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Equity Market Timing, How Long Does It Last?

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Abstract

Market timing is a very well-known investment strategy, albeit a difficult one to execute properly. Equity market timing is a type of market timing investment plan whereby a company issues equity when their market price is high and repurchases equity when the price is low. The cost of equity for a firm can be lowered by taking advantage of such fluctuations. This analysis documents the importance of market equity timing as a facet of real financial policy, with very persistent effects when observing present capital structures. Results indicate that subsequent capital structures are derived from the incremental outcome of managers' historical attempts to time the equity market.

Keywords: Market Timing, market-to-book, equity

Timing do Mercado de Capital Próprio, Quanto Tempo Dura?

Abstrato

Timing do mercado é uma estratégia de investimento muito conhecida no mundo financeiro, mas de difícil execução. *Timing* do mercado de capital próprio é um plano de investimentos em que a empresa emite ações quando o seu preço de mercado é alto e recompra ações quando o seu preço é baixo, quando comparado com antigos valores de mercado e contabilísticos. Aproveitando essa flutuação, a empresa consegue reduzir o custo do capital em comparação com outras formas de financiamento externo. Esta análise documenta que a estratégia de *timing* é um especto importante e real na política financeira das diferentes empresas, com efeitos muito persistentes na estrutura de capital das mesmas. Os resultados indicam que a atual estrutura de capital é o resultado incremental de passadas tentativas feitas pelos gerentes em ordem de avaliar o mercado de capitais.

Keywords: *Timing* do mercado, *market-to-book*, capital próprio

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1. Introduction

Market timing is a very recognized investment strategy, although opinions within the literature diverge on the ease of its execution, most authors advocate that it is a relatively difficult type of trading which can only be properly accomplished by managers and individuals with high levels of financial knowledge and skills. Equity market timing is a type of investment plan where the company issues equity when their market price is high and repurchases equity when the price is low. By taking advantage of such fluctuations, a firm can lower the cost of equity compared to the costs of other capital sources and thus benefit from them.

In a completely efficient marketplace, as first mentioned by Modigliani and Miller (1958), different capital forms possess the same costs, thus there is no benefit from opportunistically switching between types of financing. Such conditions do not arise in the real world, and there are certain costs which must be necessarily taken into account when choosing means of external financing. Within an inefficient capital market, shareholders will profit from market timing. Therefore, if managers think they can time the market, undertaking such an approach will likely come across as a signal that they care about investors.

Several previous works of research on the subject have suggested that market equity timing is an important aspect within real financial policy.[1] On preliminary evidence, it appears clear that when the market value of a company is high when compared to previous market and book values, the firm will tend to issue equity rather than debt, and when the market valuation is low the firm will tend to repurchase shares.[2] The following evidence provided insight into capital structures and subsequent long-term stock returns, suggesting that market equity timing is normally effective, rendering equity issues appealing when the cost of equity is low, and vice versa[3]. The authors of a third separate analysis further observed that companies have a tendency to issue equity when stakeholders are excited about forecast results and earnings.[4] A fourth set of authors, Harvey and Graham (2001) performed an anonymous survey of various CFOs, who acknowledged attempts to time the market. 2/3 of chief financial officers within this survey further disclosed that both overvalued and undervalued stock prices influence the issuing of

[1] See Alti (2006), Baker and Wurgler (2002), and others.
[2] Concurring with the works of Marsh (1982), Taggart (1977), Jung, Kim and Stulz (1996), Hovakimian, Opler and Titman (2001), Pagano, Panetta and Zingales (1998), Ikenberry, Lakonishok and Vermaelen (1995), Jung, Kim and Stulz (1996), and others.
[3] See Ritter (1991, 1995), Jegadeesh (2000), Stigler (1964), Ikenberry (1995), Fama (1998), Norli et al. (2000), Baker and Wargler (2000), and others.
[4] See Teoh et al. (1998), Ritter and Loughran (1997), Rajan (1997), Sarin et.al (2001), and others.

stock, and recent stock price increases made them even likelier to attempt to sell the stock at an even higher price. Stock prices were voted the second most important aspect when making the decision on whether or not to issue equity.

The main research goal of our study is to identify the means through which equity market timing influences a company's capital structure, and whether such an influence has short- or long-term effects. Given the extensive research within the literature, the existence of a short-term impact should be evident. Nonetheless, the existence of a long-term impact is more questionable since companies can balance and dilute the effects of equity market timing. Classical financial literature suggests as much, meaning that there is little if any consensus on this approaches' theoretical long-term effects.

The results we obtained concur with the theory that shows that the effects of market timing are not only persistent, they also have a significant impact on a firm's capital structure. Firms with low leverage increase funds when the market value is high (measured by the ratio market-to-book), while firms with high leverage tend to increase their funds when the market value is low.

The results of our analysis were obtained through statistical regressions, the majority of these consisting of Ordinary Least Squares (OLS), while some applied the Fama-Macbeth method. Leverage ratio and variations of the same variable always take the position of dependent variable, while independent variables change throughout our analysis. One of the most relied upon ratios was the external financing weighted average market-to-book ratio, or M/B_{efwa} ratio for short. This independent variable is a weighted average of previous market-to-book ratios which takes external financing, debt or equity into consideration. The ratio returns high values for firms that have already raised external financing in the past, when the market-to-book ratio was high, while returning a low value if a company raised external financing when the market-to-book value was low. The application of this ratio enables us to conclusively propose that leverage and historical data were strongly and negatively correlated. These results are robust and economically significant regardless of whether the relationship is tested against the book or market valuation.

It became clear further into our work that previous valuations have a persistent impact on capital structures. In order to measure this persistence, we implemented three different types of tests. The first one uses leverage as a dependent variable, while controlling for the actual market-to-book ratio, leaving the external financed weighted average ratio to capture solely the firm's in-house fluctuation. The discovered variation helped to explain the capital structure outcomes, suggesting that these momentary fluctuations in the market values lead to perpetual

modifications in the company's capital structure. The second test utilizes the original levels of capital structure and proceeds to assess how successive oscillations in market values affect a firm's capital structure. A third test is also applied whereupon we checked the power of the weighted average ratio lagged values, discovering that the impact of this variable on the capital structure lasted for more than 10 years. These results suggest that the capital structure of 2018 depends strongly on the market-to-book oscillations that existed in 2008 and earlier. This variation presented within the market-to-book ratio has long term influences on capital arrangement, rendering our results difficult to explain by relying solely on traditional capital theories.

The market-to-book ratio is a measure of investment opportunities and risk of capital structures. Trade-off theory forecasts that fluctuations in this indicator should be momentary if one is to achieve an optimal capital arrangement. This suggestion was not verified by our results, with these temporary effects being instead shown to be very persistent. On the pecking order theory, Myers reports that managers try to prevent issuing equity, and on a dynamic version they reduce leverage to increase the probability of investment. Our results did not concur with this theory either, with the robust relationship we found between long-term investment prospects and leverage being particularly difficult to explain under this theoretical framework. The entrenchment theory proposed by Zwiebel (1996) however, is mainly concurrent with our statistical results. Periods in which a company has high market values can lead to the entrenchment of management, resulting in a reduction of the relevance of an optimal point for the capital structure as external debt financing options will tend to be resisted.

The simplest and most direct way to explain the results of our paper, is that a firm's capital structure is the incremental outcome of all managers' historical attempts to time the equity market. The two versions of market equity timing could also clarify these outcomes. The first version of these, expanded upon by Myers and Majluf (1984) integrated rational agents and adverse costs, which are inversely connected to the market-to-book ratio. In the second version of market equity timing, company managers look at investors as irrational agents, and thus assume that the increase of equity usually happens in an abnormal way when its cost is low. Both versions require adverse selection costs to reduce desirability on market timing. Although both are consistent with our results, the second one appears more appropriate for our purposes, given earnings and long-run evidence.

Everything discussed in this section will be expanded upon and presented in more detail throughout our work in the following sections. The thesis is divided into a literature review section, a methodology section which includes data and summary statistics and regressions

(section 3), a results section (section 4), a discussion & limitations section (section 5), followed by a section containing our conclusions (section 6). Robustness checks (section 7) and an appendix will be provided at the end (section 9).

2. Literature review

Looking at the current market context, a significant number of different debt and equity instruments can be found. A firm's capital structure can possess a variety of compositions depending on the different instruments that companies choose to rely upon for self-financing. Some companies may decide to finance themselves only through debt or equity, while others may find that the perfect spot is somewhere in between, choosing instead to mix both approaches. Even the earliest analyses of capital structures have seen authors trying to find the perfect capital structure to maximize a firm's market value. A straight answer has continue to elude researchers, resulting in the continuation of this topic as one of the most widely discussed within the finance literature.

On this section, we will address some important topics and findings within the wider existing body of literature that will serve as a basis for our study and its theoretical framework.

2.1 Trade-off Theory

The first formal proposal for the trade-off theory was published by Kraus and Litzenberger (1973). This theory was derived from what is arguably one of the most important papers in finance literature, Modigliani and Miller's 1963 work. In this seminal piece, Modigliani and Miller stated that debt can maximize a firm's value (i.e., by contracting more debt the company can take advantage of the deductible tax). They further proposed that although debt is a cheaper way of financing the company when compared to equity, one should refrain from analyzing debt solely from this perspective since adding debt also increases the probability of financial distress (Ang, Chua and McConnel (1982) and Jensen and Smith (1984)).

It is important to note that different companies will possess different debt percentages, and that managers will always attempt to pursue optimum ratios (Marsh (1982)). In order to reach the ideal point of debt, one should look at the marginal value of tax on increasing debt in a manner that minimizes capital costs while maximizing a company's value. This evidence suggests that healthier companies should take advantage of debt, but many authors over the years have digressed and offered counter propositions, suggesting instead that: higher non-debt tax shields indicate less debt (DeAngelo and Masulis (1980)); too much debt can lead to asset substitution and conflicts of interest between bond- and share-holders (Fama and Miller (1972)

and Jensen and Meckling (1976)); there is no evidence that tax shields increase the value of a company (Fama and French (1998)).

The book-to-market ratio is an important indicator in this dissertation study and can be connected to different aspects of our main relied-upon theory, particularly when assessing the costs of financial distress. Firms with growth and investment opportunities are those that lose more with debt, since a significant debt burden can prevent new capital from being raised (Myers (1976); Smith and Watts (1992); Barclay, Smith and Watts (1995) and Rajan and Zingales (1995)). However, trade-off theory literature establishes a main relation between market-to-book and capital structure saying that capital structures will slowly respond to the market-to-book ratio.

2.2 Pecking Order Theory

This theory first saw the light of day in Donaldson's 1961 paper, before being further developed by Myers and Majluf (1984), with the notion of optimal structure disappearing, along with the suggestion that capital structures should be seen as an asymmetric conflict between inside and outside financing. This asymmetry can vary in its impact and effect on the moment of choice for not only inside and outside financing, but also between debt and equity.

CEO's will typically prefer to rely upon internal rather than external financing options, not merely because they possess more information within the firm than outside firm financiers, but also because external financing will invariably mean that managers lose their information advantage. This model thus proposes that managers will tend to prioritize the choosing of internal funds, followed by debt, and only then followed by equity. Furthermore, in situations where a firm has a lack of investment opportunities, managers tend to retain earnings in order to build a financial stack in order to prevent outside financing in the near future, with equity issues only taking place when the risk of bankruptcy is too big (when debt costs are large). When a company decides to issue shares, investors start to ponder whether this is taking place because the manager believes them to be currently overvalued in the market. If the firm issues debt however, investors are likely to think that the company is undervalued.

A well performing company following the precepts laid out by this theory should have a lower debt ratio, given that these ratios should only increase when the firms need outside financing. There are significant difficulties to the analysis of the relationship between book-to-market and capital structure values through the 1st theory proposed, also denominated as static theory. Myers further proposes an alternative dynamic version, whereby high growth firms

decrease leverage to avoid equity investments in the future (Myers (1984) and Fama and French (2000)).

2.3 Managerial Entrenchment Theory

Managerial entrenchment takes place when a manager invests in order to increase his value as an employee, rather than to benefit the company's finances. This is essentially the topic under discussion on Zwibel's (1996) paper, "Dynamic Capital Structure under Managerial Entrenchment". The underlying idea in this case is that equity financing is facilitated through high valuations and good investments, but it also allows managers to become rooted. This theory in itself has some intrinsic connection to market timing, since managers issue equity when the market value of the company is high.

2.4 Market Timing Theory

The theory of Market Timing will provide the theoretical foundation for this paper's results. This principle has been widely discussed within the literature, resulting in the creation of three very important versions of equity market timing. The last one by Baker and Wurgler (2002) states that the actual capital structure is given by the cumulative past outcomes of managers trying to time the equity market. We expect this version to provide the most appropriate and accurate explanations for the results of our study.

The genesis of the first dynamic version can be found in Myers and Majluf's 1984 paper, incorporating rational agents, namely managers and investors, while also taking the variation of adverse selection costs into account, not only between firms, but across different timeframes as well. This theory experienced a significant number of changes since its inception (Lucas and McDonald (1990); Korajczykm Lucas and McDonald (1992) and Choe, Masulis and Nanda (1993)) and even some authors have found that equity issues tend to be announced following the release of information which could potentially reduce information asymmetry (Korajczyk, Lucas and McDonald (1991)), or that equity issues clusters around times of smaller announcement effects (Bayless and Chaplinsky (1996)).

The second dynamic version follows an altogether different train of thought, affording greater consideration to irrational agents and time-varying mispricing. This version of the theory suggests instead that managers issue equity when costs are low and repurchase when expenses are high. One important aspect of this second dynamic is that the market does not

need to be efficient, it does not assume that managers successfully predict stock returns, it simply suggests that they believe they can truly time the market.

The market-to-book ratio has different interpretations regarding these different dynamics. Within the paper made by Myers and Majluf, this ratio measures variations in adverse selection. Furthermore, the second dynamic version suggests that book-to-market extreme values are connected to extreme investor expectations, while being historically inversely related to future equity returns (La Porta (1996); La Porta, Lakonishok, Shleifer and Vishny (1997); Frankel and Lee (1998) and Shleifer (2000)). The paper published in 2002 saw them applying this same ratio for the purposes of measuring the market timing opportunities observed by managers.

3. Methodology

The existing literature drawn upon throughout this paper largely suggests that individual financing will tend to depend on the market-to-book ratio. Our goal within this thesis is to document the cumulative effect of the market-to-book ratio in the current capital structure of a company while also, as suggested by the market timing strategy, assessing whether this ratio has persistent effects which are reflected on the capital structure through net equity issues.

3.1 Data and Summary Statistics

The main sample for this model was extracted from COMPUSTAT, with firms present between 1987 and 2018 within this database being selected for our study. Only companies for which the IPO date could be defined as taking place between those 30 years became part of our final sample. [5] Knowing the IPO date enabled us to control the leverage behavior and assessing how it changed over a given timeframe, while also checking the relationship between leverage and the market-to-book indicator.

In order to create the sample, we relied upon 3 different databases: COMPUSTAT, Jay Ritter, and Screener. IPO dates were not directly extracted from COMPUSTAT given the database's inconsistency in this variable.[6] This shortcoming led us to rely on the Jay Ritter and Screener (provided by Thomson Reuters) databases for identifying the specific IPO dates, mirroring the data sources used by Wurgler, Baker (2002), and Ritter (2003) in their previous, rigorous studies. It should be noted that these databases will only identify the subset of COMPUSTAT firms that will be used in the analysis.

The IPO year is reported as the first-year market value data available on COMPUSTAT. Our sample was further restricted to eliminate companies with a SIC code between 6000 and 6999, also identified as financial companies. This specific set of firms was excluded due to their inherent and abnormal leverage ratio values. While these are by no means unusual for financial companies, such high levels will typically serve as significant indicators of financial distress in the majority of other company types (Fama and French (1992)). Other types of companies which we excluded from our sample include: Firms with a value of book assets less than $10 million for the purposes of removing relatively small companies, firms with missing values on

[5] In order to calculate the Pre-IPO years, a compensation of 1 year is given.
[6] Only 60% of the final data IPO dates were presented in the COMPUSTAT database alone.

the variable assets between the year they went public and the year they exited COMPUSTAT, and firms with a single year of available data.

In order to create all the variables required for our report, some variables which were already presented through the COMPUSTAT database needed to be combined into new ones. These will be expanded upon below.

Book equity is thus the result of total assets and convertible debt minus total liabilities, preferred stock, or redemption value of the same when the first one is missing, along with deferred taxes. Book debt is simply the difference between total assets and book equity. Both variables will be used for the purposes of calculating book and market leverage. The first one is calculated by dividing book debt by total assets, while the second one is calculated by dividing book debt by total assets, before adding market equity minus book equity. Market equity is a relatively straightforward calculation, taken from the multiplication of outstanding common shares outstanding by price (Fama and French (2000)). Net equity issues (e/At) represents the change in book equity, minus the change in retained earnings, all then being divided by total assets. Newly retained earnings (ΔRE/At) represents the change in retained earnings, divided by assets. Finally, net debt issues (d/At) is simply the residual change in assets divided by total assets. [7] After calculating and creating all of these variables, the sample was restricted even further by excluding firm-year observations with a book leverage above 1 or below 0.

This analysis is reported in IPO years, relying upon different subsamples holding the number of fiscal years of a company following an IPO date. As such, k in the term $IPO+k$ indicates the number of years that a company survived following an initial offering. The sample includes 3,678 companies at the end of the first fiscal year, with this number being reduced to 3,523 by the end of the next year, eventually being reduced down to 1,539 when looking at 10 fiscal years after the IPO. It is also worth mentioning that the number of Pre-IPO observations is a significantly smaller number when compared to the IPO year. This is due to the COMPUSTAT database failing to provide certain company-specific information prior to their public offering.

Our following table will present the summary statistics concerning the financial decisions taken within our sample. A thorough analysis of the table allows us to draw some conclusions on these decisions. Table 1 demonstrates that a firm's book leverage experiences a considerable decrease when undergoing an IPO, and while the value of this ratio increases in

[7] In the appendix is presented a table with all the different variables computations.

Table 1: Summary statistics

This table contains the means and standard deviation values. Book leverage was done dividing book debt by assets and is restricted between 0 and 1. Market leverage is book debt divided by total assets minus book equity plus market equity. New debt issues was calculated by dividing residual change in assets to assets. Net equity issues is book equity minus change in retained earnings all divided by assets. Newly retained earnings is defined as change in retained earnings split by assets. All the variables are expressed in percentage terms. The time is expressed in IPO years.

		Book Leverage D/A_t (%)		**Market Leverage D/A_t (%)**		**d/A_t(%)**		**e/A_t (%)**		**$\Delta RE/A_t$ (%)**	
Year	N	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D
Pre-IPO	1979	60.32	25.24	-	-	-	-	-	-	-	-
IPO	3678	40.86	23.85	25.25	21.77	0.45	24.09	34.19	34.33	1.70	21.51
IPO+1	3523	42.15	23.37	29.37	23.28	7.19	15.66	9.67	19.55	-3.16	22.67
IPO+3	2833	43.97	23.00	33.79	25.09	4.43	15.86	6.82	22.85	-3.66	26.53
IPO+5	2279	44.42	22.85	35.37	25.60	0.06	58.65	5.98	20.10	-4.06	29.72
IPO+10	1539	45.93	21.95	34.98	23.66	0.48	43.04	2.41	23.03	-0.67	27.24

the next 10 years, the market ratio values increased even further. The last 3 financial decision indicators also suggest that a major increase switch occurs in debt financing during a company's transition into its 2nd IPO year. Taking into consideration that the change in assets is composed by the sum of net equity with debt issues, plus retained earnings, the composition change of a company in the 2nd year is determined by roughly 35% and 50% in debt and equity issuing respectively, with 15% being determined by newly retained earnings.

3.2 Regressions

3.2.1 Annual changes in leverage

This section will endeavor to begin a preliminary analysis on both leverage and the market-to-book ratio, before proceeding to provide deeper insights into market equity timing which will be applied throughout our work. Our analysis will begin by assessing leverage changes within a firm and their relationship to market-to-book net effects to distill their specific impact, therefore allowing us to test some of the hypotheses already put forward within the existing literature.

High market-to-book values tend to emerge from firms which present high growth rates, but which may also be issuing as much debt as equity. For our research purposes we will undertake to deconstruct the change in leverage to identify the origins of any existing effect and to further assess if it emerges from net equity issues, as suggested by previous studies into equity market timing. We will first report the net effect of market-to-book ratios on annual leverage changes, before deconstructing the leverage change itself.

The market-to-book ratio serves as the primary focus of these regressions, but in order to create a benchmark set of control variables, a set of three control variables were included, drawing on the work of Rajan and Zingales (1995). Their paper proposes that asset tangibility, profitability and firm size are corelated to leverage in several developed countries. The market-to-book ratio is related to both mispricing and investment opportunities, calculated as the book value of assets minus equity plus market equity, all divided by the book value of assets. Companies returning a ratio value above 10 are considered outliers and subsequently removed from our sample. Asset tangibility is normally associated with high values of leverage since tangible assets are typically used as collateral. This particular variable is defined as the net plant, property, and equipment (PPE), divided by the book value of assets.

Profitability on the other hand, if related to internal funds and linked to Myers and Majluf (1984)'s pecking order theory, which states that managers prefer internal funds to external, could subsequently be related to low levels of leverage. Another hypothesis comes from Jensen (1986), who states that profitable firms have more cash flow problems, while effective governance might require higher levels of leverage. Profitability is defined as EBITDA divided by the book value of assets.

Lastly, firm size is measured as the log of net sales, which we further complement with the assumption that if larger firms are less likely to enter financial distress, then size may

increase leverage. To test these different variables effects on the annual change in book leverage, the following regression was performed:

$$\left(\frac{D}{A}\right)_t - \left(\frac{D}{A}\right)_{t-1} = a + b\left(\frac{M}{B}\right)_{t-1} + c\left(\frac{PPE}{A}\right)_{t-1} + d\left(\frac{EBITDA}{A}\right)_{t-1} + e\ log(S)_{t-1} + f\left(\frac{D}{A}\right)_{t-1} + u_t \quad (1)$$

The lagged leverage variable was included due to leverage being restricted to values between 0 and 1. When leverage is close to one of these values the ratio can only go one way, regardless of the values of our other variables. Controlling this variable allows us to ensure that the regression does not dilute other variable specific effects based solely on the effect of the leverage level.[8] In order to analyze where the annual changes in leverage came from, leverage needs to be deconstructed into equity issues, newly retained earnings, and alterations in leverage, provided by asset growth through equity, debt issues, and retained earnings. An illustration of this deconstruction is presented below:

$$\left(\frac{D}{A}\right)_t - \left(\frac{D}{A}\right)_{t-1} = -\left[\left(\frac{E}{A}\right)_t - \left(\frac{E}{A}\right)_{t-1}\right] = -\left(\frac{e}{A}\right)_t - \left(\frac{\Delta RE}{A}\right)_t - \left[E_{t-1}\left(\frac{1}{A_t} - \frac{1}{A_{t-1}}\right)\right] \quad (2)$$

$$-\left(\frac{e}{A}\right)_t = a + b\left(\frac{M}{B}\right)_{t-1} + c\left(\frac{PPE}{A}\right)_{t-1} + d\left(\frac{EBITDA}{A}\right)_{t-1} + e\ log(S)_{t-1} + f\left(\frac{D}{A}\right)_{t-1} + u_t \quad (3)$$

$$-\left(\frac{\Delta RE}{A}\right)_t = a + b\left(\frac{M}{B}\right)_{t-1} + c\left(\frac{PPE}{A}\right)_{t-1} + d\left(\frac{EBITDA}{A}\right)_{t-1} + e\ log(S)_{t-1} + f\left(\frac{D}{A}\right)_{t-1} + u_t \quad (4)$$

$$-\left[E_{t-1}\left(\frac{1}{A_t} - \frac{1}{A_{t-1}}\right)\right] = a + b\left(\frac{M}{B}\right)_{t-1} + c\left(\frac{PPE}{A}\right)_{t-1} + d\left(\frac{EBITDA}{A}\right)_{t-1} + e\ log(S)_{t-1} + f\left(\frac{D}{A}\right)_{t-1} + u_t \quad (5)$$

[8] Tests without the lagged variable were performed, with the results demonstrating that no endogeneity problems arise from the inclusion of this variable.

In the end these different regressions will ultimately articulate where the changes in leverage come from and if those changes are derived from equity issuing as suggested by the market equity timing theory.

3.2.2 Factors of Leverage

After analyzing the short-term effects of the market-to-book ratio on leverage, this section will begin assessing the persistence of these effects in order to understand the cross-sectional impact of leverage. Managers may use equity market timing as an opportunity then rebalance quickly, thus making the effect more noticeable in the short term, while effectively cancelling it out in the long term. In the case of managers that do not rebalance to a specific target leverage however, this theory will explain why the ratios and persistence effects differ.

In order to analyze these persistence effects, new regressions will be performed by utilizing the control variables we derived from Rajan and Zingales (1995). A new variable will be created within this section however, the external finance weighted average of market-to-book, in order to assess relevant historical variations in market valuations. The market-to-book external finance weighted average will be outlined as:

$$\left(\frac{M}{B}\right)_{efwa,t-1} = \sum_{s=0}^{t-1} \frac{e_s + d_s}{\sum_{r=0}^{t-1} e_r + d_r} * \left(\frac{M}{B}\right)_s \quad (6)$$

The summations begin at the IPO year, with *e* and *d* representing net equity and debt issues respectively, while being defined as previously stated.[9]

The external finance weighted average returns high values when a company that already possesses a high market-to-book ratio raises financing by external sources and returns low values when the reverse takes place. External finance represents opportunities to change levels of leverage, whether such opportunities are presented through debt or equity. MtB_{efwa} ratio gives more weight to valuations that prevailed when such financing decisions were being made, measuring the lags while allowing us to reflect upon the most important lagged observations.

Some important restrictions regarding this ratio were set out. The minimum weight was set to zero, while the ratio value itself was required to remain below 10, with any outliers being

[9] The weights each year are given by the sum of net debt and equity issues.

excluded. This first minimum weight restriction was applied to ensure the weighted average only increased during our set timeframe, and thus to verify that any weight increase is exclusively representative of times where the leverage was most expected to change. Therefore, a weight of zero will mean that this variable eliminates the market information for that specific year.

To test the univariate explanatory power of this weighted variable when compared to other factors, a set of different regressions was applied, relying upon the different IPO times in order to analyze their R-square value. These regressions are provided below:

$$\left(\frac{D}{A}\right)_t = a + bX_{t-1} + u_t \tag{7}$$

The X_{t-1} variable represents the 4 different variables utilized by Rajan and Zingales (1995) and which were already incorporated in our previous regressions. X_{t-1} will also further represent 4 new variables applied by Fama and French (2000), related to capital structure factors. Two of these are related to dividends, one is related to depreciation, and the last one is related to R&D. Dividends to book equity is equal to common stock dividends divided by the book value of equity, and these will be used as a proxy for profitability. As a proxy for investment opportunities the ratios are dividends to market equity and research and development which is R&D expenditures to book value of assets. The depreciation expense, calculated by dividing depreciation by the book value of assets, will provide us with the ratio necessary for our final proxy for nondebt tax shields. To compare the explanatory power of these different variables one is required to calculate the weighted averages of their individual historical values.

After this explanatory power is assessed, multivariate regressions can be performed on our book and market leverage ratios, including on our weighted average market-to-book values:

$$\left(\frac{D}{A}\right)_t = a + b\left(\frac{M}{B}\right)_{efwa,t-1} + c\left(\frac{M}{B}\right)_{t-1} + d\left(\frac{PPE}{A}\right)_{t-1} + e\left(\frac{EBITDA}{A}\right)_{t-1} + f\ log(S)_{t-1} + u_t \tag{8}$$

This new set of regressions allows us to perform the important process of inclusion of the normal lagged market-to-book ratio, ensuring that the weighted average will capture only effects derived from the residual past valuation, while the lagged values will capture current variations in the market-to-book ratio. The lagged ratio is more related to investment rather than perceived mispricing. Controlling for current investments enables past within-firm variation to improve the selection of what may have been perceived as market timing opportunities.

For testing if the coefficient of the external finance weighted average is sensitive to different control variables than the ones we relied upon earlier, another multivariate regression was performed using the control variables selected by Fama and French (2000). Some of these overlap with the ones we used in the previous multivariate regression. The different variables used were EBIT to assets, common dividends to book equity and market equity, depreciation to assets, R&D expenses scaled by assets, and firm size.[10] All the variables were lagged as in our previous models.

$$\left(\frac{D}{A}\right)_t = a + b\left(\frac{M}{B}\right)_{efwa,t-1} + c\left(\frac{M}{B}\right)_{t-1} + d\left(\frac{ET}{A}\right)_{t-1} + e\left(\frac{Div}{BE}\right)_{t-1} + f\left(\frac{Div}{ME}\right)_{t-1} + \; +g\left(\frac{Dp}{A}\right)_{t-1} + h\left(\frac{RD}{A}\right)_{t-1} + i\, RDD_{t-1} + j\, log(A)_{t-1} + u_t \tag{9}$$

3.2.3 Persistence

This section will seek to provide even deeper insight. Our previous two sections illustrated the relationship between the market-to-book ratio and leverage in the short-term, along with assessing whether historical market valuations are associated with leverage. If there indeed exists a short- and long-term effect visible within the historical data, then the market-to-book ratio can subsequently declared to be persistent. To conclude our empirical study, the magnitude of this persistence will be measured on this last step.

We will primarily rely upon a regression analysis on the cumulative changes in leverage beginning in the pre-IPO year, using the Rajan and Zingales control variables. This regression will be performed as follows:

[10] The R&D expenses segment also possesses a second variable that was calculated with a dummy variable: RDD. The variable equals 0 if the firm has R&D expenses and 1 if vice-versa.

$$\left(\frac{D}{A}\right)_t - \left(\frac{D}{A}\right)_{pre-IPO} = a + b\left(\frac{M}{B}\right)_{efwa,t-1} + c\left(\frac{M}{B}\right)_{t-1} + d\left(\frac{PPE}{A}\right)_{t-1} + e\left(\frac{EBITDA}{A}\right)_{t-1} + f\ log(S)_{t-1} + g\left(\frac{D}{A}\right)_{pre-IPO} + u_t \quad (10)$$

Since an IPO represents a critical event which is linked to the market valuation of a company, it is important to measure the changes in the dominant leverage before an IPO takes place, meaning that the pre-IPO leverage will be included within our dependent variable.

The last set of regressions performed in our study aim to demonstrate the direct persistence effect of past valuations on the current capital structure of a company. This set consists of 3 different regressions as presented below:

$$\left(\frac{D}{A}\right)_{t+1} = a1 + b1\left(\frac{M}{B}\right)_{efwa,t} + c1\left(\frac{M}{B}\right)_t + d1\left(\frac{PPE}{A}\right)_t + e1\left(\frac{EBITDA}{A}\right)_t + f1\ log(S)_t + u_{1,t+1} \quad (11)$$

$$\left(\frac{D}{A}\right)_{t+\tau} = a2 + b2\left(\frac{M}{B}\right)_{efwa,t} + c2\left(\frac{M}{B}\right)_t + d2\left(\frac{PPE}{A}\right)_t + e2\left(\frac{EBITDA}{A}\right)_t + f2\ log(S)_t + u2_{,t+\tau} \quad (12)$$

$$\left(\frac{D}{A}\right)_{t+\tau} = a + b3\left(\frac{M}{B}\right)_{efwa,t} + c3\left(\frac{M}{B}\right)_{t+\tau-1} + d3\left(\frac{PPE}{A}\right)_{t+\tau-1} + e3\left(\frac{EBITDA}{A}\right)_{t+\tau-1} + f3\ log(S)_{t+\tau-1} + u3_{t+\tau} \quad (13)$$

The first regressions presented in this set differ from our previous regressions in that they measure the effect of the average value of the weighted ratio of the capital structure presented in t+1. While similar in format to our previous regressions, its application is oriented differently. Our second regression here will still controlling time through t, but it will further consider a new capital structure time through t+τ. This last regression has a significant change when compared to our previous ones, with the M/B_{efwa} measuring its effects through time t, while the regression itself aims to returns its results through $t + \tau - 1$. τ represents a company's survived years. This set of regressions will get a further deepest explanation in the results part.

4. Results

Given all our previous regressions, this section will endeavor to explain within the context of market equity timing, those same OLS analyses. These regressions are noted in IPO years on our IPO sample (e.g., if the time in study is IPO+1 year, the lagged variables represent the IPO year). In our results section the order of our regressions results will follow the regression segment.

The annual changes in leverage will be the primary subject of our analysis. This first set of regressions is divided into 4 panels, with the first one analyzing which factors change annual leverage levels, while the next 3 will endeavor to explain where that changes comes from.

Table 2, panel A demonstrates that leverage and the market-to-book ratio possess negative correlation, with high values of market-to-book ratio typically leading to lower levels of leverage. By multiplying the coefficient and the sample standard deviation given by the independent variable, the total change can be measured. In our IPO+3 year this total change amounted to -1.2%, meaning that at the time of IPO+3, one unit increase in the market-to-book ratio will tend to result in a leverage decrease of almost 1.20%. Such results are consistent with the theory that managers tend to issue equity when the prices are high, but it does not properly explain where such change originates from. Regarding our other columns, asset tangibility and firm size tends to increase the leverage ratio by 0.15% and 2.2% respectively within the same year, while profitability typically reduces it by 1.3%. These results are consistent with previous studies performed by Baker, Wurgler or La Porta. [11]

The next panel results conclusively demonstrate that changes in leverage through market-to-book ratio originates mostly from net equity issues. Furthermore, and concurring with previous studies by Marsh (1982) and other financial authors, panel B seems to suggest that the market-to-book ratio is highly significant to net equity issues. Panel C further shows that newly retained earnings are weakly related to the market-to-book ratio, thus rejecting the hypotheses that leverage is affected by market-to-book based on newly retained earnings. Panel D shows that growth in assets is positively related to market-to-book, thus increasing leverage levels through a positive effect. [12] All the distinct panels from B to D reflect the total effect of the market-to-book ratio, with the sum of all of these resulting in our panel A.

[11] Sample standard deviations will be presented in the appendix

[12] The effect of firm size is positive; however, this indicator does not change leverage one on one in the same manner that our others do. The derivate of leverage to net equity issues ratio increases net equity ratio by *Z,* but reduces leverage by $\frac{D*Z}{A}$

Table 2: Determinants of changes in leverage [13]

$$\left(\frac{D}{A}\right)_t - \left(\frac{D}{A}\right)_{t-1} = -\left(\frac{e}{A}\right)_t - \left(\frac{\Delta RE}{A}\right)_t - \left[E_{t-1}\left(\frac{1}{A_t} - \frac{1}{A_{t-1}}\right)\right] = a + b\left(\frac{M}{B}\right)_{t-1} + c\left(\frac{PPE}{A}\right)_{t-1} + d\left(\frac{EBITDA}{A}\right)_{t-1} + e\ log(S)_{t-1} + f\left(\frac{D}{A}\right)_{t-1} + u_t$$

Ordinary least squared regressions (already identified on the paper as 1, 3, 4 and 5) of changes in the book leverage ratio. The independent variables are market-to-book ratio, asset tangibility, profitability, firm size and lastly lagged leverage. The coefficients of a and f are not reported. Book leverage is book debt divided by assets. Market-to-book ratio is assets plus market equity minus book equity everything divided by book assets, this variable is lagged at all times, except in the IPO year, on that time is measure at time t. Firm-year observations with market-to-book ratio higher than 10 were dropped. Asset Tangibility equals PPE (net property, plant and equipment) divided by assets. Profitability is EBITDA divided by assets. Firm size is composed by the log of net sales. All independent variables are expressed in percentage terms except for market-to-book and firm size. Panel A presents the changes in leverage. Panel B presents net equity issues as dependent variable. Panel C presents newly retained earnings as dependent variable. Panel D presents growth in assets growth coming from equity. The regressions are robust and t-stat values are presented by the columns t().

Panel A: Changes in Book Leverage (%)

		MtB_{t-1}		PPE/A_{t-1}		$EBITDA/A_{t-1}$		$\log(S)_{t-1}$		
Year	*N*	*b*	*t(b)*	*c*	*t(c)*	*d*	*t(d)*	*e*	*t(e)*	R^2
IPO	3678	-1.77	-5.99	0.06	3.62	-0.09	-3.29	13.19	22.04	0.55
IPO+1	3523	-0.85	-5.88	0.04	4.82	-0.11	-6.11	0.71	2.22	0.12
IPO+3	2833	-0.75	-4.68	0.02	1.97	-0.06	-3.21	0.68	2.15	0.07
IPO+5	2279	-0.93	-4.25	0.04	4.19	-0.06	-2.37	1.56	4.67	0.08
IPO+10	1539	-0.69	-1.67	0.00	-0.21	0.01	0.35	0.36	0.94	0.07

[13] Correlation matrix with these variables is presented in the appendix

Panel B: Changes in Book Leverage Due to Equity Issues (%)										
		MtB_{t-1}		PPE/A_{t-1}		$EBITDA/A_{t-1}$		$\log(S)_{t-1}$		
Year	*N*	*b*	*t(b)*	*c*	*t(c)*	*d*	*t(d)*	*e*	*t(e)*	R^2
IPO	3678	-3.78	8.16	0.09	-3.70	0.20	-4.09	20.63	-24.03	0.37
IPO+1	3523	-2.69	12.82	0.00	0.39	0.33	-12.25	3.93	-10.09	0.27
IPO+3	2833	-3.96	12.00	-0.04	2.97	0.35	-5.17	1.70	-1.48	0.16
IPO+5	2279	-3.82	10.79	-0.01	0.73	0.35	-8.24	1.72	-3.63	0.21
IPO+10	1539	-3.82	5.52	-0.03	1.22	0.48	-3.74	0.35	-0.39	0.11

Panel C: Changes in Book Leverage Due to Newly Retained Earnings (%)										
		MtB_{t-1}		PPE/A_{t-1}		$EBITDA/A_{t-1}$		$\log(S)_{t-1}$		
Year	*N*	*b*	*t(b)*	*c*	*t(c)*	*d*	*t(d)*	*e*	*t(e)*	R^2
IPO	3678	0.65	-1.89	0.01	-0.69	-0.31	6.63	-0.24	0.40	0.11
IPO+1	3523	-0.56	2.82	-0.02	1.46	-0.71	15.26	-2.07	4.35	0.42
IPO+3	2833	-0.23	0.69	0.00	0.33	-0.67	8.09	-0.25	0.18	0.24
IPO+5	2279	-0.61	2.29	-0.02	0.89	-0.63	12.53	-0.49	0.60	0.14
IPO+10	1539	0.26	-0.49	0.06	-1.42	-0.69	5.99	0.23	-0.23	0.13

Panel D: Changes in Book Leverage Due to Changes in Assets (%)										
		MtB_{t-1}		PPE/A_{t-1}		$EBITDA/A_{t-1}$		$\log(S)_{t-1}$		
Year	*N*	*b*	*t(b)*	*c*	*t(c)*	*d*	*t(d)*	*e*	*t(e)*	R^2
IPO	3678	1.36	-6.00	-0.04	2.87	0.02	-0.90	-7.19	15.22	0.40
IPO+1	3523	2.40	-12.07	0.07	-5.71	0.27	-9.21	-1.16	2.68	0.15
IPO+3	2833	3.45	-13.60	0.06	-4.45	0.26	-6.40	-0.77	1.49	0.14
IPO+5	2279	3.49	-11.71	0.07	-2.85	0.22	-5.95	0.33	-0.43	0.07
IPO+10	1539	2.86	-6.35	-0.03	0.59	0.22	-4.08	-0.22	0.25	0.04

Our final 3 columns comprise asset tangibility, profitability, and size. In a side analysis, the profitability column suggests that changes in leverage through profitability typically originate from retained earnings. Previous statements purport that profitable firms will tend to issue less equity, but this new result also suggests that this effect is instead balanced from the higher return earnings, reducing leverage. Another interesting pattern arises from our firm size variable, which returns large values for our IPO years, revealing that this variable seems to play an important role during these critical starting periods.

The effect of the market-to-book ratio on leverage in the short term is confirmed, allowing us to proceed to the analysis on long-term effects. This part required the creation of our external financing weighted average ratio as previously stated. Different plots tracing out the cross section of our R-squared values with different independent variables had to be created in order to examine the power of this weighted variable. In figure 1, the dashed lines in these plots represent the external financing weighted average ratio or efwa ratio, while the solid one represents the lagged one-year indicator.

Our average weighted ratio appears to hold more univariate explanatory power than the unweighted ratio. Panel A further suggests that market-to-book starts with an explanation power of roughly 20% of the capital structure and a with negative coefficient in both regressions as expected. [14] While the weighted average explanation suffered a slight decline at the start, this one held steady throughout the firm's lifetime. This did not take place with the once-lagged market-to-book, which experienced decreased explanatory power as time progressed. As firms age, historical information becomes more relevant in explaining the capital structure, a conclusion supported by the increasing gap present between the solid and dashed line in our plots as time progresses. Both versions of asset tangibility in panel B on the other hand, presented low levels of explanatory power along with positive coefficients.

Profitability is presented in Panel C, although it has low explanatory power, this variable returned in these visual analyses the most peculiar results along with our market-to-book ratio, being the only variables whereby historical valuations had a significant increase on explanatory powers. Such results make sense in the context of our profitability variable only if the firm keeps the retained earnings instead of paying them out. Our weighted average variable includes not only the presented profitability, they further include the effect of previous ones which

[14] All the coefficients mentioned on this part of the paper will be presented in the next regression tables: Table 3 (Factors of Leverage) and Table 4 (Factors of Leverage – Different Control Variables).

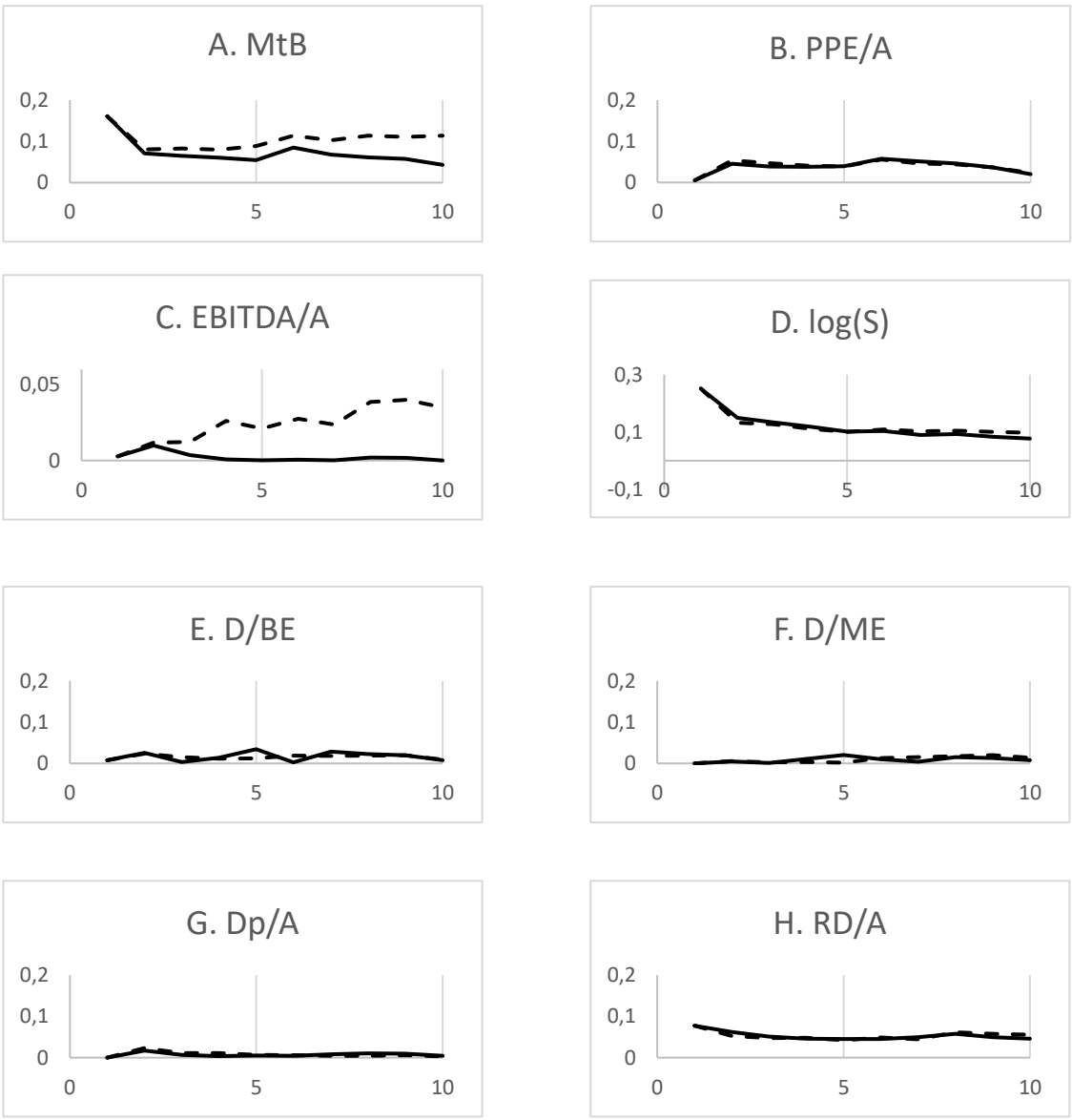

Figure 1: Explanatory power (R-Square) of capital structure factors as firms age

$$\left(\frac{D}{A}\right)_t = a + bX_{t-1} + u_t$$

Ordinary least squares regressions of book leverage regress with 8 different determinants of capital represented by the 8 different panels. Book leverage is debt divided by assets. From the 8 different independent variables, they were defined in 2 different ways, one considers the weighted average of past external financing and the other is the simple lagged one-year values, the variables efwa is presented by the dashed line and the normal lagged by the solid line. External financing is the sum of net and debt issues, when this sum is negative the weight is set to 0. Market-to-book ratio is assets plus market equity minus book equity everything divided by book assets, firm-year observations with market-to-book ratio higher than 10 were dropped. Asset Tangibility equals PPE (net property, plant and equipment) divided by assets. Profitability is EBITDA divided by assets. Firm size is composed by the log of net sales. Scaled by book and market equity are the common dividends. Depreciation expense is divided by assets. Research and Development is split by assets.

directly affect retained earnings values. These effects of past profitability have already been widely discussed within the literature, notably within Wessels and Titman (1988) paper titled "The determinants of capital structure". Our size variable demonstrates some ability to explain younger firms, but that explanation power decreases a lot with time, with the normal and weighted ratios showing only marginal differences in this variable, with positive coefficients in both. Both dividend ratios along with depreciation (Panels E, F and G) appear to possess very little explanatory power, with none of them returning an R-square larger than 3.5%. R&D expenses returned a negative coefficient, and while it explains almost 10% of the capital structure, our weighted average scheme does not seem to improve this variable's explanatory power. Figure 1 simply suggests that capital structure results from several factors when a firm performs an IPO. As companies get older the cross section of leverage is further clarified by past choices, and while this historic data does not affect all our control variables, it does add value to the market-to-book and profitability variables.

After assessing the explanatory power of all our control variables, both weighted and unweighted ratios, our next step is to check if the effect of the market-to-book ratio is notable over the long term.

Table 3 demonstrates that M/B_{efwa} is both more consistent and stronger than the once lagged market-to-book ratio, with this difference being even more visible in the book leverage, represented in panel A. The normal lagged market-to-book ratio has little explanatory power for younger companies, losing this power almost entirely as they age, while the M/B_{efwa} ratio demonstrates an almost opposite behavior, the signal getting even stronger and with larger negative coefficients over time. Furthermore, market leverage has a mechanical association with the market-to-book ratio, which can explain its larger values in our Panel B, particularly when compared to panel A.

The M/B_{efwa} ratio is our most important economic variable. In our IPO+3 year row, a single standard increase in this indicator implies a decrease in book leverage of around 9%, with the same decrease taking place in market leverage. The biggest increase originates from our size variable, whereby a one unit increase in standard deviation is associated with an increase of almost 6% in the book leverage, along with 3,6% in market leverage. Consistent with Figure 1, the effect of past valuations on the capital structure becomes clearer over time. Our IPO+10 row demonstrates that the effect of M/B_{efwa} is even more pronounced than in previous years, with one standard deviation increase leading to a decrease of nearly 20% in market leverage, along with nearly 15% in book leverage. After our average weighted ratio

Table 3: Factors of leverage

$$\left(\frac{D}{A}\right)_t = a + b\left(\frac{M}{B}\right)_{efwa,t-1} + c\left(\frac{M}{B}\right)_{t-1} + d\left(\frac{PPE}{A}\right)_{t-1} + e\left(\frac{EBITDA}{A}\right)_{t-1} + f\ log(S)_{t-1} + u_t$$

Ordinary least squared regressions (identified on the paper as 8) of changes in the book and market leverage ratio, the independent variables are market-to-book ratios, asset tangibility, profitability and firm size. The coefficients of *a* are not reported. Book leverage is book debt divided by assets. Market leverage as book debt to assets plus market equity minus book equity. Market-to-book ratio is defined in 2 different methods. The first one is the external finance weighted average from t-1. The external finance of net debt and equity issues distribute the weights. When the external finance is negative the weight equals 0. The other t-1 market-to-book is assets plus market equity minus book equity everything divided by assets lagged for all years. Asset Tangibility equals PPE (net property, plant and equipment) divided by assets. Profitability is EBITDA divided by assets. Firm size is composed by the log of net sales. Asset tangibility and profitability are expressed in percentage terms. Panel A shows the results for book leverage. Panel B shows the results for the market leverage dependent. The regressions are robust and t-stat values are presented by the columns t().

Panel A: Book Leverage (%)

	$MtB_{efwa,t-1}$		MtB_{t-1}		PPE/A_{t-1}		$EBITDA/A_{t-1}$		$\log(S)_{t-1}$	
Year	*b*	*t(b)*	*b*	*t(b)*	*c*	*t(c)*	*d*	*t(d)*	*e*	*t(e)*
IPO+1	-	-	-2.58	-10.39	0.11	6.28	-0.16	-5.37	10.60	16.93
IPO+3	-2.44	-6.67	-0.74	-1.87	0.12	7.24	-0.26	-8.47	11.68	20.48
IPO+5	-3.08	-8.42	-0.46	-1.14	0.12	6.58	-0.29	-8.48	11.07	17.17
IPO+10	-4.36	-9.56	-0.11	-0.19	0.06	2.69	-0.22	-4.58	9.13	13.03

Panel B: Market Leverage (%)										
	$MtB_{efwa,t-1}$		MtB_{t-1}		PPE/A_{t-1}		$EBITDA/A_{t-1}$		$\log(S)_{t-1}$	
Year	*b*	*t(b)*	*b*	*t(b)*	*c*	*t(c)*	*d*	*t(d)*	*e*	*t(e)*
IPO+1	-	-	-5.96	-27.68	0.15	9.01	-0.12	-5.44	7.22	13.62
IPO+3	-2.72	-7.6	-5.90	-14.75	0.15	8.92	-0.14	-6.50	7.36	13.28
IPO+5	-6.28	-9.32	-5.95	-12.54	0.18	9.08	-0.17	-5.72	6.16	9.75
IPO+10	-10.38	-10.72	-6.99	-12.05	0.11	4.85	-0.23	-4.62	5.21	7.52

variable, the largest effect on IPO+10 originates from profitability, with an approximately 11% decrease in both book and market leverage.[15]

Table 4 demonstrates the regressions undertaken with the control variables suggested by Fama and French (2000). As previously stated, the aim in this case is to find out whether M/B_{efwa} is sensitive to changes in our control variables. The results of these regressions are presented in the next table.

Similarly to previous results, the biggest change in our IPO+10 book and market leverage columns comes from the M/B_{efwa} ratio, while the second biggest change originates from profitability. Table 4 also suggests that this ratio is not sensitive to changes in our control variables. Tables 3 and 4 further demonstrate that historical values possess a significant effect on leverage and in a different manner and magnitude to that previously reported within the literature. The last part of our results is related to persistence, with Table 5 representing the cumulative changes of leverage from the pre-IPO year.

The results of the coefficients and significance values in Table 5 do not differ much from Table 3. This concurrence serves to provide further data suggesting that valuations influence capital structure in a way that perseveres and accumulates over time. It further suggests that the average weighed ratio is unlikely to reflect an omitted variable that could possess an effect on initial leverage levels. Furthermore, and similarly to our previous results, a 1 unit increase in our M/B_{efwa} ratio leads to a decrease in the book and leverage ratio greater than that of any other independent variable.

Table 6 tested the persistence of the market-to-book ratio in a different manner, applying Fama-Macbeth regressions for each year through a set of 3 regressions. These regressions contained only firms that survived τ years in order to ensure that coefficients represented a consistent sample of the same firms, resulting on a total of roughly 90 regressions alone, without the survival subsample regressions. These Fama-Macbeth regressions were performed with the aid of a Stata package which enables the application of different conditions on multiple regressions of this specific type.

Table 6 presents the different coefficients and t-stats gained from our performance of the Fama-Macbeth regressions, along with the 2 coefficient ratios. The ratios *b2/b1* and *b3/b1* will measure the effects in long-term oscillations in the market-to-book ratio.

[15] Sample standard deviations will be presented in the appendix.

Table 4: Factors of leverage – Different Control Variables

$$\left(\frac{D}{A}\right)_t = a + b\left(\frac{M}{B}\right)_{efwa,t-1} + c\left(\frac{M}{B}\right)_{t-1} + d\left(\frac{ET}{A}\right)_{t-1} + e\left(\frac{Div}{BE}\right)_{t-1} + f\left(\frac{Div}{ME}\right)_{t-1} + \ + g\left(\frac{Dp}{A}\right)_{t-1} + h\left(\frac{RD}{A}\right)_{t-1} + i\ RDD_{t-1} + j\ log(A)_{t-1} + u_t$$

Ordinary least squared regression (already identified on the paper as 9) of changes in the book and market leverage ratio, the independent variables are variables suggested by Fama and French theirs 2000's paper. Coefficients *a* is not reported. Book leverage is book debt divided by assets. Market leverage as book debt to assets plus market equity minus book equity. Market-to-book ratio is defined in 2 different methods. The first one is the external finance weighted average from t-1. The external finance of net debt and equity issues distribute the weights. When the external finance is negative the weight equals 0. The other t-1 market-to-book is assets plus market equity minus book equity everything divided by assets lagged for all years. Asset Tangibility equals PPE (net property, plant and equipment) divided by assets. Profitability is EBITDA divided by assets. Firm size is composed by the log of net sales. Common dividends is divided by book equity and market equity. Depreciation expense is divided by assets. R&D is divided by assets. RDD is a dummy variable that turns into 0 if a company did R&D expenses on the year in study. All independent variables are expressed in percentage terms except for both market-to-books, iRDD and firm size. EBIT is scaled to assets. Panel A shows the results for book leverage. Panel B shows the results for the market leverage dependent. The regressions are robust and t-stat values are presented by the columns t().

Panel A: Book Leverage (%)

	$MtB_{efwa,t-1}$		MtB_{t-1}		ET/A_{t-1}		Div/BE_{t-1}		Div/ME_{t-1}		Dp/A_{t-1}		RD/A_{t-1}		$iRDD_{t-1}$		$\log(A)_{t-1}$	
Year	*b*	*t(b)*	*b*	*t(b)*	*c*	*t(c)*	*d*	*t(d)*	*e*	*t(e)*	*b*	*t(b)*	*b*	*t(b)*	*c*	*t(c)*	*d*	*t(d)*
IPO+1	-	-	-2.35	-9.59	-0.05	-1.73	0.09	5.27	0.02	0.77	0.70	5.24	-0.12	-2.36	-7.65	-8.00	7.16	10.29
IPO+3	-2.42	-6.12	-0.40	-0.85	-0.17	-3.66	0.08	2.51	0.01	0.12	0.33	1.66	-0.16	-1.82	-7.32	-7.38	8.93	14.51
IPO+5	-3.21	-8.24	-0.94	-2.10	-0.14	-2.15	0.00	7.31	0.08	0.59	0.44	2.44	-0.05	-0.53	-6.84	-6.33	9.22	13.85
IPO+10	-4.52	-9.48	0.38	0.58	-0.16	-2.61	0.04	2.22	0.00	1.14	0.36	1.96	-0.20	-1.72	-2.52	-2.04	7.82	10.76

Panel B: Market Leverage (%)																		
	$MtB_{efwa,t-1}$		MtB_{t-1}		ET/A_{t-1}		Div/BE_{t-1}		Div/ME_{t-1}		Dp/A_{t-1}		RD/A_{t-1}		$iRDD_{t-1}$		$\log(A)_{t-1}$	
Year	*b*	*t(b)*	*b*	*t(b)*	*c*	*t(c)*	*d*	*t(d)*	*e*	*t(e)*	*b*	*t(b)*	*b*	*t(b)*	*c*	*t(c)*	*d*	*t(d)*
IPO+1	-	-	-5.59	-26.55	-0.09	-3.34	0.03	3.10	0.02	1.27	0.39	3.04	-0.26	-4.51	-6.51	-7.05	5.90	9.12
IPO+3	-2.70	-7.57	-5.08	-12.17	-0.16	-4.40	0.00	0.15	0.23	3.32	0.12	0.93	-0.30	-4.14	-6.67	-6.84	5.97	9.92
IPO+5	-6.03	-8.99	-5.37	-10.36	-0.16	-2.27	0.00	2.40	0.12	0.78	0.14	1.34	-0.27	-2.77	-6.89	-6.64	5.72	8.71
IPO+10	-10.13	-10.7	-6.24	-10.23	-0.27	-4.03	0.01	3.09	0.01	37.64	0.21	1.13	-0.31	-3.15	-4.40	-4.01	5.36	7.55

Table 5: Factors of leverage - Cumulative Changes from Pre-IPO

$$\left(\frac{D}{A}\right)_t - \left(\frac{D}{A}\right)_{pre-IPO} = a + b\left(\frac{M}{B}\right)_{efwa,t-1} + c\left(\frac{M}{B}\right)_{t-1} + d\left(\frac{PPE}{A}\right)_{t-1} + e\left(\frac{EBITDA}{A}\right)_{t-1} + f\ log(S)_{t-1} + g\left(\frac{D}{A}\right)_{pre-IPO} + u_t$$

Ordinary least squared regression (identified on the paper as 10) of cumulative changes in the book and market leverage ratio since pre-IPO, the independent variables are market-to-book ratios, asset tangibility, profitability and firm size. The coefficients of *a* and *g* are not reported. Book leverage is book debt divided by assets. Market leverage as book debt to assets plus market equity minus book equity. Market-to-book ratio is defined in 2 different methods. The first one is the external finance weighted average from t-1. The external finance of net debt and equity issues distribute the weights. When the external finance is negative the weight equals 0. The other t-1 market-to-book is assets plus market equity minus book equity everything divided by assets lagged for all years. Asset Tangibility equals PPE (net property, plant and equipment) divided by assets. Profitability is EBITDA divided by assets. Firm size is composed by the log of net sales. Asset tangibility and profitability are expressed in percentage terms except for firm size. Panel A shows the results for book leverage. Panel B shows the results for the market leverage dependent. The regressions are robust and t-stat values are presented by the columns t().

Panel A: Book Leverage (%)

	$MtB_{efwa,t-1}$		MtB_{t-1}		PPE/A_{t-1}		$EBITDA/A_{t-1}$		$\log(S)_{t-1}$	
Year	*b*	*t(b)*	*b*	*t(b)*	*c*	*t(c)*	*d*	*t(d)*	*e*	*t(e)*
IPO+1	-	-	-2.88	-8.29	0.12	6.02	-0.19	-3.99	9.97	12.79
IPO+3	-2.35	-5.05	-0.85	-1.51	0.15	7.89	-0.35	-7.26	11.27	15.59
IPO+5	-3.82	-7.35	0.20	0.36	0.17	7.77	-0.42	-7.33	10.61	12.77
IPO+10	-4.83	-8.26	-0.04	-0.06	0.07	2.52	-0.17	-2.71	8.35	8.01

Panel B: Market Leverage (%)										
	$MtB_{efwa,t-1}$		MtB_{t-1}		PPE/A_{t-1}		$EBITDA/A_{t-1}$		$\log(S)_{t-1}$	
Year	*b*	*t(b)*	*b*	*t(b)*	*c*	*t(c)*	*d*	*t(d)*	*e*	*t(e)*
IPO+1	-	-	-6.17	-18.91	0.11	5.65	-0.19	-3.87	7.89	10.34
IPO+3	-2.53	-5.59	-6.63	-11.90	0.15	7.02	-0.24	-5.77	8.34	11.21
IPO+5	-6.33	-7.17	-5.53	-8.03	0.19	7.71	-0.30	-5.48	6.79	7.72
IPO+10	-11.33	-9.61	-7.04	-7.85	0.14	4.69	-0.20	-2.43	4.91	5.09

Table 6: Persistence of Market-to-book

$$\left(\frac{D}{A}\right)_{t+1} = a1 + b1\left(\frac{M}{B}\right)_{efwa,t} + c1\left(\frac{M}{B}\right)_{t} + d1\left(\frac{PPE}{A}\right)_{t} + e1\left(\frac{EBITDA}{A}\right)_{t} + f1\ log(S)_{t} + u_{1,t+1}$$

$$\left(\frac{D}{A}\right)_{t+\tau} = a2 + b2\left(\frac{M}{B}\right)_{efwa,t} + c2\left(\frac{M}{B}\right)_{t} + d2\left(\frac{PPE}{A}\right)_{t} + e2\left(\frac{EBITDA}{A}\right)_{t} + f2\ log(S)_{t} + u2_{,t+\tau}$$

$$\left(\frac{D}{A}\right)_{t+\tau} = a3 + b3\left(\frac{M}{B}\right)_{efwa,t} + c3\left(\frac{M}{B}\right)_{t+\tau-1} + d3\left(\frac{PPE}{A}\right)_{t+\tau-1} + e3\left(\frac{EBITDA}{A}\right)_{t+\tau-1} + f3\ log(S)_{t+\tau-1} + u3_{t+\tau}$$

Fama-Macbeth regressions (already identified on the paper as 11,12 and 13) of actual and future leverage on the market-to-book ratio, the independent variables are market-to-book ratios, asset tangibility, profitability and firm size. The only coefficients reported are *b1, b2, b3* and *c3*. Book leverage is book debt divided by assets. Market leverage as book debt to assets plus market equity minus book equity. The persistence of market-to-book ratio is defined by dividing *b2* and *b3* to *b1.* Since the sample has 30 years, it was done a set of 3 regressions for each year. On the different sets are only included firms that survived τ years, that way each coefficient is calculated for the same sample of firms. Market-to-book ratio is defined in 2 different methods. The first one is the external finance weighted average from t-1. The external finance of net debt and equity issues distribute the weights. When the external finance is negative the weight equals 0. The other t-1 market-to-book is assets plus market equity minus book equity everything divided by assets lagged for all years. Asset Tangibility equals PPE (net property, plant and equipment) divided by assets. Profitability is EBITDA divided by assets. Firm size is composed by the log of net sales. Panel A shows the results for book leverage. Panel B shows the results for the market leverage dependent. The regressions are robust and t-stat values are presented by the columns t().

Panel A: Book Leverage (%)

	$MtB_{efwa,t}$ Coefficient						MtB_{t+r-1} Coefficient		Coefficient Ratios	
Year	*b1*	*t(b1)*	*b2*	*t(b2)*	*b3*	*t(b3)*	*c3*	*t(c3)*	*b2/b1*	*b3/b1*
t+1	-3.98	-11.62	-3.98	-11.62	-3.98	-11.62	-0.55	-2.08	1.00	1.00
t+3	-4.40	-18.35	-3.89	-22.07	-3.21	-15.52	-0.73	-2.01	0.88	0.73
t+5	-4.59	-15.76	-4.24	-16.37	-3.52	-16.63	-0.34	-1.10	0.92	0.77
t+10	-4.21	-10.99	-3.76	-12.10	-3.51	-10.50	0.13	0.36	0.89	0.83

Panel B: Market Leverage (%)

	$MtB_{efwa,t}$ Coefficient						MtB_{t+r-1} Coefficient		Coefficient Ratios	
Year	*b1*	*t(b1)*	*b2*	*t(b2)*	*b3*	*t(b3)*	*c3*	*t(c3)*	*b2/b1*	*b3/b1*
t+1	-3.22	-7.75	-3.22	-7.75	-3.22	-7.75	-4.13	-12.38	1.00	1.00
t+3	-3.27	-20.23	-3.26	-21.99	-4.60	-11.91	-6.53	-17.65	1.00	1.41
t+5	-3.16	-15.99	-3.15	-16.14	-4.46	-10.85	-6.60	-17.92	1.00	1.41
t+10	-3.08	-15.09	-3.07	-15.05	-3.89	-18.41	-6.98	-28.41	1.00	1.26

The set of firms remained the same for all 3 regressions in our annual categories. One should keep in mind that as a selection criteria in our models, a firm must survive the same number of years as τ or more, thus leading to *b1* being directly affected by τ.

Our *b1* coefficient has returned small and tight values, the range of *b1* book values varies between -3.98 and -4.59, thus demonstrating that *b1's* survival effect is small. The coefficients *b2* and *b3* serve as measurements of M/B_{efwa}'s persistence, with their results confirming the persistence of this ratio as being strongly significant for a 10-year minimum. Our b3 coefficient returned impressive results, suggesting that this determinant remains strong even past the 10 IPO-year mark. Our coefficients for the book ratio c3 are also smaller than b3, suggesting that the historical trail of this variable with data older than 10 years has more of an impact on the actual capital structure, than the present market-to-book ratio. Even in the panel B these 2 variables have considerable close values given the mechanical correlation between the variables talked previously.

Our *b2/b1* coefficient ratios column provide us with further information on the market-to-book beginning effect levels that remains after τ years. One can see from our book leverage results that the initial effect after 10 years remains 0.89, meaning that 89% of the initial effect still persists even beyond a decade. In our market leverage variable, the effect is 100% permanent, with the results in the last 2 columns returning virtually identical values.

All these analyses demonstrate that market valuations possess a significant and persistent effect on actual capital structures of companies, and that this effect is not influenced by our control variables, thus suggesting that it could work as a universal strategy. Our appendix will provide additional tables with further information which follows the main aim of this study, while also providing a robustness check on market equity timing in different sic codes, as defined by the Fama and French library.

5. Discussion and Limitations

Given the theories discussed in the literature review section, along with the results we obtained, this segment will assess whether these results can be explained by the different theories we reviewed in the literature review, while identifying some limitations in the model which may influence our final results.

When considering adjustment costs within the trade-off theory, it becomes clear that capital structures adjust slowly over time to correct for changes in the market-to-book ratio. Under this theory, on table 6 the M/B_{efwa} ratio past momentary fluctuations measured at time t are no longer relevant and variables as $b2$ and $b3$ should be 0 for measuring distant future capital structures, the results did not verify these assumptions. Additionally, table 6 served to illustrate that fluctuations in the market-to-book ratio possess a significant higher impact than expected for periods of up to a decade and beyond. Furthermore, Tables 3 and 4 support the notion that past fluctuations are of greater importance than various current variables, thus rendering adjustment costs within a span of 10 years not worthwhile. We further demonstrated that a portion of this variation has little if anything to do with optimum targets, suggesting that this theory has little overall use for the purposes of explaining our results.

Pecking order theory was another theory that failed to concur with our results. According to this theory, companies with improved market-to-book ratios would most likely experience a decline in leverage duo to newly retained earnings, but the results we obtained do not show such behavior. Our results suggest instead that the decline comes from net equity issues. Furthermore, Myers suggests the existence of an association between investment and future leverage, while the results of our work demonstrate a powerful and persistent relationship between historical values and the market-to-book ratio.

Managerial entrenchment theory is significantly more of a theoretical framework than the other notions and ideas analyzed in our literature review. Our own analysis along with the results we obtained above, offer significant support to the work done by the authors of this theory, particularly in terms of the long returns after the issuing and repurchasing of equity.

The Market timing theory eventually emerged as the one concept closest to explaining the totality of the results we obtained in our analysis, which appears to confirm its significance as a feature of financial decisions, as stated in our literature review. We should of course hesitate to eliminate all other possible theories. Nevertheless, this theory states that actual capital structures are derived from the accumulation of CEOs' past attempts to time the equity market, concurring with the results of our study.

Finally, it is of relevance and importance to point out some limitations which could influence the results of this investigation. Our study was performed solely on US companies which undertook IPO's within the last 30 years. Although other authors have undertaken studies that have covered different time spans, the choice of timeframe along with the place of study can affect these results with relative ease, performing the same study in the UK or Germany would most likely change the results obtained.

Future improvements in this study could be obtained by changing our sample of IPO years. Although 10 years represents a robust choice for the majority of companies in study, increasing the timeframe under research even further would likely yield even more interesting results. Likewise, the sample of our study could improve with the incorporation of premium databases such as that of the Security Data Company, allowing for further assessment of the companies being evaluated.

6. Conclusion

Traditional models in finance, have provided explanations in the past as to why switching opportunistically between debt or equity will not bring gains to a firm. On the contrary, evidence from this investigation on the diverse financial decisions following the issuing and repurchasing of equity suggests that equity market timing is an important aspect of real financial policy. In order to assess the influence of market timing on capital structures, it appears clear that the market-to-book ratio is an important measure for managers in perceiving market timing opportunities. We also found evidence that managers attempt to issue equity when the valuation of a company is high on the market, and refrain from doing so when the opposite is true. Furthermore, variations in a firm's valuation had very persistent effects on actual capital structures. All of these discoveries found throughout the course of our work are difficult to reconcile with traditional models of capital structure. The best explanation for the totality of our findings is that capital structure is the incremental outcome derived from all managers' historical attempts within that firm to time the equity market, thus ruling out theories regarding optimal capital structures. Market equity timing shows both significance and power to explain the actual capital structures.

7. Robustness Check

This robustness check section is comprised of an analysis of persistence tests realized separately to different sic codes, with the persistence tests being derived from applying Fama Macbeth's model for the set of 3 regressions presented in our persistence section of this paper. For our purposes, the full sample is divided into 5 different industry portfolios, a division drawn from Kenneth French's data library. [16] These portfolios thus distinguish between consumer industry (1st portfolio), manufacturing (2nd portfolio), high-tech (3rd portfolio), health (4th portfolio), and others (5th portfolio), with this last one containing the rest of the sample, including entertainment, transportation, construction, and many other company types. The analysis of these portfolios was performed in the same way as in our previous analyses, with the indicators presenting the same market-to-book and capital structure aspects. On table 7 and 12 the different regression panels represent the different sic code industries.[17]

Concurring with our previous results, coefficients *b2* and *b3* measure the persistence of M/B_{efwa} and once more confirm the persistence of this ratio in virtually every portfolio for the last 10 years. The analysis of our portfolios returned high coefficients with considerable levels of significance, particularly for book values which do not possess any mechanical relation with the leverage variable. Our *b3* variable also returned exceptionally strong values. The poorest outcomes in this analysis emerged from our 5th portfolio, which despite showing significance in past recent years on the book values, lost some level of strength and significance as the group industry aged, however by practical terms is still permanent. Furthermore, a deep analysis into the book ratios revealed that for all cases except our 5th portfolio oldest companies, the value of *b3* is many times bigger than *c3*. This result suggests that data older than 10 years have more of an impact on capital structures than the actual market-to-book ratio and although the 5th portfolio will likely loose this persistence within the next years, the values are still persistence.

Our coefficients ratios columns provide information on the beginning effects that persist after τ years, with book leverage these initial effects seem to persist even after 10 years for all our portfolios. The effect is also permanent in market leverage, with the results in our last 2 columns returning similarly high percentage values. All these analyses appear to demonstrate conclusively that market valuations have a persistent impact on a firm's capital structure and that this effect is not influenced by the different industries in which a given company may be incorporated.

[16] The all sic-code division is presented in the appendix
[17] Table 12 represents the market leverage results and it is displayed in the appendix

Table 7: Robustness Check – Book Leverage

Fama-Macbeth regressions (already mentioned on the paper as 11,12 and 13) of actual and future leverage on the market-to-book ratio, the independent variables are market-to-book ratios, asset tangibility, profitability and firm size. The only coefficients reported are *b1, b2, b3* and *c3*. Book leverage is book debt divided by assets. Market leverage as book debt to assets plus market equity minus book equity. The persistence of market-to-book ratio is defined by dividing *b2* and *b3* to *b1.* Since the sample has 30 years, it was done a set of 3 regressions for each year. On the different sets are only included firms that survived τ years, that way each coefficient is calculated for the same sample of firms. Market-to-book ratio is defined in 2 different methods. The first one is the external finance weighted average from t-1. The external finance of net debt and equity issues distribute the weights. When the external finance is negative the weight equals 0. The other t-1 market-to-book is assets plus market equity minus book equity everything divided by assets lagged for all years. Asset Tangibility equals PPE (net property, plant and equipment) divided by assets. Profitability is EBITDA divided by assets. Firm size is composed by the log of net sales. The 5 different panels represent the book leverage values on 5 different portfolios. The regressions are robust and t-stat values are presented by the columns t().

1st Portfolio (%)										
			$MtB_{efwa,t}$ Coefficient				MtB_{t+r-1} Coefficient		Coefficient Ratios	
Year	b1	t(b1)	b2	t(b2)	b3	t(b3)	c3	t(c3)	b2/b1	b3/b1
t+1	-4.72	-7.76	-4.72	-7.76	-4.72	-7.76	-0.44	-0.60	1.00	1.00
t+3	-4.51	-10.5	-5.15	-9.09	-4.04	-8.18	0.56	0.97	1.14	0.90
t+5	-4.64	-10.47	-5.62	-9.43	-4.74	-9.08	1.35	3.05	1.21	1.02
t+10	-3.99	-7.29	-4.61	-9.56	-4.45	-8.46	1.22	2.90	1.15	1.11

2nd Portfolio (%)										
			$MtB_{efwa,t}$ Coefficient				MtB_{t+r-1} Coefficient		Coefficient Ratios	
Year	b1	t(b1)	b2	t(b2)	b3	t(b3)	c3	t(c3)	b2/b1	b3/b1
t+1	-3.98	-11.62	-3.98	-11.62	-3.98	-11.62	-0.06	-0.05	1.00	1.00
t+3	-5.24	-7.44	-5.85	-7.21	-4.92	-4.66	-0.04	-0.04	1.12	0.94
t+5	-6.27	-7.94	-7.08	-8.72	-6.34	-7.21	0.89	0.77	1.13	1.01
t+10	-9.60	-11.99	-10.39	-11.59	-9.39	-11.89	4.00	4.32	1.08	0.98

3rd Portfolio (%)										
			$MtB_{efwa,t}$ Coefficient				MtB_{t+r-1} Coefficient		Coefficient Ratios	
Year	b1	t(b1)	b2	t(b2)	b3	t(b3)	c3	t(c3)	b2/b1	b3/b1
t+1	-3.27	-6.41	-3.27	-6.41	-3.27	-6.41	-0.02	-0.04	1.00	1.00
t+3	-3.08	-9.84	-3.28	-11.00	-3.34	-7.60	1.18	1.76	1.07	1.08
t+5	-3.80	-6.25	-4.12	-6.44	-3.38	-7.30	0.76	1.37	1.08	0.89
t+10	-2.06	-7.01	-2.67	-9.07	-2.60	-4.62	0.31	0.41	1.30	1.27

4th Portfolio (%)										
			$MtB_{efwa,t}$ Coefficient				MtB_{t+r-1} Coefficient		Coefficient Ratios	
Year	b1	t(b1)	b2	t(b2)	b3	t(b3)	c3	t(c3)	b2/b1	b3/b1
t+1	-2.61	-6.78	-2.61	-6.78	-2.61	-6.78	-1.15	-2.35	1.00	1.00
t+3	-2.12	-7.9	-2.81	-8.78	-2.83	-6.08	-0.74	-2.06	1.32	1.33
t+5	-1.87	-5.85	-2.15	-6.43	-2.43	-8.09	-0.88	-2.45	1.15	1.30
t+10	-2.98	-5.42	-3.04	-5.08	-3.38	-6.49	-1.39	-1.69	1.02	1.13

5th Portfolio (%)										
			$MtB_{efwa,t}$ Coefficient				MtB_{t+r-1} Coefficient		Coefficient Ratios	
Year	b1	t(b1)	b2	t(b2)	b3	t(b3)	c3	t(c3)	b2/b1	b3/b1
t+1	-3.42	-2.74	-3.42	-2.74	-3.42	-2.74	1.90	0.99	1.00	1.00
t+3	-2.10	-2.77	-3.27	-3.90	-2.72	-3.52	2.64	1.30	1.55	1.30
t+5	-1.67	-4.02	-2.51	-4.72	-1.85	-2.76	2.30	1.06	1.51	1.11
t+10	-1.15	-2.3	-1.03	-2.63	-1.10	-1.89	3.16	1.20	0.90	0.96

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9. Appendix

Table 8: Correlation Matrix

Correlation matrix with the variables used in the regression "Determinants of change in leverage" and the summary statistics. Book leverage is book debt divided by assets. Market-to-book ratio is assets plus market equity minus book equity everything divided by book assets, this variable is lagged at all times, except in the IPO year, on that time is measure at time t. Firm-year observations with market-to-book ratio higher than 10 were dropped. Asset Tangibility equals PPE (net property, plant and equipment) divided by assets. Profitability is EBITDA divided by assets. Firm size is composed by the log of net sales. New debt issues is calculated by dividing residual change in assets thru assets. Net equity issues is book equity minus change in retained earnings all divided by assets. Newly retained earnings is defined as change in retained earnings split by assets.

	MtB_t	e/A_t	$\Delta RE/A_t$	d/A_t	PPE/A_t	$EBITDA/A_t$	$\log(S)_t$	D/A_{t-1}	$\Delta D/A$
MtB_t	1								
e/A_t	0.1662*	1							
$\Delta RE/A_t$	0.0054	-0.7018*	1						
d/A_t	-0.2232*	-0.3674*	-0.2852*	1					
PPE/A_t	-0.2136*	-0.0523*	0.0668*	-0.0197*	1				
$EBITDA/A_t$	0.0588*	-0.2059*	0.3494*	-0.1613*	0.1557*	1			
$\log(S)_t$	-0.0814*	-0.1752*	0.1481*	0.0242*	0.0660*	0.3524*	1		
D/A_{t-1}	-0.1795*	0.0130*	0.0597*	0.0830*	0.1546*	0.0677*	0.2959*	1	
$\Delta D/A$	-0.0760*	-0.2298*	-0.1901*	0.0130*	0.0011	-0.0632*	0.0425*	-0.3036*	1

Table 9: Standard Deviation of Determinants of Change in Leverage

Standard deviations on the least squared regressions (already mentioned on the paper as 1, 3, 4 and 5) of changes in the book leverage ratio, the independent variables are market-to-book ratio, asset tangibility, profitability, firm size and lastly lagged leverage. Book leverage is book debt divided by assets. Market-to-book ratio is assets plus market equity minus book equity everything divided by book assets, this variable is lagged at all times, except in the IPO year, on that time is measure at time t. Firm-year observations with market-to-book ratio higher than 10 were dropped. Asset Tangibility equals PPE (net property, plant and equipment) divided by assets. Profitability is EBITDA divided by assets. Firm size is composed by the log of net sales.

Year	MtB_{t-1}	PPE/A_{t-1}	$EBITDA/A_{t-1}$	$\log(S)_{t-1}$
IPO	2.9494	16.188	28.465	5.9864
IPO+1	1.4475	8.8221	17.5605	3.2095
IPO+3	1.5945	8.8181	19.8308	3.1872
IPO+5	2.1947	9.2958	25.2844	3.3319
IPO+10	4.1594	11.8852	36.468	3.8086

Table 10: Standard Deviation of Factors in Leverage

Standard deviations on the least squared regressions (already mentioned on the paper as 8) of changes in the book and market leverage ratio, the independent variables are market-to-book ratios, asset tangibility, profitability and firm size. Book leverage is book debt divided by assets. Market leverage as book debt to assets plus market equity minus book equity. Market-to-book ratio is defined in 2 different methods. The first one is the external finance weighted average from t-1. The external finance of net debt and equity issues distribute the weights. When the external finance is negative the weight equals 0. The other t-1 market-to-book is assets plus market equity minus book equity everything divided by assets lagged for all years. Asset Tangibility equals PPE (net property, plant and equipment) divided by assets. Profitability is EBITDA divided by assets. Firm size is composed by the log of net sales.

Panel A: Book Leverage

Year	$MtB_{efwa,t-1}$	MtB_{t-1}	PPE/A_{t-1}	$EBITDA/A_{t-1}$	$\log(S)_{t-1}$
IPO+1	-	2.49	17.82	29.39	0.63
IPO+3	3.66	3.98	17.12	31.02	0.57
IPO+5	3.84	4.09	18.15	33.83	0.64
IPO+10	3.51	5.79	22.56	48.94	0.70

Panel B: Market Leverage

Year	$MtB_{efwa,t-1}$	MtB_{t-1}	PPE/A_{t-1}	$EBITDA/A_{t-1}$	$\log(S)_{t-1}$
IPO+1	-	2.15	16.82	22.08	0.53
IPO+3	3.57	4.00	17.32	22.03	0.55
IPO+5	3.13	4.74	19.37	30.42	0.63
IPO+10	2.31	3.95	22.47	48.96	0.69

Table 11: Sic Code Portfolios

Sic code division for the different 5 industry portfolios. This division is presented on Kenneth's French library and it's the division they use to perform return studies and analyze different portfolios.

1 Cnsmr (Consumer Durables, NonDurables, Wholesale, Retail, and Some Services (Laundries, Repair Shops))
0100-0999
2000-2399
2700-2749
2770-2799
3100-3199
3940-3989
2500-2519
2590-2599
3630-3659
3710-3711
3714-3714
3716-3716
3750-3751
3792-3792
3900-3939
3990-3999
5000-5999
7200-7299
7600-7699
2 Manuf (Manufacturing, Energy, and Utilities)
2520-2589
2600-2699
2750-2769
2800-2829
2840-2899
3000-3099
3200-3569
3580-3621
3623-3629
3700-3709
3712-3713
3715-3715
3717-3749
3752-3791
3793-3799
3860-3899
1200-1399
2900-2999
4900-4949

3 HiTec (Business Equipment, Telephone and Television Transmission)
3570-3579
3622-3622 Industrial controls
3660-3692
3694-3699
3810-3839
7370-7372 Services - computer programming and data processing
7373-7373 Computer integrated systems design
7374-7374 Services - computer processing, data prep
7375-7375 Services - information retrieval services
7376-7376 Services - computer facilities management service
7377-7377 Services - computer rental and leasing
7378-7378 Services - computer maintanence and repair
7379-7379 Services - computer related services
7391-7391 Services - R&D labs
8730-8734 Services - research, development, testing labs
4800-4899
4 Hlth (Healthcare, Medical Equipment, and Drugs)
2830-2839
3693-3693
3840-3859
8000-8099
5 Other (Mines, Constr, BldMt, Trans, Hotels, Bus Serv, Entertainment, Finance, etc.)
Companies that previous sic codes did not incorporate were included in this section

Table 12: Robustness Check – Market Leverage

Fama-Macbeth regressions (already mentioned on the paper as 11,12 and 13) of actual and future leverage on the market-to-book ratio, the independent variables are market-to-book ratios, asset tangibility, profitability and firm size. The only coefficients reported are *b1, b2, b3* and *c3*. Book leverage is book debt divided by assets. Market leverage as book debt to assets plus market equity minus book equity. The persistence of market-to-book ratio is defined by dividing *b2* and *b3* to *b1.* Since the sample has 30 years, it was done a set of 3 regressions for each year. On the different sets are only included firms that survived τ years, that way each coefficient is calculated for the same sample of firms. Market-to-book ratio is defined in 2 different methods. The first one is the external finance weighted average from t-1. The external finance of net debt and equity issues distribute the weights. When the external finance is negative the weight equals 0. The other t-1 market-to-book is assets plus market equity minus book equity everything divided by assets lagged for all years. Asset Tangibility equals PPE (net property, plant and equipment) divided by assets. Profitability is EBITDA divided by assets. Firm size is composed by the log of net sales. The 5 different panels represent the market values on 5 different portfolios. The regressions are robust and t-stat values are presented by the columns t().

1st Portfolio (%)

	$MtB_{efwa,t}$ Coefficient						MtB_{t+r-1} Coefficient		Coefficient Ratios	
Year	*b1*	*t(b1)*	*b2*	*t(b2)*	*b3*	*t(b3)*	*c3*	*t(c3)*	*b2/b1*	*b3/b1*
t+1	-4.31	-4.75	-4.31	-4.75	-4.31	-4.75	-5.13	-10.61	1.00	1.00
t+3	-3.44	-7.76	-3.56	-8.28	-5.37	-6.59	-5.32	-9.17	1.04	1.56
t+5	-3.25	-8.85	-3.32	-10.15	-4.57	-8.39	-6.06	-9.89	1.02	1.41
t+10	-2.82	-5.6	-2.86	-8.32	-3.62	-6.09	-6.16	-10.41	1.01	1.28

2nd Portfolio (%)

	$MtB_{efwa,t}$ Coefficient						MtB_{t+r-1} Coefficient		Coefficient Ratios	
Year	*b1*	*t(b1)*	*b2*	*t(b2)*	*b3*	*t(b3)*	*c3*	*t(c3)*	*b2/b1*	*b3/b1*
t+1	-2.36	-1.38	-2.36	-1.38	-2.36	-1.38	-8.29	-4.32	1.00	1.00
t+3	-4.55	-6.69	-4.57	-6.15	-5.61	-6.66	-11.02	-7.50	1.01	1.24
t+5	-5.30	-6.74	-5.36	-6.95	-6.75	-9.64	-10.67	-7.96	1.01	1.27
t+10	-8.63	-8.14	-8.17	-9.32	-9.71	-9.19	-7.43	-8.25	0.95	1.13

3rd Portfolio (%)										
	$MtB_{efwa,t}$ Coefficient						MtB_{t+r-1} Coefficient		Coefficient Ratios	
Year	*b1*	*t(b1)*	*b2*	*t(b2)*	*b3*	*t(b3)*	*c3*	*t(c3)*	*b2/b1*	*b3/b1*
t+1	-3.08	-5.86	-3.08	-5.86	-3.08	-5.86	-2.22	-3.06	1.00	1.00
t+3	-3.33	-6.78	-2.65	-7.52	-4.71	-5.78	-3.44	-4.95	0.80	1.41
t+5	-3.45	-6.97	-3.00	-6.61	-4.24	-5.83	-4.25	-6.19	0.87	1.23
t+10	-2.14	-10.46	-1.92	-7.37	-2.74	-7.08	-6.44	-8.77	0.90	1.28

4th Portfolio (%)										
	$MtB_{efwa,t}$ Coefficient						MtB_{t+r-1} Coefficient		Coefficient Ratios	
Year	*b1*	*t(b1)*	*b2*	*t(b2)*	*b3*	*t(b3)*	*c3*	*t(c3)*	*b2/b1*	*b3/b1*
t+1	-2.36	-6.12	-2.36	-6.12	-2.36	-6.12	-3.05	-6.16	1.00	1.00
t+3	-2.25	-7.47	-1.92	-7.47	-3.50	-8.94	-2.91	-10.30	0.85	1.56
t+5	-1.94	-5.47	-1.63	-4.98	-2.87	-8.5	-3.60	-7.51	0.84	1.48
t+10	-2.76	-5.09	-2.22	-4.85	-3.49	-4.74	-3.96	-6.13	0.80	1.26

5th Portfolio (%)										
	$MtB_{efwa,t}$ Coefficient						MtB_{t+r-1} Coefficient		Coefficient Ratios	
Year	*b1*	*t(b1)*	*b2*	*t(b2)*	*b3*	*t(b3)*	*c3*	*t(c3)*	*b2/b1*	*b3/b1*
t+1	-3.81	-4.19	-3.81	-4.19	-3.81	-4.19	-4.47	-2.59	1.00	1.00
t+3	-4.01	-4.12	-3.76	-4.57	-5.44	-4.45	-6.43	-3.5	0.94	1.36
t+5	-3.10	-6.86	-3.23	-3.83	-5.05	-4.26	-6.24	-3.41	1.04	1.63
t+10	-2.87	-5.71	-2.51	-4.38	-3.58	-5.44	-6.74	-3.20	0.87	1.25

Table 13: Variable Construction

Construction of the most importable variables used throughout the analysis. The data numbers are referring to the COMPUSTAT variable list items. The computation of this variables was already mentioned in the text.

Name	Computation
Book Equity	Total Assets [data6] – Total Liabilities [data181] – Preferred Stock [data10] + Deferred Taxes [data35] + Convertible Debt [data79]. If Preferred Stock [data10] is missing, is replaced with Redemption Value of Preferred Stock [data56]
Book Debt	Total Assets [data6] – Book Equity
Book Leverage	Book Debt / Total Assets [data6] * 100
Market Equity	Common Shares Outstanding [data25] * Price [data199]
Market Leverage	Book Debt / (Total Assets [data6] – Book Equity + Market Equity) * 100
Net Equity Issues (*e*)	(ΔBook Equity – ΔBalance Sheet Retained Earnings [data36]))/ Total Assets [data6]
Newly Retained Earnings	ΔRetained Earnings [data36] / Total Assets [data6]
Net Debt Issued	(ΔTotal Assets - *e* - ΔRE) / Total Assets [data6]
Market-to-Book	(Total Assets [data6] – Book Equity + Market Equity) / Total Assets [data6]
Asset tangibility	Net Plant, Property and Equipment [data8] / Total Assets [data6]
Profitability	Earnings before Interest, Taxes and Depreciation [data13] / Total Assets [data6]
Size	Log (Net Sales [data12])
Dividends over Book Equity	Common Stock Dividends [data21] / Book Equity
Dividends over Market Equity	Common Stock Dividends [data21] / Market Equity
Depreciation Expense to Assets	Depreciation Expense [data14] / Total Assets [data6]

R&D to Assets	Research and Development [data46] / Total Assets [data6]
R&D Dummy	RDD=1 if Research and Development [data46] is missing; else RDD=0
Log of Assets	Log (Total Assets [data6])