts. In contrast, according to pure pecking order theory there is no well-defined target leverage ratio. Internal financing is preferred over external financing, and if the firm has to resort to external funding debt is preferred over equity.

The main point of trade-off theory is that company value is maximized through a trade-off between tax shields and the potential financial distress caused by large debt. The only reason for firms to deviate from their optimal leverage ratio is adjustment costs.

The main point of the pecking order theory is that internal financing will always be cheaper than issuing debt, which in turn will always be cheaper than issuing equity. A pure pecking order theory can be disproved by individual firms issuing equity while still at low leverage, however, on aggregate the theory seems to fit well with observations. If asymmetric information is introduced, as further investigated by Myers and Majluf (1984), firm managers have incentives to act in line with the pecking order theory.

Comparing the two theories, Myers (1984) comes to the conclusion that neither of the theories are perfect, as each of them have their gaps and anomalies. Myers introduces his "modified pecking order theory" and voices the idea that capital

structure may be the result of cumulative financing requirements over an extended time period.

Myers' ideas are the groundwork of our paper, as we try to examine the implications of both theories and contrast them against the market timing theory to achieve a better understanding of corporate capital structure in Swedish firms.

2.1.2 Dynamic Trade-off Theory

Fischer et al (1989) developed a theory of dynamic trade-off theory where the adjustment towards a target leverage only takes place if the adjustment costs are smaller than the benefit obtained from moving closer to the target. Compared to the static trade-off theory, where firms are assumed to be at their target leverage, the dynamic trade-off theory explicitly allows for adjustment costs and thus it is no longer necessary that firms are at optimal leverage. In light of this, the adjustment speed towards the target leverage can be estimated, and the fact that firms move towards their optimal leverage is seen as evidence in favor of trade-off theory. These theories will be of great importance when interpreting the results for our leverage deficit variable. A strong impact on leverage from the leverage deficit could be interpreted in favor of dynamic trade-off theory.

However, Chang and Dasgupta (2009) argue that tests including target leverage ratios do not distinguish between target behavior and mechanical mean reversion. They use simulated data without any leverage targets and still find practically the same results as those found in many trade-off theory studies.

The existence of a target leverage is a feature of the trade-off theory not found in neither pecking order theory nor market timing theory, where leverage is driven by other factors such as adverse selection or mispricing of the firm's equity.

2.1.3 Pecking Order Through Adverse Selection

In their paper, Myers and Majluf (1984) develop their adverse selection model. They argue that firms are more willing to issue debt than equity if external financing is required.

The theory presented by Myers and Majluf concludes that if managers of a firm have favorable insider information about a firm, and act in the interest of current stockholders, then in some cases they will choose not to act on positive-NPV investment opportunities. Since an issue is often interpreted as a negative, or at least less positive signal, the prices investors are willing to pay will be lower. In turn, this leads to bargain prices for the new issue and significant costs for old shareholders. If these costs outweigh the value of the investment, management will refuse to issue shares even though there might be no other options, and thus pass on the investment opportunity.

More importantly for our study, the model predicts that firms will prefer issuing debt to equity, and therefore especially firms with a higher need for financing will tend to lever up their firm. This assumption is captured in our financial deficit variable, so that a higher financial deficit should imply an increase in leverage.

2.2 Empirical Work

2.2.1 Stock Returns

In his paper, Welch (2004) presents his findings that firm leverage is largely dependent on stock returns, since firms do not rebalance to counteract this effect.

Welch presents evidence that firms do not issue or repurchase equity in order to rebalance the effects of stock returns on leverage ratios. According to Welch, stock returns is the primary known component of capital structure. Welch provides a wide

range of possible explanations, such as direct transaction costs or indirect costs, or manager incentives in line with Myers and Majluf (1984).

Graham and Harvey (2001) offer an explanation to the problem in their survey, in which they find that managers tend to raise equity in times where past returns are high, because they feel that the terms are more favorable when the share price is perceived as higher than normal. On the other hand, following low or negative stock returns, managers are more likely to repurchase shares and avoid new issues, since they feel that the terms are unfavorable.

In our paper, we have included past stock returns in line with Graham and Harvey's (2001) and Welch's (2004) arguments, expecting firms with higher stock returns to have a lower leverage.

2.2.2 Market Timing

Equity market timing is the practice of issuing equity at times when the market value is high, and repurchasing shares when the market value is low. The idea is to take advantage of fluctuations in the cost of equity compared to the cost of other forms of financing.

Modigliani and Miller (1958) argued that the costs of different financing means do not differ independently, and that therefore there are no gains to be made from speculatively switching between financing forms. However, the ideas of Modigliani and Miller are based on as set of assumptions that are not necessarily true.

A number of researchers have, in papers subsequent to Modigliani and Miller, suggested that if markets are not effective there might be incentives to attempt to time the market. Baker and Wurgler (2002) find that market timing has a large and

persistent effect on capital structure. They present evidence that low-leverage firms are the ones that raised money when market valuations were high, and that high leverage firms are the ones that raised money when market valuations were low.

Baker and Wurgler construct a measure of market valuation based on weighted market-to book ratios and then regress leverage on their measure with evidence suggesting that leverage is strongly negatively related with past market valuations. A series of tests on persistency also suggests that the effect is persistent over a long time period. Baker and Wurgler even goes as far as to articulate the idea that "capital structure is the cumulative outcome of attempts to time the equity market".

Mahajan and Tartaroglu (2008) conduct a study on equity market timing using the Baker and Wurgler (2002) measure in G7 countries. Similar to the proponents of the theory, they find that leverage is correlated with historical market-to-book ratio. However, according to Mahajan and Tartaroglu this relationship cannot be attributed to equity market timing. They find that firms undo the effects of equity issuance, and propose that firms act more in line with a dynamic trade-off model.

In this paper, our measures of market timing use the same intuition as the one behind the Baker and Wurgler measure. They are derived from the Baker and Wurgler measure by Kayhan and Titman (2007). For more details regarding these measures see section 3.2.2.

2.2.3 Leverage Deficit

Hovakimian et al (2001) present evidence that firms adjust their leverage ratios towards a target ratio, predicted by traditional variables from trade-off theory. The leverage deficit, which is the difference between the predicted target ratio and the actual

leverage ratio is shown to have a significant impact on whether firms issue debt or equity.

Similar evidence that firms are moving towards a target leverage ratio is presented by Fama and French (2002). However, they find that the adjustment speed is slow. Our measure of leverage deficit is consistent with the approach of both papers.

2.2.4 Financial Deficit

Shyam-Sunder and Myers (1999) test the trade-off theory against the pecking order theory alternative hypothesis. Most importantly for our paper, Shyam-Sunder and Myers present evidence that firms with a high financial deficit tend to issue more debt than equity, resulting in an increased leverage ratio. This finding supports Myers and Majluf's (1984) adverse selection theory, and plays an important role for the results for our financial deficit measure.

3 Data and Methodology

3.1 Data

Our sample consists of accounting data obtained from Compustat WRDS and stock price and share data obtained from Thomson Reuters Datastream. The dataset is based on non-financial firms (financial firms are those with a SIC code between 6000 and 6999 and are eliminated due to capital structures and regulation differing very much from other firms) listed on the Stockholm OMX as of March 30th 2014. After merging the accounting data with the financial data we're left with a total of 192 firms where both types of data are available. For every firm we have collected yearly data during

the period 1994-2013 for total assets, total liabilities (hereby called "debt"), cash, property, plant & equipment, retained earnings, EBITDA, sales, industry, stock price and total number of common shares.

We have collected annual reports for three of the firms in our dataset since they had multiple observations during certain years due to changes in the period over which their fiscal year spanned. Some stocks missed observations for the number of shares during certain years. If these observations occurred during the middle or end of the sample period we replaced the missing value with the last non-missing value. For missing values in the beginning of the sample period we replaced them with the next non-missing value (though only if the missing value was a maximum of three years back in time before the next non-missing value).

We define equity change as the change in book value of equity minus the change in retained earnings and debt change simply as the change in debt (which is also equal to the change in assets minus the equity change). This definition is the same as previously used by Baker and Wurgler (2002) and Kayhan and Titman (2007). Since we rely on a balance sheet definition and not on items from the cash flow statement, these two variables include certain non-cash components and there will therefore be some noise. Due to the lack of cash flow data in Compustat we choose to use balance sheet data despite the possible noise. Kayhan and Titman (2007) tried both balance sheet and cash flow definitions of equity and debt change and found qualitatively similar results for US firms. Appendix A contains more details on the rest of our variable construction.

All observations where either equity or debt change are missing have been eliminated (this means that all observations from 1994 are dropped since the ratios require two consecutive firm-years of observations to be calculated). We Winsorize equity and debt change as well as market-to-book at the 5% and 95% level on a yearly basis. Observations with negative values of book equity and observations with missing values

of market-to-book ratio are also eliminated. After these adjustments to our data we are left with a total of 187 companies and 2243 firm-year observations.

3.2 Variables

3.2.1 Financial Deficit

The financial deficit has played a major role in several papers studying capital structure. Frank and Goyal (2003) and Shyam-Sunder and Myers (1999) used it to test the pecking order theory, while Baker and Wurgler (2002) and Kayhan and Titman (2007) used it to study the effect of equity market timing. Several different definitions of financial deficit have been used. Our definition, which is a simple accounting identity, is the same as Kayhan and Titman's. Using an accounting identity instead of actual cash flow data allows us to obtain more firm-year observations since Swedish companies have not been required to include a cash flow statement in their annual report during our whole sample period and also because Compustat lacks complete cash flow data even during later years. The financial deficit is defined as the sum of equity change (e) and debt change (d).

$$FD = e + d = (\Delta Book\ equity - \Delta Retained\ earnings) + \Delta Debt$$

$$= \Delta WC + I + D - CF$$

The financial deficit (FD) is equal to the sum of change in working capital (ΔWC), investments (I) and dividends (D), less the net of cash flow (CF). A positive financial deficit means that the firm has invested more than what has been generated within the firm. A negative financial deficit means that the firm has a positive free cash flow; it has generated more than what has been invested during the period. Kayhan and Titman (2007) mention that the financial deficit can be seen as an endogenous variable, which is influenced by whether or not the firm is under- or overlevered. Overlevered

firms might reduce their investment expenditures in order to decrease financial deficit as well as increase free cash flow to be able to pay off debt. This stands in contrast to the pecking order theory in which, as mentioned by Shyam-Sunder and Myers (1999), firms with high financial deficits are expected to increase their leverage ratios since issuing debt is preferred to issuing equity. This means that there could be a positive relationship between financial deficit and changes in leverage ratio that has nothing to do with the pecking order theory. Kayhan and Titman (2007) account for this problem by including a leverage deficit variable which is the difference between the observed leverage ratio and the predicted target leverage ratio. This will be explained closer in section 3.2.3.

Shyam-Sunder and Myers (1999) mention that the financial deficit might have a different effect on leverage depending on whether it is positive or negative. As suggested by Kayhan and Titman (2007), we therefore also include an interaction variable to separate positive values of financial deficit. This variable interacts the financial deficit with a dummy variable taking the value of one for firm-years where the financial deficit is positive and a value of zero otherwise. Thus the interaction variable takes on the value zero for years when the financial deficit is negative and the value of the positive financial deficit for years when the deficit is positive.

3.2.2 Market Timing Measures

Baker and Wurgler (2002) established that market-to-book affects leverage. They created the "external finance weighted average market-to-book ratio", which is based on the idea that firms have a tendency to raise new funds by issuing equity when their market value is high and issuing debt when their market value is low.

With this in mind, Kayhan and Titman (2007) developed two measures of market timing that is closely related to the Baker and Wurgler (BW) timing measure. They basically split the measure into two, with one part measuring yearly timing and the other part measuring long-term timing. Similar to the BW measure, the financial deficit plays a major role.

$$Yearly\ timing\ (YT) = \left(\sum_{s=0}^{t-1} FD_s * (M/B)_s\right)/t - \overline{FD} * \overline{M/B} \qquad (1)$$

$$= c\hat{o}v(FD, M/B)$$

$$Long - term\ timing\ (LT) = \left(\sum_{s=0}^{t-1} (M/B)_s/t\right) * \left(\sum_{s=0}^{t-1} (FD_s/t\right) \qquad (2)$$

$$= \overline{M/B} * \overline{FD}$$

Both measures are expected to have a negative relationship to leverage following the market timing hypothesis.

The yearly timing measure is the sample covariance between the financial deficit measure and the market-to-book ratio. This is in line with Baker and Wurgler's (2002) idea that a firm raising external capital will decrease (increase) its leverage ratio during years when its market valuation is high (low). The logic behind this is that companies take advantage of overvaluation, as measured by a high market-to-book ratio compared to the adjacent years, by funding their capital need with new equity.

The long-term timing measure, which is the average market-to-book ratio multiplied by the average financial deficit, does not only capture market timing. Myers (1977) predicted that leverage is negatively related to the part of a firm's market value accounting for growth. Since the market-to-book ratio can be seen as a proxy for investment opportunities and growth, firms with a higher market-to-book ratio will be disposed to avoid debt financing in order to maintain their financial flexibility. Baker and Wurgler (2002) account for this by using a one-year lagged market-to-book ratio

in their regressions. However, Hovakimian (2006) argues that the average of market-to-book ratios over a number of years could be a better proxy for a firm's growth opportunities since it should not include the same amount of noise.

As shown below, the BW timing measure can be seen as a combination of the yearly and long-term timing measures (see Appendix B for the derivation):

$$EFWAMB_{t-1} = \left(\sum_{s=0}^{t-1} FD_s * (M/B)_s\right) / \sum_{r=0}^{t-1} FD_r \qquad (3)$$

$$= \frac{\hat{cov}(FD, \mathrm{M/B})}{\overline{FD}} + \overline{M/B}$$

$$= (YT + LT)/\overline{FD}$$

3.2.3 Target Leverage

According to the dynamic trade-off theory of capital structure, firms have a target leverage ratio determined by the benefits and costs of debt financing. If firms tend to move toward this target ratio then we would expect for those firms with a leverage ratio higher than their target to adjust and lower their leverage ratio. The opposite is then true for firms with a leverage ratio that is lower than their target ratio. We therefore include the difference between the actual leverage ratio and the predicted target ratio as one of the explanatory variables in our model.

We predict the target leverage ratio using explanatory variables found to have a significant relationship with leverage in major industrialized countries by Rajan and Zingales (1995). These variables are profitability, tangibility, market-to-book ratio and size. We also include industry dummies to capture industry-specific characteristics of leverage. These regressions are done using a Tobit specification with restriction on the

predicted values between 0 and 1. The results of these regressions can be found in Appendix C.

Predicting target leverage ratio[1]:

$$Lev_t = \alpha + \beta_1 \left(\frac{EBITDA}{A_{t-1}}\right)_{t-1} + \beta_2 \left(\frac{PPE}{A}\right)_{t-1} + \beta_3 (M/B)_{t-1} + \beta_4 SIZE_{t-1} + \beta_5 Ind.dum. + \varepsilon_t$$

After we have predicted the target leverage ratio we can estimate the leverage deficit, which is the difference between the actual leverage (L_t) and the predicted target ratio ($\hat{L}_t$).

$$Ldef_t = L_t - \hat{L}_t$$

The change in target leverage is the difference between the current target leverage and the target leverage ratio at the start of the observation period.

$$\Delta Target_{t-x} = \hat{L}_t - \hat{L}_{t-x}$$

Chang and Dasgupta (2009) argue that, based on simulations, many characteristics thought to influence leverage ratio do so simply because they are correlated with the financial deficit. The average American firm issues debt 75% of the time it needs to raise money, therefore any characteristic that forecasts financial deficits will also forecast leverage ratios. They also claim that even without any target debt ratios, there is a mechanical mean reversion of leverage ratio.

3.2.4 Stock Returns

As noted by Welch (2004), stock returns and market leverage ratios have a negative relationship if firms do not rebalance their debt in the following periods. According to

[1] This regression is used to predict the target for both book and market leverage.

Kayhan and Titman (2007) this relationship will hold over short periods of time, but over the longer time periods used in our study firms should be able to take actions that counterbalance their stock returns (assuming that adjustment costs are not too high).

To examine the effect of stock returns on leverage we include a variable measuring the cumulative return over the current year and the previous four years. This variable could indicate market timing if we find that it has a negative relation with book leverage since this would mean that firms are more willing to issue new equity during periods of high valuation. Though Leary and Roberts (2005) argue that this could also be a sign of dynamic rebalancing with adjustment costs. They analyzed simulated data and found support for their hypothesis that firms facing adjustment costs will have a lagged or partial response to stock returns.

3.2.5 Profitability

Kayhan and Titman (2007) comment that the pecking order theory proposes that profitability should have an independent effect on capital structure. According to the pecking order theory, internal financing is always preferred to external financing, implying a negative relationship between profitability and leverage. In extreme cases of pecking order theory, profitable firms can finance all of their investments with retained earnings and choose not to issue any new equity or debt. This would lead to a decrease in leverage while the financial deficit is equal to zero. Titman and Wessels (1988), Rajan and Zingales (1995) as well as Kayhan and Titman (2007) have found a negative relation between leverage and profitability. Our measure of profitability is earnings before interest, taxes, depreciation and amortization divided by last year's total assets.

3.2.6 Average Market-to-book Ratio

According to Kayhan and Titman (2007), the explanatory power of the Baker and Wurgler (2002) timing measure relies mainly on the average market-to-book ratio being included in it. The average market-to-book ratio can be seen as a proxy for market timing but could also capture other factors influencing capital structure, such as growth opportunities. Kayhan and Titman test the explanatory power of the ratio by including it in other specifications of their model. We choose to include the measure in order to look at the effect of market-to-book ratio not only when it is interacted with financial deficit in different ways (as in our timing measures), but also as an independent explanatory variable.

A negative relationship between leverage and market-to-book has been found in many studies, such as Rajan and Zingales (1995), Baker and Wurgler (2002), Hovakimian (2004) and Kayhan and Titman (2007). Parson and Titman (2008) mention that the relation between market-to-book and market leverage is strong, but somewhat mechanical due to the market value of equity affecting both the dependent and explanatory variables. On the other hand there is no mechanical relation between book leverage and market-to-book. Chen and Zhao (2006) argue that the negative effect found in previous studies depend entirely on a subset of small firms with very high market-to-book ratios. They find that more than 88% of all firms in their sample of American firms have a significant positive relationship between market-to-book and book leverage

3.3 Methodology

3.3.1 Short-term Effects

In order to look at the short-term effects we analyze a period ranging from year *t* until *t-4*[2].

Step 1: Predict the target leverage ratio

$$Lev_t = \alpha + \beta_1 \left(\frac{EBITDA}{A_{t-1}}\right)_{t-1} + \beta_2 \left(\frac{PPE}{A}\right)_{t-1} + \beta_3 (M/B)_{t-1} + \beta_4 SIZE_{t-1} + \beta_5 Ind.dum. + \varepsilon_t$$

and then construct the leverage deficit variable ($Ldef_{t-4}$) and the target change ($\Delta Target_{t-4}$).

Step 2: Run a regression to explain the change in leverage between *t* and *t-4*

$$\Delta Lev_{t,t-4} = \alpha + \beta_1 FD_{t,t-4} + \beta_2 FDd_{t,t-4} + \beta_3 YT_{t,t-4} + \beta_4 LT_{t,t-4} + \beta_5 r_{t,t-4} + \beta_6 (\overline{M/B})_{t,t-4} + \beta_7 EBITDA_{t,t-4} + \beta_8 Ldef_{t-4} + \beta_9 \Delta Target_{t-4} + \beta_{10} Ind.dum. + \varepsilon_t$$

This regression is a standard OLS regression to estimate coefficients and robust clustered (by firm) standard errors. In other tests, we run different kinds of regressions to obtain new coefficient estimates and also use a bootstrap method to obtain new standard errors. Extension tests are found in section 4.6.

The regression includes the cumulative financial deficit ($FD_{t,t-4}$), cumulative profitability ($EBITDA_{t,t-4}$) and the interaction variable measuring positive financial deficits ($FDd_{t,t-4}$). These three are divided by the beginning period's (*t-4* in this case) total assets. The yearly ($YT_{t,t-4}$) and long-term timing ($LT_{t,t-4}$) measures as well as the average market-to-book ($(\overline{M/B})_{t,t-4}$) is included to capture any market timing effects.

[2] This period covers five years instead of the six years used by Kayhan and Titman (2007). This is done in order to increase the number of observations included in our regressions.

All of these six variables are calculated over years t to *t-4*. Industry dummies as well as the leverage deficit ($Ldef_{t-4}$) and target change ($\Delta Target_{t-4}$) estimated in step 1 are also included. For more details regarding the construction of these variables see Appendix A.

Our regressions are done with the change in book leverage and change in market leverage as dependent variables. The reason for looking at both book and market leverage is that both have their drawbacks and advantages. According to Parson and Titman (2008), scaling by market value has benefits in the form of taking expected future tax benefits, financial distress costs, etc. into account. The main shortcoming is the mechanical relationship found between several determinants of capital structure and market value (such as market-to-book ratio). Titman and Wessels (1988) mention that even when firms use a randomly selected "target" book leverage ratio, correlation will be found between market leverage and explanatory variables involving market value. For this reason we also run our regressions with book leverage as the dependent variable. A survey by Graham and Harvey (2001) found that managers mainly seem to focus on book leverage, which adds another advantage to using it as the variable to be explained. Chang and Dasgupta (2009) mention that another reason to use book leverage is that if firms use "active rebalancing", the effect from this will be found in the change of book leverage.

3.3.2 The Persistence of History

In order to look at the long-term effects we analyze a period ranging from year t until *t-8.*

Step 1: Predict the target leverage ratio

$$Lev_t = \alpha + \beta_1 \left(\frac{EBITDA}{A_{t-1}}\right)_{t-1} + \beta_2 \left(\frac{PPE}{A}\right)_{t-1} + \beta_3 (M/B)_{t-1} + \beta_4 SIZE_{t-1} + \beta_5 Ind.dum. + \varepsilon_t$$

and then construct the leverage deficit variable ($Ldef_{t-8}$) and the target change ($\Delta Target_{t-8}$).

Step 2: Run a regression to explain the change in leverage between *t* and *t-8*

$$\begin{aligned}\Delta Lev_{t,t-8} = \alpha &+ \beta_1 FD_{t-4,t-8} + \beta_2 FDd_{t-4,t-8} + \beta_3 YT_{t-4,t-8} + \beta_4 LT_{t-4,t-8} + \beta_5 \overline{M/B}_{t-4,t-8} \\ &+ \beta_6 r_{t-4,t-8} + \beta_7 EBITDA_{t-4.t-8} + \beta_8 FD_{t,t-4} + \beta_9 FDd_{t,t-4} + \beta_{10} YT_{t,t-4} \\ &+ \beta_{11} LT_{t,t-4} + \beta_{12} \overline{M/B}_{t,t-4} + \beta_{13} r_{t,t-4} + \beta_{14} EBITDA_{t,t-4} + \beta_{15} Ldef_{t-8} \\ &+ \beta_{16} \Delta Target_{t-8} + \beta_{17} Ind.dum. + \varepsilon_t\end{aligned}$$

This regression is a standard OLS regression to estimate coefficients and robust clustered (by firm) standard errors. In other tests, we run different kinds of regressions to obtain new coefficient estimates and also use a bootstrap method to obtain new standard errors. Extension tests are found in section 4.6.

The regression to explain the change in leverage between *t* to *t-8* includes the same variables as those used to explain the change in leverage between *t* to *t-4*, as well as the same variables calculated over *t-4* to *t-8* in order to see if the effect persists. A significant effect from these measures calculated over the early period (*t-4* to *t-8*) should be interpreted as a persistent effect. Leverage deficit and change in target leverage are calculated over *t* to *t-8*. How we construct these variables can be found in Appendix A.

3.3.3 Changes in Leverage and its Different Components

Baker and Wurgler (2002) mention that the net effect of market-to-book ratio on changes in leverage might not be apparent. High market-to-book firms are often those growing at a fast pace and they might issue as much debt as equity. We will therefore also look at the net effect of market-to-book on the annual changes in book leverage.

The change in leverage will thereafter be decomposed to examine whether the effect comes from net equity issues, as implied by market timing theory.

Our main focus is on the market-to-book ratio, but three of the other variables used in our target leverage regressions, as well as last year's leverage ratio are also included in these regressions. The variables also used in target leverage regressions are profitability ($\left(\frac{EBITDA}{A_{t-1}}\right)_{t-1}$), tangibility ($\left(\frac{PPE}{A}\right)_{t-1}$) and size.

We decompose the change in leverage into three parts: net equity issues, newly retained earnings and the residual change in leverage which depends on total asset growth[3].

$$\Delta(D/A)_t = -(e/A_{t-1}) - (\Delta RE/A_{t-1}) - \left[E_{t-1}\left(\frac{1}{A_t} - \frac{1}{A_{t-1}}\right)\right]$$

Following Baker and Wurgler (2002) as well as Mahajan and Tartaroglu (2008), we regress the change in leverage as well as the three components using market-to-book ratio and the four other variables mentioned previously as explanatory variables. The lagged level of leverage is included as the change can only be in one direction at the two ends, thus concealing the effects of the other explanatory variables if it's not included.

$$C_{it} = \alpha + \beta_1(M/B)_{t-1} + \beta_2\left(\frac{PPE}{A}\right)_{t-1} + \beta_3\left(\frac{EBITDA}{A_{t-1}}\right)_{t-1} + \beta_4 SIZE_{t-1} + \beta_5(D/A)_{t-1} + \varepsilon_t$$

Where C_i represents the different components of change in leverage. Mahajan and Tartaroglu state that a positive relation between net equity issues and market-to-book ratio could be an indication that the historical market-to-book ratio, and in turn our market timing measures, capture market timing effects.

[3] Due to Winsorized values and dividing equity issues and retained earnings by last year's total assets, the relationship between the three components and the change in leverage will not be perfect.

3.3.4 The Effect on Leverage Following Significant Net Equity Issues

Previous studies such as Mahajan and Tartaroglu (2008) have found an inverse relationship between Baker and Wurgler's (2002) *EFWAMB* measure and leverage in most industrialized countries that have been studied. This is consistent with both the market timing hypothesis and some dynamic trade-off models. To find evidence supporting the market timing hypothesis, we would assume firms not to adjust their capital structures to neutralize the impact of an equity issue on leverage.

We analyze changes in book and market leverage ratios for periods up to five years after a significant net equity issue. A significant issue is defined as a net equity issue (e/A_{t-1}) greater than five percent of total pre-issue assets, which is in line with what have been used in previous studies, such as Mahajan and Tartaroglu (2008) and Hovakimian et al. (2001). According to Mahajan and Tartaroglu, these issues should be more relevant to study due to effect from market timing being more clear and steadfast. We will look at the changes in leverage starting from the year of the significant net equity issue ($t = 0$) up until five years after the issue ($t = 5$), with the year before the net equity issue as a benchmark to calculate the change in leverage from (t = -1). The mean and median changes in leverage are then tested to be significantly different from zero each year using t-statistics and a one-sided Wilcoxon signed-rank test respectively.

Hovakimian et al. (2001) as well as Hovakimian (2004) have found that the effect on leverage following pure equity issues is different from that of mixed equity and debt issues during the same year. We therefore also look at the leverage changes after years with significant net equity issues not accompanied by any significant net debt issues (d/A_{t-1}). A significant net debt issue is defined in the same way as a significant net equity issue; thus we only look at years when the net equity issue is greater than five

percent of total pre-issue assets and net debt issue is less than five percent of total pre-issue assets.

4 Results

4.1 Descriptive Statistics

From Table 1 we can see that the average book leverage has dropped from 56.96% to 51.30% over our sample period while average market leverage is at about the same level now as in the beginning of the sample period. The average net debt issue is about 20% larger than the average net equity issue. Retained earnings have on average increased by a very small amount (0.38%) over the sample period.

Figure 1 displays the average financing flows for the firms and years in our sample. Noteworthy are the drops in especially net debt issues after the two financial crises 2001 and 2008. Net equity issues seems to spike one to two years before the financial crises. There is a large fluctuation in the financing flows beginning after the financial crisis 2001 and lasting until the end of our sample period.

Figure 2 displays the average market-to-book ratio for all firms and years included in our sample. Noteworthy is the sharp rise in market-to-book before the 2001 financial crisis and the drop thereafter, which is not replicated during the next financial crisis. Due to yearly Winsorizing at the 5% and 95% level our values are much smoother than and not as high as the real values.

Figure 1 - Average financing flows

1995 average net debt issue is not shown for visibility purposes.

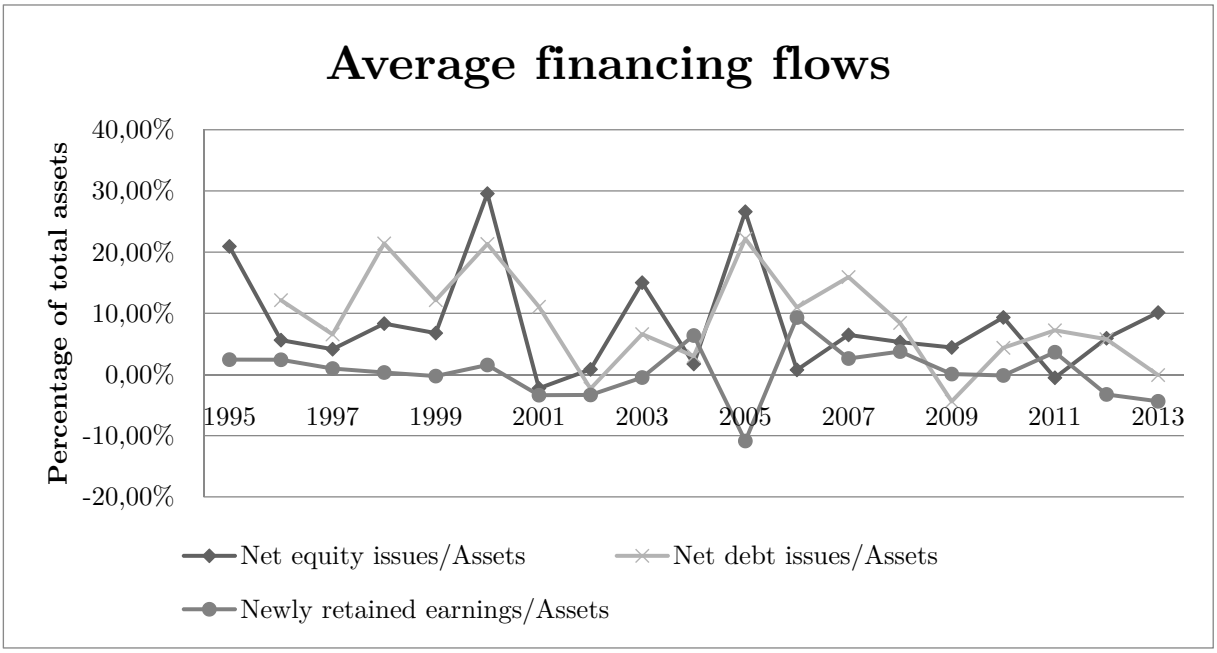

Figure 2 - Average market-to-book ratio

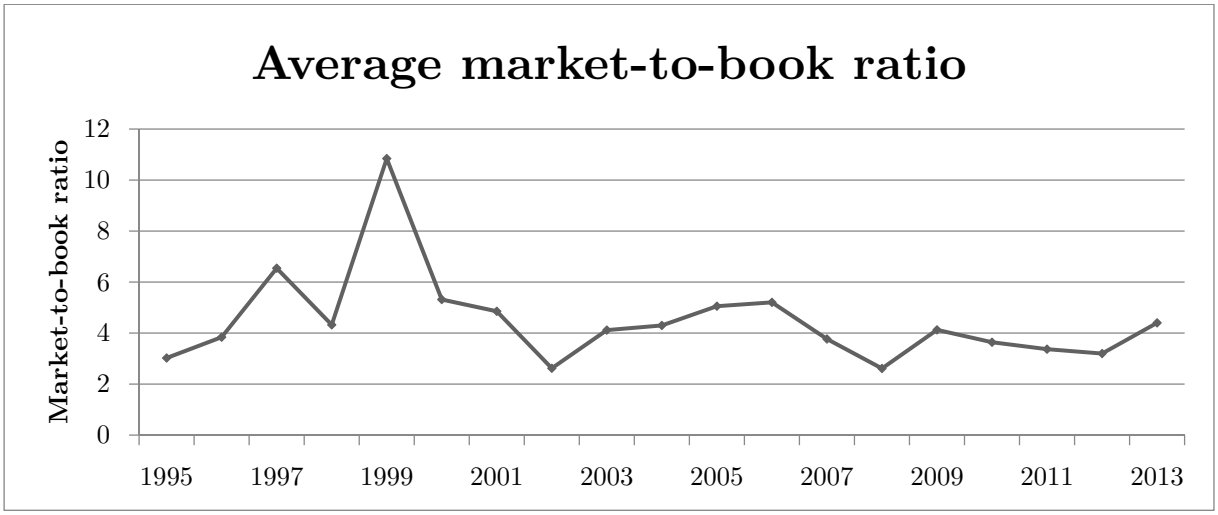

Table 1

Summary statistics of capital structure and financing decisions

This table reports the means and standard deviations of leverage and the different components of change in assets for each year of our sample in percentage terms. Book leverage (D/A) is defined as book debt divided by total assets. Market leverage (D/MV) is defined as book debt divided by total assets minus book equity plus market value of equity. Net debt issues (d/A_{t-1}) is defined as change in debt divided by last year's total assets. Net equity issues (e/A_{t-1}) is defined as the change in equity, minus the change in retained earnings, divided by last year's total assets. Newly retained earnings ($\Delta RE/A_{t-1}$) is defined as the change in retained earnings divided by last year's total assets.

		D/A		D/MV		d/A_{t-1}		e/A_{t-1}		$\Delta RE/A_{t-1}$	
Year	N	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
1995	19	56.96	15.22	24.34	12.21	95.18	405.89	20.94	81.21	2.44	3.66
1996	20	57.46	14.50	24.12	12.71	12.15	43.88	5.62	17.45	2.41	7.93
1997	43	52.54	18.49	18.26	11.28	6.56	16.28	4.14	8.48	0.97	6.27
1998	67	55.36	16.38	15.66	11.28	21.42	55.89	8.32	23.05	0.33	7.76
1999	83	54.08	17.40	18.39	11.92	12.15	37.44	6.76	13.90	-0.26	10.26
2000	108	49.28	21.14	15.19	12.61	21.30	63.53	29.54	87.03	1.38	20.24
2001	116	51.47	19.96	18.99	13.02	11.07	60.46	-2.25	28.67	-3.38	37.64
2002	125	50.87	19.99	19.79	12.92	-2.33	14.02	0.84	22.68	-3.34	20.36
2003	128	50.64	19.73	24.03	13.63	6.60	85.55	15.02	182.46	-0.49	25.50
2004	130	49.82	19.64	18.93	12.69	3.00	17.52	1.72	84.84	6.37	78.03

Table 1 continued

		D/A		D/MV		d/A_{t-1}		e/A_{t-1}		$\Delta RE/A_{t-1}$	
Year	N	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	*S.D*	Mean	S.D.
2005	138	50.15	19.83	19.55	12.87	22.20	63.02	26.62	93.47	-10.87	99.87
2006	146	50.61	19.51	17.08	12.57	10.99	33.88	0.76	32.42	9.32	30.34
2007	158	51.87	19.96	17.88	13.06	15.93	42.01	6.48	22.03	2.62	20.88
2008	169	51.80	19.62	21.50	13.80	8.42	17.16	5.30	38.83	3.75	29.50
2009	176	48.90	19.31	25.19	13.53	-4.39	13.06	4.42	21.13	0.08	17.68
2010	176	48.15	18.80	20.16	13.43	4.36	19.66	9.33	47.47	-0.15	22-59
2011	180	49.66	17.73	21.01	13.58	7.22	18.40	-0.53	48.13	3.64	54.62
2012	186	51.24	17.73	23.03	14.01	5.77	22ö60	5.93	33.93	-3.26	28.97
2013	74	51.30	19.71	25.23	15.69	-0.09	14.2	10.13	41.36	-4.38	18.25
Total	2085	50.80	19.14	20.39	13.46	9.00	54.20	7.52	64.64	0.38	40.96

Figure 3 - Average observed and predicted target leverage ratios

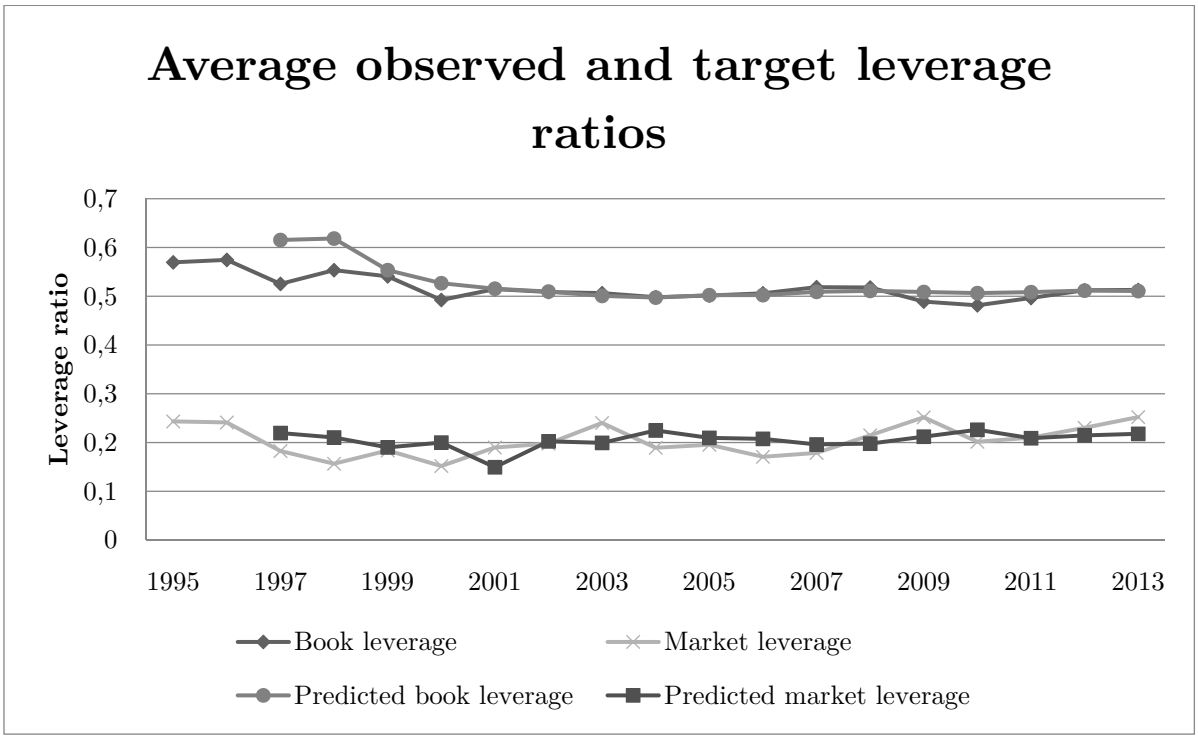

Figure 3 presents the observed values of book and market leverage and also the predicted target values. We can clearly see that the average book leverage has remained very stable after the financial crisis of 2001, hovering at around 50%.

4.2 Short-term Effects

Table 2 reports coefficient estimates and robust clustered standard errors for our explanatory variables used to explain the change in leverage.

Table 2

Regression to explain the change in leverage between *t* to *t-4*

Panel A reports coefficient estimates, clustered robust standard errors and 95% confidence intervals for the regression to explain changes in book leverage. Panel B presents the same statistics for the regression to explain changes in market leverage All coefficient estimates as well as standard errors are reported in percentage terms. Constants are not reported. Panel C reports standard deviations for our explanatory variables while Panel D presents a sensitivity analysis. *, ** and *** mark significance at the 10%, 5% and 1% level respectively.

Variable	Coeff.		S.E.	95% Conf. interval	
Panel A: Book Leverage Regression Results					
Financial deficit ($FD_{(t,t-4)}$)	2.091	*	1.096	-0.073	4.255
Positive FD ($FDd_{(t,t-4)}$)	-1.721	*	0. 881	-3.461	0.020
Yearly timing ($YT_{(t,t-4)}$)	-0.00044	*	0.00026	-0.00095	0.000071
Long-term timing ($LT_{(t,t-4)}$)	0.000028		0.000081	-0.00013	0.00019
Average M/B ($\overline{M/B}_{t,t-4}$)	0.057		0.178	-0.295	0. 410
Cum. stock return ($r_{(t,t-4)}$)	-0.473		0.358	-1.180	0. 233
Cum. profitability ($EBITDA_{(t,t-4)}$)	-0.797		0.536	-1.856	0.262
Leverage deficit ($Ldef_{t-4}$)	-37.28	***	4.187	-45.55	-29.02
Change in target ($\Delta Target_{t-4}$)	70.88	***	18.90	33.54	108.2
Panel B: Market Leverage Regression Results					
Financial deficit ($FD_{(t,t-4)}$)	0.655	***	0.299	0.064	1.246
Positive FD ($FDd_{(t,t-4)}$)	-0.52	***	0.258	-1.037	-0.019
Yearly timing ($YT_{(t,t-4)}$)	0.000091		0.00011	-0.00013	0.00031
Long-term timing ($LT_{(t,t-4)}$)	0.00014	***	0.000062	0.000014	0.00026
Average M/B ($\overline{M/B}_{t,t-4}$)	-0.287	***	0.082	-0.449	-0.124
Cum. stock return ($r_{(t,t-4)}$)	-1.595	***	0.317	-2.221	-0.968
Cum. profitability ($EBITDA_{(t,t-4)}$)	0.165		0.289	-0.406	0.737
Leverage deficit ($Ldef_{t-4}$)	-34.23	***	4.135	-42.40	-26.06
Change in target ($\Delta Target_{t-4}$)	35.92	***	5.443	25.17	46.67

Table 2 continued

Panel C: Standard Deviation of the Explanatory Variables

Variable	N	Mean	S.D.
Financial deficit ($FD_{(t,t-4)}$)	1518	0.700	2.741
Positive FD ($FDd_{(t,t-4)}$)	1518	1.025	3.129
Yearly timing ($YT_{(t,t-4)}$)	1346	237.7	2016
Long-term timing ($LT_{(t,t-4)}$)	1346	1223	4877
Average M/B ($\overline{M/B}_{t,t-4}$)	1519	4.366	5.049
Cum. stock return ($r_{(t,t-4)}$)	1345	0.913	1.493
Cum. profitability ($EBITDA_{(t,t-4)}$)	1518	0.642	1.311
Book leverage deficit ($Ldef_{t-4}$)	1251	0.0042	0.160
Change in book target ($\Delta Target_{t-4}$)	1247	0.011	0.030
Market leverage deficit ($Ldef_{t-4}$)	1251	-0.0033	0.106
Change in market target ($\Delta Target_{t-4}$)	1247	0.0096	0.062

Panel D: Magnitude Effect on the Change in Leverage

One std. dev. change in	% change in book	% change in market
Financial deficit ($FD_{(t,t-4)}$)	5.731	1.795
Positive FD ($FDd_{(t,t-4)}$)	-5.385	-1.653
Yearly timing ($YT_{(t,t-4)}$)	-0.887	0.183
Long-term timing ($LT_{(t,t-4)}$)	0.137	0.683
Average M/B ($\overline{M/B}_{t,t-4}$)	0.288	-1.448
Cum. stock return ($r_{(t,t-4)}$)	-0.706	-2.381
Cum. profitability ($EBITDA_{(t,t-4)}$)	-1.045	0.216
Leverage deficit ($Ldef_{t-4}$)	-5.965	-3.628
Change in target ($\Delta Target_{t-4}$))	2.126	2.227

We find evidence indicating that both financial deficit and the positive financial deficit interaction term have a significant effect on both book and market leverage. The positive coefficient for the financial deficit in both book and market leverage regressions is very much in line with Myers and Majluf's (1984) adverse selection model, indicating that firms with a higher financial deficit tend to increase leverage. The effect on leverage from a one standard deviation change in financial deficit is fairly large, and estimated to roughly 5.7% and 1.8% for book and market leverage respectively. The

coefficient for our interaction displays a negative coefficient, which is unexpected since firms with no need for external financing should be less likely to issue debt, and since the positive cash flows in themselves should decrease leverage. This raises some doubt concerning our financial deficit measures. However when the financial deficit is excluded from the regressions we obtain positive coefficients for the interaction variable. One possible explanation is that some firms with a very high financial deficit do not have spare debt capacity, and thus turn to equity in their issuing decision. This would explain the negative interaction term. In conclusion, these measures give some evidence in favor of pecking order theory.

The coefficient for our yearly timing measure turns out insignificant for market leverage, but significant at a 10% level for book leverage. The positive sign of the coefficient in the market leverage regression (even though insignificant) is puzzling since we would expect it to turn out negative in line with Kayhan and Titman (2007). A one standard deviation change in our yearly timing measure turns out to have a rather small effect on leverage. The negative coefficient in the book leverage regression may give some evidence in favor of market timing, however small. Our long-term timing measure turns out insignificant in the regression explaining book leverage but significant in the regression for market leverage. However, the positive sign of the coefficient is not in line with what is expected from Kayhan and Titman (2007). Thus, our timing measures fail to provide evidence for the market timing hypothesis.

We find that the coefficient for average market-to-book ratio turns out significant for market leverage, but not for book leverage, which is not surprising considering the mechanical relationship between market-to-book and market leverage. A negative coefficient could also be expected from a market-timing perspective since firms would be believed to decrease leverage (issue equity instead of debt) if market-to-book is high. However, our results once again fail to provide evidence for market timing in the regression explaining change in book leverage. The effect on market leverage is highly

endogenous since an increase in market-to-book will in itself decrease leverage, even if it has no impact on the firm's decisions to issue equity or debt. Thus, we do not find evidence in favor of market timing.

The coefficient for cumulative stock returns turn out highly significant for market leverage, however it turns out insignificant for book leverage. It is negative, in line with Welch (2004) but the effect of a one standard deviation change in returns is not very large. This could be interpreted as evidence for the impact of past stock returns on leverage. However, since we do not find significance for the impact on book leverage, we do not interpret this as a sign of market timing. Increases in stock price will in itself affect market leverage, and so the stock returns variable is highly endogenous for market leverage.

Our measure for cumulative profitability turns out insignificant for both book and market leverage. If we believe Donaldson's (1961) and Myers' (1984) theories that internally generated equity is cheaper than externally raised equity to hold, we would expect a negative effect on leverage by cumulative profitability. However, the insignificance of our measure might be explained by our firms' tendency to rebalance leverage ratios. If returns are omitted from our independent variables, profitability has a negative effect on leverage significant at a 10% level for book leverage. Since returns and profitability are assumed to be correlated, this result could be interpreted as some further evidence in favor of the pecking order theory.

We find that the leverage deficit is very effective in explaining leverage. This is consistent with Hovakimian et al's (2001) finding that firms deviating from their predicted target leverage will change their leverage in the direction of the target. Coefficients for both leverage deficit and change in target are highly significant for both book and market leverage, and a one standard deviation change in either also has a fairly large effect on leverage. This evidence could be interpreted in favor of the trade-

off theory, confirming previous studies. On the other hand, this could also be interpreted in line with Chang and Dasgupta (2009). Their simulated data showed mechanical mean leverage reversion without any target leverage whatsoever, thus it is hard to draw any definitive conclusions regarding our leverage deficit variable.

4.3 The Persistence of History

Table 3 reports coefficient estimates and robust clustered standard errors for the regressions to explain changes in book and market leverage between *t* to *t-8*.

Table 3

Regression to explain the change in leverage between *t* to *t-8*

Panel A reports coefficient estimates, clustered robust standard errors and 95% confidence intervals for the regression to explain changes in book leverage. Panel B presents the same statistics for the regression to explain changes in market leverage. All coefficient estimates as well as standard errors are reported in percentage terms. Constants are not reported. Panel C reports standard deviations for our explanatory variables while Panel D presents a sensitivity analysis. *, ** and *** mark significance at the 10%, 5% and 1% level respectively.

Variable	Coeff.		S.E.	95% Conf. interval	
Panel A: Book Leverage Regression Results					
Financial deficit ($FD_{(t-4,t-8)}$)	1.838	***	0.596	0.660	3.017
Positive FD ($FDd_{(t-4,t-8)}$)	-0.219	***	0.468	-3.113	-1.259
Yearly timing ($YT_{(t-4,t-8)}$)	-0.00055	*	0.00028	-0.0011	0.000014
Long-term timing ($LT_{(t-4,t-8)}$)	-0.000064		0.000089	-0.00024	0.00011
Average M/B ($\overline{M/B}_{t-4,t-8}$)	-0.034		0.265	-0.558	0.490
Cum. stock return ($r_{(t-4,t-8)}$)	-1.616	***	0.526	-2.658	-0.574
Cum. profitability ($EBITDA_{(t-4,t-8)}$)	1.985	**	0.841	0.320	3.650
Financial deficit ($FD_{(t,t-4)}$)	0.040		0.745	-1.435	1.515
Positive FD ($FDd_{(t,t-4)}$)	2.050	*	1.134	-0.194	4.293
Yearly timing ($YT_{(t,t-4)}$)	-0.000038		0.00030	-0.00062	0.00055
Long-term timing ($LT_{(t,t-4)}$)	0.000055		0.00018	-0.00029	0.00040

Panel A continued

Average M/B ($\overline{M/B}_{t,t-4}$)	0.075		0.359	-0.636	0.786
Cum. stock return ($r_{(t,t-4)}$)	-0.053		0.804	-1.644	1.539
Cum. profitability ($EBITDA_{(t,t-4)}$)	-3.236	**	1.338	-5.883	-0.589
Leverage deficit ($Ldef_{t-8}$)	-50.58	***	5.736	-61.93	-39.23
Change in target ($\Delta Target_{t-8}$)	69.75	***	22.01	26.20	113.3

Panel B: Market Leverage Regression Results

Financial deficit ($FD_{(t-4,t-8)}$)	0.326		0.287	-0.242	0.894
Positive FD ($FDd_{(t-4,t-8)}$)	-0.254		0.218	-0.685	0.178
Yearly timing ($YT_{(t-4,t-8)}$)	0.00027	*	0.00014	-0.0000025	0.00055
Long-term timing ($LT_{(t-4,t-8)}$)	0.000074		0.000049	-0.000023	0.00017
Average M/B ($\overline{M/B}_{t-4,t-8}$)	-0.059		0.156	-0.367	0.250
Cum. stock return ($r_{(t-4,t-8)}$)	-0.393		0.262	-0.912	0.126
Cum. profitability ($EBITDA_{(t-4,t-8)}$)	-0.241		0.364	-0.962	0.479
Financial deficit ($FD_{(t,t-4)}$)	-0.247		0.436	-1.110	0.616
Positive FD ($FDd_{(t,t-4)}$)	1.944	***	0.711	0.538	3.350
Yearly timing ($YT_{(t,t-4)}$)	-0.0000062		0.00013	-0.00026	0.00025
Long-term timing ($LT_{(t,t-4)}$)	0.00011		0.00011	-0.000098	0.00032
Average M/B ($\overline{M/B}_{t,t-4}$)	-0.619	***	0.208	-1.032	-0.207
Cum. stock return ($r_{(t,t-4)}$)	-2.590	***	0.420	-3.421	-1.759
Cum. profitability ($EBITDA_{(t,t-4)}$)	0.683		0.653	-0.610	1.976
Leverage deficit ($Ldef_{t-8}$)	-48.62	***	4.979	-58.47	-38.77
Change in target ($\Delta Target_{t-8}$)	47.73	***	6.369	35.12	60.33

Panel C: Standard Deviation of the Explanatory Variables

Variables $(t, t-4)$	S.D.	Variables $(t-4, t-8)$	S.D.
Financial deficit ($FD_{(t,t-4)}$)	2.741	Financial deficit ($FD_{(t-4,t-8)}$)	3.401
Positive FD ($FDd_{(t,t-4)}$)	3.129	Positive FD ($FDd_{(t-4,t-8)}$)	3.912
Yearly timing ($YT_{(t,t-4)}$)	2016	Yearly timing ($YT_{(t-4,t-8)}$)	2470
Long-term timing ($LT_{(t,t-4)}$)	4877	Long-term timing ($LT_{(t-4,t-8)}$)	6020
Average M/B ($\overline{M/B}_{t,t-4}$)	5.049	Average M/B ($\overline{M/B}_{t-4,t-8}$)	7.204
Cum. stock return ($r_{(t,t-4)}$)	1.493	Cum. stock return ($r_{(t-4,t-8)}$)	1.663
Cum. profitability ($EBITDA_{(t,t-4)}$)	1.311	Cum. profitability	1.462
Book leverage deficit ($Ldef_{t-8}$)	0.165	($EBITDA_{(t-4,t-8)}$)	
Change in book target ($\Delta Target_{t-8}$)	0.038		
Market leverage deficit ($Ldef_{t-8}$)	0.110		
Change in mkt target ($\Delta Target_{t-8}$)	0.081		

Table 3 continued

Panel D: Magnitude Effect on the Change in Leverage		
One std. dev. change in	% change in book	% change in market
Financial deficit ($FD_{(t-4,t-8)}$)	6.251	1.109
Positive FD ($FDd_{(t-4,t-8)}$)	-0.857	-0.994
Yearly timing ($YT_{(t-4,t-8)}$)	-1.358	0.667
Long-term timing ($LT_{(t-4,t-8)}$)	-0.385	0.446
Average M/B ($\overline{M/B}_{t-4,t-8}$)	-0.245	-0.425
Cum. stock return ($r_{(t-4,t-8)}$)	-2.687	-0.653
Cum. profitability ($EBITDA_{(t-4,t-8)}$)	2.903	-0.352
Financial deficit ($FD_{(t,t-4)}$)	0.110	-0.677
Positive FD ($FDd_{(t,t-4)}$)	6.414	6.082
Yearly timing ($YT_{(t,t-4)}$)	-0.077	-0.012
Average M/B ($\overline{M/B}_{t,t-4}$)	0.268	0.537
Long-term timing ($LT_{(t,t-4)}$)	0.379	-3.126
Cum. stock return ($r_{(t,t-4)}$)	-0.079	-3.867
Cum. profitability ($EBITDA_{(t,t-4)}$)	-4.242	0.895
Leverage deficit ($Ldef_{t-8}$)	-8.349	-5.372
Change in target ($\Delta Target_{t-8}$)	2.661	3.868

Our market timing measures all turn out insignificant except for the early period (*t-4* to *t-8*) yearly timing measure for both book and market leverage, which is significant at a 10% confidence level. However, they display different signs. The variation of signs is unexpected since according to Kayhan and Titman (2007) we would expect all of them to have a negative sign. We think that this result is due to peculiarities in our data sample and/or measures, which will be further discussed in section 4.7. We conclude that we do not find evidence in favor of the market timing theory using our market timing measures in regressions to explain the change in leverage.

The average market-to-book measure coefficients are found to be insignificant for both periods in the book leverage regression, and for the early period (*t-4* to *t-8*) in the

market leverage regression. The coefficient for the late period in the market leverage regression is significant and negative, as expected. As discussed in section 4.2, the significant coefficient for market-to-book ratio cannot be interpreted as evidence in favor of the market timing hypothesis when found in the market leverage regression because of the mechanical relationship, and furthermore we can conclude that the effects do not seem to be very persistent since the early period coefficient is insignificant also for the market leverage regression.

The cumulative returns measure turns out significant for the early period but insignificant for later period in the book leverage regression, which is unexpected according to previous findings by Welch (2004) and Kayhan and Titman (2007). For the market leverage regression, the effect of stock returns in the early period (*t-4* to *t-8*) is insignificant while the later period (*t* to *t-4*) is significant. This is expected since the effects from the early period may have been rebalanced while the later period still exhibits some effects on leverage. As discussed in section 4.2 we do not find evidence of market timing due to the mechanical relationship of this measure and market leverage.

The cumulative profitability measure turns out significant at a 5% level for both the early period (*t-4* to *t-8*) and the late period (*t* to *t-4*) in the book leverage regression. This might suggest that profitability indeed has an effect on leverage, in line with pecking order theory. Since the significance is found for both measurement periods, the effect on leverage is interpreted as persistent. The profitability measure turns out insignificant for the market leverage regression. Since profitable firms also should experience an increase in stock returns, these effects may cancel each other out in the market leverage regression. These results could be interpreted in favor of pecking order theory, and suggest that the effect on book leverage from profitability is persistent.

As in the short term effects regression, leverage deficit over the entire period has high explanatory power, which is very much in line with Hovakimian et al (2001). The coefficients are strongly significant, and a one standard deviation has a large effect on leverage. This could be interpreted as even stronger evidence in favor of the trade-off theory, but also simply as mean reversion as found to be the case by Chang and Dasgupta (2009).

In general, it is difficult to draw conclusions based on our regressions, since some variables behave unexpectedly. Table 4 presents the correlations between our market timing variables, showing a negative correlation between the two yearly timing measures estimated over period *t* to *t-4* and *t-4* to *t-8*.

Table 4

Correlation between our market timing measures

This table reports the correlations between our market timing measures measured over both periods, *t* to *t-4* and *t-4* to *t-8*.

	$YT_{t,t-4}$	$YT_{t,-4\ t-8}$	$LT_{t,t-4}$	$LT_{t,-4\ t-8}$
$YT_{t,t-4}$	1	-0.05	0.38	0.42
$YT_{t,-4\ t-8}$	-0.05	1	0.18	0.15
$LT_{t,t-4}$	0.38	0.18	1	0.04
$LT_{t,-4\ t-8}$	0.42	0.15	0.04	1

4.4 Changes in Leverage and its Different Components

Due to the lack of results found in favor of Kayhan and Titman's (2007) market timing measures, we also look into whether the previous period's market-to-book ratios are associated with changes in book leverage due to net equity issues.

Table 6 summarizes the results for the change in leverage and each of its components. Panel A reports the change in book leverage ratio. It shows a positive relationship between market-to-book and change in book leverage. This holds true for all sub-periods as well as the whole sample period, for which the coefficient is significant. This goes against previous studies by Frank and Goyal (2009) and Baker and Wurgler (2002), who found the relation to be negative for the American market and argue that this relation exist because market-to-book is seen as a proxy for growth and investment opportunities, which are negatively related to leverage. Our findings are on the other hand supported by Chen and Zhao (2006), who found that more than 88% of their sample of American firms have a positive relation between market-to-book and book leverage.

Panel B reports the relation between net equity issues and the four different determinants of capital structure. We find that equity issues are positively influenced by market-to-book (the coefficient is negative and the dependent variable negative). However for the sub-periods 1995-2001 and 2008-2013 the relation is negative, only the sub-period 2002-2007 reports a positive relation. According to Mahajan and Tartaroglu (2008), the negative relation found during two sub-periods has the implication that during those periods the historical market-to-book ratios are unlikely to capture any market timing effects on leverage which is a possible explanation for the mixed signs found for our market timing coefficients reported in sections 4.2 and 4.3. Firm size, profitability as well as tangibility are negatively related to net equity issues.

Panel C reports that newly retained earnings is positively associated with profitability while the relation to the rest of the explanatory variables is negative. We would expect newly retained earnings and market-to-book to have a positive relationship due to market-to-book being seen as a proxy for growth, although it is possible that a one-year lag in market-to-book is not enough to capture this effect.

Panel D is reported for completeness and proposes that residual asset growth is positively related to the market-to-book ratio, size and lagged leverage ratio.

Table 5 presents the correlations between the financial deficit, net equity issues, net debt issues and market-to-book ratio. Market-to-book ratio is negatively correlated with financial deficit which we find a little bit unexpected since we would expect a higher financial deficit during years of high market valuation according to market timing theory.

Table 5

Correlations between four of our variables

This table presents the correlation between four of our variables. Financial deficit (FD) is defined as the sum of change in equity, minus the change in retained earnings plus the change in debt. Net debt issues (d/A_{t-1}) is defined as the change in debt divided by last year's total assets. Net equity issues (e/A_{t-1}) is defined as the change in equity minus the change in retained earnings divided by last year's total assets. Market-to-book ratio (M/B) is defined as total assets minus book equity plus market equity divided by total assets.

	FD	d/A_{t-1}	e/A_{t-1}	M/B
FD	1	0.18	0.04	-0.004
d/A_{t-1}	0.18	1	0.41	0.02
e/A_{t-1}	0.04	0.41	1	0.01
M/B	-0.004	0.02	0.01	1

Table 6

Looking at the change in leverage and the impact of its components

This table reports the results for regressions on change in leverage itself as well as the different components of the change in leverage. The explanatory variables are four determinants of capital structure as well as the lagged book leverage. Every regression is done for four different periods; the first ranging from 1995-2001, the second from 2002-2007, the third from 2008-13 and the fourth from 1995-2013 (our whole sample period). Book leverage is defined as debt divided by total assets. Net equity issue is defined as the change in equity minus the change in retained earnings divided by total assets. Newly retained earnings is defined as the change in retained earnings divided by total assets. Market-to-book ratio is defined as total assets minus book equity plus market equity divided by total assets. Tangibility is the net of property, plant and equipment divided by total assets. Profitability is defined as earnings before interest, taxes, depreciation and amortization divided by total assets. Size is the natural logarithm of sales.

In Panel A, dependent variable is the change in book leverage. In Panel B, dependent variable is the net equity issue (negative). In Panel C, dependent variable is newly retained earnings (negative). In Panel D, dependent variable is residual asset growth (negative).

The results are expressed in percentage terms and the constants are not reported. Number of observations during each period is reported in the second column. The first column for each explanatory variable reports coefficients estimates while the second reports clustered robust standard errors. *, ** and *** mark significance at the 10%, 5% and 1% level respectively.

		$(M/B)_{t-1}$		$(PPE/A)_{t-1}$		$\left(\frac{EBITDA}{A_{t-1}}\right)_{t-1}$		$SIZE_{t-1}$		$(D/A)_{t-1}$		
Period	N	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Adj R^2
Panel A: Change in book leverage $(\Delta(D/A)_t)$ %												
95-01	263	0.10	0.09	-0.89	2.60	-4.89**	2.45	0.50*	0.27	-14.44***	4.59	0.10
02-07	772	0.10	0.10	-0.96	1.87	-0.11	2.18	0.74***	0.23	-16.35***	2.62	0.08
08-13	916	0.05	0.06	2.68	1.45	-1.85	2.48	0.50***	0.16	-14.86***	2.43	0.07
95-13	1951	0.09**	0.05	1.00	1.12	-1.66	1.29	0.61***	0.14	-15.53***	1.88	0.08

Table 6 continued

		$(M/B)_{t-1}$		$(PPE/A)_{t-1}$		$\left(\frac{EBITDA}{A_{t-1}}\right)_{t-1}$		$SIZE_{t-1}$		$(D/A)_{t-1}$		
Period	N	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	
Panel B: Change in book leverage due to net equity issues $(-(e/A_{t-1})_t)$ %												
95-01	263	0.06	0.16	5.49	4.66	-6.60	11.60	1.40*	0.71	-9.32	12.15	-0.01
02-07	772	-2.40	2.15	18.36	17.91	31.22**	13.30	5.48*	2.78	-59.98	36.83	0.05
08-13	916	0.80	0.64	-7.15	5.99	38.05***	9.55	1.78	1.12	12.25	16.79	0.06
95-13	1951	-0.47	0.67	5.35	8.22	27.48***	7.15	3.72**	1.59	-26.60	20.41	0.03
Panel C: Change in in book leverage due to newly retained earnings $(-(\Delta RE/A_{t-1})_t)$ %												
95-01	263	-0.19*	0.10	-4.85**	2.12	-16.40***	5.90	-0.74	0.50	5.08	3.84	0.26
02-07	772	0.82**	0.38	-1.82	4.31	-57.71***	14.18	-0.24	0.96	20.42	12.70	0.06
08-13	916	-0.93	0.71	11.86	10.89	-43.78***	7.50	1.03	1.00	-18.64	17.59	0.06
95-13	1951	0.06	0.15	1.46	3.63	-45.44	7.32	0.09	0.57	3.17	7.72	0.05
Panel D: Change in book leverage due to residual asset growth $(-E_{t-1}(1/A_t - 1/A_{t-1}))$ %												
95-01	263	-0.60	0.38	12.06***	4.62	39.82**	18.73	0.59	0.72	-2.74	8.04	0.30
02-07	772	-0.14	0.12	0.73	3.05	25.37***	5.91	-0.76**	0.27	-4.21	5.03	0.05
08-13	916	0.25*	0.14	-3.43	7.10	20.53***	4.00	-1.13***	0.37	0.07	3.88	0.03
95-13	1951	-0.29	0.19	2.76	3.78	26.47***	4.65	-0.85***	0.24	-0.89	3.03	0.06

4.5 The Effect on Leverage Following Significant Net Equity Issues

Table 8 reports the changes in leverage for five years following significant net equity issues. The change is defined as leverage during year t (t = 0, 1, 2, 3, 4, 5) minus leverage year t = -1, where t = 0 is the year of the significant net equity issue.

Looking at Panel A and the year of the net equity issue, we see a decrease in both book and market leverage (although the impact on market leverage is very small and insignificant). This is not surprising considering the brief mechanical effect of a new issue on leverage. The mean book leverage ratio is higher than the pre-issue ratio already after one year while the median is just slightly lower during all five years. The mean and the median change of book leverage hover around zero percent during the whole time-frame which is quite surprising considering the issue statistics in Panel A of Table 7, showing that a firm issuing a significant amount of net equity does so again in an average of 2.35 years.

Panel B of Table 8 reports an even larger decrease in leverage following the net equity issue. The mean of book leverage is higher than the pre-issue level after one year. The median is positive for both leverage ratios first after three years. As can be seen in Panel B of Table 7**,** firms issuing a significant amount of net equity while not issuing a significant amount of net debt does so again in an average of 2.94 years. Especially noteworthy is that the increase found for mean book leverage is significant for year three and four. What is surprising is that the changes reported in Panel B of Table 8 are neutralized faster than those in Panel A, even though the initial effect on leverage is larger. However Table 7 reveals that firms issuing a significant amount of equity, whether it's accompanied by debt issues or not, on average issue a relatively

larger amount of equity than the group not issuing a significant amount of debt during the same year (the mean of net equity issues are 48.08% and 31.96% respectively).

The results found show that the mean and median firm eradicates the effect on leverage from net equity issues within one to three years, despite both the mean and median firm issuing a significant amount of equity again during the five-year period. This transitory effect is in line with previous studies on the American market by Hovakimian (2006), Alti (2006) and Mahajan and Tartaroglu (2008), who found that the effect from equity issues (and possible market timing attempts) on leverage is not lasting. In unreported results, without Winsorizing any variables, we have found similar rebalancing effects as reported above. Firms may try to time the market, however the effects do not last long and our findings do not support Baker and Wurgler's (2002) theory that firm capital structure is the cumulative result of past attempts to time the market.

Table 7

Statistics of significant net equity issues

Panel A reports net equity issue statistics based on all significant net equity issues ($e/A_{t-1} \geq 0.05$) whether they're accompanied by net debt issues or not. Panel B reports net equity issue statistics not accompanied by any significant net debt issues ($d/A_{t-1} < 0.05$). The first column reports the number of companies observed and the second column the total number of observations. The third and the fourth column report the mean and median number of significant net equity issues per company. The fifth and the sixth column report the mean and median number of years between a firm's net equity issues. The seventh and eighth column report the mean and median of net equity issues.

		No. of issues		Years between issues		$\Delta e/A$	
No. of firms	N	Mean	Median	Mean	Median	Mean	Median
Panel A: All significant net equity issues							
145	510	3.52	3	2.35	2	48.08	19.43
Panel B: Significant net equity issues not accompanied by significant net debt issues							
119	243	2.04	2	2.94	2	31.96	17.13

Table 8

Changes in leverage following significant net equity issues

Reported are the means and medians (in percentage terms) of changes in leverage following significant net equity issues. Panel A reports changes in leverage following all significant net equity issues ($e/A_{t-1} \geq 0.05$) whether they're accompanied by net debt issues or not. Panel B reports changes in leverage following significant net equity issues not accompanied by any significant net debt issues ($d/A_{t-1} < 0.05$). The mean and the median of the change in leverage is reported in the first two columns each year. The third column reports the number of observations. Means are tested to be different from zero using *t*-statistics and medians are tested to be different from zero using a one-sided Wilcoxon sign test. *, ** and *** mark significance at the 10%, 5% and 1% level respectively.

Panel A: All significant net equity issues

	$Lev_{t=0} - Lev_{t=-1}$			$Lev_{t=1} - Lev_{t=-1}$			$Lev_{t=2} - Lev_{t=-1}$		
	Mean	Median	N	Mean	Median	N	Mean	Median	N
Book leverage	-2.97***	-2.51***	460	0.60	-0.54	459	0.94*	-0.45	393
Market leverage	-0.15	0.12		-0.23	-0.34		0.95**	0.21	
	$Lev_{t=3} - Lev_{t=-1}$			$Lev_{t=4} - Lev_{t=-1}$			$Lev_{t=5} - Lev_{t=-1}$		
	Mean	Median	N	Mean	Median	N	Mean	Median	N
Book leverage	0.11	-0.88	330	-0.35	-0.43	268	-1.31	-1.49**	173
Market leverage	1.29***	0.79***		1.44***	0.58**		0.92*	0.23	

Table 8 continued

Panel B: Significant net equity issues not accompanied by significant net debt issues

	$Lev_{t=0} - Lev_{t=-1}$			$Lev_{t=1} - Lev_{t=-1}$			$Lev_{t=2} - Lev_{t=-1}$		
	Mean	Median	N	Mean	Median	N	Mean	Median	N
Book leverage	-7.61***	-5.66***	227	0.93	-0.43	218	0.41	-1.11	169
Market leverage	-1.94***	-0.79***		-0.14	-0.49		-0.37	-0.46*	
	$Lev_{t=3} - Lev_{t=-1}$			$Lev_{t=4} - Lev_{t=-1}$			$Lev_{t=5} - Lev_{t=-1}$		
	Mean	Median	N	Mean	Median	N	Mean	Median	N
Book leverage	1.72*	0.74	142	1.85*	1.88	124	1.83	0.03	69
Market leverage	2.14***	0.97***		2.90***	0.77***		1.84**	0.96	

4.6 Extension Tests

4.6.1 Bootstrap Replications

Following Kayhan and Titman (2007), we use a bootstrap method to obtain new standard errors by redrawing samples from our pool of data. These results are not reported. The procedure proposed by Efron (1979) is a non-parametric technique that randomly draws new samples from the existing observations. Given our unbalanced panel data, we draw a sample of firm clusters instead of single firm-year observations to protect the time-series structure. Using a bootstrap method allows us to control for the potential presence of bias, due to for example overlapping leverage change intervals and lagged correlation between the dependent and explanatory variables in our regression as mentioned by Kayhan and Titman (2007).

The bootstrap randomly draws N observations from the total sample of N firm clusters. Some firms will appear more than once while some may not appear at all. In the second step the regression model is then used to obtain coefficient estimates and standard errors. This is then repeated 1000 times (though some replications fail due to the bootstrap not drawing observations from all industries).

The results do not differ very much from those obtained without bootstrapping. The main difference is that the timing coefficients that were significant in the regressions reported in sections 4.2 and 4.3 all lose their significance.

4.6.2 Other Regressions

We also run other regressions based on our main regression model to see if we are able to obtain negative coefficient signs for all timing measures.

1. Regressions allowing for two dimensions of clustered standard errors. In our ordinary regressions only one dimension of clustered standard errors are taken into account, in our case corresponding to factors within each firm. Using this type of two dimensional regression allows us to also take into account possible yearly factors affecting leverage.

2. Regressions where the timing measures have been derived and split up into an equity and debt timing part. For the derivation of these, see Appendix B.

3. Regressions employing industry classifications by Fama and French (1997), instead of our definition based on the first number in the SIC code.

4. Regressions on groups created by ranking the market-to-book and financial deficit either overall or on a yearly basis (even though both methods create observation gaps within firms). We split our sample into a combination of nine groups, three groups created based on the market-to-book ratio and three groups based on the level of financial deficit.

The results of the regressions above are not reported. We do not find consistent signs for the market timing measure coefficients across periods in any of the regressions with the change in leverage between t and t-δ as the dependent variable. Some of the regressions including the split timing measures show a positive relation between the change in leverage and our equity timing measures. It is possible that this could be explained by the results in Table 7, Panel B showing that the average firm increases leverage after significant net equity issues not accompanied by significant net debt issues. The regressions employing market-to-book and financial deficit groups do not result in consistent signs for market timing measure coefficients between groups. Also, we found mixed signs for the different market timing measure coefficients within the nine groups.

4.6.3 Financial Deficit Including Changes in Cash

Kayhan and Titman (2007) mention that the financial deficit could be considered an endogenous variable (even if it is often seen as exogenous in the pecking order theory). The financial deficit is probably affected by the state of debt and equity markets. It does not seem far-fetched that a firm generates a high financial deficit when the markets view it positively.

$$FD = e + d - \Delta Cash$$

We partly address this problem in unreported regressions where we exclude the change in cash from the financial deficit. The main reason to do this is because firms might issue equity when they're overvalued and hold the proceeds as cash, resulting in a decrease instead of an increase in leverage associated with a high financial deficit. The results show that our previous regressions are quite robust to the definition change of financial deficit. The differences are mainly slightly lower coefficients for both financial deficit and the positive financial deficit interaction variable as well as for most of our timing measures.

4.7 Possible Explanations for the Mixed Signs of Timing Coefficients

4.7.1 Data Issues

Ideally, we would use cash flow data instead of balance sheet identities. Our use of balance sheet data will result in some noise, which may affect our results. However, this is necessary because of lack of cash flow data for Swedish companies. Using only interest bearing liabilities to calculate leverage could also yield different results, since non-interest bearing liabilities do not come with any additional costs for e.g. financial distress. It should also be noted that even though there have been fluctuations in the

leverage ratio for individual companies, the average book leverage ratio has more or less hovered around 50% since the 2001 financial crisis.

Our data displays a negative correlation between market-to-book and net equity issues for two of our sub-periods, which is unexpected. A positive relation between market-to-book and the change in book leverage is found for all periods, it is possible that this effect might obscure possible market timing effects when using Kayhan and Titman's (2007) market timing measures. We also find negative correlation between two of the market timing measures. When looking at Table 9 we can see that even though average net equity issue is roughly the same size as the average net debt issue, average change in debt is about ten times as large as the average change in equity minus change in retained earnings, meaning that companies with less assets tend to issue relatively more equity. This is in line with the results found in section 4.4, showing a negative relation between firm size and net equity issues.

Table 9

Summary statistics of equity and debt issues

This table reports the means of net equity and debt issues in percentage terms as well as the means of change in equity and debt. Net equity issues (e/A_{t-1}) is defined as the change in equity, minus the change in retained earnings, divided by last year's total assets. Net debt issues (d/A_{t-1}) is defined as change in debt divided by last year's total assets. The change in equity (e) is defined as the change in book equity minus the change in retained earnings. The change in debt (d) is defined as the change in debt.

Year	e/A_{t-1}	d/A_{t-1}	e	d
1995	20.94	95.18	727.16	-35.79
1996	5.62	12.15	535.52	314.82
1997	4.14	6.56	237.28	1353.78
1998	8.32	21.42	251.62	604.89
1999	6.76	12.15	429.69	115.41
2000	29.54	21.30	245.58	826.94
2001	-2.29	11.07	-117.66	781.75
2002	0.84	-2.33	9.96	-187.91
2003	15.02	6.60	1.36	-323.09
2004	1.72	3.00	88.43	-101.77
2005	26.62	22.20	-408.91	690.71
2006	0.76	10.99	-177.18	87.70
2007	6.48	15.93	31.42	800.82
2008	5.30	8.42	307.35	697.23
2009	4.42	-4.39	6.05	-616.94
2010	9.33	4.36	-111.77	-86.76
2011	-0.53	7.22	-34.18	473.12
2012	5.93	5.77	-65.74	141.22
2013	10.13	-0.09	40.45	-25.29
Mean	7.51	9.01	23.93	247.12

4.7.2 Market Timing Measure Issues

Hovakimian (2004) mentions that there might be an estimation error due to imputed regressors when using the four variables seen as determinants of capital structure to estimate target leverage and leverage deficit and then in the next step include these two variables in our regressions. An alternative would be to include these four variables directly in our main regressions. However, neither of these specifications yield significant nor sign consistent timing variables when tested by Kayhan and Titman (2007).

It is not clear whether measures based on historical market-to-book ratios are an optimal proxy to measure market timing, as suggested by Mahajan and Tartaroglu (2008). According to them, timing effects will be hard to find if the regression to explain equity issues has a positive coefficient for market-to-book ratio, which is the case for some of the sub-periods in our sample (see Table 6). As mentioned earlier it is also possible that the positive relation between market-to-book and change in book leverage can obscure the effect from market timing measures relying on market-to-book ratios. Furthermore, Mahajan and Tartaroglu's (2008) study find evidence for market timing in Italy only when modifying the Baker and Wurgler (2002) measure to use different weighting schemes. This implies that there might not be a "one size fits all" market timing measure.

Another possible problem with the long-term timing measure is that it includes the average financial deficit in absolute numbers, which leads to a higher value for larger firms. The long-term timing effect on leverage might then be hidden if it's mainly found in smaller firms. Since the Baker and Wurgler (2002) measure uses a weighting scheme based on financial deficit, we will test it in section 4.8 to see if it yields different results.

4.7.3 Swedish Market Characteristics

The Swedish market is not as complete or as deep as the U.S. market. There are also differences in regulations, culture and behavior that might influence the effect of market timing attempts. During the time that our data spans, there have been two shocks to the market in the forms of the early 2000's IT crisis and the late 2000's banking crisis. These crises may have a strong impact on firms which may override the effects of market timing during "normal times".

A very limited number of studies of market timing on the Swedish market has been executed. A study on the Swedish market over the years 2000-2007 by Albinsson and Karlsson (2008) in the form of a Master thesis found a positive coefficient for the Baker and Wurgler (2002) measure when explaining the change in book leverage, in line with some of our results using the Kayhan and Titman (2007) market timing measures. This might be interpreted as some evidence for characteristics in the Swedish market leading to different results than those previously found for the U.S market.

4.8 Testing the Baker and Wurgler Measure

As a final test we try the Baker and Wurgler (2002) measure (see Eq. 3 in section 3.3.2) to see if it is able to find any indications of market timing in our data. Mahajan and Tartaroglu (2008) have previously found that some weighting schemes work better to find a market timing effect in different markets. The Kayhan and Titman (2007) measures, although capturing the intuition behind the Baker and Wurgler measure, do not use any weighting at all. For every year, the Baker and Wurgler measure weights all market-to-book observations from the first year a firm is found in our sample until *t-1* (where $t = 0$ is the current year). The weights used are the amount of external financing raised by a firm each year, which is defined as the sum of net equity issues

and net debt issues, divided by the total sum of external financing for every year up until and including year *t-1*. We start by running the original Baker and Wurgler regression to explain leverage[4], which includes variables that we have previously used:

$$\left(\frac{D}{A}\right)_t = \alpha + \beta_1 EFWAMB_{t-1} + \beta_2 (M/B)_{t-1} + \beta_3 \left(\frac{PPE}{A}\right)_{t-1} + \beta_4 \left(\frac{EBITDA}{A_{t-1}}\right)_{t-1} + \beta_5 SIZE_{t-1} + \varepsilon_t$$

In unreported regressions using the above setup, we find that the Baker and Wurgler measure (*EFWAMB*) shows negative coefficients, which are significant for both the change in book and market leverage. The regressions show an adjusted R^2 of 0.28 and 0.31 respectively.

Because of these results we replace the yearly and long-term timing measures in our previous regressions with the *EFWAMB*. The regression explaining change in leverage between *t* to *t-4* includes *EFWAMB* lagged one year while the regression explaining change in leverage between *t* to *t-8* includes *EFWAMB* lagged one year as well as *EFWAMB* lagged five years. We do not include the average market-to-book in these regressions as the *EFWAMB* includes a weighted version of market-to-book, unlike Kayhan and Titmans's (2007) measures. The results are reported in Table 10 and Table 11.

As can be seen in Table 10, both regressions show negative coefficients for the *EFWAMB* measure. It is significant in the regression explaining the change in market leverage. However, a one standard deviation change in *EFWAMB* does have a fairly small effect on leverage. The coefficients for the other explanatory variables do not change noteworthy. The book leverage and market leverage regressions have an adjusted R^2 of 0.25 and 0.28 respectively, compared to 0.25 and 0.30 when using Kayhan and Titman's (2007) timing measures.

[4] This regression is done for both book and market leverage.

Table 11 reports the change in leverage between year *t* to *t-8*. For both regressions, the lagged *EFWAMB* measures are negative and significant. A one standard deviation change in *EFWAMB* leads to a moderate change in leverage. The other explanatory variables do not change a great deal concerning book leverage compared to using the Kayhan and Titman (2007) measures. However it can be noted that both our stock returns and profitability measures gain significance. The book leverage and market leverage regressions both have an adjusted R^2 of 0.43, compared to 0.41 and 0.46 respectively when using Kayhan and Titman's (2007) timing measures. Thus the models including *EFWAMB* have an as high or higher explanatory value when trying to explain the changes in book leverage, compared to our previous models including Kayhan and Titman's measures. The opposite is true when explaining changes in market leverage, in this case the models including Kayhan and Titman's timing measures have a higher explanatory value.

Based on these results, it is possible that the weights used to calculate the *EFWAMB* measure can in some cases overcome data peculiarities[5] and possibly find market timing effects. Although when running the regressions containing *EFWAMB* with un-Winsorized values of market-to-book, *EFWAMB* has positive coefficients in the regressions to explain the change in leverage between *t* to *t-4* which implies that Winsorizing market-to-book at the 5% and 95% level also plays a role in finding this inverse relationship in our sample. Kayhan and Titman (2007) mention that the presence of the market-to-book ratio in the *EFWAMB* can cause a negative relation with leverage for reasons that have nothing to do with market timing. This is due to the fact that the market-to-book ratio is a proxy for growth and investment opportunities, which in theory have a negative relation to leverage. However it is unlikely that the relation would remain when the variable is lagged. It is also not clear

[5] Such as the negative relation found between market-to-book and equity issues certain sub-periods and the positive relation between market-to-book and book leverage.

if the effect found can be attributed to market timing or dynamic trade-off theory with adjustment costs, due to the results in section 4.5 showing fast re-balancing after equity issues. Market timing theory would predict the effect on leverage from market timing attempts to be long-lasting.

Table 10

EFWAMB and the change in leverage between *t* to *t-4*

Panel A reports coefficient estimates, clustered robust standard errors and 95% confidence intervals for the regression to explain changes in book leverage. Panel B presents the same statistics for the regression to explain changes in market leverage. All coefficient estimates as well as standard errors are reported in percentage terms. Constants are not reported. Panel C presents a sensitivity analysis. *, ** and *** mark significance at the 10%, 5% and 1% level respectively.

Variable	Coeff.		S.E.	95% Conf. interval	
Panel A: Book Leverage Regression Results					
Financial deficit ($FD_{(t,t-4)}$)	2.006	*	1.036	-0.040	4.051
Positive FD ($FDd_{(t,t-4)}$)	-1.642	*	0.833	-3.288	0.0055
B&W measure ($EFWAMB_{t-1}$)	-0.014		0.020	-0.053	0.025
Cum. stock return ($r_{(t,t-4)}$)	-0.481		0.377	-1.226	0.264
Cum. profitability ($EBITDA_{(t,t-4)}$)	-0.847		0.568	-1.969	0.274
Leverage deficit ($Ldef_{t-4}$)	-37.392	***	4.178	-45.643	-29.141
Change in target ($\Delta Target_{t-4}$)	70.691	***	20.316	30.564	110.817
Panel B: Market Leverage Regression Results					
Financial deficit ($FD_{(t,t-4)}$)	0.778	***	0.294	0.197	1.358
Positive FD ($FDd_{(t,t-4)}$)	-0.670	***	0.252	-1.168	-0.171
B&W measure ($EFWAMB_{t-1}$)	-0.018	*	0.010	-0.038	0.003
Cum. stock return ($r_{(t,t-4)}$)	-1.602	***	0.321	-2.236	-0.969
Cum. profitability ($EBITDA_{(t,t-4)}$)	0.240		0.261	-0.275	0.755
Leverage deficit ($Ldef_{t-4}$)	-31.965	***	4.028	-39.922	-24.009
Change in target ($\Delta Target_{t-4}$)	32.481	***	4.952	22.700	42.262

Table 10 continued

Panel C: Magnitude Effect on the Change in Leverage		
One std. dev. change in	% change in book	% change in market
Financial deficit ($FD_{(t,t-4)}$)	5.490	2.130
Positive FD ($FDd_{(t,t-4)}$)	-5.132	-2.093
B&W measure ($EFWAMB_{t-1}$)	-0.496	-0.637
Cum. stock return ($r_{(t,t-4)}$)	-0.714	-2.390
Cum. profitability ($EBITDA_{(t,t-4)}$)	-1.103	0.313
Financial deficit ($FD_{(t,t-4)}$)	-5.986	-3.389
Leverage deficit ($Ldef_{t-4}$)	2.105	2.013
Change in target ($\Delta Target_{t-4}$)	5.490	2.130

Table 11

EFWAMB and the change in leverage between *t* to *t-8*

Panel A reports coefficient estimates, clustered robust standard errors and 95% confidence intervals for the regression to explain changes in book leverage. Panel B presents the same statistics for the regression to explain changes in market leverage. All coefficient estimates as well as standard errors are reported in percentage terms. Constants are not reported. Panel C presents a sensitivity analysis. *, ** and *** mark significance at the 10%, 5% and 1% level respectively.

Variable	Coeff.		S.E.	95% Conf. interval	
Panel A: Book Leverage Regression Results					
Financial deficit ($FD_{(t-4,t-8)}$)	1.491	***	0.429	0.643	2.339
Positive FD ($FDd_{(t-4,t-8)}$)	-1.887	***	0.340	-2.560	-1.214
B&W measure ($EFWAMB_{t-5}$)	-0.046	**	0.021	-0.088	-0.005
Cum. stock return ($r_{(t-4,t-8)}$)	-1.441	***	0.466	-2.363	-0.519
Cum. profitability ($EBITDA_{(t-4,t-8)}$)	1.911	**	0.777	0.373	3.448
Financial deficit ($FD_{(t,t-4)}$)	0.320		0.783	-1.229	1.869
Positive financial deficit ($FDd_{(t,t-4)}$)	1.779		1.159	-0.515	4.072
B&W measure ($EFWAMB_{t-1}$)	-0.062	*	0.036	-0.132	0.009
Cum. stock return ($r_{(t,t-4)}$)	0.050		0.752	-1.437	1.538
Cum. profitability ($EBITDA_{(t,t-4)}$)	-3.210	**	1.270	-5.723	-0.697
Leverage deficit ($Ldef_{t-8}$)	-51.313	***	5.634	-62.459	-40.166
Change in target ($\Delta Target_{t-8}$)	67.806	***	21.812	24.648	110.965

Table 11 continued

Panel B: Market Leverage Regression Results					
Financial deficit ($FD_{(t-4,t-8)}$)	0.433	*	0.235	-0.032	0.897
Positive FD ($FDd_{(t-4,t-8)}$)	-0.343	*	0.174	-0.687	0.002
B&W measure ($EFWAMB_{t-5}$)	-0.025	**	0.010	-0.045	-0.005
Cum. stock return ($r_{(t-4,t-8)}$)	-0.414	**	0.269	-0.945	0.118
Cum. profitability ($EBITDA_{(t-4,t-8)}$)	-0.383		0.342	-1.060	0.295
Financial deficit ($FD_{(t,t-4)}$)	0.230		0.329	-0.421	0.880
Positive financial deficit ($FDd_{(t,t-4)}$)	1.492	**	0.702	0.103	2.881
B&W measure ($EFWAMB_{t-1}$)	-0.050	***	0.018	-0.085	-0.015
Cum. stock return ($r_{(t,t-4)}$)	-2.711	***	0.398	-3.500	-1.923
Cum. profitability ($EBITDA_{(t,t-4)}$)	1.235	**	0.535	0.176	2.294
Leverage deficit ($Ldef_{t-8}$)	-46.590	***	5.112	-56.705	-36.475
Change in target ($\Delta Target_{t-8}$)	45.282	***	5.755	33.893	56.700

Panel C: Magnitude Effect on the Change in Leverage		
One std. dev. change in	% change in book	% change in market
Financial deficit ($FD_{(t-4,t-8)}$)	5.064	1.469
Positive FD($FDd_{(t-4,t-8)}$)	-7.390	-1.342
B&W measure ($EFWAMB_{t-5}$)	-1.882	-1.023
Cum. stock return ($r_{(t-4,t-8)}$)	-2.401	-0.687
Cum. profitability ($EBITDA_{(t-4,t-8)}$)	2.802	-0.555
Financial deficit ($FD_{(t,t-4)}$)	0.899	0.630
Positive financial deficit ($FDd_{(t,t-4)}$)	5.535	4.668
B&W measure ($EFWAMB_{t-1}$)	-2.197	-1.771
Cum. stock return ($r_{(t,t-4)}$)	0.081	-4.047
Cum. profitability ($EBITDA_{(t,t-4)}$)	-4.248	1.603
Leverage deficit ($Ldef_{t-8}$)	-8.439	-5.148
Change in target ($\Delta Target_{t-8}$)	2.616	3.660

5 Implications

5.1 Interpretation of Our Results

In our regressions we do see results strongly in favor of trade-off theory through our leverage deficit variable. Firms seem to move towards a target, and as such undo the effects of equity issues at a fast rate. Even though these results could be the result of a simple mean reversion as proposed by Chang and Dasgupta (2009), our results imply that a dynamic trade-off theory with a reasonably high speed of adjustment is very hard to reject. Our results strengthen the argument for trade-off theory as an explanation for the capital structure of Swedish firms.

Concerning our pecking order theory measures, our evidence is somewhat more inconclusive. Our financial deficit measure gives some evidence in favor of pecking order and adverse selection theory, since a higher financial deficit seems to increase leverage. However, the insignificance of our profitability measure points more to theories of firms rebalancing leverage at fast rates.

We do not find evidence for market timing through our cumulative return measure or Kayhan and Titman's (2007) market timing measures, nor do we find support that it was the long-term timing measure that drove the results in the Baker and Wurgler (2002) measure. However, when using the Baker and Wurgler measure with its weighting scheme, our results do indicate that market timing possibly has an effect on the capital structure of Swedish firms although the effect is not very large compared to our other measures. We cannot be certain whether these effects should be attributed to market timing or dynamic trade-off theory with adjustment costs, due to the results in section 4.5 showing fast re-balancing after significant equity issues. Market timing theory would predict more long-term effects on leverage from market timing attempts. Our results are therefore more in line with a dynamic trade-off theory.

5.2 Suggestions for Future Research

Following our findings, it would be an interesting project to look at different market timing measures in a bigger set of countries, similar to what Mahajan and Tartaroglu (2008) did when they applied the Baker and Wurgler (2002) measure on G7 countries. It would be rewarding to compare the characteristics of markets exhibiting market-timing tendencies using one measure with markets that do not, in order to find explanations to why this happens. This could lead to a greater understanding of particularly market timing theory but also in extension a more complete theory of capital structure.

References

Albinsson, M., Karlsson, M., 2008. Market Timing - En Studie Över Market Timing-teorins Applicerbarhet på den Svenska Marknaden. Degree Project Master Level, Lund University.

Alti, A., 2006. How Persistent is the Impact of Market Timing on Capital Structure? *The Journal of Finance* 61, 1681-1710.

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

Chang, X., Dasgupta, S., 2009. Target Behavior and Financing: How Conclusive is the Evidence? *The Journal of Finance* 64, 1767-1795.

Chen, L., Zhao, X., 2006. On the Relation Between Market-to-Book Ratio, Growth Opportunity, and Leverage Ratio. *Finance Research Letters* 3, 253-266.

Donaldson, G., 1961. Corporate Debt Capacity: A Study of Corporate Debt Policy and the Determination of Corporate Debt Capacity. Harvard Business School, Division of Research, Harvard University.

Efron, B., 1979. Bootstrap Methods: Another Look at the Jackknife. *The Annals of Statistics* 7, 1–26.

Fama, E., French, K.R., 1997. Industry Costs of Equity. *Journal of Financial Economics* 43, 153-193.

Fama, E., French, K.R., 2002. Testing Trade-off and Pecking Order Predictions about Dividends and Debt. *Review of Financial Studies* 15, 1–33.

Frank, M.Z., Goyal, V.K., 2009. Capital Structure Decisions: Which Factors are Reliably Important? *Financial Management* 38, 1-37.

Fischer, E.O., Heinkel, R. and Zechner, J., 1989. Dynamic Capital Structure Choice: Theory and Tests. *The Journal of Finance* 44, 19-40.

Graham, J.R., Harvey, C.R., 2001. The Theory and Practice of Corporate Finance: Evidence from the Field. *Journal of Financial Economics* 60, 187–243.

Hovakimian, A., 2004. The Role of Target Leverage in Security Issues and Repurchases. *The Journal of Business* 77, 1041-1072.

Hovakimian, A., 2006. Are Observed Capital Structures Determined by Equity Market Timing? *Journal of Financial and Quantitative Analysis* 41, 221-243.

Hovakimian, A., Opler, T., Titman, S., 2001. The Debt-Equity Choice. *Journal of Financial and Quantitative Analysis* 36 (1), 1–24.

Kayhan, A., Titman, S., 2007. Firms' Histories and Their Capital Structures. *Journal of Financial Economics* 83, 1-32.

Leary, M.T., Roberts, M.R., 2006. Do Firms Rebalance Their Capital Structures? *The Journal of Finance* 60, 2575-2619.

Mahajan, A. Tartaroglu, S., 2008. Equity Market Timing and Capital Structure: International Evidence. *Journal of Banking and Finance* 32, 754–766

Myers, S.C., 1977. Determinants of Corporate Borrowing. *Journal of Financial Economics* 5, 147-175.

Myers, S.C., 1984. The Capital Structure Puzzle. *The Journal of Finance* 39, 575–592.

Myers, S.C., Majluf, N.S., 1984. Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have. *Journal of Financial Economics* 13, 187–221

Parsons, C., Titman, S., 2008. Empirical Capital Structure: A Review. *Foundations and Trends in Finance* 3, 1-93.

Rajan, R.G., Zingales, L., 1995. What Do We Know About Capital Structure? Some Evidence from International Data. *The Journal of Finance* 50, 1421-1460.

Shyam-Sunder, L., Myers, S.C., 1999. Testing Static Tradeoff Against Pecking Order Models of Capital Structure. *Journal of Financial Economics* 51, 219–244.

Titman, S., Wessels, R., 1988. The Determinants of Capital Structure Choice. *The Journal of Finance* 43, 1-19.

Welch, I., 2004. Capital Structure and Stock Returns. *Journal of Political Economy* 112, 106–131.

Appendix A. Variable Construction

Table 12

Definition of general variables.

Variable	Data used
Book debt (D)	$Debt$
Book equity (E)	$Total\ assets - Book\ Debt$
Market equity	$(Common\ Shares\ Outstanding * Price)/1000$
Market value (MV)	$Market\ Equity\ +\ Book\ Debt$
Book leverage (D/A)	$Debt/Total\ Assets$
Market leverage (D/MV)	$Debt/Market\ Value$
Market-to-book ratio (M/B)	$Market\ Value/Total\ Assets$
Asset tangibility ratio (PPE/A)	$Property, Plant\ \&\ Equipment/Total\ Assets$
Profitability ratio ($EBITDA/A_{t-1}$)	$EBITDA/Total\ Assets_{t-1}$
Size ($SIZE$)	$\ln(Sales)$
Newly retained earnings ($\Delta RE/A$)	$\Delta Retained\ Earnings/Total\ Assets$
Net debt issue ($\Delta d/A$)	$\Delta Debt/Total\ Assets_{t-1}$
Net equity issue ($\Delta e/A$)	$(\Delta Book\ Equity - \Delta Retained\ Earnings)/Total\ assets_{t-1}$
Financial deficit ($\Delta d + \Delta e$)	$(\Delta Book\ Equity - \Delta Retained\ earnings) +\ \Delta Debt$

Table 13

Definition of variables included in regressions.

Variable	Data used
Financial deficit ($FD_{(t,t-x)}$)	$\left(\sum_{t-x}^{t} FD\right)/A_{t-x}$
Financial deficit dummy	$\begin{cases} d_t = 1\ if\ FD_t > 0 \\ d_t = 0\ if\ FD_t \leq 0 \end{cases}$
Positive financial deficit ($FDd_{(t,t-x)}$)	$\left(\sum_{t-x}^{t} Dummy * FD\right)/A_{t-x}$
Yearly timing ($YT_{(t,t-x)}$)	$\hat{cov}(FD, M/B)_{t-1,t-x-1}$
Long-term timing ($LT_{(t,t-x)}$)	$\left(\frac{(\sum_{t-x-1}^{t-1} M/B)}{5} * \frac{(\sum_{t-x-1}^{t-1} FD)}{5}\right)$
Average M/B ($\overline{M/B}_{t,t-x}$)	$\left(\sum_{t-x}^{t} M/B\right)/5$
Cum. stock return ($r_{(t,t-x)}$)	$\sum_{t-x}^{t}\left(\frac{P_t - P_{t-1}}{P_{t-1}}\right)$

Table 13 continued

Cum. profitability ($EBITDA_{(t,t-x)}$)	$\left(\sum_{t-x}^{t} EBITDA\right)/A_{t-x}$
Leverage deficit ($Ldef_t$)	$L_t - \hat{L}_t$
Change in target leverage ($\Delta Target_{t-x}$)	$\hat{L}_t - \hat{L}_{t-x}$
Baker and Wurgler measure ($EFWAMB_{t-x}$)	$\sum_{s=0}^{t-x} \frac{e_s + d_s}{\sum_{r=0}^{t-x} e_r + d_r} * (M/B)_s$

Appendix B. Derivation of the Timing Measures

Kayhan and Titman's (2007) market timing measures are derived from Baker and Wurgler's (2002) $EFWAMB$ measure shown in Eq. A.1 below.

$$EFWAMB_{t-1} = BW = \sum_{s=0}^{t-1} \frac{e_s + d_s}{\sum_{r=0}^{t-1} e_r + d_r} * (M/B)_s \qquad (A.1)$$

Since the financial deficit can be defined as

$$FD = e + d \qquad (A.2)$$

The BW measure can also be written as

$$BW = \sum_{s=0}^{t-1} \frac{FD_s}{\sum_{r=0}^{t-1} FD_r} * (M/B)_s \qquad (A.3)$$

Equation (A.3) can be rewritten as

$$BW * \left(\sum_{s=0}^{t-1} FD_s\right) = \sum_{s=0}^{t-1} FD_s * (M/B)_s \qquad (A.4)$$

Let

$$\left(\sum_{s=0}^{t-1} FD_s\right)/t = \overline{FD} \quad and \quad \left(\sum_{s=0}^{t-1} (M/B)_s\right)/t = \overline{M/B}$$

Scaling equation (A.4) by t and adding and subtracting $\overline{FD} * \left(\overline{M/B}\right)$ from it gives us

$$BW * \overline{FD} = \left(\sum_{s=0}^{t-1} FD_s * (M/B)_s\right)/t - \overline{FD} * \overline{M/B} + \overline{FD} * \overline{M/B} \qquad (A.5)$$

Which can also be written as

$$BW * \overline{FD} = c\hat{o}v(FD, M/B) + \overline{FD} * \overline{M/B} \qquad (A.6)$$

In order to split the timing measures into debt and equity parts, equation (A.2) can be combined with the yearly timing measure using the additive law of covariance, which yields

$$YT = c\hat{o}v(e, M/B) + c\hat{o}v(d, M/B) \qquad (A.7)$$

Using equation (A.2), the long-term timing measure can be re-written as

$$LT = \bar{e} * \overline{M/B} + \bar{d} * \overline{M/B} \qquad (A.8)$$

Appendix C. Tobit Regression of Target Leverage Ratios

We use a Tobit regression to predict the target book and market leverage ratio. The explanatory variables are profitability ($EBITDA/A_{t-1}$), tangibility (PPE/A), market-to-book ratio (MV/A), size ($\ln(Sales)$) and industry dummies. The predicted value of leverage is restricted to be between 0 and 1. The results of these regressions can be found below in Table 14.

Table 14

Predicting target leverage

Panel A reports to the coefficient estimates and the corresponding standard errors. Number of observations and chi-square probabilities are also reported. The statistics for the constant and the industry dummies are not included. Panel B reports the number of observations and the mean and standard deviation for the predicted target leverage and also for both periods' leverage deficit and change in target leverage. The coefficients and standard errors in Panel A as well as the means and standard deviations in Panel B are presented in percentage terms. Constants are not reported. *, ** and *** mark significance at the 10%, 5% and 1% level respectively.

Panel A: Predicting target leverage

	Book Leverage		Market Leverage	
Variable	Coeff.	S.E.	Coeff.	S.E.
$(EBITDA/A_{t-1})_{t-1}$	-6.90***	1.90	-1.76	1.29
$(PPE/A)_{t-1}$	9.94***	2.14	-3.10**	1.46
$(M/B)_{t-1}$	0.11*	0.06	-1.16***	0.04
$Size_{t-1}$	4.44***	0.19	0.35***	0.13
No. of observations	1951		1951	
Pseudo R^2	-0.6498		-0.3548	
Prob. $> \chi^2$	0		0	
LR $\chi^2(10)$	645.31		822.95	

Table 14 continued

Panel B: Target leverage statistics					
		Book Leverage		Market Leverage	
Variable	N	Mean	S.D.	Mean	S.D.
Predicted target leverage ($\widehat{L}_t$)	1951	51.14	9.96	20.61	7.84
Leverage deficit ($Ldef_{t-4}$)	1251	0.42	16.05	-0.33	10.58
Leverage deficit ($Ldef_{t-8}$)	672	0.02	16.46	0.05	11.04
Change in target ($\Delta Target_{t-4}$)	1247	1.06	3.05	0.96	6.19
Change in target ($\Delta Target_{t-8}$)	670	1.92	3.82	1.29	8.10