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# *Investigating the Effect of Equity Market Timing on Corporate Capital Structure*

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# ABSTRACT

The market timing theory of capital structure states that firms are more likely to issue equity when their market values are high, relative to their true values. Baker and Wurgler (2002) claim that equity market timing has a significant and long-lasting effect on capital structure. Their study has been criticized on the basis that their misvaluation proxy is biased by information on future growth prospects. This thesis makes use of a proxy for misvaluation based on intrinsic value which is believed to not suffer from such confounding factors. The main interest is in the long-run effect of market timing, however, short-term investigations are also performed. The results do not show evidence for a significant relationship between equity market timing and capital structure in the long and short-run. This work sides with the main line of criticism and suggests that the results of Baker and Wurgler (2002) are indeed driven by information on growth prospect, as opposed to by misvaluation and equity market timing.

**Key words:** equity market timing, intrinsic value, capital structure, initial public offering

# Contents

# I. Introduction

Modigliani and Miller (MM) (1958) show that in a perfect and efficient capital market any capital structure choices made by companies are irrelevant in terms of their effect on market value. This study has led to the famous Capital Structure Irrelevance Proposition. The world of corporate finance is abundant in theories on capital structure, however, real-world capital markets are far from perfect. As a result, many of these theories, when brought to the real world, fail to provide robust explanations of occurring phenomena. Therefore, a general consensus on the explanation for firm capital structure choices has not been reached.

One explanation for firm capital structure decisions is the market timing theory. Equity market timing refers to the management opportunistically choosing the point in time at which to either issue or repurchase equity capital. The intention is to capitalize on the benefits that may arise from the temporary fluctuations of the cost of equity relative to other forms of financing, such as debt. According to the theory, managers are more likely to issue equity when their companies are overvalued and are more likely to repurchase equity when their companies are undervalued.

In the seminal work from 2002 Baker and Wurgler (BW) ask the question of: "[H]ow equity market timing affects capital structure?" (Baker and Wurgler, 2002). Their paper investigates both the short- and long-term impact of this phenomenon on the capital structure of companies. The text looks at the effect of misvaluation on current capital structure. The main findings are not only that the effect is economically and statistically significant, but also that fluctuations in market valuation have considerably long-run effects on capital structure with a half-life of about 10 years. Furthermore, BW explain their results by proposing a new nuance to the market timing theory which states that "[C]apital structure is the cumulative outcome of attempts to time the equity market." (Baker and Wurgler, 2002).

The paper of BW has created great debate. The work that most directly targets BW is the one of Hovakimian (2006), however, the main line of criticism that can be traced along the majority of works holds that the misvaluation measure of BW is confounded by information regarding growth opportunities which helps to obtain their significant results. It is believed that as innovative as this study is, it fails to account for this problem which has been affecting similar works in the past. As a result, the main purpose of this thesis is to adjust the for the presence of this widely-discussed flaw in the work of BW. By aiming to account for future growth opportunities, the analysis tries to test for the presence of a significantly negative effect of market timing on capital structure. A single measure is selected to account for both misvaluation and firm-specific growth prospects. This measure is defined as market value divided by the company's intrinsic value and is based on accounting information regarding the

company fundamentals. The intrinsic value is a measure popularized by Ohlson (1995) that adjusts the book value of the company for any abnormal earnings generated in the future. As a result, the misvaluation measure based on intrinsic value filters out information about growth prospects much better than other misevaluation measures and is intended to be relatively pure (Dong et al., 2006). Furthermore, this work focuses exclusively on Initial Public Offerings (IPOs). This approach contrasts that of BW which also focuses on subsequent equity issues. The intention here is to investigate the presence of market timing effects on leverage of the biggest and most important capital market event for a corporation. To summarize, this thesis sets itself apart from previous works in two major ways. First and foremost, the analysis is performed with the use of a company misvaluation measure based on intrinsic value. Second, the focus is placed solely on the biggest IPOs conducted in the USA.

The main issues of interest in this thesis have led to the formulation of the following research question:

*How does the equity market timing of the largest Initial Public Offerings in the USA during the period of 1999-2008 affect the capital structure of the corresponding equity issuers?*

This research question is investigated by testing two hypotheses developed in the Methodology Section. The main results show that company misvaluation at the time of the IPO does not have a negative significant long-run stand-alone effect on current capital structure during a 10-year period following the year of the IPO. These insignificant results do not change even after controlling for additional determinants of current leverage, which may potentially distort the statistical output. In the models used, only a few years show significant results, however, these significant results are believed to be caused by confounding factors. Furthermore, a number of the significant results suggest the presence of a positive relationship between equity market timing and company leverage, which is contrary to the hypothesis in BW. It is also important to note that, even if such an effect is present in reality, it is hardly going to be of any economic significance due to its extremely small magnitude. Therefore, there does not seem to be supporting evidence regarding the statistically and economically significant long-run market timing effect of equity issues on capital structure that is reported by BW. Further investigation on the annual change in leverage did not obtain significant evidence for the presence of a short-term effect of company misvaluation at the year of the IPO on leverage. Therefore, there is no evidence to believe that there is an equity market timing effect on capital structure in the short run as well. This suggests reasons to doubt the fact that the companies in the compiled sample have timed their IPOs. A breakdown of changes in leverage into net equity issues, newly retained earnings, and a residual does not show a significant relationship between company misvaluation and net equity issues.

All of the results discussed above are obtained on the basis of a proxy for company misvaluation based on intrinsic value. The same models, except for the one investigating the long-run effect, are re-

estimated with the use of the market-to-book ratio as the proxy for company misvaluation. This is performed as a way to more directly compare the results presented here with those reported by BW. These results show that the market-to-book ratio provides considerably more significant results. Even though, the market-to-book ratio does not provide conclusive evidence for the presence of an equity market timing effect on capital structure in the long-run or in the short-run, it gives stronger hints for the possibility of the existence of such an effect. The difference between the market-to-book ratio and the company misvaluation proxy based on intrinsic value is the fact that the former is biased by great amounts of information regarding future growth prospects. Therefore, it is believed that the difference in the results from the models that regress leverage on company misvaluation based on intrinsic value and those based on the market-to-book ratio, arises mainly from the presence of this confounding information on future growth prospects. As a result, this thesis sides with the critics of BW and suggests that there does not seem to be any strong evidence suggesting a negative relationship between equity market timing and capital structure. No conclusions about causality can be drawn, however, the lack of evidence regarding a significant relationship is a stronger suggestion regarding the lack of causality, than evidence regarding the presence of such a relationship would have been regarding causality.

The rest of the text is organized as follows. Section II provides information on the data. Section III provides information on the theoretical framework and methodology. Section IV presents the results. Section V gives a discussion on the limitations and makes suggestions of future research. Section VI concludes.

# II. Data Section

## 1. Sample Selection and Definition of Variables

A list of 7221 non-financial[1] firms which are located in the United States of America (USA) and have successfully conducted an Initial Public Offering (IPO) is obtained from the Thompson One Banker database. This list consists of firm name, IPO year, and size of IPO as measured by the total proceeds from the IPO market in millions of US dollars. The purpose of this thesis is to investigate any changes in company leverage, which are potentially caused by the market timing of equity issues, in this case of the IPO itself. Therefore, the starting point of observation is the year in which a given company performed an IPO (*year 0*). The IPOs included in the obtained list date back to 1999 and go until 2008. The lower bound of the selection is set at 1999 due to the widespread lack of needed financial data for earlier yeas. The upper bound is set at 2008 with the intention to not include IPOs performed during the peaks of the most recent world financial crisis. The reason for this is that market conditions and mechanisms could potentially differ greatly and lead to distortions in the obtained results.

The list of 7221 IPO firms is ranked in descending order of IPO size. That is, the firms that realized the greatest proceeds are assigned the top places in the list, etcetera. The logic behind the reorganization of the data is that when a firm is about to conduct an IPO, the larger the IPO, the greater the incentive that the management has to engage in market timing. Furthermore, the greater the IPO, the larger its impact on the financial market. Thus any insights about the presence and effects of market timing have greater importance.

Starting from the top of the IPO list, the 350[2] largest IPOs from the period are screened for the availability of needed financial data on COMPUSTAT on a year-by-year basis. The company names obtained from Thompson One Banker are then matched with the company CUSIPs in order to extract the needed data from COMPUSTAT. Firms with insufficient data observations are excluded from the list. Only firms with all necessary data available for a minimum of three[3] years after *year 0* are selected and included in the final sample. The result is a final sample of 117 firms. All analyses of the sample are performed on annual bases in IPO time, following Baker and Wurgler (2002). As previously discussed, the year of the IPO is defined as *year 0*. Therefore, the year following the IPO is defined as *year 1*, the year two years after the IPO is defined as *year 2*, etcetera. In terms of IPO time, the sample consists of 117 firm observations for *years 0, 1, and 2*, 116 firm observations for *year 3*, etcetera, going

[1] Financial firms with SIC codes between 6000 and 6999 have been excluded from the sample, following widespread academic practice based on the belief that the regulations imposed on such institution do not allow them to be directly comparable with other types of institutions.
[2] The selection of 350 firms was arbitrary and partly lead by the aim of obtaining a final sample of more than 100 firms.
[3] The requirement for a minimum period of three years following the IPO is included for the sake of computation of the company intrinsic value. For more information on the intrinsic value, please refer to the Methodology Section.

down to 38 firm observations for *year 10*. The following paragraphs explicitly describe the data used in this research.

The main variable of interest is the company's leverage ratio, more specifically book leverage, defined as *book debt* over *total assets*. Leverage is thus measured in percentage terms. Companies for which book leverage cannot be measured due to the lack of information are not included in the sample. Furthermore, companies that only depended on equity financing during the entire period of observation are excluded from the sample because there is no change in leverage to be analyzed. Book debt, measured in millions of US dollars, is defined as total debt, including both current and non-current components, reported on the financial statement at the end of the year. Data on total assets is measured in millions of US dollars. Annual values for both book debt and total assets are obtained from COMPUSTAT. For summary statistics and elaborations on the data on company leverage please refer to the Descriptive Statistics Section.

For the purposes of the regression analysis performed in later sections, several control variables are employed. More information regarding these control variables is delayed to the Methodology Section. Three variables are included in order to control for any confounding effects on leverage. The first variable measures the company's profitability and is defined as *earnings before interest taxes depreciation and amortization (EBITDA*) for a given year over *total assets* at the end of the same year, both measured in millions of US dollars. Profitability is thus measured in percentage terms. The second variable measures the company's size and is defined as *total sales,* which represents the total gross sales of a company in a given year measured in millions of US dollars. Gross sales are defined as total revenue less discounts, returns, and allowances. I take the logarithm of the total sales to minimize the impact of extreme observations in the sample. Four firms had one year of missing total sales data, which makes the logarithmic transformation impossible. With the intention to keep these companies in the sample, I use the level of total sales of the year before (or after) the year with the missing observation as a proxy. The data on Total Sales shows very little variation within firms, so this is not believed to cause issues on the aggregate level. The third variable measures asset tangibility and is defined as *net property plant, and equipment (PPE)* over *total assets*, both measured in millions of US dollars. Asset tangibility is thus in percentage terms. All data on the discussed control variables is obtained from COMPUSTAT.

The computation of the company intrinsic value (V) requires the gathering of additional firm data. For more information regarding the intrinsic value please refer to the Methodology Section. Net income data on a per company basis is obtained from COMPUSTAT and is measured in millions of US dollars. The method for computing the intrinsic value requires the computation of the company costs of capital ($R_e$) at *year 0*. For the sake of computing $R_e$, company adjusted betas at *year 0* are obtained from the Bloomberg database. Lastly, data on the risk-free rate based on 10-year US Treasury bond yields and the historic return of the S&P 500 index is obtained from the personal publicly-available database

of Professor Robert Shiller[4] These data are used to compute the company specific market risk premium (MRP) and as a result the $R_e$ of the individual companies in the sample.

For the purposes of the misvaluation measure, the market value in *year 0* and annual data on book equity of all companies are obtained from COMPUSTAT. *Market value* (M) is defined as number of shares outstanding times the market price and book equity is defined as the sum of ownership interest of ordinary and preference shareholders in the company at the end of a given year. Both variables are measured in millions of US dollars. The initial IPO list contained a number of firms with negative equity values which are not included in the final sample. Finally, the misvaluation measure (M/V) is calculated as the ratio of *market value* in *year 0* divided by *intrinsic value* in *year 0.* For summary statistics and brief elaborations on the data of company misvaluation, please refer to the Descriptive Statistics Section.

## 2. Descriptive Statistics

This section presents brief descriptive statistics regarding the variables used in the analysis part. TABLE 1. gives the summary statistics for leverage for the entire sample of firms. As previously mentioned, in *year 0* the sample starts out with 117 firms and drops to 38 in *year 10.* It can be seen that the firms in the sample are, on average, not excessively leveraged. However, there seems to be a slight upward trend, with the exception of a few years, which can be observed by the apparent increase in average leverage. Comparing this data to that of Baker & Wurgler (BW) (2002) the sample compiled here is slightly less leveraged with averages ranging between approximately 31% and 40%, as opposed to averages of above 40% only. The upward trend in average leverage is also observed in BW, however,

**TABLE 1.** presents descriptive statistics on company leverage in each year of the sample. Year 0 is defined as the year of the IPO. Leverage in every year is defined as total book debt divided by total assets.

**Leverage Descriptive Statistics**

| Year | N | Mean | Median | Max | Min | St. Dev. | Increase in Leverage |
|---|---|---|---|---|---|---|---|
| **Leverage *year 0*** | 117 | 31.19% | 29.37% | 88.95% | 0.00% | 21.82% | |
| **Leverage year 1** | *117* | 31.30% | 33.00% | 77.28% | 0.00% | 19.49% | 0.11% |
| **Leverage *year 2*** | *117* | 33.03% | 34.71% | 92.76% | 0.00% | 21.20% | 1.73% |
| **Leverage year 3** | *116* | 33.28% | 34.21% | 87.69% | 0.00% | 20.59% | 0.25% |
| **Leverage *year 4*** | *107* | 34.35% | 33.38% | 85.72% | 0.00% | 20.11% | 1.07% |
| **Leverage year 5** | *100* | 34.05% | 34.23% | 95.70% | 0.00% | 20.12% | -0.29% |
| **Leverage *year 6*** | *88* | 32.62% | 34.09% | 75.30% | 0.00% | 19.61% | -1.43% |
| **Leverage year 7** | *82* | 34.34% | 33.54% | 93.21% | 0.00% | 20.11% | 1.72% |
| **Leverage *year 8*** | *70* | 33.90% | 33.16% | 69.66% | 0.00% | 18.45% | -0.44% |
| **Leverage year 9** | *54* | 36.63% | 38.37% | 90.66% | 0.00% | 21.71% | 2.73% |
| **Leverage *year 10*** | *38* | 40.78% | 38.15% | 99.08% | 0.00% | 23.35% | 4.15% |

the sample in this text includes three years during which average sample leverage dropped, as can be seen from the last column of TABLE 1. Last but not least, it is notable that from all positive changes in

[4] http://www.econ.yale.edu/~shiller/data.htm

leverage that can be observed in the sample, the change in leverage from *year 0* to *year 1* is the smallest. From first sight, this may be viewed as a small evidence of the negative effect of equity market timing during the IPO in company leverage. Further investigation and analysis are provided in later sections of the thesis.

`TABLE 2. presents summary statistics on misvaluation (M/V) for the entire sample of firms at *year 0*. It can be seen that more than half of the sample is overvalued, with the share of overvalued firms equal to 74%. The average M/V is equal to 3.32, which is largely due to a number of firms that are assigned abnormally high overvaluation measures. In most cases these are firms that consistently realized net losses after their IPO or that never managed to generate income at a rate that is higher than the rate of return required by their shareholders. A comparison was carried out with academic works of comparable focus. For example, Elliott et. al. (2008) who also compute company misvaluation under a perfect foresight assumption report a sample in which 82.62% of firms are overvalued. Furthermore, D'Mello & Shroff (2000) take the reverse approach towards market timing by focusing on undervaluation and equity repurchases. They theorize that when firms are guided by market timing they will repurchase stocks in cases of undervaluation and report a sample in which 74% of firms are undervalued based on M/V.

**TABLE 2.** presents descriptive statistics on company misvaluation at the year of the IPO. Company misvaluation is defined as market value divided by intrinsic value, both at year 0.

**Company Misvaluation Descriptive Statistics**

| Year | N | Mean | Median | Max | Min | St. Dev. |
|---|---|---|---|---|---|---|
| **Full Sample** | 117 | 3,32 | 2,14 | 25,74 | 0,20 | 3,80 |
| **Overvalued Firms** | 87 | 4,31 | 2,82 | 25,74 | 1,03 | 3,98 |
| **Undervalued Firms** | 30 | 0,60 | 0,61 | 1,00 | 0,20 | 0,22 |

For further information on descriptive statics, please refer to Tables A1, A2, and A3 in the Appendix. These tables present descriptive statistics for all other variables used in the analytical part of this thesis. These variables are *asset tangibility*, *profitability*, and *company size*.

Lastly, TABLE 3 presents a correlation matrix of all variables. It is important to note that the correlation between all pairs of variables is moderate, that is, no pair exhibits extreme levels of either positive or negative correlation. This is crucial for the Ordinary Least Squares regressions that are performed in later sections. A high correlation between the independent variables may lead to multicollinearity, which poses serious issues for the regression output. The presence of multicollinearity can result in coefficient estimates that are unstable and difficult to interpret. Judging by the output of the correlation matrix, multicollinearity is unlikely to pose any issues. Furthermore, the correlations between the leverage and two out of three control variables follow the expectations[5]. Asset tangibility and leverage are positively correlated, while profitability exhibits a negative correlation with leverage. Contrary to expectations, the correlation between company size and leverage is negative, which may, for example be explained by the fact that larger firms tend to generate more internal cash flows and to require less debt to finance their operations. However, the correlation between the independent variable of interest—company misvaluation, and the independent variable—company leverage, albeit negative, is also very low at approximately -3%. Although this cannot translate into any conclusions regarding causation, it still casts some doubt on both the economic and statistical significance and on the existence of a negative effect of equity market timing on leverage.

**TABLE3.** presents a correlation matrix for all variables. Asset Tangibility is defined as net property, plant and equipment over total assets. Profitability is defined as EBITDA over total assets. Company size is defined as the natural logarithm of total sales. Company misvaluation is defined as market value divided by intrinsic value, both at the year of the IPO.

**Correlation Matrix All Variables**

| | **Leverage** | **Asset Tangibility** | **Profitability** | **Company Size** | **Company Misvaluation** |
|---|---|---|---|---|---|
| **Leverage** | 1.0000 | | | | |
| **Asset Tangibility** | 0.2930 | 1.0000 | | | |
| **Profitability** | -0.0436 | 0.0758 | 1.0000 | | |
| **Company Size** | -0.1195 | 0.0544 | 0.1315 | 1.0000 | |
| **Company Misvaluation** | -0.0292 | -0.0012 | -0.0571 | -0.0432 | 1.0000 |

[5] For more information on the control variables please refer to the Methodology Section.

# III. Methodology

## 1. Literature Review and Motivation

Modigliani and Miller (MM) (1958) study a perfect capital market characterized by no taxes, no transaction costs, no bankruptcy costs, perfect information symmetry on the sides of investors and companies, etcetera. Using this market, MM prove that the costs of capital, that is the costs of different forms of financing, do not vary independently. They propose that any capital structure choices made by the company are irrelevant in terms of their effect on the market value of that company. The value of a company is determined solely by its earning potential and by the riskiness of the assets it uses to operate. All of this leads to the famous capital structure irrelevance proposition.

However, in reality companies do pay taxes, bankruptcy comes at a greater cost, information is very asymmetric at times, and the list goes on. Therefore, capital markets are far from perfect. This has led to various adjustments of the setting used by MM and to the creation of many mainstream theories of capital structure. BW discuss four main capital structure theories in their seminal work from 2002. These theories are trade-off theory, pecking order theory, managerial entrenchment theory, and market timing theory.

The trade-off theory proposes that there is an optimal leverage ratio that a company should aim to achieve. The trade-off theory recognizes the benefits that a company can obtain from having certain amounts of debt. These benefits arise from the fact that debt interest payments are tax deductible and as a result shield part of the company earnings. However, holding debt comes at a cost—the costs of financial distress and bankruptcy. Therefore, a company has to take into account both the benefits and costs that result from issuing debt instead of equity capital and trade them off in order to reach an optimal capital structure that maximizes its value.

In contrast, the pecking order theory proposed by Myers and Majluf (1984) assumes that corporate leaders have significantly greater amounts of information regarding company prospects, as compared to investors. Therefore, investors interpret the actions undertaken by the company in the realm of capital markets as releases of new information. It is assumed that an equity offer from the side of the company is interpreted by investors as a sign of overvaluation and is met by a drop in company value. As a result, companies will refrain from issuing equity. The main conclusion of the pecking order theory is that companies will opt for equity financing only as a last resort.

The managerial entrenchment theory popularized by academic such as Zwiebel (1996) and Berger (1997) suggests that corporate management may have incentives that do not necessarily promote

the best interest of the company and its shareholders. Entrenched management may attempt to avoid debt as high levels of debt tend to restrict managerial freedom to engage in self-benefiting actions.

The theories above were briefly discussed with the intention of leading the reader into the topic. However, the theory of interest in this text is the one of market timing, which proposes that the company management opportunistically chooses the point in time at which to either issue or repurchase equity capital. The intention is to capitalize on the benefits that arise from the temporary fluctuations of the cost of equity relative to other forms of financing, such as debt. Under the perfect capital market of MM the costs of different types of financing do not vary independently and there is nothing to gain from switching between debt and equity. However, according to the market timing theory, which operates under the assumption of inefficient or segmented markets, managers can issue or repurchase equity and benefit existing shareholders at the expense of newly entering or exiting shareholders. According to the theory, managers are more likely to issue equity when they have reasons to believe that their companies are overvalued, and are more likely to repurchase equity when they have reasons to believe that their companies are undervalued.

Therefore, the market timing theory suggests that capital structure is relevant and that it is influenced by the current valuation of the company, relative to its true valuation. Loughran and Ritter (1995) investigate a sample of firms issuing stock in the period 1970-1990 and reach a conclusion that firms tend to engage in equity issues when their shares are greatly overvalued. Kim and Weisbach (2008) investigate the market for initial and secondary equity offers and focus on the uses to which the issuing firms put their proceeds. They find evidence that firms that may be overvalued tend to engage in relatively more offerings and to exhibit higher post-offering saving rates. Blanchard, Rhee, and Summers (1993) and Baker, Stein, and Wurgler (2002) propose further evidence suggesting that corporate management can take advantage of market timing to raise capital because the raised capital is invested into projects that would not have been made under different circumstances. Finally, BW (2002) summarize the evidence of market timing into four categories. First, research focused on actual financing choices made by firms suggests that firms have a tendency to issue equity, both under initial and secondary offerings, when their valuation is high relative to both current book value and to past market valuation (Hovakimian et. al. 2001; Pagano et. al. 1998, and others). Second, studies that investigate the long-run stock returns following financing choices suggest that firms issue equity when its cost is relatively low and repurchase equity when its cost is relatively high. This is judged by the fact that equity issuers tend to exhibit low subsequent returns, while repurchasers tend to show high subsequent returns (Brav and Gompers, 1997; Inkenberry et. al. 1995, and others). Third, analyses of forecasts and realizations surrounding equity issues propose that such issues tend to take place when investor expectations can be viewed as “too enthusiastic” (Loughran and Ritter, 1997; and others). Fourth, and judged by BW as the most convincing evidence, two-thirds of managers have reported in an anonymous

survey conducted by Graham and Harvey (2001) that they view the amount of over- or undervaluation as an "important or very important" consideration when making financing decisions.

BW ask the question of: "[H]ow equity market timing affects capital structure?" (Baker and Wurgler, 2002). Their seminal paper investigates both the short- and long-term impact of this phenomenon on the capital structure of companies. The text looks at the effect of misvaluation—as measured by the historical market-to-book ratio averaged by a weighting technique which assigns higher weights to ratios in years with greater external financing, on current capital structure. The main findings are not only that the effect is economically and statistically significant, but also that fluctuations in market valuation have considerably long-run effects on capital structure with a half-life of about 10 years. BW state that such evidence is inconsistent will three out of the four above-discussed theories of capital structure. The trade-off theory is rejected on the basis of the presence of long-lived effects on capital structure, which testify towards the lack of an optimal capital structure. The pecking order theory is rejected due to its proposition that equity issues are considered a last-resort form of external financing, which is not supported by the results of BW. The managerial entrenchment theory is dismissed on the basis that evidence suggests the exploitation of new shareholders, as opposed to the exploitation of current shareholder. BW conclude that their findings are only consistent with the market timing theory of capital structure. Furthermore, they explain their results by proposing a new nuance to the theory which states that "[C]apital structure is the cumulative outcome of attempts to time the equity market." (Baker and Wurgler, 2002). To summarize, the main takeaway from their work is the proposal that current capital structure is strongly related to and can be explained by historical market values and the timing of equity issues.

The work of BW has created great debate within the academic world. Hovakimian (2006) most directly targets BW. He does not reject the existence of equity market timing, however, he finds no evidence for significant long-lasting effects on capital structure. He believes that one of the reasons for this is the fact that historical market-to-book ratios contain information not only regarding misvaluation, but also regarding growth opportunities. This is testified by the significant effect of the weighted historical market-to-book on current financing and investment decisions. The hypothesis that market-to-book ratios are biased by the presence of information regarding growth prospects is also proposed by Kayhan and Titman (2007).

There are other academics who also disprove of BW's proposition. For example, Alti (2006) does find evidence on market timing, however, his analysis suggests that any impact that market timing may have on capital structure is wiped off after a maximum of two years. Alti (2006) proposes a similar reason for the dismissal of BW's results, namely the fact the underlying firm characteristics containing information on long-term growth traits confound their measure of misvaluation. He states that as

innovative as this study is, it fails to account for this problem, which has been affecting similar works in the past.

To summarize, the biggest and most wide-spread criticism of BW's work is that it fails to properly control for firm-specific growth opportunities. In their model information on misvaluation is captured by the above-mentioned weighted average of historical market-to-book ratios, while the only control variable for growth prospects is the current market to book ratio. This poses the issue that if the current market-to-book ratio fails at capturing firm specific growth opportunities, which many academics believe it does, then the weighted average of historical market-to-book ratios is not a clean measure of misvaluation.

Equity misvaluation is an unobservable phenomenon and any reactions that a firm may have to such a phenomenon are endogenous. This requires a sound proxy for misvaluation. The main purpose of this thesis is to adjust the for the presence of the above-discussed flaw in the work of BW, by aiming to properly account for future growth opportunities. The analysis here tries to isolate and test for the presence of a significantly negative effect of market timing on current capital structure in the long-run. Similarly to BW (2002), the majority of academic research makes use of variables closely related to market-to-book to account for misvaluation, growth opportunities, or both. Therefore, this problem is not specific to BW (Alti, 2006).

Accounting for firm specific growth opportunities with readily-available variables obtained from financial statements has proven to be insufficient. In this thesis, a single measure is selected to account for both misvaluation and firm-specific growth prospects. This measure is defined as market value divided by company intrinsic value (M/V). The intrinsic value[6] of a company is a measure popularized by Ohlson (1995) which is very similar to the dividend discount model for computing the price of a certain stock and to the discounted cash flow model (DCF). The purpose of the intrinsic value model is to adjust the book value of the company for any abnormal earnings that may be generated in the future. By doing this, the method computes a value which takes into account the growth and profit opportunities of the company. The major difference between the misvaluation and growth opportunity measures of BW and of this work is that the former compares book value to market value, while the latter compares intrinsic value to market value. Intrinsic value is believed to do a much better job since it makes use of forward looking information, as compared to the historical information incorporated into the book value measure. Therefore, M/V filters out information about growth prospects much better and is intended to be a relatively pure measure of misvaluation Dong et al. (2006). This measure is used for similar purposes by a number of other academic works such as Lee et. al. (1999) and D'Mello and Shroff (2000).

[6] For more detailed information regarding the computation of and the intuition behind this measure please refer to the corresponding section of this text.

Furthermore, this thesis focuses exclusively on the market timing effect of the company's IPO on its capital structure. BW also focus on IPOs, however, they include additional information on subsequent net equity issues through the use of the weighted average of the market-to-book ratio. With the intention to narrow the scope of this thesis, the decision is made to disregard information on subsequent net equity issues by all firms in the sample. Since IPOs tend to be very large in terms of proceeds, management can be expected to have greater incentives to time the equity market. The effects of such attempts to time the issue can have greater implications for the capital markets and, thus, an empirical investigation on this issue is informative.

This text uses three control variables for leverage. The main focus is on the effect of company misvaluation at the time of the IPO on leverage. However, it is clear that there are other determinants of leverage which, if omitted from the analytical model, may lead to significant bias in the estimates of the misvaluation effect of interest. Therefore, the effect of other determinants of leverage needs to be controlled for. Three control variables for leverage are borrowed from the work of BW. These variables are found by Rajan and Zingales (1995) to correlate with leverage in developed countries and are: asset tangibility, profitability, and size. Asset tangibility is assumed to positively affect leverage as greater amounts of tangible assets may be pledged as collateral when issuing debt. Profitability is believed to have negative effects on leverage as greater profitability leads to higher amounts of internal funds which decrease the need to raise external funds through the issue of debt. Finally, size is viewed as a factor that increases leverage as larger firms are less likely to enter into financial distress due to higher levels of leverage.

To summarize, this thesis sets itself apart from previous works in two major ways. First and foremost, the analysis is performed with the use of a company misvaluation measure based on intrinsic value. Second, the focus is placed solely on the biggest IPOs conducted in the USA.

Lastly, the issues discussed so far have resulted in the formulation of the following main research question:

*How does the equity market timing of the largest Initial Public Offerings in the USA during the period of 1999-2008 affect the capital structure of the corresponding equity issuers?*

In this paper, I investigate this research question by testing the following two hypotheses:

***H01:*** *Equity market timing has a significant negative long-run stand-alone effect on corporate capital structure.*

***H02:*** *Equity market timing has a significant negative long-run effect on corporate capital structure when controlling for additional determinants of leverage in the face of asset tangibility, profitability, and size.*

Further issues regarding capital structure and equity market timing are also presented and analyzed in the results and discussion section with the intention to provide the reader with a better understanding of the obtained results and their comparison with the results reported by BW.

## 2. Intrinsic Value Computation & Intuition

One of the aims of this text is to obtain a precise and unbiased measure of the relative market valuation of a company, that is, to determine whether the company in question is undervalued or overvalued. For this purpose, the intrinsic value of each company at *year 0* needs to be computed and compared to the actual valuation that the market has attached to it, based on the number of shares outstanding and the going share price. As already mentioned, the intrinsic value method was first introduced by Ohlson (1995) and has its foundations in accounting theory. The method is based on clean surplus accounting, under which the changes in the book value of equity are assumed to be equal to the generated income in a given year, less any dividends paid out. This means that all gains and losses affecting book value are also part of earnings. Intrinsic value is commonly denoted as V in academic literature. This section deals with the description of the intrinsic value computation and with providing an intuition behind the concept.

The general formula for the computation of intrinsic value that is most widely applied in the academic literature[7] can be seen in equation **(1)**:

**(1)** $$\boldsymbol{V_t = B_t + \sum_{i=1}^{\infty} \frac{E_t[NI_{t+i} - (R_e * B_{t+i-1})]}{(1+R_e)^i}},$$

where:

- $\boldsymbol{V_t}$ is the intrinsic value of the company at time t;
- $\boldsymbol{B_t}$ is the book value of equity at time t;
- $\boldsymbol{E_t}[\dots]$ is a term describing the market expectations at time t, based on information available at time t;
- $\boldsymbol{NI_t}$ is the net income of the company at time t;
- $\boldsymbol{R_e}$ is the company cost of equity capital.

It can be seen from equation **(1)**, that the computation of V starts by taking the book value of equity in a given year, for example, *year 0*, as this is the year of interest in this thesis. This value is then adjusted for any abnormal returns that are generated from this point in time (*year 0*) until infinity. These abnormal returns are defined as the difference between the net income generated in a given year and the cost of

[7] For examples of such academic works refer to: Lee et. al. (1999), Dong et. al (2007) and Elliott et. al. (2008).

capital multiplied by the book value of equity. It is important to understand the intuition behind the computation of the abnormal returns. Within this model, abnormal returns are characterized as any earnings generated that exceed the amount required by the company's shareholders. The amount required by shareholders is based on the required rate of return for investing their funds in the company's risky assets and the worth of their interest in the company's assets.

In this sense, equation **(1)** is very informative with regard to the actual value of a company as it splits it into two distinct parts. The first part is the book value of equity, which simply gives the amount of capital invested. The second part in equation **(1)** is the sum of the discounted future abnormal earnings generated by the company. If the company earns income at a rate that is exactly equal to its cost of capital, then the second part will be zero. However, if the company generates income at a rate that is higher than its costs of capital, the second part will be positive and the value of the company will be larger relative to the value of the capital that is currently invested in it (Lee et. al., 1999).

It can be seen that equation **(1)** represents the intrinsic value of a company in terms of an infinite stream of abnormal earnings. However, for practical purposes an explicit forecast period needs to be decided on. Once this explicit forecast period is chosen, a terminal value (TV) needs to be calculated and added to the sum of abnormal earnings generated during the explicit forecast period. The concept of terminal value is widely applied in the world of corporate finance and consist of a single amount, in this case abnormal earnings generated in a given year t, projected into infinity by the means of a perpetuity. This terminal value provides an estimate of all the abnormal earnings generated beyond the explicit forecast period. Judgement needs to be executed regarding the choice of the length of the explicit forecast period. After a careful and in-depth review of academic works with a similar focus, an explicit forecasting period of three years is chosen. Lee et. al. (1999) perform computations with TV=3, TV=12, and TV=18 and conclude that there is little difference in the end results obtained from the various methods. Similarly, Dong et. al (2007) and Elliott et. al. (2008) compute the company intrinsic value with TV=3. Based on the methodology of the above-mentioned texts and some other less famous academic works, there seems to be a considerable consensus with regards to the use of TV=3.

This leads to the following modification of equation **(1)**:

**(2)** $$V_t = B_t + \frac{(NI_{t+1} - R_e * B_t)}{(1+R_e)^1} + \frac{(NI_{t+2} - R_e * B_{t+1})}{(1+R_e)^2} + TV,$$

where TV is given by formula **(3)**:

**(3)** $$TV = \frac{(NI_{t+3} - R_e * B_{t+2})}{(1+R_e)^2 * R_e},$$

The terminal value has been defined in such a way since the abnormal earnings in year t+3 first need to be discounted to year t+1 and only then discounted to year t using the perpetuity method. For

the purposes of this text, year t has been set equal to *year 0*, with the intention to observe the intrinsic value measure in the year of the IPO. Year t+3 is thus equal to year 3, which explains the requirement of a minimum of three years following the IPO in the sample selection process described in the Data Section.

## 3. Intrinsic Value Implementation Issues

As can be seen from the expectations factor in equation **(1)**, the computation of the intrinsic value depends on the availability of market expectations based on at-the-time currently available public information. In academic literature, these expectations are factored in through analysts' forecasts of company performance such as in Lee et al. (1999), Dong et al. (2006), and Elliott et al. (2008). However, with the intention to narrow the scope of this thesis, a simplifying assumption is borrowed from D'Mello & Shroff (2000). This assumption substitutes the analyst forecasts of future performance for actual company performance. Since realized future performance is used to proxy for expected future performance, this method requires an assumption of perfect foresight. For example, the assumption of perfect foresight means that at time t, the market expectations on company performance for year t+1 exactly coincide with the realized company performance in year t+1. D'Mello & Shroff (2000) also compute the intrinsic value with analyst forecasts approximating for market expectations. The authors subsequently perform robustness checks and compare the results of the two approaches. They conclude that any differences are negligible with respect to the end results obtained.

As is explained in the previous section, any company that earns income at a rate of return exceeding its cost of capital generates positive abnormal earnings. In that case, the second factor in equation **(1)** is positive. This leads to an upwards adjustment on the book value. If a company earns income at a rate that is exactly equal to its cost of capital, the company does not generate any abnormal earnings, the second factor in equation **(1)** is equal to zero and there is no adjustment to the book value. However, there are also cases in which the rate at which a company generates income is lower than the rate of return required by equity holders. In this case the second factor in equation **(1)** is negative. This requires a negative adjustment of the book value of equity. Due to the use of a terminal value, this causes certain implication issues as the intrinsic value in cases such as the ones described above may turn out to be negative. Another issue related to the terminal value, which may also result in negative intrinsic value observations is the realization of a net loss at the end of the explicit forecasting period. Therefore, some adjustments are performed in order to obtain non-negative intrinsic value observations. Some of these issues may be caused by the perfect foresight assumption discussed earlier.

The first applied solution is directly targeting cases in which the obtained terminal value is negative. This solution draws its foundation in business logic and is applied in many academic works

such as Bernard (1998), Penman & Sougiannis (1998), and D'Mello & Shroff (2000). The method consists of simply restricting the terminal value in the computation of the intrinsic value to be non-negative. This method is rather logical as the terminal value projects the company's performance until infinity. A negative terminal value means that the management of a given company indefinitely invests the company's capital into negative net present value (NPV) projects, that is, into projects that earn a rate of return lower than the rate of return required by shareholders. It is reasonable to assume that the management of a company which continues to exist, will not invest money in negative NPV projects over the long run. Therefore, the terminal value of the intrinsic value computation is restricted to be non-negative for all companies in the sample. For example, a terminal value of -100 million is simply equal to a terminal value of 0.

The second applied solution is targeting cases in which the company realized a net loss in the last year of the explicit forecasting period. If this is a once-off occurrence, the intrinsic value of the company is underestimated[8], due to the fact that the earnings of the last year in the explicit forecast period are used to compute the terminal value. A similar problem that works in the opposite direction and overestimates the intrinsic value of a given company results in the case in which the firm generates an extraordinarily high net income during the last year of the explicit forecast period. This results in an unjustifiably large terminal value and biases the intrinsic value upwards. In order to counter the effects of such temporary fluctuations in earnings, the terminal value is computed on the basis of the average of the earnings realized in *years 3 and 4*, as opposed to only *year 3*. This method is applied by D'Mello & Shroff (2000) and serves to smooth out temporary fluctuations in earnings. This results in the following adaptation of the terminal value formula:

**(4)**
$$TV = \left( \frac{\frac{(NI_{t+3} - R_e * B_{t+2})}{(1+R_e)^2} + \frac{(NI_{t+4} - R_e * B_{t+3})}{(1+R_e)^3}}{2} \right) * \frac{1}{R_e}$$

## 4. Cost of Capital Computation

The computation of the company intrinsic value requires the estimation of the company specific cost of capital ($R_e$) at *year 0*. For this purpose, the capital asset pricing model (CAPM) has been used. The CAPM model computes an estimate of the company cost of equity capital by adjusting the risk-free rate ($r_f$) by taking into account the firm's sensitivity to the overall market performance. This measure of sensitivity is widely known as the company beta ($\beta$). The above-mentioned adjustment of the risk

[8] Or maybe even negative—see previous paragraph.

free rate is performed by multiplying the company beta by the market risk premium (MRP). The MRP is defined as the incremental return that stockholders need to receive as a compensation for holding risky securities instead of investing their money risk-free. This can all be seen from the CAPM formula in **(5)**:

**(5)** $$\boldsymbol{R_e = r_f + \beta * [E(R_m) - r_f]}$$

Company specific values of beta at *year 0* are readily obtained from Bloomberg. Therefore, it is not necessary to estimate the company betas. However, judgement is executed when choosing between the raw and adjusted betas provided by Bloomberg. The raw beta is obtained by performing a linear regression on the relationship between the historical returns of the given company and those of the S&P 500 market index. The raw beta is also called the historical beta. The adjusted beta provided by Bloomberg is a forward-looking estimate of the company's beta which takes into account the fact that each security's true beta will eventually converge to the market average of one in the long run (Bloomberg Professional Service). It is important to note that within the computation of the company intrinsic value, the company cost of capital is used for the purpose of discounting future abnormal returns. Therefore, the forward-looking nature of the adjusted beta provided by the Bloomberg database serves the purposes of this text better.

A suitable market index needs to be chosen to serve a proxy for the overall market return in estimating the MRP of the CAPM. This index needs to be well diversified and needs to offer a long-history of data availability, in order to be able to provide a good approximation. An obvious and widely used option in the world of corporate finance is the S&P 500 market index which consists of the largest 500 US companies based on market capitalization. Two major reasons for using the S&P 500 need to be taken into account. First, the S&P 500 is the market index used in other academic writings which deal with the computation of company intrinsic value for similar end purposes (D'Mello & Shroff, 2000, Lee et. al. (1999), etc.). Second, the S&P500 is the market index used by Bloomberg in the computation of the adjusted beta which is used for the estimation of the company specific cost of capital. Therefore, in order to stay consistent with both the other parts of the data used in this text and with previous academic work, the S&P 500 is chosen as the market proxy for the CAPM model.

The choice of the risk free rate also deserves a certain degree of caution as it goes into the computation of the MRP and directly into the overall CAPM computation of the cost of capital. In order to provide a good match for the S&P 500, I select the yield on the US treasury bonds. However, a decision needs to be made regarding the duration of these bonds. Since the cost of capital is used to discount the future abnormal returns, it is more suitable to have a forward-looking risk-free rate. Therefore, the choice is narrowed down to long-term governmental bonds with durations of either 10 or 30 years. 30-year governmental bonds may be considered more forward looking, however, attention must be paid to the fact that they are less often traded, as compared to 10-year bonds. Due to this less-liquid market their prices and yields may not be very reflective of the current market conditions and

forces. For this reason, I choose the 10-year US governmental bond yield to serve as the risk free rate for the purposes of the CAPM.

The MRP at *year 0* has been computed by calculating a long-run arithmetic average of the excess returns of the S&P 500 over the 10-year governmental bond yield. This method is used over the period 1871-XXXX, with the upper limit (XXXX) changing on a per-company basis and being equal to the respective calendar year that corresponds to *year 0*. For example, the cost of capital for a company that performed an IPO in 2001 is estimated with a MRP averaged over the period 1871-2001. However, this method of estimating the MRP is likely to result in an overestimate due to specific factors that significantly affected company stock prices during the period 1900-2002 (Elroy Dimson, 2003). Dimson's research suggests that over this period of more than a century, the realized returns should be lowered by 0.8% in order to negate the effect of this bias on the computation of the MRP. The obtained market premiums on a per company basis are in check with the suggestions of 4.5%-5.5% of the bestselling guide to corporate valuation by Koller et al. (2010).

## 5. Regression Models

To analyze the research question regarding the presence of a significantly negative equity market timing effect on leverage, this text uses Ordinary Least Squares (OLS) regressions. This is the statistical method used by BW and by a number of the other papers discussed. The regressions look at the effect of the misvaluation at *year 0* on current leverage. As previously discussed, this is done through fixed-year regressions in IPO time for every year in the sample. Therefore, the dependent variable in these regressions is leverage in a given year, while the independent variable is company misvaluation at *year 0.*

There are two types of regression models in this text—simple and adjusted ones. The simple models only look at the self-standing effect of misvaluation on leverage in *year 1* until *year 10* and are used to test **H01**. The regression equation is thus given by equation **(6)**:

**(6)** $$\boldsymbol{Leverage_t = \alpha + \beta_1 * Company\ Misvaluation_0 + \epsilon_t},$$

where *t* gives the respective year in IPO time, that is *year 1* until *year 10* and $\beta_1$ gives the effect of misvaluation on leverage at *year t.*

However, there is certain concern that this model may be biased due to the presence of other determinants of leverage. As previously discussed, misvaluation may have an effect on leverage, but even if it does, it is unlikely to be the only variable affecting leverage. Therefore, there is a need to control for other possible determinants of the dependent variable. The three control variables used are the one-year lagged values of profitability, size, and asset tangibility. The inclusion of these variables is

believed to solve for confounding factors that may bias the estimate of $\beta_1$. This modification leads to the adjusted regression model used to test **H02**, which is given by equation **(7)**:

$$\textbf{(7)}\ \boldsymbol{Leverage_t = \alpha + \beta_1 * Company\ Misvaluation_0 + \beta_2 * Profitability_{t-1} + \beta_3 * Size_{t-1} + \beta_4 * Asset\ Tangibility_{t-1} + \epsilon_t},$$

where the effect of interest is again given by $\beta_1$. The models in equations **(6)** and **(7)**, by testing **H01** and **H02** are directly used to provide and answer to the main research question.

Furthermore, additional regressions that investigate the short-run effect of misvaluation on leverage are performed to separately investigate the presence of a possible short-lived relationship. Following BW, the dependent variable in these regressions is change in leverage defined as $Leverage_t - Leverage_{t-1}$. This gives rise to the model presented in equation **(8)**:

$$\textbf{(8)}\ \boldsymbol{Leverage_t - Leverage_{t-1} = \alpha + \beta_1 * Company\ Misvaluation_0 + \beta_2 * Profitability_{t-1} + \beta_3 * Size_{t-1} + \beta_4 * Asset\ Tangibility_{t-1} + \epsilon_t},$$

where the effect of interest is captured by $\beta_1$. This model, together with a number of other models presented in the next section, does not serve the purpose of directly answering the research question or of directly testing the constructed hypotheses. The additional models are included with the intention to provide a better explanation for the obtained results and to help the reader understand the bigger picture behind the results from the models in equations **(6)** and **(7)**. I have decided to include these additional models directly in the Results and Discussion Section for the sake of proving the text with a more coherent flow.

# IV. Results and Discussion

The first step of the analysis consists of investigating the stand-alone long-run effect of company misvaluation based on intrinsic value (M/V) at *year 0* on current leverage by directly testing **H01**. This is done by performing fixed-year regressions in IPO time for every year in the sample, starting from *year 1* until *year 10*. First, these regressions are performed on the full sample of 117 firms. Following this analysis, the same regressions are performed on a sample that limits M/V at 10. This is an approach borrowed from BW, which serves to reduce the sample size to 109 firms[9]. The intention is to remove any possible distortions in the results that may occur due to the presence of companies with extremely high values of M/V. If such values are genuine occurrences, then they are extreme outliers that may bias the results; while if they are not genuine, then they relate to companies that do not fit the computational procedure for M/V well enough as to produce reliable results. The results from the regressions on the full and on the capped samples are presented in TABLE 4.

It can be seen from the output in TABLE 4 that in the full sample, M/V enters the model with a highly insignificant effect in *year 1* which does not turn significant in any of the 10 years of investigation following the IPO. The effect given by the regressions performed on the capped sample do not differ greatly. M/V again enters the model with a highly insignificant effect in *year 1* and remains insignificant until *year 5*, when it appears to have an effect on current leverage that is significant at the 5% level. Following *year 5*, the effect turns insignificant and remains such until the end of the period of investigation.

**TABLE 4.** presents the OLS regression output of the simple model which investigates the stand-alone effect of company misvalution in the year of the IPO on current leverage. Therefore, the dependent variable is current company leverage and the independent variable is company misvaluation. Current company leverage is defined as book leverage which is computed as book debt divided by total assets, both measured in millions of US dollars. Leverage is, thus, measured in percentage terms. The company misvalution measure is defined as market value divided by company intrinsic value, both at the year of the IPO. The output on the left corresponds to the full sample, while the output on the right corresponds to the sample for which the misvalution measure has been capped at a value of 10.

$$Leverage_t = \alpha + \beta_1 * Company\ Misvaluation_0 + \epsilon_t$$

| Dependent Variable: Leverage | | Company Misvaluation | | $R^2$ | Dependent Variable: Leverage | | Company Misvaluation | | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|
| | N | β1 | P-value | | | N | β1 | P-value | |
| ***year 1*** | *117* | 0,000 | 92,10% | 0,01% | ***year 1*** | *109* | -0,011 | 24,10% | 1,28% |
| ***year 2*** | *117* | 0,003 | 58,40% | 0,26% | ***year 2*** | *109* | -0,010 | 28,60% | 1,06% |
| ***year 3*** | *116* | -0,002 | 65,90% | 0,17% | ***year 3*** | *109* | -0,012 | 22,00% | 1,40% |
| ***year 4*** | *107* | -0,004 | 45,10% | 0,54% | ***year 4*** | *100* | -0,010 | 32,30% | 1,00% |
| ***year 5*** | *100* | -0,006 | 23,20% | 1,45% | ***year 5*** | *93* | -0,020 | 3,90% | 4,60% |
| ***year 6*** | *88* | -0,005 | 30,60% | 1,22% | ***year 6*** | *81* | -0,017 | 10,30% | 3,32% |
| ***year 7*** | *82* | -0,001 | 82,90% | 0,06% | ***year 7*** | *75* | 0,002 | 85,40% | 0,05% |
| ***year 8*** | *70* | -0,003 | 54,30% | 0,55% | ***year 8*** | *64* | 0,003 | 81,40% | 0,09% |
| ***year 9*** | *54* | 0,005 | 51,90% | 0,81% | ***year 9*** | *49* | 0,012 | 44,40% | 1,25% |
| ***year 10*** | *38* | 0,015 | 10,80% | 7,04% | ***year 10*** | *34* | 0,032 | 11,10% | 7,74% |

Therefore, these two regressions on the full and capped samples do not give much evidence towards the existence of a stand-alone effect of company misvaluation on current leverage in any of the

[9] From now on, this sample will be referred to as the capped sample.

10 years of observation, except for *year 5* in the capped sample regressions. There does not seem to be a valid explanation for the significant effect in *year 5*. The Descriptive Statistics Section discussed that there are three years within the sample during which the mean leverage of the companies drops. These years are *year 5, year 6,* and *year 8.* As it can be seen from TABLE 4, the significant result appears in *year 5.* There is reason to believe, that this result is an artifact of the data, rather than evidence for the presence of the phenomenon of interest, because there is a possibility that there are other factors that have led to this negative effect on leverage in these three years. The results presented in TABLE 4 give evidence that serves to reject **H01.** Based on the output obtained on the basis of the constructed sample, there does not appear to be reason to believe that equity market timing has a significant negative long-run self-standing effect on capital structure.

However, one should not be too quick to draw any conclusions. First, these models have an extremely low level of $R^2$, ranging between 0,01% and 7,74%, which means that M/V serves to explain only a very small part of the total variation in current company leverage. Second, these models are very likely to suffer from omitted variable bias and to present a distorted and unreliable picture of the relationship between company misvaluation at the time of the IPO and current leverage. In order to overcome such issues, these simple regression models are expanded by the inclusion of the three control variables discussed in the Methodology Section. These variables are asset tangibility, profitability, and company size. As was previously discussed, they are believed to correlate with and to have an effect on the determination of company leverage in many developed countries. Therefore, with the inclusion of these variables, the adjusted regression models aim to solve the omitted variable bias problem by directly incorporating factors, different than company misvaluation, which are believed to have an effect on current leverage. TABLE 5 present the regression output for the adjusted models on both the full and capped samples. These models serve to directly test **H02**.

It can be seen from the reported values that in the full sample, M/V enters the model with a highly insignificant effect on current leverage. This effect does not turn significant until the end of the investigation period. That is, during the 10-year interval after the IPO, there is not a single year in which current leverage is significantly affected by the company misvaluation measure at the time of the IPO. Interpreting the size and significance of the effects of the control variables is not of central concern for this text and is omitted for the sake of brevity. These variables are included with the sole purpose to estimate a true and unbiased effect of company misvaluation on current leverage. The picture presented by the regression output obtained from the capped sample is slightly different. M/V again enters the model with a highly insignificant effect, however, it sharply turns significant in *year 5* and in *year 6*¸ at the 5% and 10% significance levels, respectively. This significance is, nevertheless, short-lived, as the effect is rendered highly insignificant in the remaining years until the period of observation ends. The effect in *year 5* and *year 6*, albeit statistically significant, can hardly be viewed as economically significant. These two significant results suggest that an increase of 1 in M/V (which would, for

example, mean that the market valuation of a company becomes twice as high as its intrinsic value) causes leverage to drop by 0,022% in *year 5* and 0,019% in *year 6*. Once more, there does not appear to be a reasonable explanation for the presence of a significant effect in these two years only. As was already mentioned, the sample exhibits an overall drop in leverage during *year 5*, *year 6*, and *year 8*. As it can be seen from TABLE 5, the significant results appear in *year 5* and in *year 6*. Therefore, the adjusted regression model may, as well, be biased by confounding factors that lower the mean leverage of the sample. It appears that this result is again an artifact of the data and sample, rather than evidence for the presence of a true phenomenon. To summarize, there does not appear to be strong evidence for the presence of a long-run effect of company misvaluation on current company leverage. Furthermore, even if such an effect, as the one observed here, is present in reality, it can hardly be viewed as an economically important determinant of leverage due to its extremely small magnitude. This serves to reject **H02**.

**TABLE 5.** presents the OLS regression output of the adjusted model which investigates the long-run effect of company misvalution in the year of the IPO on current leverage. Therefore, the dependent variable is current company leverage and the independent variable is company misvaluation. Asset Tangibility, Profitability, and Size serve the purpose of control variables. Current company leverage is defined as book leverage which is computed as book debt divided by total assets, both measured in millions of US dollars. Leverage is, thus, measured in percentage terms. The company misvalution measure is defined as market value divided by company intrinsic value, both at the year of the IPO. Asset tangibility is defined as net PPE over total assets. Profitability is defined as EBITDA over total Assets. Size is defined as the natural logarith of total sales. The top output corresponds to the full sample, while the bottom output corresponds to the sample for which the misvalution measure has been capped at a value of 10.

$$Leverage_t = \alpha + \beta_1 * Company\ Misvaluation_0 + \beta_2 * Profitability_{t-1} + \beta_3 * Size_{t-1} + \beta_4 * Asset\ Tangibility_{t-1} + \epsilon_t$$

| Dependent Variable: Leverage | | Company Misvaluation | | Asset Tangibility | | Profitability | | Size | | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|
| | N | β1 | P-value | β2 | P-value | β3 | P-value | β4 | P-value | |
| ***year 1*** | *117* | -0,001 | 90,10% | *0,145* | 2,60% | -0,098 | 60,80% | -0,006 | 60,00% | 4,71% |
| ***year 2*** | *117* | 0,003 | 50,40% | *0,250* | 0,00% | -0,137 | 56,00% | -0,006 | 60,50% | 11,11% |
| ***year 3*** | *116* | -0,002 | 66,90% | *0,237* | 0,00% | -0,328 | 16,70% | -0,010 | 40,50% | 11,67% |
| ***year 4*** | *107* | -0,007 | 17,40% | *0,207* | 0,10% | -0,539 | 2,00% | -0,026 | 8,10% | 19,63% |
| ***year 5*** | *100* | -0,007 | 11,80% | *0,267* | 0,00% | -0,365 | 15,50% | -0,025 | 7,00% | 22,86% |
| ***year 6*** | *88* | -0,006 | 19,20% | *0,265* | 0,00% | -0,462 | 7,50% | -0,030 | 5,00% | 25,51% |
| ***year 7*** | *82* | -0,002 | 66,00% | *0,222* | 0,10% | -0,454 | 10,10% | -0,044 | 1,30% | 21,78% |
| ***year 8*** | *70* | -0,002 | 62,90% | 0,195 | 0,50% | -0,266 | 31,40% | -0,051 | 0,30% | 22,97% |
| ***year 9*** | *54* | 0,004 | 61,70% | 0,194 | 3,20% | 0,103 | 75,70% | -0,064 | 0,40% | 25,55% |
| ***year 10*** | *38* | 0,013 | 13,10% | 0,077 | 48,90% | -0,002 | 99,80% | -0,074 | 0,30% | 29,82% |

| Dependent Variable: Leverage | | Company Misvaluation | | Asset Tangibility | | Profitability | | Size | | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|
| | N | β1 | P-value | β2 | P-value | β3 | P-value | β4 | P-value | |
| ***year 1*** | *109* | -0,009 | 35,20% | 0,075 | 27,30% | 0,004 | 98,20% | -0,006 | 60,90% | 2,67% |
| ***year 2*** | *109* | -0,006 | 54,70% | *0,171* | 1,60% | -0,100 | 68,50% | -0,005 | 67,80% | 6,57% |
| ***year 3*** | *109* | -0,010 | 28,90% | *0,176* | 1,00% | -0,507 | 6,40% | -0,010 | 40,60% | 10,24% |
| ***year 4*** | *100* | -0,013 | 17,50% | *0,151* | 2,10% | -0,553 | 1,70% | -0,030 | 5,30% | 16,98% |
| ***year 5*** | *93* | -0,022 | 2,20% | *0,191* | 0,40% | -0,390 | 13,80% | -0,032 | 2,60% | 20,72% |
| ***year 6*** | *81* | -0,019 | 6,50% | *0,198* | 0,30% | -0,366 | 17,00% | -0,039 | 1,80% | 22,97% |
| ***year 7*** | *75* | -0,002 | 86,40% | *0,171* | 2,20% | -0,383 | 17,90% | -0,046 | 1,40% | 18,21% |
| ***year 8*** | *64* | 0,000 | 98,00% | 0,136 | 6,10% | -0,273 | 30,10% | -0,054 | 0,20% | 21,32% |
| ***year 9*** | *49* | 0,009 | 52,00% | 0,123 | 20,40% | 0,043 | 89,90% | -0,070 | 0,20% | 26,36% |
| ***year 10*** | *34* | 0,016 | 43,40% | 0,031 | 80,30% | 0,057 | 94,10% | -0,075 | 0,70% | 29,91% |

Based on the results obtained from the simple and adjusted regression models presented-above, the answer to the main research question is the following. There is no strong and conclusive evidence for the presence of a statistically and economically significant long-run effect of company misvaluation

(M/V) at the time of the IPO on current leverage. As previously discussed, the effect of company misvaluation at *year 0* on current leverage is intended to capture the presence of a long-run effect of equity market timing on corporate capital structure. Therefore, in the constructed sample, there does not seem to be any evidence for the long-run effect of equity market timing on corporate capital structure. Such an effect can be observed neither in regressions investigating the stand-alone long-run effect of company misvaluation on current leverage nor in models attempting to control for the possible omission of other important determinants of current corporate leverage.

Now the text turns to the additional investigation mentioned in the previous section. This serves to provide a better understanding of the results obtained above. Before fully dismissing the hypothesis, it is informative to perform further investigations on the short-run effect of company misvaluation on capital structure. The main focus of this text is on investigating the presence of the long-run effect on capital structure, the existence of which is at the core of the findings of BW. Nevertheless, their text also provides evidence for the existence of a short-term effect. The presence of such a short-term effect tends to be less controversial in the world of academic corporate finance. Therefore, as in BW, the annual change in leverage is regressed on the previously-used independent variables. Regression output from the full and capped samples are given in TABLE 6.

**TABLE 6.** presents the OLS regression output of the adjusted model which investigates the short-run effect of company misvalution in the year of the IPO on the annual change in leverage. Therefore, the dependent variable is the annual change in company leverage and the independent variable is company misvaluation. Asset Tangibility, Profitability, and Size serve the purpose of control variables. Current company leverage is defined as book leverage which is computed as book debt divided by total assets, both measured in millions of US dollars. Leverage is, thus, measured in percentage terms. The company misvalution measure is defined as market value divided by company intrinsic value, both at the year of the IPO. Asset tangibility is defined as net PPE over total assets. Profitability is defined as EBITDA over total Assets. Size is defined as the natural logarithm of total sales. The top output corresponds to the full sample, while the bottom output corresponds to the sample for which the misvalution measure has been capped at a value of 10.

$$Leverage_t - Leverage_{t-1} = \alpha + \beta_1 * Company\ Misvaluation_0 + \beta_2 * Profitability_{t-1} + \beta_3 * Size_{t-1} + \beta_4 * Asset\ Tangibility_{t-1} + \epsilon_t$$

| Dependent Variable: Change in | | Company Misvaluation | | Asset Tangibility | | Profitability | | Size | | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|
| | N | β1 | P-value | β2 | P-value | β3 | P-value | β4 | P-value | |
| ***year 1*** | *117* | 0,001 | 74,30% | *0,051* | 24,20% | 0,032 | 80,20% | -0,007 | 38,20% | 1,96% |
| ***year 2*** | *117* | 0,004 | 10,10% | *0,103* | 0,10% | -0,004 | 97,20% | -0,004 | 41,30% | 12,37% |
| ***year 3*** | *116* | -0,002 | 24,50% | *0,010* | 67,60% | -0,400 | 0,00% | -0,002 | 66,60% | 17,34% |
| ***year 4*** | *107* | -0,004 | 11,00% | *-0,010* | 72,40% | -0,141 | 19,10% | -0,006 | 40,30% | 4,13% |
| ***year 5*** | *100* | -0,002 | 39,80% | *0,030* | 25,80% | 0,097 | 39,60% | -0,004 | 48,00% | 3,22% |
| ***year 6*** | *88* | 0,000 | 79,90% | *-0,009* | 74,50% | 0,074 | 50,20% | -0,014 | 3,00% | 5,83% |
| ***year 7*** | *82* | 0,002 | 27,90% | *-0,036* | 21,80% | 0,068 | 57,00% | -0,001 | 90,80% | 3,61% |
| ***year 8*** | *70* | -0,001 | 64,40% | -0,052 | 11,60% | 0,211 | 10,30% | -0,009 | 29,70% | 7,97% |
| ***year 9*** | *54* | 0,002 | 59,30% | -0,009 | 80,90% | 0,188 | 16,30% | -0,015 | 8,60% | 9,10% |
| ***year 10*** | *38* | 0,001 | 68,90% | -0,014 | 74,60% | 0,069 | 78,70% | -0,007 | 45,20% | 2,49% |

| Dependent Variable: Change in | | Company Misvaluation | | Asset Tangibility | | Profitability | | Size | | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|
| | N | β1 | P-value | β2 | P-value | β3 | P-value | β4 | P-value | |
| ***year 1*** | *109* | -0,005 | 42,30% | *0,021* | 65,70% | 0,028 | 83,30% | -0,007 | 36,50% | 1,76% |
| ***year 2*** | *109* | 0,003 | 53,20% | *0,087* | 0,60% | -0,040 | 71,80% | -0,004 | 45,30% | 7,46% |
| ***year 3*** | *109* | -0,003 | 36,90% | *0,004* | 85,70% | -0,221 | 2,30% | -0,005 | 28,90% | 6,63% |
| ***year 4*** | *100* | -0,004 | 41,30% | *-0,002* | 95,30% | -0,147 | 19,00% | -0,006 | 42,10% | 2,83% |
| ***year 5*** | *93* | -0,008 | 8,00% | *0,021* | 47,70% | 0,055 | 64,70% | -0,006 | 33,80% | 5,71% |
| ***year 6*** | *81* | 0,000 | 98,80% | *-0,007* | 81,90% | 0,069 | 56,50% | -0,014 | 5,50% | 5,12% |
| ***year 7*** | *75* | 0,013 | 1,70% | *-0,023* | 47,70% | 0,066 | 59,00% | 0,003 | 69,00% | 9,38% |
| ***year 8*** | *64* | 0,003 | 66,20% | -0,047 | 20,00% | 0,229 | 9,10% | -0,008 | 34,10% | 8,31% |
| ***year 9*** | *49* | 0,004 | 54,00% | -0,010 | 81,10% | 0,170 | 24,00% | -0,014 | 13,30% | 9,11% |
| ***year 10*** | *34* | 0,002 | 80,30% | -0,011 | 82,70% | 0,188 | 53,70% | -0,007 | 48,10% | 3,68% |

From the results on the full sample regressions in TABLE 6, it can be seen that M/V is again highly insignificant from the beginning until the end of the investigation period. Once more, the results from the capped sample present a slightly improved picture. The effect of interest is statistically significant in *year 5* and in *year 7* at the 10% and 5% significance levels, respectively. However, these results are, again, hardly of any economic significance, as they suggest that a 1 full point change in M/V would lead to approximately one-tenth of a percentage point change in leverage. The significant result is *year 5* is again believed to be an artefact of the data. Furthermore, the result obtained for *year 7* gives evidence of a positive short-term effect of M/V on leverage, which is contrary to the findings of BW. Again, there is no apparent reason for the presence of a genuinely significant effect of misvaluation on annual change in leverage in only two out of ten years. Moreover, since this is an investigation of the short-term effect of misvaluation on leverage, if an effect is expected to be present only for a few years, it is expected to be present immediately after the IPO in the beginning of the 10-year period, as opposed to in the middle and towards the end of it, as is the case here.

BW use the market-to-book ratio (MB) as the dependent variable for their short-term regressions on leverage. Therefore, as an addition to the investigation of the presence of a short term effect of misvaluation on leverage, MB is used as an alternative measure that proxies for the level of misvaluation. Comparing the results of such regressions with the ones presented above can be informative, because the company misvaluation measure used until now is assumed to be a significantly purer and less biased measure of misvaluation than MB. The reason for this is that M/V is based on the intrinsic value of the company, as opposed to M/B which is based on book equity. TABLE 7 presents the regression output for both the full and the capped samples. It can be seen from the results on the full sample that MB enters the model with a significant effect on annual change in leverage in *year 1* and in *year 2* at a 10% and 1% significance level, respectively. Thereafter, the effect is rendered insignificant until the end of the period, with the exception of *year 5* and *year 7*, when the effect is significant at the 5% and 1% significance level, respectively. However, in *year 2* and in *year 7*, which are the years providing the most significant results, the obtained significant effects are, once more, positive. This is contrary to all expectations based on the results reported by BW. In the capped sample, the results are very similar, with MB having a significant effect on leverage in *years 1,2,5* and *7*. In this case, the reported effects in *years 1,2 and 7* are positive. It can also be seen that MB, contrary to M/V, does not provide significant results only in years in which the overall leverage in the sample drops. This result is very informative. The difference between the misvaluation measure M/V and MB is mainly the presence of information about growth prospects in MB. Therefore, the fact that regressions on MB produce more significant results suggests that the link between annual changes in leverage and MB may not be driven by misvaluation, but by the presence of information on growth prospects. This is a key issue, to which this

text will return later, once a more in-depth investigation on the effects of misvaluation on the annual changes in leverage has been performed.

**TABLE 7.** presents the OLS regression output of the adjusted model which investigates the short-run effect of the market-to-book ratio on the annual change in leverage. Therefore, the dependent variable is the annual change in company leverage and the independent variable is the market to book ratio. Asset Tangibility, Profitability, and Size serve the purpose of control variables. Current company leverage is defined as book leverage which is computed as book debt divided by total assets, both measured in millions of US dollars. Leverage is, thus, measured in percentage terms. The market-to-book ratio is defined as market value divided by book equity. Asset tangibility is defined as net PPE over total assets. Profitability is defined as EBITDA over total Assets. Size is defined as the natural logarith of total sales. The top output corresponds to the full sample, while the bottom output corresponds to the sample for which the misvalution measure has been capped at a value of 10.

$$Leverage_t - Leverage_{t-1} = \alpha + \beta_1 * Market\ to\ Book + \beta_2 * Profitability_{t-1} + \beta_3 * Size_{t-1} + \beta_4 * Asset\ Tangibility_{t-1} + \epsilon_t$$

| Dependent Variable: Change in | | Market-to-Book | | Asset Tangibility | | Profitability | | Size | | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|
| | N | β1 | P-value | β2 | P-value | β3 | P-value | β4 | P-value | |
| ***year 1*** | *117* | -0,005 | 6,00% | *0,044* | 30,60% | 0,073 | 56,90% | -0,007 | 38,00% | 4,93% |
| ***year 2*** | *117* | 0,005 | 0,30% | *0,098* | 0,10% | -0,037 | 70,40% | -0,005 | 29,90% | 17,09% |
| ***year 3*** | *116* | 0,001 | 16,80% | *0,006* | 79,00% | -0,396 | 0,00% | -0,002 | 64,90% | 17,76% |
| ***year 4*** | *107* | -0,003 | 39,70% | *-0,007* | 79,80% | -0,091 | 39,40% | -0,005 | 48,60% | 2,39% |
| ***year 5*** | *100* | -0,009 | 4,60% | *0,029* | 27,60% | 0,177 | 12,70% | -0,001 | 86,50% | 6,52% |
| ***year 6*** | *88* | 0,002 | 62,40% | *-0,008* | 77,50% | 0,063 | 58,10% | -0,015 | 2,60% | 6,03% |
| ***year 7*** | *82* | 0,011 | 0,00% | *-0,013* | 64,00% | -0,043 | 69,00% | -0,003 | 68,70% | 22,12% |
| ***year 8*** | *70* | 0,001 | 62,10% | -0,048 | 15,10% | 0,213 | 9,90% | -0,008 | 8,01% | 7,97% |
| ***year 9*** | *54* | -0,004 | 21,00% | -0,019 | 60,20% | 0,243 | 8,60% | -0,015 | 8,00% | 11,48% |
| ***year 10*** | *38* | 0,003 | 46,00% | -0,005 | 91,10% | 0,051 | 84,20% | -0,006 | 51,50% | 3,64% |

| Dependent Variable: Change in | | Market-to-Book | | Asset Tangibility | | Profitability | | Size | | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|
| | N | β1 | P-value | β2 | P-value | β3 | P-value | β4 | P-value | |
| ***year 1*** | *109* | 0,037 | 9,10% | *0,021* | 63,80% | 0,075 | 57,80% | -0,007 | 36,40% | 3,84% |
| ***year 2*** | *109* | 0,005 | 0,20% | *0,080* | 0,70% | -0,099 | 35,30% | -0,005 | 29,80% | 15,28% |
| ***year 3*** | *109* | 0,001 | 16,70% | *0,004* | 86,70% | -0,214 | 2,60% | -0,004 | 31,90% | 7,62% |
| ***year 4*** | *100* | -0,003 | 42,50% | *0,005* | 87,50% | -0,117 | 29,00% | -0,004 | 57,90% | 2,80% |
| ***year 5*** | *93* | -0,010 | 3,40% | *0,033* | 25,40% | 0,177 | 14,80% | -0,001 | 93,70% | 7,23% |
| ***year 6*** | *81* | 0,002 | 63,00% | *-0,006* | 84,70% | 0,051 | 68,60% | -0,014 | 4,20% | 5,42% |
| ***year 7*** | *75* | 0,012 | 0,00% | *-0,006* | 84,00% | -0,063 | 58,70% | -0,002 | 76,30% | 23,07% |
| ***year 8*** | *64* | 0,001 | 67,10% | -0,046 | 21,00% | 0,233 | 8,50% | -0,009 | 30,30% | 8,29% |
| ***year 9*** | *49* | -0,004 | 25,00% | -0,030 | 47,00% | 0,245 | 10,70% | -0,016 | 8,70% | 11,07% |
| ***year 10*** | *34* | ,0027952 | 47,30% | -0,005 | 91,50% | 0,175 | 56,40% | -0,007 | 48,50% | 5,20% |

At first glance, there does not seem to be consistent evidence for the presence of a significant and negative short-term effect of misvaluation on company leverage, at least not based on the misvaluation measure derived from intrinsic value. However, short-term changes in leverage have different determinants. It may be the case that company misvaluation does have a significant effect on leverage in the short-run that is caused by equity market timing, however, on the overall level this effect may be masked by the other determinants of leverage and their relationship with company misvaluation. Following the example of BW and using the identity that book equity equals balance sheet retained earnings plus paid-in share capital, change in leverage is broken down into net equity issues, newly retained earnings, and a residual change in leverage. This breakdown can be seen in equation **(9)**:

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

, where:

- $\frac{e}{A}_t$ is net equity issues in *year t*, which is defined as the change in book equity minus the change in balance sheet retained earnings, together divided by total assets;
- $\left(\frac{\Delta RE}{A}_t\right)$ is the amount of newly retained earnings in *year t*;
- $\left[E_{t-1} * \left(\frac{1}{A_t} - \frac{1}{A_{t-1}}\right)\right]$ is any residual change in leverage in *year t* that is not captured by either of the other two components.

In order to test for the presence of a concealed short-term equity market timing effect, all three components of the change in leverage are regressed on the M/V, together with the three control variables. Furthermore, with the intention to compare the obtained results with the results reported by BW, all three regressions are re-estimated using MB as the misvaluation proxy. The results for the full and capped samples do not differ significantly, therefore only results for the full sample are presented in order to stay concise.

The most important results are presented in TABLE 8 which shows the regression output for the model investigating the effect of company misvaluation on net equity issues. It would be expected that in the presence of equity market timing overvalued companies will show more net equity issues. The company misvaluation measure enters the model with a highly insignificant effect and remains insignificant during the entire period of observation. On the contrary, the effect of MB on net equity issues is significant in *year 2* and *year 7* at the 1% and 10% significance level, respectively. Once more, regardless of the statistical significance of this effect, its economic impact can hardly be viewed as significant, given the extremely small reported coefficients. The fact that the misvaluation proxy based on company intrinsic value does not report a significant effect in any of the 10 years of observation, while the misvaluation proxy based on MB reports statistically significant effects in two out of ten years is both interesting and informative. The comparison of these two results shows that, on one hand, a relatively purer misvaluation proxy does not report any evidence for market timing, while on the other hand, a misvaluation proxy containing large amounts of information on future growth prospects, picks up some evidence for market timing. It was previously discussed that the main critique of BW's work is that their results are driven mainly by the presence of information regarding growth prospects and not by company misvaluation. Therefore, this observation hints towards the validity of this main line of criticism. It can be seen that once information about growth prospects is mixed into the variable used as the misvaluation proxy, part of the results become statistically significant. Since the main difference between the misvaluation measure based on intrinsic value and MB is information about growth and profitability, it can be claimed that the shift from insignificant to significant results is caused mainly by the presence of this additional information. This discussion can and should be linked back to the observations made regarding the difference in significance between regressions on annual changes in leverage using M/V and regressions using MB.

**TABLE 8.** presents the OLS regression output of the adjusted model which investigates the effect of two different proxies for misvaluation on net equty issues. Therefore, the dependent variable is net equity issues and the independent variable is a proxy for misvaluation. Net equity issues are defined as the change in book equity minus the change in balance sheet retained earnings, together divided by total assets. Asset Tangibility, Profitability, and Size serve the purpose of control variables. Current company leverage is defined as book leverage which is computed as book debt divided by total assets, both measured in millions of US dollars. Leverage is, thus, measured in percentage terms. The market-to-book ratio is defined as market value divided by book equity. Asset tangibility is defined as net PPE over total assets. Profitability is defined as EBITDA over total Assets. Size is defined as the natural logarithm of total sales. The top output corresponds to the regression models in which the dependent variable is company misvalation, which is defined as market value divided by company intrinsic value. The bottom output corresponds to the regression model in which the dependent variable is the market-to-book ration defined as market value divided by book equity. Both models investigate the full sample.

$$Net\ Equity\ Issues_t = \alpha + \beta_1 * Misvaluation\ Proxy + \beta_2 * Profitability_{t-1} + \beta_3 * Size_{t-1} + \beta_4 * Asset\ Tangibility_{t-1} + \epsilon_t$$

| Dependent Variable: Net Equity | | Company Misvaluation | | Asset Tangibility | | Profitability | | Size | | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|
| | N | β1 | P>t(β1) | β2 | P-value | β3 | P-value | β4 | P-value | |
| ***year 1*** | *117* | -0,003 | 23,70% | *-0,073* | 2,40% | -0,128 | 17,70% | 0,013 | 3,30% | 9,82% |
| ***year 2*** | *117* | -0,002 | 23,00% | *-0,036* | 16,50% | -0,005 | 95,50% | 0,010 | 2,70% | 6,68% |
| ***year 3*** | *116* | -0,004 | 13,40% | *-0,012* | 70,50% | -0,017 | 88,00% | -0,005 | 44,70% | 2,68% |
| ***year 4*** | *107* | 0,000 | 85,20% | *-0,053* | 8,80% | 0,020 | 86,40% | 0,001 | 89,60% | 3,06% |
| ***year 5*** | *100* | -0,001 | 62,10% | *-0,028* | 28,80% | -0,038 | 73,30% | 0,000 | 95,00% | 1,49% |
| ***year 6*** | *88* | 0,002 | 44,90% | *-0,041* | 18,70% | 0,120 | 35,30% | 0,000 | 96,00% | 3,58% |
| ***year 7*** | *82* | 0,002 | 46,30% | *-0,123* | 0,20% | 0,189 | 23,10% | 0,004 | 65,10% | 13,74% |
| ***year 8*** | *70* | 0,000 | 95,70% | -0,169 | 1,30% | 0,477 | 6,60% | 0,003 | 85,10% | 12,40% |
| ***year 9*** | *54* | 0,000 | 87,10% | -0,042 | 19,60% | 0,034 | 77,70% | 0,003 | 69,10% | 4,09% |
| ***year 10*** | *38* | -0,004 | 68,80% | 0,174 | 20,50% | 0,044 | 95,70% | -0,020 | 48,90% | 6,68% |

| Dependent Variable: Net Equity | | Market-to-Book | | Asset Tangibility | | Profitability | | Size | | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|
| | N | β1 | P-value | β2 | P-value | β3 | P-value | β4 | P-value | |
| ***year 1*** | *117* | 0,000 | 95,70% | *-0,073* | 2,40% | -0,120 | 21,40% | 0,012 | 3,80% | 8,69% |
| ***year 2*** | *117* | 0,004 | 0,90% | *-0,039* | 12,50% | -0,041 | 64,00% | 0,009 | 0,03% | 11,08% |
| ***year 3*** | *116* | 0,000 | 98,30% | *-0,011* | 73,00% | -0,012 | 91,60% | -0,005 | 46,30% | 0,68% |
| ***year 4*** | *107* | -0,004 | 37,30% | *-0,052* | 9,30% | 0,037 | 74,60% | 0,002 | 80,30% | 3,78% |
| ***year 5*** | *100* | 0,001 | 80,60% | *-0,027* | 29,50% | -0,038 | 74,20% | -0,001 | 90,30% | 1,30% |
| ***year 6*** | *88* | -0,001 | 88,50% | *-0,042* | 18,00% | 0,113 | 39,60% | 0,000 | 97,70% | 2,93% |
| ***year 7*** | *82* | 0,007 | 5,50% | *-0,108* | 0,60% | 0,115 | 46,10% | 0,003 | 73,20% | 17,21% |
| ***year 8*** | *70* | 0,001 | 74,80% | -0,164 | 1,60% | 0,478 | 6,50% | 0,003 | 84,00% | 12,54% |
| ***year 9*** | *54* | 0,000 | 90,90% | -0,042 | 20,20% | 0,038 | 76,40% | 0,003 | 69,50% | 4,06% |
| ***year 10*** | *38* | -0,009 | 42,10% | 0,143 | 29,60% | 0,108 | 89,30% | -0,023 | 42,50% | 8,06% |

Therefore, this text offers evidence which suggests that the results reported by BW may be the cause of confounding information on growth prospects that plagues their independent variable. Thus this text sides with the previously-sited critics of BW's work. There may be numerous reasons for the results obtained by BW being more significant and striking than the ones reported here. First, BW do not directly use MB as their proxy for misvaluation, rather they make use of a more elaborate measure which is, nevertheless, still based and highly dependent on MB since, at its core, it is just a weighted average of MB. The use of this variable may lead to more significant results, as the results here have shown that MB may have an effect on net equity issues, which, in turn have an effect on changes in leverage and thus on leverage in general. Second, BW compile a significantly more elaborate sample on which they perform their statistical analysis. Their sample may be better suited and thus may provide more precise and complete results. Third, BW make use of information regarding the exact date of the IPO and are able to perform a significantly more exact analysis. All of this taken together may lead to their obtaining more significant and strongly exhibited results.

TABLE 9 (on the next page) presents the regression output for the models that investigate the effects of M/V and of MB on the remaining two determinants of change in leverage – newly retained earnings and the residual change in leverage. It can be seen that in these two cases the switch from M/V to MB does not lead to notable changes. MB and M/V have significant effects on newly retained earnings in two out of ten years. However, the years do not both coincide, as the significant effects are reported in *year 4* and *year 9* for MB and *year 2* and *year 9* for M/V. It could have been expected that MB will have a more significant effect on newly retained earnings. This could be expected because MB incorporates information about growth prospects and companies with better growth prospects may be expected to have greater amounts of newly retained earnings which will be used as forms of internal financing—a preferred type of financing under the pecking order theory. However, this is not the case, as there is no apparent difference in the degree of significance. Furthermore, a relationship between MB and newly retained earnings may suggest a link between leverage and MB through its forecasting power on earnings. The strength of the relationship is not strong enough to draw such a conclusion, therefore, as BW suggest, any link between MB and leverage is not likely to go through retained earnings. Lastly, both MB and the M/V have highly insignificant effects on the residual change in leverage throughout the period of observation. Focusing solely on MB, since it is the variable that more often provides significant results for the effect on the individual components of annual changes in leverage, several suggestions can be made. First, it can be suggested that the effect does not come though the residual change in leverage. Second, the effect is more significant for net equity issues than it is for newly retained earnings. Therefore, if the effect comes through net equity issues, as opposed to through newly retained earnings, this effect is most probably driven by information regarding growth prospects and not by misvaluation. The reason for this last suggestion is that identical regressions which substitute M/V for MB yield highly insignificant results.

For the sake of providing supportive evidence for the above-mentioned, the models[10] in TABLE 5. are re-estimated with the use of the market-to-book ratio as the independent variable. This can only serve as an indirect comparison with the results of BW, as they use the previously-discussed more elaborate version of the market-to-book ratio. The results from the re-estimated models are notably more significant, with the market-to-book ratio having a highly significant result on leverage in six out of ten years during the period of analysis. Although, this is not a direct comparison it still serves to strengthen the point made earlier regarding the fact that regressions using the market-to-book ratio provide more significant results than regressions using a misvaluation measure based on intrinsic value due to the presence of confounding information regarding future growth prospects in the former measure.

Lastly, the method that I use to compute leverage within this thesis slightly differs from the method used by BW. As a form of robustness check all models presented in this section are re-estimated with

[10] Regression output is not reported for the sake of brevity.

the alternative method for computing leverage. The end results and conclusions do not differ. Therefore, this analysis is not included.

**TABLE 9.** presents the OLS regression output of two adjusted models which investigates the effect of two different proxies for misvaluation on newly retained earnings and on the residual change in leverage. Therefore, the dependent variable is either newly retained earnings or residual change in leverage and the independent variable is a proxy for misvaluation. Newly retained earnings are defined as the change in retained earnings divided by total assets, while the residual change in leverage is any change that is not due to net equity issue or to newly retained earnings. Asset Tangibility, Profitability, and Size serve the purpose of control variables. Current company leverage is defined as book leverage which is computed as book debt divided by total assets, both measured in millions of US dollars. Leverage is, thus, measured in percentage terms. The market-to-book ratio is defined as market value divided by book equity. Asset tangibility is defined as net PPE over total assets. Profitability is defined as EBITDA over total Assets. Size is defined as the natural logarithm of total sales. In the first and third regression models the dependent variable is company misvalation, which is defined as market value divided by company intrinsic value. In the second and third regression model the dependent variable is the market-to-book ration defined as market value divided by book equity. Both models investigate the full sample.

$$Newly\ Retained\ Earnings_t = \alpha + \beta_1 * Misvaluation\ Proxy + \beta_2 * Profitability_{t-1} + \beta_3 * Size_{t-1} + \beta_4 * Asset\ Tangibility_{t-1} + \epsilon_t$$

$$Residual\ Change\ in\ Leverage_t = \alpha + \beta_1 * Misvaluation\ Proxy + \beta_2 * Profitability_{t-1} + \beta_3 * Size_{t-1} + \beta_4 * Asset\ Tangibility_{t-1} + \epsilon_t$$

| **Dependent Variable: Newly Retained Earnings** | | **Company Misvaluation** | | | **Asset Tangibility** | | **Profitability** | | **Size** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | $R^2$ |
| | | **N** | **β1** | **P-value** | **β2** | **P-value** | **β3** | **P-value** | **β4** | **P-value** | |
| | ***year 1*** | *117* | -0,002 | 63,50% | *-0,052* | 25,80% | -0,537 | 0,00% | 0,004 | 63,30% | 13,82% |
| | ***year 2*** | *117* | 0,009 | 0,10% | *0,015* | 67,70% | -0,116 | 36,00% | 0,000 | 95,10% | 9,94% |
| | ***year 3*** | *116* | 0,001 | 87,90% | *-0,014* | 76,20% | -0,379 | 2,40% | -0,009 | 29,00% | 6,35% |
| | ***year 4*** | *107* | -0,001 | 83,80% | *-0,057* | 18,60% | -0,426 | 1,10% | -0,001 | 94,80% | 7,20% |
| | ***year 5*** | *100* | -0,002 | 50,10% | *-0,043* | 27,30% | -0,401 | 1,70% | -0,015 | 10,70% | 10,17% |
| | ***year 6*** | *88* | 0,002 | 48,40% | *-0,007* | 83,10% | -0,062 | 65,40% | 0,003 | 72,60% | 1,08% |
| | ***year 7*** | *82* | -0,001 | 77,20% | *-0,067* | 12,00% | -0,049 | 77,80% | 0,010 | 36,50% | 4,21% |
| | ***year 8*** | *70* | 0,001 | 10,36% | -0,104 | 9,80% | -0,151 | 53,30% | -0,042 | 0,90% | 15,22% |
| | ***year 9*** | *54* | 0,009 | 8,60% | -0,072 | 24,00% | -0,090 | 69,50% | -0,018 | 22,30% | 11,27% |
| | ***year 10*** | *38* | 0,002 | 58,50% | 0,015 | 80,20% | 0,019 | 95,70% | -0,002 | 88,70% | 1,41% |

| **Dependent Variable: Newly Retained Earnings** | | **Market-to-Book** | | | **Asset Tangibility** | | **Profitability** | | **Size** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | $R^2$ |
| | | **N** | **β1** | **P-value** | **β2** | **P-value** | **β3** | **P-value** | **β4** | **P-value** | |
| | ***year 1*** | *117* | -0,002 | 40,70% | *-0,055* | 22,90% | -0,513 | 0,00% | 0,004 | 64,70% | 14,18% |
| | ***year 2*** | *117* | 0,004 | 10,30% | *0,009* | 81,30% | -0,128 | 33,60% | 0,000 | 99,80% | 2,87% |
| | ***year 3*** | *116* | 0,001 | 52,70% | *-0,018* | 70,20% | -0,379 | 2,30% | -0,010 | 28,10% | 6,67% |
| | ***year 4*** | *107* | -0,010 | 7,60% | *-0,055* | 19,80% | -0,385 | 1,70% | 0,002 | 86,30% | 9,99% |
| | ***year 5*** | *100* | -0,008 | 21,10% | *-0,044* | 25,50% | -0,324 | 5,90% | -0,012 | 21,30% | 11,22% |
| | ***year 6*** | *88* | -0,003 | 55,70% | *-0,009* | 78,70% | -0,051 | 71,80% | 0,004 | 66,10% | 0,90% |
| | ***year 7*** | *82* | 0,006 | 14,20% | *-0,055* | 20,80% | -0,095 | 58,70% | 0,416 | 36,50% | 6,77% |
| | ***year 8*** | *70* | 0,000 | 88,40% | -0,106 | 9,50% | -0,153 | 52,80% | -0,042 | 0,90% | 15,22% |
| | ***year 9*** | *54* | 0,009 | 8,60% | -0,072 | 24,00% | -0,090 | 69,50% | -0,019 | 21,30% | 5,78% |
| | ***year 10*** | *38* | 0,000 | 94,90% | 0,018 | 75,60% | 0,036 | 91,80% | -0,002 | 86,20% | 0,51% |

| **Dependent Variable: Residual Change in Leverage** | | **Company Misvaluation** | | | **Asset Tangibility** | | **Profitability** | | **Size** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | $R^2$ |
| | | **N** | **β1** | **P-value** | **β2** | **P-value** | **β3** | **P-value** | **β4** | **P-value** | |
| | ***year 1*** | *117* | 0,005 | 29,00% | *0,176* | 1,30% | 0,698 | 0,10% | -0,023 | 6,70% | 15,97% |
| | ***year 2*** | *117* | -0,003 | 41,10% | *0,124* | 3,30% | 0,118 | 55,20% | -0,015 | 14,80% | 6,47% |
| | ***year 3*** | *116* | 0,001 | 81,50% | *0,036* | 52,20% | -0,003 | 98,60% | 0,012 | 26,60% | 1,64% |
| | ***year 4*** | *107* | -0,003 | 64,10% | *0,100* | 13,20% | 0,265 | 29,50% | -0,006 | 70,70% | 3,40% |
| | ***year 5*** | *100* | 0,001 | 74,10% | *0,100* | 4,60% | 0,536 | 1,30% | 0,011 | 35,90% | 10,87% |
| | ***year 6*** | *88* | -0,004 | 36,80% | *0,039* | 50,50% | 0,016 | 94,90% | -0,017 | 25,00% | 3,06% |
| | ***year 7*** | *82* | 0,001 | 76,30% | *0,154* | 0,50% | -0,071 | 74,40% | -0,015 | 26,50% | 11,40% |
| | ***year 8*** | *70* | -0,002 | 72,50% | 0,220 | 0,40% | -0,116 | 68,70% | 0,030 | 10,60% | 15,45% |
| | ***year 9*** | *54* | -0,008 | 23,50% | 0,105 | 17,70% | 0,244 | 40,30% | 0,000 | 99,70% | 8,25% |
| | ***year 10*** | *38* | 0,003 | 81,80% | -0,202 | 24,70% | 0,006 | 99,50% | 0,015 | 68,50% | 4,76% |

| **Dependent Variable: Residual Change in Leverage** | | **Company Misvaluation** | | | **Asset Tangibility** | | **Profitability** | | **Size** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | $R^2$ |
| | | **N** | **β1** | **P-value** | **β2** | **P-value** | **β3** | **P-value** | **β4** | **P-value** | |
| | ***year 1*** | *117* | -0,003 | 55,60% | *0,173* | 1,50% | 0,706 | 0,10% | -0,023 | 7,40% | 15,38% |
| | ***year 2*** | *117* | -0,002 | 45,00% | *0,127* | 2,90% | 0,131 | 51,00% | -0,015 | 16,20% | 6,38% |
| | ***year 3*** | *116* | 0,000 | 95,00% | *0,035* | 53,30% | -0,005 | 98,20% | 0,012 | 26,80% | 1,59% |
| | ***year 4*** | *107* | 0,011 | 23,10% | *0,099* | 13,30% | 0,257 | 29,60% | -0,009 | 59,60% | 4,56% |
| | ***year 5*** | *100* | -0,002 | 83,00% | *0,100* | 4,70% | 0,538 | 1,60% | 0,011 | 34,80% | 10,81% |
| | ***year 6*** | *88* | 0,006 | 53,50% | *0,043* | 46,70% | 0,001 | 99,80% | -0,018 | 21,90% | 2,56% |
| | ***year 7*** | *82* | -0,002 | 72,20% | *0,150* | 0,70% | -0,063 | 77,60% | -0,015 | 27,80% | 11,44% |
| | ***year 8*** | *70* | 0,000 | 95,50% | 0,222 | 0,40% | -0,113 | 69,50% | 0,030 | 10,70% | 15,30% |
| | ***year 9*** | *54* | -0,003 | 70,40% | 0,094 | 24,50% | 0,293 | 35,00% | 0,001 | 95,90% | 5,82% |
| | ***year 10*** | *38* | 0,012 | 40,30% | -0,166 | 33,90% | -0,093 | 92,70% | 0,019 | 59,90% | 6,64% |

# V. Limitations and Suggestions for Future Research

The analysis performed in this text does not come without limitations. First, there are some general limitations regarding the majority of papers investigating the existence of an equity market timing effect on corporate capital structure. These limitations are suggested by De Angelo et. al. (2010) who investigate the probability of misvalued firms to engage in equity offerings. Their findings suggest that the vast majority of corporations with excellent market timing opportunities fail to issue stock. This is contrary to a lot of the evidence on the presence of the equity market timing phenomenon discussed earlier in this text. The reason for such a contradiction is that the vast majority of research regarding equity market timing has been performed on firms which have engaged in equity issues in one form or another. In contrast, the work of De Angelo et. al. (2010) focuses on the overall probability of any firm in the general firm population to issue stock or not. This allows them to observe whether firms with outstanding market timing opportunities will take advantage of them, as the equity market timing theory would suggest. The results of De Angel et. al (2010) suggest that the majority of firms does not. Therefore, the problem with a great number of academic works which examine the presence of equity market timing and its effect on capital structure may be that they suffer from a form of sampling bias that helps them yield their affirmative results. Therefore, one suggestion for future research would be to perform analysis, similar to the one in this text, however, on the general firm population. That is, to investigate whether company misvaluation based on intrinsic value has significant influence over the likelihood to issue equity.

Second, there are authors which interpret the results which were presented earlier in this text as evidence for the existence of market timing differently. Eckbo et. al. (2000) interpret the presented evidence that high MB firms earn low returns after their equity issues as an outcome that is due to the low risk of these issuers. Fama (1998) also questions findings on the existence for equity market timing on several grounds. Schultz (2003) finds evidence for what he calls pseudo market timing of equity issues. He suggests that firms do not issue equity at high prices as a result of their attempts to time the market, but as a consequence of the fact that equity issues tend to cluster around general peaks in the capital market. Fisher and Statman (2006) on the contrary do not argue against the existence of market timing. However, they propose that it is dependent not only on value but also on the sentiments of investors, both of which are extremely difficult to forecast. Therefore, successful market timing requires future information on sentiments and value that cannot be obtained from widely available measures. The views of authors such as these cast doubt on the justifications used to prove the very existence and possibility of equity market timing. Taking such views into account may be needed in order for future research to rethink the widely spread approaches used to investigate equity market timing, some of which are also employed in this work.

Third, this paper makes simplifying assumptions which may be viewed as limitations and may cause certain distortions in the results. An assumption regarding perfect market foresight is used for the purpose of the computation of company intrinsic value. Prior research discussed in the Methodology Section suggests that the substitution of analysists' forecasts for actual outcomes does not lead to significant differences in the outcomes. However, this does not rule out the outcome in which significant differences do occur in the sample used for the purposes of this text. Therefore, one suggestion for future research is to carry out an investigation, which computes company intrinsic value, for the sample used here, based on analysis forecasts and on realized returns, with the intention to investigate the presence of any difference in the obtained results.

Fourth, this paper does not directly compare its results with the results of BW, because it does not make use of their weighted average market-to-book measure for misvaluation. The Results and Discussions Section makes suggestions regarding the obtained difference in results, however, this does not completely rule out the possibility that the difference in results is partly or fully due to a difference in the samples used. Therefore, a suggestion for future research is to perform the complete analysis of this thesis with the inclusion of the misvaluation measure of BW. This way, a conclusion can be made regarding the issue of whether any difference in results is solely due to the theoretical concepts discussed here or to the sample and data used. Further suggestions are to try to reproduce the sample of BW and apply the misvaluation measure based on intrinsic value to it or to perform more precise analysis by taking into account the exact date at which the IPO took place.

# VI. Conclusion

The market timing theory proposed in Baker and Wurgler (2002) suggest that the capital structure of the firm is the cumulative outcome of past attempts to time the equity market. In their paper, they provide strong evidence that market timing has both short-term and long-term effect on the capital structure of the firm.

However, the work of BW has created great debate within the academic world. One paper that directly targets BW is Hovakimian (2006), who claims that there is no evidence for the presence of significant long-lasting effects of equity market timing on capital structure. He believes that one of the reasons for this is the fact that historical market-to-book ratios, which are used by BW to proxy for misvaluation, contain information not only regarding misvaluation, but also regarding growth opportunities.

In this thesis, I revisit the evidence of the market timing theory by using a better defined measure of firm's misvaluation. The main purpose is to adjust for the presence of the widely-discussed flaw in the work of BW by properly accounting for future growth opportunities. The misvaluation measure selected in this study is defined as market value divided by company intrinsic value. The purpose of the intrinsic value model is to adjust the book value of the company for any abnormal earnings that may be generated in the future. Thus, this misvaluation measure filters out information about growth prospects much better than the measure used in BW (2002). (Dong et al., 2006).

The main results obtained from standard regression models show that company misvaluation at the time of the IPO does not have a significant long-run stand-alone effect on current capital structure during a 10-year period following the year of the IPO. These insignificant results do not change even after controlling for additional determinants of current leverage, which may potentially distort the statistical output. In the regression results, only a few years show significant results, however, there is reason to believe that these significant results are caused by confounding factors. Even if these significant results testify the presence of the phenomenon of interest, their effect are hardly of any economic significance due to their extremely small magnitude of the obtained coefficients. Furthermore, a number of the significant results suggest the presence of a positive relationship between equity market timing and company leverage which is contrary to the results of BW. Therefore, there does not seem to be supporting evidence regarding the statistically and economically significant long-run market timing effect of equity issues on capital structure that is reported by BW. Further investigation on the annual change in leverage did not obtain significant evidence for the presence of a short-term effect of company misvaluation at the year of the IPO on leverage. Therefore, there is no evidence to believe that there is an equity market timing effect on capital structure in the short run as well. This suggests reasons to doubt the fact that the companies in the compiled sample have timed their IPOs. A breakdown of changes

in leverage into net equity issues, newly retained earnings, and a residual does not show a significant relationship between company misvaluation and net equity issues.

To compare the information content in the different misvaluation measures, I perform regression analysis using market-to-book ratio, the misvaluation measure in BW (2002). Though it gives stronger hints of the possibility of the market timing effect, the market-to-book ratio does not provide conclusive evidence for the short-run or long-run effect of the market timing effect on firm's capital structure either. Some possible reasons are discussed in more detail in the previous section and are difference in sample, less precise definition of the IPO date, and the use of a more elaborate misvaluation measure based on the market-to-book ratio. The evidence in this thesis suggests that the difference in results using the misvaluation measure based on intrinsic value and the market-to-book ratio is mainly due to the presence of confounding information regarding company growth prospects. This is in line with the discussed line of criticism and is believed to be the case because substituting the pure measure for misvaluation based on intrinsic value for the market-to-book ratio leads to obtaining more significant results. Further research in the topic is needed to provide more conclusive answers to the posed question.

# Appendix

**TABLE A1.** presents descriptive statistics on asset tangibility. Asset tangibility in every year is defined by Net Property Plant and Equipment over Total Assets.

**Asset Tangibility Descriptive Statistics**

| Year | N | Mean | Median | Max | Min | St. Dev. |
|---|---|---|---|---|---|---|
| **Asset Tangibility year 0** | 117 | 35,90% | 29,11% | 92,49% | 0,18% | 28,22% |
| **Asset Tangibility year 1** | *117* | 36,47% | 29,95% | 92,81% | 0,16% | 28,18% |
| **Asset Tangibility year 2** | *117* | 37,41% | 29,78% | 92,29% | 0,14% | 29,04% |
| **Asset Tangibility year 3** | *116* | 38,45% | 29,52% | 95,09% | 0,14% | 30,45% |
| **Asset Tangibility year 4** | *107* | 37,99% | 31,82% | 95,58% | 0,17% | 29,73% |
| **Asset Tangibility year 5** | *100* | 38,36% | 31,74% | 93,06% | 0,18% | 29,30% |
| **Asset Tangibility year 6** | *88* | 40,41% | 33,68% | 94,26% | 0,14% | 30,13% |
| **Asset Tangibility year 7** | *82* | 41,18% | 34,94% | 93,69% | 0,07% | 30,05% |
| **Asset Tangibility year 8** | *70* | 42,43% | 37,89% | 94,26% | 0,57% | 30,31% |
| **Asset Tangibility year 9** | *54* | 42,66% | 36,72% | 93,00% | 0,53% | 29,65% |
| **Asset Tangibility year 10** | *38* | 42,11% | 37,06% | 90,17% | 0,51% | 28,16% |

**TABLE A2.** presents descriptive statistics on profitability. Profitability in every year is defined as EBITDA over total assets.

**Profitability Descriptive Statistics**

| Year | N | Mean | Median | Max | Min | St. Dev. |
|---|---|---|---|---|---|---|
| **Profitability year 0** | 117 | 14,24% | 12,37% | 46,36% | 0,00% | 9,62% |
| **Profitability year 1** | *117* | 14,40% | 12,44% | 41,00% | 0,40% | 8,27% |
| **Profitability year 2** | *117* | 13,50% | 12,37% | 54,01% | 0,33% | 7,93% |
| **Profitability year 3** | *116* | 13,26% | 11,94% | 54,98% | 0,03% | 8,23% |
| **Profitability year 4** | *107* | 12,32% | 11,20% | 34,57% | 0,14% | 6,78% |
| **Profitability year 5** | *100* | 13,20% | 11,57% | 37,62% | 1,51% | 7,19% |
| **Profitability year 6** | *88* | 13,69% | 12,02% | 38,97% | 0,04% | 7,49% |
| **Profitability year 7** | *82* | 13,05% | 11,89% | 43,85% | 0,32% | 7,41% |
| **Profitability year 8** | *70* | 14,42% | 13,35% | 42,68% | 1,28% | 7,51% |
| **Profitability year 9** | *54* | 14,49% | 13,71% | 34,94% | 0,21% | 7,06% |
| **Profitability year 10** | *38* | 14,39% | 12,60% | 63,33% | 2,06% | 10,62% |

**TABLE A3.** presents descriptive statistics on company size. Company size in every year is defined as the natural logarithm of total sales.

**Company Size Descriptive Statistics**

| Year | N | Mean | Median | Max | Min | St. Dev. |
|---|---|---|---|---|---|---|
| **Company Size year 0** | 117 | 6,57 | 6,67 | 10,21 | 0,15 | 0,28 |
| **Company Size year 1** | *117* | 6,77 | 6,77 | 10,30 | 0,02 | 0,28 |
| **Company Size year 2** | *117* | 6,92 | 6,97 | 10,33 | 0,58 | 0,29 |
| **Company Size year 3** | *116* | 7,09 | 6,99 | 10,35 | 3,17 | 0,30 |
| **Company Size year 4** | *107* | 7,20 | 7,22 | 10,72 | 3,02 | 0,30 |
| **Company Size year 5** | *100* | 7,34 | 7,35 | 10,95 | 3,80 | 0,29 |
| **Company Size year 6** | *88* | 7,55 | 7,55 | 11,02 | 4,03 | 0,30 |
| **Company Size year 7** | *82* | 7,69 | 7,73 | 11,02 | 5,19 | 0,30 |
| **Company Size year 8** | *70* | 7,84 | 7,81 | 11,02 | 5,34 | 0,30 |
| **Company Size year 9** | *54* | 7,96 | 7,91 | 10,98 | 5,24 | 0,30 |
| **Company Size year 10** | *38* | 7,90 | 7,69 | 11,01 | 5,30 | 0,28 |

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