International Research Journal of Finance and Economics
ISSN 1450-2887 Issue 118 January, 2014
http://www.internationalresearchjournaloffinanceandeconomics.com

Market Timing and Capital Structure

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Abstract

This paper revisits the determinants of the firm's capital structure. The main focus is on 'the market timing theory' according to which the current level of capital structure is the cumulative outcome of past attempts to 'time the market' (Baker and Wurgler, 2002) and its impact on the capital structure. In this paper, the impact of mispricing on the capital structure is tested the short run and in the long run using a sample of US firms from 1993-2006 and insider trade as a good proxy of misvaluation,

By controlling for a wide range of determinants of capital structure and by using several methodologies (leverage changes around securities choices, OLS regressions for the effect of past securities issues on leverage, OLS for the effect of historical market conditions on leverage, and OLS regression with cumulative change in leverage as the dependent variable, and partial adjustment regressions (SYS-GMM)), the results show that overvalued firms issue substantially more equity and lower their leverage ratios by more than undervalued firms. However, in contrast to Baker and Wurgler (2002), the negative impact of overvaluation on leverage ratio is not persistent. The effect of past securities issues on capital structure is due to that fact that firms slowly adjust toward their target levels. Overall, although equity issues are timed to period of stock overvaluation, they have no significant lasting effect on capital structure. These results suggest that firms can engage in equity market timing even if they have target debt ratios.

Keywords: Capital Structure, Market Timing, Mispricing, Equity Issues, Equity Repurchases.

1. Introduction

One of the most contentious and controversial issues in the theory of finance has been the theory of capital structure. The genesis of this controversy was the seminal contributions by Modigliani and Miller (1958, 1963). Since the publication of their "irrelevance theory of capital structure", the theory of capital structure has been a topic of great interest to finance economists and a plethora of research has been undertaken in an attempt to identify the determinants of capital structure. For a long period of time, the most prominent theories of capital structure remain the tradeoff theory (Modigliani and Miller, 1963; Jensen and Meckling, 1976; Myers, 1977; Stulz, 1990; Hart and Moore, 1995; Ross, 1977) and the pecking order theory (Myers and Majluf, 1984).

Recently, market timing has begun to take a prominent position in attempting to explain aspects of finance that traditional research has failed to explain. In corporate finance, market timing is the practice of issuing stocks at high prices and repurchasing them at low prices to exploit temporary fluctuations in the cost of equity. Baker and Wurgler (2002) have suggested 'the market timing theory of capital structure' according to which the current capital structure is "the cumulative outcome of past attempts to time the equity market". Although the practice of market timing had already been documented before in many

empirical studies[1], it was the long term persistent effect of market timing on capital structure which drew considerable attention. Baker and Wurgler (2002) raise the persistence question and offer a striking answer. Timing effects on leverage extend beyond ten years. However, since their market timing measure is likely to be proxy for some other firm characteristics, their paper has been subject to a lot of criticism and many new researches start to test the consequences of changes in equity market valuation on capital structure. Until now, researchers didn't reach any consensus on the importance and persistency of market timing on capital structure.

The objective of this paper is to address two questions: "Does market timing determine capital structure?" and "Does it have persistent effect?" This paper attempts to avoid the problem of Baker and Wurgler by using a new timing measure which is more likely to capture market timing. The measure used is insider trading, where overvaluation (undervaluation) is defined as firms whose insiders are net sellers (buyers). The rationale is that insiders have private information and they will react by selling equity when they think that the stock price is overvalued and buying equity when the stock price is undervalued. Accordingly, the market timing behavior will be captured by linking the equity issuance to whether firm's insiders are net sellers or net buyers. This approach measures market misvaluation directly from managerial trades without the intermediate step of using the pricing multiples, resulting in a more natural, direct, and simple measure which doesn't suffer from the limitations of previous mispricing proxies. To prove that this measure can act as a mispricing proxy, the amount of equity issued was compared for firms with net insider sellers versus those with net insider buyers. The result shows that the average net insider sellers firms issue more equity compared to the average net insider buyer firms. Moreover, the difference cannot be explained by the difference in leverage, the availability of growth opportunities, or the need of money since the two types of firms do not differ in their leverage level or in growth characteristics and net insider sellers firms are more profitable. All these findings show that insider trade can act as a proxy for misvaluation.

The analysis of the impact of misvaluation on the capital structure consists of two main parts. First, evidence on the negative effect of managerial insider sales (overvaluation) on the capital structure is provided. Second, the persistency effect on leverage ratio is tested and whether firms quickly adjust toward target leverage is examined. No convincing evidence that equity market timing has persistent effect on leverage has been found. While the results suggest that equity issues are timed to market conditions, the effect of equity issues on leverage is short lived that reverses and completely vanishes in two years. By further analyzing the impact of market timing on capital structure, we found that the misvaluation five years ago doesn't help in determining the current leverage, suggesting that it is unlikely that market conditions is the only factor that affect the capital structure decision. On the other hand, past securities issuances have persistent effect on the firm's leverage ratio. This persistent effect contradicts the previous findings and casts doubt on the tradeoff theory unless adjustment costs are large relative to the benefits of being at the optimum. Therefore, the speed with which firms adjust toward target leverage is estimated. Since the existing literature provided mixed results on the speed of adjustment toward target leverage, their different findings are somehow reconciled by showing that the estimated speed of adjustment is sensitive to the econometric procedure employed in panel data sets. The results show that past securities are affecting the leverage ratio only because firms slowly adjust toward their leverage. By repeating the analysis on subsamples, the results show the importance of the time dimension on the estimated speed of adjustment. The persistent effect of securities on capital structure disappears when firms are adjusting more rapidly. Furthermore, in a post adjustment subsample in which sample firms had just issued new debt and equity, the past securities issues lose

[1] Some studies show that seasoned equity offerings coincide with high market valuations (Taggart, 1977; Marsh, 1982; Asquith and Mullins, 1986; Korajczyk, et al., 1991; Jung, et al., 1996; Hovakimian, et al., 2001) and share repurchases coincide with low market valuations (Ikenberry, et al., 1995). Long term underperformance following seasoned equity offerings is an indirect evidence for firms timing the market as shown in Loughran and Ritter (1995, 1997), Spiess and Affleck-Graves (1995), and Eckbo, et al. (2000), among others. A third evidence for market timing is the survey interview of Graham and Harvey (2001) in which CFO's admit that the market value of the stock (and the recent price run-up) is an important consideration for the timing of the equity issue.

their explanatory power on the capital structure. This suggests that the persistent effect of securities issues on the observed debt ratio is due to delayed adjustments.

Although other concurrent studies reach similar conclusions (Kayhan and Titman, 2007; Alti, 2006; Flannery and Rangan, 2006; Hovakimian, 2006; Hovakimian, 2006 among others), the current study makes a number of distinct contributions that differentiate it from other studies. First, the proxy used in capturing misvaluation is new and contains less noise compared to measures previously used. Also, before using insider trading as a proxy for misvaluation, a test is done to see whether it reflects market timing. Second, it examines in details the role played by market timing across different types of corporate financing transactions by differentiating pure issues and pure repurchases from mixed ones. This separation was motivated by Hovakimian (2004) who finds that the importance of the deviation from target leverage in earlier studies of debt-equity choice was driven by the subsample of equity issues accompanied by debt reductions. Third, it has been argued that firms incur costs in adjusting its leverage ratio toward the target one; yet, many researches failed to recognize the presence of adjustment costs. This serious concern is addressed by using a partial adjustment model and by using a post adjustment sample.

The remainder of the paper is organized as follows. Previous literature on market timing impact on capital structure and an overview of the empirical studies are provided next. Section 3 develops the hypotheses and describes the methodology and section 4 follows with a presentation of the data and a description of the market timing proxy used in this study. Section 5 tests whether insider trading acts a good proxy for misvaluation. Section 6 sets out the empirical results of the effect of market timing on capital structure in the short turn, while section 7 tests the persistent effect on the capital structure. Section 8 continues the empirical analysis by incorporating adjustment costs. Finally, section 9 closes this paper with a summary and conclusion.

2. Literature Review

With the three pre-eminent theories of capital structure (the static tradeoff, pecking order, and market timing), one strand of literature claims that managers attempt to time markets by issuing share when the stock price is overvalued and buying it back when it is undervalued. Accordingly, it is the fluctuations in the stock prices rather than benefits and costs of equity and debt financing that determine the firms' capital structure. The first expansion of the market timing theory is proposed by Baker and Wurgler (2002). They provide evidence that equity market timing has a persistent effect on the capital structure of the firm. They attempt to capture equity market timing attempts by focusing on the historical market to book time series. By using this measure and by controlling the firm's growth opportunities, they found that leverage changes are inversely related to the historical market to book ratio which they interpret as evidence for equity market timing hypothesis. Furthermore, they found that equity market timing attempts have at least a decade long impact on capital structure, inconsistent with the trade-off theory. Thereby, they conclude that the "capital structure of a firm is the cumulative outcome of past attempts to time the equity markets".

However, it is widely accepted that the market to book ratio of equity has a dual role in empirical studies since it is used as a measure of market misvaluation and as a proxy for future growth opportunities. If firms' growth opportunities are measured with error by the current market to book ratio, then historical market to book ratio may be a firm characteristic capturing growth opportunities which suggest a lower leverage. Furthermore, historical market to book ratio might have a role in explaining leverage within the trade-off framework if firms' leverage change slower than its growth opportunities due to the presence of adjustment costs. The main studies testing market timing are discussed below[2].

[2] This paragraph focuses only on studies that examine the long term influence of changes in stock market values on capital structure which appeared after Baker and Wurgler publication in 2002. Therefore, some studies are omitted.

Hokamian (2004) finds that equity issues can be timed to equity market conditions, without having significant long lasting effects on capital structure. Frank and Goyal (2004) find that high market to book ratios have a short term negative influence on debt issuance, with no clear relationship between market valuations and equity issuance activity. They also find that in the long run, firms seem to revert to a certain ratio, which they interpret it as evidence for the existence of optimal capital structure. Additionally, Leary and Roberts (2005) provide evidence that firms attempt to rebalance leverage to stay within an optimal range in three to five years following the equity issuance. The fact that the impact of equity market timing on leverage is a short one has been also documented by Flannery and Rangan (2006), Alti (2006) and Hovakimian (2006). Moreover, Kayhan and Titman (2007) make the point that the significance of the historical market to book series in leverage might be due to the noise in the current market to book ratio. Thus, they split Baker and Wurgler's (2002) measure into two components; the mean market to book ratio reflecting short term effect (measure of growth opportunities) and the covariance between market to book ratio and financing deficit (a measure of timing activity). They show that the persistence result of Baker and Wurgler is driven by the mean market to book ratio rather than the covariance.

Although it is hard to reconcile the findings of Baker and Wurgler (2002) with the traditional static trade-off theory, a dynamic iteration of tradeoff theory with the presence of adjustment costs can present different explanation. The dynamic tradeoff model suggested by Fischer, Heinkel, and Zechner (1989) proposes long waiting periods before adjustment and large deviation from the target capital structure even if small adjustment costs exist. With this different line of criticism, Hennessy and Whited (2005) show that the observed negative link between the historical market to book series and current leverage can be replicated with a dynamic tradeoff model and no market timing opportunities. Similarly, Liu (2005) and Hovakimian (2006) argue that historical market to book ratio is more consistent with models of tradeoff with adjustment costs than with equity market timing hypothesis.

To the contrary, Chen and Zhao (2006) argue that past market to book ratios can explain leverage through persistent financing policies, consistent with market timing hypothesis. Huang and Ritter (2007) note the long lasting influence of past securities issues on leverage as firms rebalance very slowly to their optimal capital structure.

In summary, the validity of the market timing hypothesis in US remains unresolved and this paper is a contribution to this ongoing debate about the persistent effect of market timing on capital structure.

3. Methodology and Hypotheses

To test the effect of equity issuance timing on the capital structure, several hypotheses are formulated. The first hypothesis is that given that managers are timing their equity issues, a negative relationship would be expected between leverage and insider sales and between change in leverage ratio and insider sales.

*H*1: *Overvaluation and leverage ratio are negatively related.*

*H*2: *Overvaluation will negatively affect the change in leverage.*

Furthermore, the market timing theory predicts a long term influence of market conditions on the capital structure.

*H*3: *The negative relationship between leverage and overvaluation should persist for several years after (market timing theory)*

Even the long term impact of equity transactions on capital structure can be still consistent with both the market timing theory and the dynamic trade-off model with the presence of adjustment costs. Assuming that the fixed costs make up a large proportion of the adjustment costs, firms would not make capital structure adjustments frequently, and the deviation from target capital structure would reflect only these costs.

*H*4: *The negative relationship between past equity issues and leverage is not due to adjustment cost (market timing theory).*

Moreover, in a dynamic environment with frictions, a firm's leverage typically deviates from the target level. The post adjustment subsample consists of firm year observations when firms are most likely to be near their target leverage. The historical values should lose their explanatory power on the capital structure in the post adjustment subsample under the dynamic trade off theory or maintain their explanatory power under the market timing theory.

*H*5: *The negative relationship between past equity issues and leverage persists in a post adjustment subsample (dual issues)*

While hypotheses 1 and 2 test the short term impact of equity market timing on the capital structure, the remaining hypotheses test the persistent effect.

The methodologies used to test the short-term impact of market timing on capital structure are (1) Tobit regression framework with leverage ratio as the dependent variable and (2) Ordinary least square regression (OLS) with change in leverage as the dependent variable. On the other hand, the methodologies used to test the persistency effect are (1) leverage changes around securities issues, (2) OLS regressions for the effects of past securities issues, (3) OLS regression for the effect of historical market conditions on leverage, (4) OLS regressions for the cumulative changes in leverage and (5) partial adjustment regressions.

The reported t-statistics in all OLS regression reflect robust standard errors adjusted for heteroscedasticity (White, 1980) and for correlation across observations of a given firm (Rogers, 1993). This might address the problem of biased errors by relaxing the assumption that the errors are identically distributed and independent from each other.

Static panel data model is used for all models except for the partial adjustment model since it enables us to control unobservable individual specific or time specific effect as well as individual heterogeneity by using either firm specific/random effect (Baltagi, 2001). The Breusch-Pagan (1980) Lagrange-Multiplier (LM) test is used to choose between a simple panel-data model without effects and a model with fixed or random effects. To choose between fixed effects and random effects panel data model, Hausman (1978) test was performed where a high p-value favors the use of fixed effects. As for the partial adjustment model, a dynamic panel data model is used, namely System Generalized Method of Moments (SYS-GMM) developed by Arellano and Bover (1995) and Blundell and Bond (1998).

4. Data

4.1. Data Source and Sample Construction

The data used in this paper covers firms in the Compustat Industrial Annual from 1992 to 2006, excluding financial firms with a Standard Industrial Classification (SIC) codes between 6000 and 6999, with a format code of 4, 5 or 6[3] with missing data on total assets, and with a book value of assets of less than $10 million to eliminate very small firms and reduce the effect of outliers. Because the regression specification includes lagged variables, firms with fewer than two consecutive years of data are also excluded.

The insider trading sample is obtained from Compustat's Executive Compensation Database (Execucomp) - an annual database reporting manager level information on managerial equity ownership, option holdings, equity grants, option grants, and option exercises starting from 1992 for only the top five highest paid executives. However, this database doesn't report open market purchases and sales directly. Therefore, following Jenter (2005), net open market sale for a manager in year t will be constructed as the annual change in stock holdings minus the number of shares acquired through option exercises and stock grants. This approach requires taking first differences of the number of shares, thus implying loss of one year of data and it requires a manager to be present in the database for at least two consecutive years. Observations with missing shareholdings, negative reported shareholdings, and negative reported stock or option grants are eliminated from the sample.

[3] Format code 5 is for Canadian firms, and format codes 4 and 6 are not defined in COMPUSTAT.

To be included in the sample for calendar year t, a firm must have total assets and total liabilities for the fiscal years ending in calendar years t-1 and t. Therefore, the main empirical analysis of the study is conducted over 14 year period between 1993 and 2006, though they utilize data from earlier year. Variables definitions mostly follow Baker and Wurgler (2002) with few modifications and they are presented in Appendix B. Following Hovakimian's (2004) approach, a firm is defined as issuing equity (debt) when net equity (debt) issuance exceeds five percent of the pre-value of total assets. A firm is defined as repurchasing equity (debt) when net equity (debt) repurchased exceeds five percent of the pre-issue value of total assets. The five percent screen has used widely in a number of studies (Hovakimian, et al., 2001; Korajczyk and Levy, 2003; Hovakimian, 2006; Hovakimian, et al., 2004) and its accuracy has been confirmed as it shows to coincide with most equity issues reported in the Securities Data corporation (SDC) database[4]. Firm year observations are dropped if any of the variables BL, MB, ΔD, Δ E, Δ RE, PRF, SIZE, TNG, are missing in any fiscal year. Furthermore, firm-years observations with book leverage (BL) higher than one 5or market to book ratio (MB) greater than ten are also dropped.

4.2. Definition and Construction of Insider Trading

Although existing empirical tests of misvaluation theory commonly use accounting multiples to measure overvaluation[6], this paper measures market misvaluation directly from managerial trades, which avoids the potential biases[7] arising when calculating the fundamental value of the firm using accounting variables. Instead, insider trading assesses whether managers perceive their firms as overvalued or not, a perception which ultimately triggers the managerial decision to issue equity or not. If managers are timing the market in their corporate finance decision by issuing stock when it is overvalued and repurchasing it when it is undervalued, they should do the same with their own money. Acting on their private information, and as long as the managers believe their firm is overvalued, they will try to liquidate their personal holdings of own company stock at the overvalued market prices and refrain from buying it on the open market. This will lead to an increase in insider sales and a decrease in purchases when the firm is believed to be overvalued by its managers. As a result, overvalued firms will be more likely those firms whose insiders are net sellers rather than net buyers.

However, it is important to make sure that manager's insider trading is indeed proxying for market misvaluation. First, it is necessary to establish that managerial trades are informed trades. Second, it is essential that managers behave opportunistically in their personal trades; so that they decrease their purchase and increase their sales if they believe that their firm is overvalued.

Concerning the informational content of insider trading, this has been well documented in the literature. Previous studies of managerial decisions unanimously show that insiders are indeed better informed about their companies' prospects, they profit from trading in shares of their firms, and they earn abnormal returns by demonstrating an ability to consistently 'buy low and sell high' (Jaffe, 1974; Finnerty, 1976; Seyhun 1986, 1998; Rozeff and Zaman, 1988; Lin and Howe, 1990).

To see whether managers on average trade opportunistically and whether they will increase (decrease) their sales and decrease (increase) their purchases prior to the announcement of bad (good) events., numerous studies have investigated insider trading behavior around corporate announcements

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[4] The SDC database is a Thompson Financial Product that provides information about major corporate events, including new debt and equity issues, mergers and acquisitions, etc.

[5] This criterion is only imposed on book leverage and has no effect on market leverage, since market value cannot be less than zero and therefore market leverage is never greater than one. However, to maintain consistency, these observations are also dropped from the market leverage samples.

[6] For example, Dong, et al. (2007) define market misvaluation as the discrepancy between the market price and a contemporaneous measure of the fundamental value. To measure the fundamental value, they use the ratio of price to book value of equity (P/B) and the ratio of price to residual income model value (P/V). Rhodes-Kropf, et al. (2005) use market-to-book (M/B) as a measure of misvaluation. They decompose M/B into a 'valuation component' and a 'growth component' and calculate measures of fundamental value by running cross sectional regressions of market values on accounting fundamentals each year.

[7] These biases arise due to the fact that accounting variables might proxy for other factors like future growth opportunities and risk besides the fundamental value (Daniel, et al.,2001; Barberis and Huang, 2001)

including equity offerings (Gombola, et al., 1997; Cheng, et al., 2006); bankruptcy (Seyhun and Bradley, 1997) and takeovers (Seyhun, 1990). Penman (1982) shows that insiders time their trade relative to announcements of earnings forecasts. Elliot, et al. (1984) find that managers increase their buying (selling) prior to favorable (unfavorable) earning announcements. Lee, et al. (1992) find increased buying prior to repurchase tender offers. Karpoff and Lee (1991) find increased selling prior to seasoned equity offerings. Akbulut (2005) finds strong evidence for managerial opportunism by finding managers increasing their sales prior to bad mergers even after controlling for non-informational motivations for trading like portfolio rebalancing, diversification and wealth effects. Therefore, examining the managerial trade gives a good indication of the degree of firm's misvaluation.

To focus on information related transactions, only open market transactions are analyzed since insiders' open market sales and purchases are more likely to represent actions taken as a result of special insider information (Seyhun, 1986). All other types of insiders' transactions, such as exercises of options, shares acquired through a plan, and so forth, are excluded. Therefore, net insider selling is calculated as:

Net Insider Selling = Open Market Sales – Open Market Purchases

Since Execucomp database doesn't report open market purchases and sales directly, net open market sale for a manager in a given year will be constructed following Jenter (2005)

Net Insider Selling = – [Change in share holdings + Change in option holding - Option granted - Shares granted].

Shareholding is defined in the database as shares held directly, including restricted shares, but excluding options. This measure is used in terms of number of shares. All share quantities in the database are raw numbers that need to be adjusted for stock splits and stock dividends.

However, this way of calculation might be biased. In reality, managers might exercise options and sell stocks to rebalance their portfolios, maintain or achieve stock ownership target, meet needs for personal liquidity, etc and not to exploit market conditions. These problems exist more specifically in the database used. Since the database reports the compensation and transactions done by the top five highest paid executives, the latter are more likely to receive stock grants and options as part of their compensation and therefore are more likely to sell more on the open market (Ofeck and Yermack, 2000).[8] To control for this portfolio rebalancing motive, the levels of stock and option grants during the fiscal year, the levels of company stock and option holdings at the beginning of the fiscal year should be controlled. Because these numbers are used in the calculation of the insider variable, they cannot be included in the regression. To control for this bias, insider trading used in the paper will be represented by a dummy variable that takes a value of 1 if net insider selling is positive (the firm is a net seller) and 0 otherwise (if the firm is a net buyer).

5. Insider Selling as a Proxy for Timing Attempts?

To make sure that insider behavior reflects timing attempts, the proportion of equity issuers and the amount of equity issued will be compared for firms with net insider sellers versus those with net insider buyers. If insider behavior represents misvaluation, one would expect firms to issue more equity when insiders are selling their shares.

*H*6: *If insider trading reflects market timing, there should be a significant difference in the proportion of equity issuers between net insider buyers and net insider sellers firms.*

*H*7: *If insider trading reflects market timing, there should be a significant difference in the amount of equity issued between net insider buyers and net insider sellers firms.*

To test hypothesis 6, Panel A of table 1 reports the relationship between insider behavior and firm's decision to issue equity by comparing the number of firms whose insiders are net sellers and issuing equity as a percentage of the total number of firms issuing equity to the number of firms whose insiders are net buyers and issuing equity as a percentage of the same total number of firms. Firms are

[8] The database used reports the compensation data for the top five highest paid executives, who are more expected to get more stock grants and options as part of their compensation and salary.

defined as net insider buyers if insider trade <0, and as net insider sellers if insider trade>0. On the other hand, firms are defined as pure equity issuers if net equity issued (ΔE) exceed 5% of pre-issue value of total assets with no other financial transactions done. In a sample of 1,064 pure equity issuers firms, 320 (30.08%) equity issuance occur in firms with net insider buyers and 735 (69.08%) occur in firms with net insider sellers, a statistically significant difference. Thus, net insider sellers firms tend to issue more equity, supporting our hypothesis that insider trading behavior reflects misvaluation.

Panel B of Table 1 tests hypothesis 7 by reporting the mean value of equity issues (*Total Proceeds*) for net insider buyers and net insider sellers firms. The result indicates that firms with net insider sellers sell substantially more equity than do firms with net insider buyers. For example, the proceeds are on average $66.168 million for firms with net insider sellers, compared to $ 49.715 million for firms with net insider buyers, representing an increase of 33% relative to net insider buyers firms, a highly significant difference.

Table 1: Market timing Effects on Issuance Decisions

Panel A: Equity issuance decisions for net insider buyers vs. net insider sellers firms

Insider Behavior	**Pure Equity Issuers**	
	Number	**Proportions**
Net Insider Buyers	320	.3008
Net Insider Sellers	735	.6908
No Insiders Trade	9	.0085
Difference between Net Insider buyers and Net Insider Sellers		-.39
(z-statistics)		(-43.26)***

Panel B: Mean Values for Net Insider Buyers versus Net Insider Sellers

	(1) **Total Proceeds ($ millions)**
Net Insider Buyers	49.715
Net Insider Sellers	66.168
Difference	-16.452
(t-value)	(-4.194)***

Panel A reports the frequency of equity issuance for firms with net insider buyers versus net insider sellers. Panel B reports the mean value among insider buyers- and insider sellers firms and the t-value of their difference for different measures of Y_t.
Values significantly different from zero at the 10%, 5% and 1% levels are marked *, **, and ***respectively

The fact that net insider sellers firms issue more equity than net insider buyers might be due to reasons other than market timing. To check whether alternative explanations for the observed patterns exist, pre-issuance leverage, post issue investment, and post issue profitability are analyzed following a similar approach to Alti (2006). First, it could be that these net insider sellers are severely overleveraged prior to equity issuance and try to revert back to their target leverages by issuing equity. Table 2 reports the mean book leverage for firms with net insider buyers and net insider sellers at the beginning of the year. The results reject the hypothesis that net insider sellers firms are issuing equity to offset excess leverage. Net insider sellers firms have a significantly lower rather than higher leverage. Therefore, they should have tendency to issue more debt instead of equity to come closer to their leverage targets. Another possible explanation for the equity issuance activity is that net insider sellers firms are growing faster. The second column of table 2 compares the investment behavior of net insider sellers versus net insider buyers. Contrary to the growth explanation, the two groups of firms show similar results, indicating that net insider sellers firms do not have growth opportunities more than net insider buyers firms. The third and the fourth columns report the future investment behavior of firms by looking at the investment rate at two subsequent years. The results show that there is no tendency for net insider sellers firms to invest more in the future. This evidence shows that equity issuance is not driven by the investment behavior of firms.

Table 2: Comparison of Net Insider Buyers- and Net Insider Sellers-Firms

	(1) Book Leverage $_{t-1}$	(2) INV/A_t	(3) $(INV/A)_{t+1}$	(4) $(INV/A)_{t+2}$	(5) EBITD/A	(6) $(EBITD/A)_{t+1}$	(7) $(EBITD/A)_{t+2}$
Net Insider Buyers	2.612	6.324	6.234	6.200	13.654	13.660	13.835
Net Insider Seller	2.263	6.455	6.373	6.221	15.698	15.451	15.116
Difference (t-value)	0.349 (10.996)***	-.131 (-1.278)	-.139 (-1.316)	-.0209 (-0.195)	-2.044 (-11.711)***	-1.791 (-9.747)***	-1.281 (-6.663)***

For each variable *Yt*, Panel A reports the mean value among Net Insider Buyers- and Net Insider Sellers- firms and the *t*-value of their difference. Firms are defined as net buyers if the net insider selling is negative, and they are defined as net sellers if the net insider selling is positive. The dependent variable Yt is the total book leverage at t-1 defined as long-term debt + short-term debt scaled by assets (Item 6) in column 1, INV/A is investment defined as capital expenditures divided by year end assets in year t, t+1, and t+2 in columns 2-4 respectively. EBITD is profitability defined as earnings before interest, taxes, and depreciation divided by year end assets in year t, t+1, t+2 in columns 5-8 respectively. All variables are expressed in percentage terms.
Values significantly different from zero at the 10%, 5% and 1% levels are marked *, **, and ***respectively.

Favorable market conditions might encourage firms to issue equity even if they are not in need of money. Therefore, Column 5-7 reports the profitability of each firm in year t and in subsequent years. Supporting this view, firms with net insider sellers are more profitable than firms with net insider buyers. The high profitability of net insider sellers firms persist for more than one year. This result shows that the issuance decision of net insider sellers firms is not related to their need of money and that these firms might issue equity to take advantage of the favorable market conditions.

To summarize, net insider sellers firms issue more equity than net insider buyers. This effect doesn't stem from any difference in leverage prior to the transaction, or external financing needs now and in the future. The prevalence of large profitability among firms with net insider sellers provides further evidence for market timing.

6. Effect of Equity Market Timing on Capital Structure

The empirical analysis of the effect of misvaluation on capital structure proceeds in three steps. The first step is to verify the negative and significance relationship between insider sales and leverage ratio on one side and between insider sales and annual change in the leverage ratio on the other side. Overvaluation was found to negatively affect both the leverage ratio and the change in leverage. Subsequently, the persistency effect of insider trade on the capital structure is tested in section 7 and adjustment costs are incorporated in explaining the impact of market timing on the capital structure in section 8.

6.1. Descriptive Statistics

Table 3 presents the summary statistics for the firm's leverage, size, market to book ratio, tangibility, profitability and other important characteristics.

Table 3: Summary Statistics

Variable	Description	Mean	Standard Deviation
BL	Book Leverage	0.239	0.166
INS	Insider dummy variable	0.613	0.487
TNG	Tangibility	0.347	0.229
PRF	Profitability	0.148	0.097
R&D	Research and Development	0.027	0.053
SIZE	Size	7.318	1.567
M/B	Market to Book Ratio	1.955	1.316
KZ index[1]	Financial Constraints	0.394	1.174
Nb of Observations		**10,477**	

This table reports the mean and the standard deviation of each variable. Variables are defined in Appendix B

The Pearson correlation matrix (Table 4) shows that there are no multicollinearity problems between the variables. Most of the variables are significant at the 1% level; for instance, leverage was found to be positively correlated with tangibility, size, and financial constraints, yet negatively correlated with insider sales, growth, profitability, and research and development.

Table 4: Pearson Correlation Coefficients

	BL	INS	TNG	PRF	SIZE	M/B	R&D	RDd
BL	1							
INS	-0.098***	1						
TNG	0.292***	-0.079***	1					
PRF	-0.181***	0.111***	0.051***	1				
SIZE	0.209***	0.038***	0.075***	0.092***	1			
M/B	-0.327***	0.135***	-0232***	0.397***	-0.134***	1		
R&D	-0.239***	0.055***	-0.299***	-0.191***	-0.262***	0.356***	1	
R&Dd	0.253***	-0.075***	0.323***	-0.029***	0.022**	-0.218***	-0.432***	1
KZindex[1]	0.391***	-0.011	0.083***	-0.234***	0.020**	-0.107***	-0.073***	0.071***
KZindex[2]	0.452***	-0.049***	0.145***	-0.333***	0.059***	-0.414***	-0.175***	0.131***

This table displays the Correlation Coefficients of the variables. Variables are defined in Appendix B.
Note: *,**,*** indicate significance at the 10%, 5% and 1% level, respectively.

6.2. Determinants of Leverage -Baker and Wurgler's Replication

The first approach to detect market timing consists of regressing the leverage ratio on a set of explanatory variables. This follows Baker and Wurgler (2002) and Hovakimian (2006) amongst others with some changes in the definition of some variables.

$$BL_{it} = \beta_0 + \beta_1(INS) + \beta_2(TNG_{it-1}) + \beta_2(PRF_{it-1}) + \beta_4(SIZE_{it-1}) + \beta_5\left(\frac{M}{\pi}_{it-1}\right) + eit$$

Where BL is the book leverage as defined in the appendix; the timing measured used is represented by INS, a dummy variable which takes the value of one if insider trading is positive (firm's insiders are net sellers) and zero otherwise (firm's insiders are net buyers)[9]. Since market timing implies that firms tend to raise equity in case of overvaluation, it is expected to have a negative relationship between overvaluation (represented by firms whose insiders are net sellers) and leverage ratio.

*H*1: *Overvaluation and leverage ratio are negatively related.*

*H*1.1: *The coefficient of INS should be negative* (β1<0)

The set of independent variables included, which explicitly control for firm specific characteristics, are same as used by Baker and Wurgler (2002), and they are Tangibility (TNG), Profitability (PRF), Firm size (SIZE), and Market to book ratio (M/B). Tangibility is positively related to leverage because a high level of tangible assets would mean higher availability of collateral to get debt (β2>0) (Harris and Raviv, 1991). Profitability (PRF) may result in lower leverage ratio as greater earning reduces the needs for external debt (β3 <0 under pecking order theory) (Myers, 1977; Myers and Majluf, 1984), or it may result in higher leverage as the firm will have higher debt capacity and profitable firms may signal quality by leveraging up (β3 >0 under tradeoff theory) (Jensen, 1986; Hart and Moore, 1995). Firm size (SIZE) is positively related to leverage since large firms have less bankruptcy costs, more diversification, less moral hazard and adverse selection costs, allowing a higher optimal debt capacity (Titman and Wessels, 1988; Whited, 1992) (β4>0 under the tradeoff theory). Market to book ratio (M/B) reflecting future growth opportunities is associated with more equity financing, as explained by Rajan and Zingales (1995) based on agency cost models. More specifically,

[9] Insiders have some private information (Jaffe 1974; Finnerty 1976; Seyhun, 1986, 1988; Jenter 2005) and they react accordingly by selling equity when they think the stock price is overvalued and buying equity when the stock price is undervalued (Karpoff and Lee, 1991). Accordingly, firms are overvalued when insiders are selling their stock, as represented by INS

firms tend to limit their leverage to avoid the possibility of passing some positive projects, and thus to protect growth opportunities (Myers, 1977; Myers and Majluf, 1984) ($\beta 5<0$).

The model used is a simple ordinary least square regression of leverage with robust t-statistics reflecting standard errors adjusted for Heteroscedasticity. Breusch-Pagan (1980) test for heteroskedasticity was performed and the high result of chi^2 (110.16) rejects the null hypothesis of homoskedasticity, indicating the existence of a problem and therefore t-statistics are adjusted for heteroskedasticity. The regression results are presented in Table 5.

The insider effect on the level of leverage is negative and significant ($\beta_1<0$ consistent with hypothesis 1.1), supporting previous findings that insider sales increase and purchases decrease prior to equity issuance (Lee, 1997; Kahle, 2000). As for other variables, the results are similar to those in previous studies. The coefficient of tangibility variable is positive, statistically significant at the 1% level, consistent with the hypothesis that tangible assets serve as better collateral for conservative credit lenders ($\beta_2>0$). Profitability enters regressions with a negative and significant coefficient, consistent with Myers (1984). Size enters the regression with a positive and significant coefficient, in line with the hypothesis that larger firms have more stable cash, which reduce the probability of bankruptcy and the cost of financial distress and increase the probability of benefiting from the debt tax shield ($\beta_4>0$).

The theory of corporate finance suggests a negative relationship between leverage and growth opportunities (Stulz, 1990). Consistent with this, our results show that the growth opportunity variable measured by market to book ratio is negatively related to leverage ($\beta_5<0$). This is a validation of Rajan and Zingales' (1995) argument that due to underinvestment problem, firms expecting high future growth use a greater amount of equity finance. It could also be related to the concept of agency costs, since growing firms might prefer to use their own equity to finance new projects in order to secure for themselves, instead of creditors, the expected future returns. An alternative explanation is that managers are reluctant to issue equity when their firm's market to book ratio is low because they believe that the stock is undervalued.

The robustness of the results is checked in many ways. First, the definition of leverage used is based on book values. An alternative specification is to base leverage on market values, particularly market value of equity. The results are consistent with those previously reported with no significant changes. Second, since the dependent variable can take on values between zero and one, the regression is run using a Tobit regression with double censoring. The results are also consistent with those previously reported.

Table 5: Determinants of Leverage (Baseline Results)

	(1) Book Leverage		(2) Market Leverage		(3) Book Leverage (Tobit)	
	Coeff	**t-stat**	**Coeff**	**t-stat**	**coeff**	**t-stat**
INS	-0.021	-7.08***	-0.028	-11.57***	-0.021	-6.90***
TNG_{t-1}	0.171	26.66***	0.166	29.90***	0.185	27.33***
PRF_{t-1}	-0.232	-7.48***	-0.262	-14.15***	-0.243	-13.82***
$SIZE_{t-1}$	0.019	21.15***	0.014	18.07***	0.022	22.93***
M/B_{t-1}	-0.024	-12.01***	-0.037	-25.47***	-0.029	-21.05***
Intercept	0.132	15.68***	0.143	19.96***	0.108	12.97***
R^2	0.198		-0.028			
Number of Observations	11,641		11,641		11,641	
Root MSE	0.149		0.123			
F statistics	490.42		898.21			

$$BL_{it} = \beta_0 + \beta_1(INS) + \beta_2(TNG_{it-1}) + \beta_2(PRF_{it-1}) + \beta_4(SIZE_{it-1}) + \beta_5(\frac{M}{\pi}_{it-1}) + eit$$

The dependent variable is either the book leverage in column 1 or the market leverage in column 2. The independent variables are defined in Appendix B. The first two columns show the ordinary least squares regression of leverage with robust t-statistics reflecting standard errors adjusted for Heteroscedasticity. Column 3 shows the results of the tobit specification with double censoring. All control variables are lagged one year. Values significantly different from zero at the 10%, 5% and 1% levels are marked *, **, and *** respectively.

6.3. Determinants of Leverage

This part further quantifies the negative impact of market timing on leverage by running another regression similar to the first one but with the introduction of 3 more variables: (i) Research and development *(R&D)* identified by previous research as a determinant of corporate capital structure choice (Titman, 1984; Titman and Wessels, 1988; Rajan and Zingales, 1995). R&D, by representing either unique products or discretionary future investment opportunities, increases the costs of financial distress and implies a low impact on leverage (Myers, 1977) (β_6<0); (ii) a dummy variable RDd which takes the value of one when R&D is missing to differentiate firms that do not report R&D from those that report (Titman and Wessels, 1988; Alti, 2006 among others); and (iii) KZ index that measure financial constraints. Under the market timing hypothesis, a firm will time equity issues to coincide with market peaks (Baker and Wurgler, 2002). The likelihood of being able to do so depends on the financial constraints of the firm. A financially unconstrained firm will be more likely to be able to time its equity issues to coincide with peaks in equity prices, while a financially constrained firm will be less likely to wait for the optimal point in time for an equity issue (Korajczyk and Levy, 2003). On the other hand, the pecking order theory expects that a financially constrained firm is more likely to issue equity rather than debt (β_8 >0 according to the market timing theory or β_8 <0 according to the pecking order theory).

To further control for heterogeneity in industry characteristics, the regression includes industry dummy variables using Fama and French (1997) 48 industry classification. Since the value of leverage (book or market) is bounded between 0 and 1, a Tobit regression with double censoring is used[10]. The regression is as follows:

$$BL_{it} = \beta_0 + \beta_1(INS) + \beta_2(TNG_{it-1}) + \beta_3(PRF_{it-1}) + \beta_4(SIZE_{it-1}) + \beta_5\left(\frac{M}{B}_{it-1}\right)$$

$$+ \beta_6(R\ \&\ D_{it-1}) + \beta_7(RDd_{it-1}) + \beta_8(KZindex_{it-1}) + industry\ dummies + eit$$

Where variables are defined in appendix B, with KZ index as Kaplan and Zingales (1997) index used in previous studies (Lamont, et al., 2001). More specifically, KZ index is defined as -1.002 CF_t-39.368DIV_t-1.315C_t+3.139BL_t+0.283M/B_t. The index takes on larger values with increasing constraints. Since the market to book ratio is a separate variable that might be correlated with misvaluation, a modified version of this index (KZ index^2) that excludes M/B is used (Baker, et al., 2003).

Table 6 summarizes the coefficient estimates obtained from the regression of book leverage. Column 1 reports the results of the traditional leverage with the inclusion of R&D variables; the second and third columns incorporate KZ index in the regression by using five-variable version and the adjusted version without M/B respectively

The results are consistent with Table 5 with no changes in the sign and significance of coefficients. As for R&D, its coefficient is negative, supporting the argument that the agency costs of debts are higher for firms with higher growth opportunities (Myers, 1977) and that these firms are more likely to issue equity (Titman and Wessels, 1988). As for KZ index, it enters the regression with a positive and highly significant coefficient, confirming that the more financially constrained a firm is, the less equity it issues and the higher its leverage will be, consistent with the market timing theory.

The results presented in Table 6, column 3 suggest that the findings are robust with respect to different definitions of KZ index. The effect of net insider trade on leverage does not change across columns.

Summing up, various firm characteristics are highly significant determinants of leverage ratio; furthermore, industry level variation is taken into account. Nevertheless, the insider sales dummy variable retains both its negative size and significance even after introducing additional control variables. Thus, the leverage ratio cannot be explained by only the standards determinants of capital structure and the robustness of the significance and coefficient of net insider seller provides a conclusive conclusion about the market timing effect on leverage ratio.

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[10] The results are similar when using a simple ordinary least square regression with robust t-statistics adjusted for Heteroscedasticity

Table 6: Determinants of Leverage Book leverage as the dependent variable

Independent Variables	(1)		(2)		(3)	
	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat
INS	-.013	-4.42***	-.017	-5.99***	-.015	-5.80***
TNG_{t-1}	.119	12.41***	.084	9.14***	.086	9.38***
PRF_{t-1}	-.266	-14.31***	-.057	-3.10***	-.063	-3.39***
$SIZE_{t-1}$	.022	22.02***	.020	20.96***	.020	21.18***
M/B_{t-1}	-.021	-13.77***	-.023	-16.23***	-.009	-5.51***
$R\&D_{t-1}$	-.221	-5.50***	-.078	-2.06**	-.095	-2.51**
RDd_{t-1}	.037	9.02***	.046	11.03***	.045	10.82***
$KZ\ index^1{}_{t-1}$			.057	44.95***		
$KZ\ index^2{}_{t-1}$					.056	43.57***
Intercept	.135	4.15***	.188	4.74***	.193	4.91***
N	11,641		10,477		10,442	
LR Chi2	4348.43		5835.54		5854.76	

$$BL_{it} = \beta_0 + \beta_1(INS) + \beta_2(TNG_{it-1}) + \beta_3(PRF_{it-1}) + \beta_4(SIZE_{it-1}) + \beta_5(\frac{M}{B}_{it-1}) + \beta_6(R\ \&\ D_{it-1})$$

$$+ \beta_7(RDd_{it-1}) + \beta_8(KZindex_{it-1}) + industry\ \ dummies\ \ + eit$$

Column 1 reports the results of the simplest version of regression, which includes R&D and R&Dd. Column 2 adjusts the regression by incorporating $KZindex^1$. Column 3 replaces $KZindex^1$ by $KZindex^2$ which is defined as $KZindex^1$ without M/B. All control variables are lagged one year. Industry dummies using Fama and French (1997) 48 industry definitions are included. Tobit specification is used since leverage ratio is restricted to be between 0 and 1. The statistics for the industry dummies are suppressed. Values significantly different from zero at the 10%, 5% and 1% levels are marked *, **, and ***respectively.

6.4. Determinants of Annual Changes in Leverage

This section documents the net effect of insider sales (overvaluation) on the annual changes in leverage. Then, the change in leverage is decomposed to examine whether the effect comes through net equity issues, as the market timing implies.

*H*2: *Overvaluation will negatively affect the change in leverage.*

*H*2.1: *The coefficient of INS should be negative* ($\beta 1<0$)

Two more variables are added to the regression and they are (i) financial deficit and (ii) lagged book leverage

$$BL_{it} - BL_{it-1} = \beta_0 + \beta_1(INS) + \beta_2(TNG_{it-1}) + \beta_3(PRF_{it-1}) + \beta_4(SIZE_{it-1}) + \beta_5(\frac{M}{B}_{it-1})$$

$$+ \beta_6(R\ \&\ D_{it-1}) + \beta_7(RDd_{it-1}) + \beta_8(KZindex_{it-1}) + \beta_9(DEF_t) + \beta_{10}(BL_{it-1}) + industry\ dummies + eit$$

Where change in leverage is the dependent variable. The independent variables are as defined before with DEF as the financial deficit and BL_{t-1} as the lagged leverage.

Following Kayhan and Titman (2007), the financial deficit, or equivalently the amount of external capital raised is included in the regression since it plays a central role in both Myers' pecking order effect as discussed in Shyam-Sunder and Myers (1999) and Frank and Goyal (2003) and the timing effect as discussed by Baker and Wurgler (2002). It is associated with high leverage under the pecking order theory since firms tend to use less risky securities (debt) to finance their deficit ($\beta 9>0$). Lagged leverage is included in the regression because leverage is bounded between zero and one[11]. When leverage is near one of these boundaries, the change in leverage can go in only one direction, regardless of the effects and the values of other variables. Thus, firms with high leverage are more likely to experience a decline in leverage, and firms with low leverage are more likely to experience an increase in leverage ($\beta 10<0$). It should be noted that Baker and Wurgler (2002) estimate a change in leverage regression which is similar to this one except that it doesn't include INS, R&D, KZ index, and DEF as regressors [12].

[11] Lagged book leverage is included in previous studies whenever change in leverage is used as the dependent variable (Baker and Wurgler, 2002; Alti, 2006; Hovakimian, 2004 among others)

[12] See Baker and Wurgler's Table II, Panel A

After controlling for firm and industry characteristics, the insider sales effect on the change in book leverage is -0.8 percentage points and is significant (β_1<0, hypothesis 2.1). Furthermore, the net effect of market to book is to lower leverage (β_5<0), which might be interpreted as evidence of market timing. Other interesting results are as follows. Asset tangibility enters significantly with a positive sign to increase leverage, similar to size coefficient and consistent with theoretical hypotheses. However, profitability lost its significance. Lagged leverage enters with a negative sign as expected (β_{10}<0) and financial constraints tend to reduce leverage, but only significant at 10% (β_9>0).

However, at this point, the possibility that the negative effect of overvaluation on the change in leverage is caused by higher retained earnings or lower debt and not by equity issues cannot be discarded. Therefore, it is important to explore whether the relationship between overvaluation and changes in leverage is due to equity issues as the market timing theory would imply. Therefore, following Baker and Wurgler (2002), the change in leverage is decomposed into three parts: change in equity issues net of retained earnings (*ΔE/A)*, changes in retained earnings (*ΔRE/A)*, and the residual change in leverage. The latter can be further decomposed into the change in cash and the change in non-cash assets as follows.

$$BL_{it} - BL_{it-1} = \Delta E / A_t - \Delta RE / A_t - \left[E_t(1/A_t - 1/A_{t-1})\right]$$

$$= -\frac{\Delta E}{A_t} - \frac{\Delta RE}{A_t} = \left[(E/A)_{t-1} \frac{\Delta\, Cash + \Delta\, Non - Cash}{A_t} \right]$$

The market timing theory would predict the net effect of market timing on change in leverage to be driven by net equity issues.

*H*2.2: *With net equity issues as the dependent variable, the coefficient of INS should be positive* (β1 >0)

Following Baker and Wurgler (2002), Table 7 summarizes the results of running each component of change in leverage on insider dummy variable and other control variables. The results in column 2 indicate that the effect on leverage doesn't only go through net equity issues inconsistent with the market timing theory. The insider behavior is positively related to changes in retained earnings, indicating that insider sales affects book leverage because it forecasts earnings.

Therefore, although firms time their equity issuance decisions, market timing is much less important in the determination of capital structure; other factors affect it as well.

Up to now, some important facts can be derived from the analysis and can be summarized as (i) net insider sellers firms reduce their leverage in the year of misvaluation, and hence (ii) net insider sellers firms continue to exhibit a low leverage ratio at the end of the misvaluation year. Results found are consistent with hypotheses 1 and 2 previously formulated. Although the results show that firms are able to take advantages of market conditions in equity issues (as reflected by the significance of insider dummy), the results also suggest that market timing is much less important since insider behavior impact on changes in leverage doesn't come exclusively via new equity issues.

Table 7: Short Term Impact of Market Timing on Capital Structure
Panel A: Regression Analysis

	(1) $D/A_t - D/A_{t-1}$		**(2)** (e/A_t)		**(3)** **Residual Change in Leverage**		**(4)** $-(\Delta RE/A_t)$	
	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	Stat
INS	-0.008	-5.31***	0.006	3.86***	0.014	3.99***	-0.016	-4.89***
TNG_{t-1}	0.013	2.38**	0.020	2.91***	0.012	1.18	0.020	1.88**
PRF_{t-1}	0.005	0.32	-0.178	-5.42***	0.353	9.91***	-0.526	-10.82***
$SIZE_{t-1}$	0.004	7.40***	-0.005	-9.31***	-0.002	-1.30	-0.000	-0.07
M/B_{t-1}	-0.004	-3.98***	0.008	4.53***	0.010	5.50***	-0.007	-2.93***
$R\&D_{t-1}$	-0.043	-1.32	0.171	3.54***	0.031	0.41	0.097	1.09
$R\&Dd_{t-1}$	0.003	1.14	0.000	0.004	0.011	1.31	-0.008	-1.05
KZ $index^2_{t-1}$	-0.002	-1.80*	-0.001	-0.56	0.009	4.08***	-0.012	-4.42***

Table 7: Short Term Impact of Market Timing on Capital Structure – continued

Panel A: Regression Analysis

DEF_t	0.097	12.83***	0.184	16.53***	0.259	17.62***	0.022	2.67***
BL_{t-1}	-0.152	-18.46***	0.060	7.36***	-0.165	-7.10***	0.073	3.25***
R^2	0.2035		0.4405		0.2659		0.1328	
N	10,402		10,402		10,402		10,402	
F-stat	16.08		18.91		50.13		31.32	

Values significantly different from zero at the 10%, 5% and 1% levels are marked *, **, and *** respectively.

As shown in the table 6, these two models and their coefficients are significant at industrial group level. But, only for investment industry, comprehensive income is superior to net income. As shown in the last two raw of table 6, in auto industry, adjusted R^2 of model 7 is 0.803 and p-value of coefficient of independent variable (NI) is significant. While, adjusted R^2 for model 8 is 0.816, but, Vuong's Z-statistic is not significant and do not show that, in this industry comprehensive income is superior to net income. In investment industry for model 7, adjusted R^2 is 0.690 and p-value of coefficient of independent variable is significant. While, adjusted R^2 for model 8 is 0.721 and show that, in this industry comprehensive income is superior to net income. Also, Vuong's Z-statistic shows this issue.

7. Persistency

There is a widespread agreement that market timing affects the capital structure, but the main debate is regarding the persistency of this effect. If firms are maintaining a target leverage ratio as suggested under the trade-off theory, firms will subsequently rebalance away the influence of misvaluation and market timing would have only a short run impact on the capital structure. On the other hand, market timing hypothesis of capital structure requires that firms should not adjust or neutralize the impact of market timing from their capital structure.

*H*3: *The negative relationship between leverage and overvaluation should persist for several years after (market timing theory)*

7.1. Leverage Changes around Financial Transactions

To determine which security issues or repurchases, if any, generate long lasting effects on capital structure, Hovakimian (2004) approach is adopted by examining the patterns of changes in leverage ratios of firms surrounding the financing transactions. Since market timing should be more relevant for large issues, the focus is made only on relatively significant transactions by using 5% cutoffs[13]. Therefore, a firm is defined as issuing equity (debt) when net equity (debt) issued exceeds 5% of the pre-issue value of total assets. A firm is defined as repurchasing equity (debt) when net equity (debt) repurchased exceeds 5% of pre-issue total assets.

The short term effect of equity market timing on capital structure is tested by looking at the mean and median change in leverage at the time of the event (-1,0). The change between pre and post years (-1, +3) is examined since it reflects the long term impact of equity market timing on the capital structure. According to the market timing theory, firms do not rebalance the negative effect of equity market timing on capital structure and therefore, the persistent of a negative change in leverage (-1, +3) reflects the long lasting effects of capital structure.

*H*3.1: *A significant negative change in leverage at the time of the issuance* (-1,0) *and between pre and post years* (-1,3) *are expected for equity issuers.*

Motivated by previous debt and equity choice studies (Hovakimian, 2004; Hovakimian, et al., 2004) that show that pure equity transactions and mixed transactions have different effect on leverage,

[13] The 5% screen has been used widely in a number of other studies (Hovakimian, et al. 2001; Korajczyk and Levy 2003; Hovakimian 2006; Hovakimian, et al. 2004).

Table 8 reports the results for the leverage surrounding each financial transaction by separating pure transactions (Panel A) from mixed transactions (Panel B).

By looking at pure transactions in Panel A, the results reject the hypothesis that equity issues have significant long lasting effects on the capital structure. Although the mean change in book leverage at the time of the event is negative, this reflects only the short term mechanical impact of equity issues on leverage. However, the difference of leverage in the third year from the pre-issue year is insignificant, meaning that firms purge the negative impact of equity issuance on their leverage around three years (inconsistent with hypothesis 3.1). This finding is somehow consistent with previous evidence (Leary and Roberts, 2005; Kayhan and Titman, 2007; Alti, 2006; Hovakimian, 2006) that US firms wash out the impact of equity issues in three to five years. However, the results cannot suggest that firms adjust to higher levels of leverage compared to the pre-issue leverage since leverage change is not significantly positive.

Table 8: Changes in Leverage around financial transactions

Panel A: Pure Transactions

	$Lev_0 - Lev_{-1}$			$Lev_3 - Lev_{-1}$		
Transaction	**Mean**	**Median**	**Obs**	**Mean**	**Median**	**Obs**
Equity Issue	-.0267***	-.014***	1,003	.001	-.002***	760
Equity Repurchase	.005***	0.000***	572	.042***	.0133***	390
Debt Issue	.073***	.055***	1,775	.045***	.035***	1,460
Debt Reduction	-.083***	-.070***	1,151	-.108***	-.105***	883

Panel B: Mixed Transactions

	$Lev_0 - Lev_{-1}$			$Lev_3 - Lev_{-1}$		
Transaction	**Mean**	**Median**	**Obs**	**Mean**	**Median**	**Obs**
Dual Issue	.065***	.042***	774	.047***	.029***	624
Debt Issue and Equity Repurchase	.092***	.119***	263	.105***	.096***	190
Equity Issue and Debt Reduction	-.139***	-.122***	368	-.118***	-.124***	283
Dual Reduction	-.087***	-.069***	90	-.072***	-.088***	60

The reported significance levels for medians are based on the Wilcoxon signed rank test while the levels for means are based on t-test. Values significantly different from zero at the 10%, 5% and 1% levels are marked *, **, and *** respectively.

The picture emerging from the median change is somehow different. The latter continues to be significantly negative in the post issue years. However, the magnitude of the change between years -1 and +3 is lower (-0.2%) than the change at the time of the event (-1.4%) suggesting capital structure adjustment following equity issues (almost 75% of the negative effect of equity issues on leverage has been readjusted within 3 years). The results are also similar to the results obtained by Hovakimian (2004) who found no persistent effect for equity issues on leverage ratio.

For equity repurchases transactions, although the mean and median changes in leverage induced by equity transactions are statistically significant and exhibit a persistent positive effect on leverage, they are both small and thus economically insignificant (0.5% and 0.0% for mean and median respectively).

By looking at changes in leverage around mixed transactions in Panel B, several interesting results emerge. The leverage for equity issues accompanied by debt reductions decline in year 0 and the changes persist for at least three years, suggesting that the effect of equity issues on book leverage are persistent when the proceeds from the equity issuance are used to retire debt, consistent with Hovakimian (2006, Table 5). This result, combined with Panel A findings, suggests that the long lasting effects on capital structure is driven mainly by the debt transactions, rather than by the equity transactions, suggesting that debt retirements have long lasting effects on book leverage. Firms issuing both debt and equity experience an increase rather than a decrease in the leverage at year 0, consistent with Leary and Roberts (2005), indicating that equity issues do not have long lasting effects on leverage for firms that issue both debt and equity. Therefore, these findings question the main conclusions in Baker and Wurgler (2002). The effects of equity transaction on capital structure tend to

be small and transitory, implying that equity transaction timing is unlikely to be responsible for significant long lasting effects of market timing on leverage.

The robustness of these results is checked in different ways. Since the tests reported in Table 8 assume that different observations of the same financing event are independent, the same test is run by allowing for dependence in two different ways. First, the assumption that financing transactions by the same firm are independent is relaxed. For each firm, the mean changes in leverage and the t-statistics using the cross section of firm level means are calculated. Next, the assumption that financing transactions by firms in the same industry are independent is also relaxed. For each industry as defined by Fama and French industry classification, the mean changes in leverage and then the t-statistics using the cross section of industry level means are calculated. The results obtained remain qualitatively the same. Although 5% screen had been used to identify securities issues and repurchases by many other studies, it might be ad-hoc. It might be that larger transactions are more carefully timed or that larger transactions might generate larger and more persistent changes in leverage. To see whether the results are robust to the change in screen, the same analysis is repeated using 10% screen. This change results in a substantial decline in the number of security issues and repurchases. However, the market timing patterns for all transactions remain the same. The key results that equity market timing is unlikely to have a significant long lasting effect on capital structure do not change under any of these alternatives tests. Therefore, the sensitivity analysis reinforces this conclusion. The results are reported in Appendix C.

7.2. Effects of Past Securities Issues

The previous analysis of means and medians might block out the underlying difference in firm characteristics that determine target leverage. Since the tradeoff theory predicts that firms will issue securities to adjust toward their target leverage, past securities issues should have no impact on current leverage once target leverage is controlled. On the other hand, market timing would expect the past securities issues to continue impacting the leverage ratio. Therefore, by examining the effects of past securities issues on leverage ratio, one can differentiate between tradeoff theory and market timing theory.

$BL_{it} = f(target\ leverage\ proxies_{t-1}, Net\ Equity_{it-k}, Net\ Debt_{it}\text{-}k)$

Where BL_{it} is the leverage ratio of firm i at the end of year t, k is the lag length in years, and Net Equity $_{it-k}$ and Net Debt $_{it-k}$ are the net equity and net debt issues of firm i in year t-k. Target leverage proxies are those identified in the previous literature as important determinants of capital structure, and they are Profitability, Tangibility Firm Size, Growth Opportunities, Uniqueness (R&D), and financial constraints measured by KZ index[2] adjusted for M/B. Year dummies are also included[14]. This approach is similar to the one used by Huang and Ritter (2007). Ordinary least squares regression of leverage with robust t-statistics reflecting standard errors adjusted for Heteroscedasticity and for correlations across observations of a given firm is used.

Three scenarios are run: (1) five years history where k=5, (2) seven years history where k=7, and (3) ten years history where k=10. Pooled ordinary least squares result is used, where in each year firms must have five prior years of Compustat under scenario (1), seven prior years under scenario (2), and ten prior years under scenario (3).

If market timing effects are persistent, then past securities should continue to have an effect on the capital structure.

*H*3.2: *Cofficient of net equity issues should be negative, for k* = 5,7, *and* 10.

Table 9 reports the results with the book leverage as the dependent variable[15]. Since the results regarding the target leverage proxies are generally consistent with previous studies, only the effects of

[14] To decide whether year dummies should be included in the regression, the regression is run with time dummies. Then, testparm option is used to test whether the year dummies coefficients have zero coefficients or not. This test assumes the null hypothesis that the time dummies are not jointly significant. The F statistics obtained of 20.40 and p-value of 0.000 rejects the hypothesis that year dummies coefficients are zero. Therefore, time effects should be included in the regression.

[15] The focus is on the book leverage since there is evidence that firms slowly undo the effect on market leverage (Welch, 2004). Furthermore, same analysis was conducted with the market leverage as the dependent variable. The results are the same, except for M/B that becomes highly significant. The high t-statistics of M/B might be due to the mechanical

past securities issues are analyzed. The coefficients of net debt and net equity issues suggest that their effects on book leverage last for more than ten years, inconsistent with Alti (2006), who finds a temporary effect on book leverage and Leary and Roberts (2005) who find the effect of equity issuance on market leverage completely disappears within two to four years.

In summary, the long lasting effect of securities issues on capital structure is inconsistent with the static tradeoff although it is not necessarily inconsistent with a dynamic tradeoff with costly adjustment. Also, this result, combined with the results in Table 8, suggest that the persistent effect of net equity issues might be driven by the subsample of firms issuing equity accompanied by debt reductions, rather than pure equity transactions.

Table 9: Effects of Past Securities Issues on Book Leverage

	(1) k=5		(2) k=7		(3) k=10	
	Coeff	**t-stat**	**Coeff**	**t-stat**	**Coeff**	**t-stat**
TNG $_{t-1}$	0.103	5.95***	0.101	5.44***	0.089	4.45***
PRF $_{t-1}$	-0.052	-0.940	-0.059	-0.970	-0.060	-0.880
SIZE $_{t-1}$	0.018	6.60***	0.017	6.09***	0.013	4.29***
M/B $_{t-1}$	-0.008	-1.85*	-0.008	-1.67*	0.002	0.280
R&D $_{t-1}$	-0.024	-0.240	0.134	1.010	0.179	1.400
R&Dd $_{t-1}$	0.039	4.06***	0.040	3.95***	0.038	3.42***
KZ index$^{(2)}$ $_{t-1}$	0.058	5.35***	0.061	5.94***	0.077	6.61***
Net Debt Issue $_{t-k}$	0.063	5.32***	0.052	4.61***	0.038	2.62***
Net Equity Issue $_{t-k}$	-0.020	-2.11**	-0.026	-1.98**	-0.040	-3.22***
R^2	0.3357		0.3242		0.3414	
N	6,762		5,120		2,719	
F-stat	41.16		40.50		29.37	

$BL_{it} = f$ (*target leverage proxies*$_{t-1}$, *Net Equityi*$_{t-k}$, *Net Debt*$_{it-k}$)

Results for k=5, 7, and 10 are reported in column 1-3 respectively. Table 7 shows the ordinary least squares regression of leverage with robust t-statistics reflecting standard errors adjusted for Heteroscedasticity and for correlations across observations of a given firm (White, 1980; Rogers, 1993). Year dummies and the intercept are included but their coefficients are not reported. Values significantly different from zero at the 10%, 5% and 1% levels are marked *, **, and *** respectively.

7.3. Effect of Historical Financing Activities and Market Conditions on Leverage

To be able to know whether the persistence of net equity issues on the capital structure reported before reflect market timing, the effects of past market timing attempts on current leverage are estimated by using the following regression and controlling the target leverage.

$Bl_{it} = f$ (*target leverage proxies*$_{t-1}$, DEF_{it-k}, $DEFxINS_{it-k}$)

Year dummies are also included.

Two scenarios are run: (1) five years history where k=5, and (2) seven years history where k=7. Pooled ordinary least squares adjusted for Heteroscedasticity and for correlations across observations of a given firm (White, 1980; Rogers, 1993) is used, where in each year sample firms must have five prior years of Compustat under scenario (1) and seven prior years under scenario (2).

This regression examines the impact of the historical misvaluation (as measured by insider trade) interacted with the financial deficit on leverage. The static tradeoff theory predicts that the coefficient of DEF $_{it-k}$ and DEF $_{it-k}$ x INS$_{it-k}$ to be insignificant when k is large. If market timing effect is persistent as the market timing theory suggests, the effect of the misvaluation k years ago interacted with the financial deficit should remain negative and statistically significant even if k is large.

*H*3.3: *The coefficient of insider sales intercated with financial deficit (DEFxIns) should be negative and significant, for k* = 5 and 7.

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relationship induced by the market value of equity being in the numerator of M/B and in the denominator of the dependent variable.

Table 10 reports the results with book leverage or market leverage as the dependent variable. Discussions are based on the book leverage because Welch (2004) suggests that firms slowly undo the effect on market leverage and because there might be some mechanical relationship between market to book ratio and the market leverage (the market value of equity is in the numerator of M/B and in the denominator of the dependent variable).

The results in column 1 show that although the coefficient on the interaction term between the misvaluation and the financing deficit five years ago on the current leverage is negative as expected, it is statistically insignificant, suggesting that the effect of the insider behavior five years ago on current book leverage is insignificant.

The coefficient of insider behavior continues to be statistically insignificant in column 2 with k=7 suggesting that misvaluation seven years ago does not have an impact on the current leverage (inconsistent with hypothesis 3.3). Similar results are obtained when market leverage is used as the dependent variable in column 3 and 4

Table 10: Effects of Historical financing Activities and Market Conditions on Leverage

Panel A: All Sample

	Book Leverage				**Market Leverage**			
	(1) k=5		**(2) k=7**		**(3) k=5**		**(4) k=7**	
	Coeff	**t-stat**	**Coeff**	**t-stat**	**Coeff**	**t-stat**	**Coeff**	**t-stat**
TNG_{t-1}	0.103	5.87***	0.102	5.42***	0.103	6.66***	.102	6.50***
PRF_{t-1}	-0.044	-0.770	-0.054	-0.880	-0.129	-3.46***	-.128	-3.62***
$SIZE_{t-1}$	0.018	6.70***	0.017	6.18***	0.012	5.55***	.013	5.69***
M/B_{t-1}	-0.008	-1.86*	-0.008	-1.72*	-0.027	-10.42***	-.029	-10.26***
$R\&D_{t-1}$	-0.038	-0.370	0.123	0.920	-0.108	-1.88*	.010	0.18
$R\&Dd_{t-1}$	0.039	3.98***	0.040	3.89***	0.047	6.12***	.046	6.01***
$KZ\ index^{(2)}_{t-1}$	0.059	5.39***	0.061	5.92***	0.048	6.12***	.050	7.11***
DEF_{t-k}	0.019	1.70*	0.014	1.440	0.017	1.69*	.006	0.81
DEF_{t-k} x INS_{t-k}	-0.013	-1.090	-0.007	-0.540	-0.010	-0.990	-.002	-0.18
R^2	0.3310		0.3206		0.4630		0.4664	
N	6,762		5,120		6,762		5,120	
F-stat	33.84		33.85		70.44		70.74	

Panel B: Sample of firms with DEF>0

	(1) k=5		**(2) k=7**	
	Coeff	**t-stat**	**Coeff**	**t-stat**
TNG_{t-1}	0.092	4.88***	0.094	4.51***
PRF_{t-1}	-0.089	-1.74*	-0.111	-1.78*
$SIZE_{t-1}$	0.016	5.42***	0.014	4.86***
M/B_{t-1}	-0.007	-1.580	-0.008	-1.60***
$R\&D_{t-1}$	-0.025	-0.230	0.110	0.830
$R\&Dd_{t-1}$	0.039	3.86***	0.041	4.00***
$KZ\ index^{(2)}_{t-1}$	0.076	6.20***	0.072	6.64***
DEF_{t-k}	0.019	1.630	0.015	1.470
DEF_{t-k} x INS_{t-k}	-0.012	-1.020	-0.002	-0.200
R^2	0.3850		0.3586	
N	4,327		3,361	
F-stat	30.85		26.33	

$BL_{it} = f$ (*target leverage proxies*$_{t-1}$, DEF_{it-k}, $DEFxINS_{it-k}$)

Results for k=5 and 7 are reported in column 1-2 respectively. Panel B reports the results for a subsample that includes only firms that have financial deficit, not surplus (DEF is greater than 0). All panels show the ordinary least squares regression of leverage with robust t-statistics reflecting standard errors adjusted for Heteroscedasticity and for correlations across observations of a given firm (White, 1980; Rogers, 1993). Year dummies and the intercept are included but their coefficients are not reported. Values significantly different from zero at the 10%, 5% and 1% levels are marked *, **, and *** respectively.

While Panel A reports the results for the full sample, Panel B repeats the same regression for the financing deficit sample only. The choice of this subsample is motivated by the fact that misvaluation affects positive financial deficit in a way different than negative financial deficit (Kayhan and Titman, 2007). The results obtained confirm the main conclusion that misvaluation doesn't have persistent effect on the capital structure. In summary, the non- long lasting effect of misvaluation through their influence on capital structure is consistent with tradeoff theory, but inconsistent with market timing theory.

7.4. Cumulative Changes in Leverage Regressions

Following Baker and Wurgler (2002), the persistence effect of past valuation is tested by regressing the cumulative change in leverage between t+n and t on several control variables measured at time t+n-1, while controlling for the pre-issue leverage as follows:

$$BL_{t+\pi} - BL_{t-1} = \beta_0 + \beta_1(INS) + \beta_2(TNG_{t+\pi-1}) + \beta_2(PRF_{t+\pi-1}) + \beta_4(SIZE_{t+\pi-1}) + \beta_5(\frac{M}{\pi}_{t+\pi-1}) + \beta_6(R\&D_{t+\pi-1}) + \beta_7(RDd_{t+\pi-1})$$

$$\beta_8(KZindex_{t+\pi-1}) + \beta_9(DEF_{t+\pi}) + \beta_{10}(BL_{t-1}) + industrydummies + eit$$

If the market timing has a permanent effect on leverage, then the cumulative change in leverage from its pre-equity issuance level should continue to reflect the misvaluation effect in the year after. On the other hand, if the effects observed previously are reversed, then the insider trade should have no effect on the future capital structure.

*H*3.4: *The market timing theory predicts a significant negative sign for the insider sales on the cumulative change in leverage* ($\beta 1 < 0$)

Table 11 reports the results where the dependent variable is the cumulative change in leverage for n=1 and n=2 years in columns 1-2 respectively. The first column shows that there is very little persistence in the misvaluation effect. Recall from Table 7, column 1 where the dependent variable is the change in leverage BL_t-BL_{t-1} , the insider effect in the equity issuance year is -0.8 percentage points (coefficient is -0.008). One year later, the coefficient has moved in the direction of decreased market timing. Insider variable dummy coefficient increases to -0.004 (0.4 percentage points). Therefore, almost half of this effect is reversed in the first fiscal year following equity issuance. By the second year, the insider effect is completely gone; the insider dummy continues to be negative, but is insignificant in year 2 in column 2 (inconsistent with the market timing hypothesis, hypothesis 3.4). Furthermore, column 2 shows that the coefficients for all control variables increase in absolute value while that of insider has further diminished and is no longer significantly different from zero. Thus, the misvaluation effect is permanently dead within two years and leverage differences have dissipated. The variables controlled in the future determines the cumulative change in leverage rather than market timing impact, providing evidence that market timing effect on capital structure doesn't persist for long time.

Table 11: Cumulative Changes in Leverage Regressions

	(1) BL_{t+1}-BL_{t-1}		(2) BL_{t+2}-BL_{t-1}		(3) BL_{t+1}-BL_{t-1}		(4) BL_{t+2}-BL_{t-1}	
	Coeff	**t-stat**	**Coeff**	**t-stat**	**Coeff**	**Stat**	**Coeff**	**Stat**
INS	-0.004	-1.65*	-0.004	-1.340	-0.005	-1.87*	-0.004	-1.33
TNG	0.027	3.19***	0.041	4.23***	0.041	4.84***	0.066	6.67***
PRF	-0.082	-3.20***	-0.059	-2.24**	-0.168	-8.34***	-0.222	-9.68***
SIZE	0.006	7.27***	0.007	6.79***	0.007	7.58***	0.007	6.83***
M/B	-0.009	-5.87***	-0.009	-4.90***				
R&D	-0.025	-0.490	-0.026	-0.500	-0.123	-2.51**	-0.179	-3.56***
R&Dd	0.014	3.52***	0.018	4.01***	0.011	2.84***	0.013	2.96***
KZ index$^{(2)}$	0.010	2.85***	0.031	7.61***				
DEF	0.095	11.35***	0.103	12.14***	0.095	11.59***	0.098	11.91***
BL	-0.367	-22.41***	-0.524	-31.65***	-0.325	-30.35***	-0.418	-34.46***
R^2	0.2703		0.3386		0.2573			0.2875
N	6,757		6,193		7,035			6,437
F-stat	23.34		33.94		23.45			29.34

$$BL_{t+\pi} - BL_{t-1} = \beta_0 + \beta_1(INS) + \beta_2(TNG_{t+\pi-1}) + \beta_2(PRF_{t+\pi-1}) + \beta_4(SIZE_{t+\pi-1}) + \beta_5(\frac{M}{\pi}_{t+\pi-1}) + \beta_6(R\,\&\,D_{t+\pi-1}) + \beta_7(RDd_{t+\pi-1})$$

$$+ \beta_8(KZindex_{t+\pi-1}) + \beta_9(DEF_{t+\pi}) + \beta_{10}(BL_{t-1}) + industry\,dummies + eit$$

The results reported use the ordinary least squares regression of change in leverage with robust t-statistics reflecting standard errors adjusted for Heteroscedasticity. The statistics for the industry dummies are suppressed. The dependent variable is the total change in leverage between t+n and t with n=1 and n=2 in column 1 and 2 respectively. Values significantly different from zero at the 10%, 5% and 1% levels are marked *, **, and ***respectively.

One concern is that this effect may be influenced on one hand by the interaction between KZ Index and pre-issue leverage and on the other hand by the interaction between market to book ratio and the insider dummy variable. It may be the case that both variables capture the market timing effect in the initial year, but the market to book ratio does a better job in reflecting the persistence of this effect. If this is the case, by including both variables in the regression, the insider dummy variable may turn to be insignificant even though the market timing effect is persistent. To address these potential concerns these two variables are excluded in column 3 and 4 of Table 11. The results are similar to the first two columns. The insider dummy effect is reduced by half in n=1, pointing to a reversal, and turns to be insignificant in year 2, indicating that the effect of misvaluation on capital structure completely vanishes in two years. Overall, the evidence shows that the market timing effect on cumulative changes in leverage is reduced with time and disappears within two years.

8. Partial Adjustment Models

8.1. Partial Adjustment Regression

All the previous regressions, similar to most empirical studies (Titman and Wessels 1988; Rajan and Zingales 1995; Graham 1996), implicitly assume that firms' adjustment to the financial target is instantaneous and costless and firms can continuously rebalance their capital structure toward the optimal level. However, if the costs of the adjustments to the financial target outweigh the benefits, firms will wait to recapitalize, resulting in "extended excursions away from their targets" (Myers 1984) and persistent effect of past securities issuance on leverage. Therefore, the presence and the magnitude of adjustment costs affect the speed at which firms reverse and the degree to which past securities affect the capital structure. This part tries to test whether the persistent effect of past securities found in Table 9 is a consequence of firms' failure to rebalance their capital structure or a consequence of costly adjustment.

*H*4: *The negative relationship between past equity issues and leverage is not due to adjustment costs* (*market timing theory*).

Firm's financing decision is viewed as a-two phase process, where the first phase consists of target formation and the second consists of adjustment toward the debt level set in the first phase. The firm's financial behavior is best characterized by a partial adjustment model (Spies, 1974; Taggart, 1977; Jalilvand and Harris, 1984; Ozkan, 2001) where the existence of adjustment costs prevents firms from making immediate adjustment to the firm's target. As long as the adjustment costs exceed the costs of operating with sub-optimal leverage, firms will decide not to adjust, resulting in a deviation of the firm's leverage from the target leverage. With costly adjustments, firms may not find it optimal to adjust fully, but partially, represented as follows.

$$BL_{i,t} - BL_{i,t-1} = \lambda(BL^{*}_{i,t} - BL_{i,t-1}) + e_{i,t}$$

Where $BL_{i,t}$ is the leverage ratio of the firm at the end of year t, BL^{*}_{it} is the target leverage, and λ is the speed of adjustment toward the target capital structure or the rate of convergence and e is a statistical noise assumed to have a mean of zero and constant variance. The target leverage ratio is estimated as follows:

$$BL^{*}_{i,t} = \alpha_{it} + \beta X_{i,t-1}$$

Where BL^{*}_{it} is the target leverage, α_{it} is the firm fixed effect, and X_{it-1} is a vector of lagged firm characteristics of firm i previously used as main determinants of capital structure (Profitability, Tangibility, Growth Opportunities, Firm Size, Uniqueness). Since the factors that determine the firm's optimal leverage change over time, it is likely that the optimal leverage ratio changes over time for the same firm. Therefore, year dummies are included to capture the time specific effects.

If target leverage is observable, then the speed of adjustment toward it (λ) can be calculated. Unfortunately, the target leverage ratio cannot be observed and a reduced form specification is used:

$$BL_{i,t} = (1 - \lambda)BL_{i,t-1} + \lambda\alpha_{it} + \gamma\beta X_{i,t-1} + e_{i,t}$$

Since past securities issues might capture unobserved firm characteristics that determine current target leverage, the use of ordinary least squares would produce biased estimates. Therefore, fixed or random effects models are used to capture the cross sectional parameter heterogeneity.

However, according to Hsiao (2003), the first estimated coefficient on the lagged dependent variable with pooled ordinary least squares (OLS) ignoring firm fixed effects is biased upward under reasonable assumptions. Additionally, the estimated coefficient using firm fixed effect is biased downward especially when the time dimension is short.

Since in the panel data, the average firm has continuous Compustat data for about thirteen years, the coefficient on BL it-1 will not be substantially biased downward

Recognizing these problems, regressions using both OLS and firm fixed effects are run. Fortunately, with a large unbalanced dataset, the sensitivity of the estimated adjustment speed to time dimensions can be evaluated with some experiments. First, only those firms continuously listed on Compustat for all the time period are reported in Panel A. Then, data is restricted to some year periods (1993-1997; 1998-2002, and 2003-2006) in Panel B, C, and D respectively.

Panel A of Table 12 shows the results for all 505 firms continuously listed on Compustat. For the book leverage, the adjustment speed is 16% per year (1-0.840, where 0.840 is the coefficient on lagged book leverage) when the pooled OLS estimator ignoring firm fixed effects is used, while the adjustment speed is 37% per year when the firm fixed effects are included. For market leverage, the adjustment speed is 17.6% using the pooled OLS estimator and 39% including firm fixed effects. While the OLS estimator without firm fixed effects suggests a slow adjustment for this long panel of firms, firm fixed regression suggests a faster adjustment. If the true adjustment speed lies between the OLS estimates with and without firm fixed effects, the results here suggest a similar adjustment speed to Flannery and Rangan (2006). This slow adjustment speed might explain the persistent effect of securities issues on leverage previously obtained. From this analysis, the long lasting effect of securities issues is still persistent with the tradeoff theory since firms slowly adjust toward their target leverage (inconsistent with hypothesis 4). As a robust test and to know whether the results obtained in Panel A are attributed to the time dimension or to the age of firms, the same analysis is repeated by restricting the use of the data to five year periods (1993-1997; 1998-2002; 2003-2006) for the same 505 firms. These results presented in Panel B, C, and D show a higher adjustment speed than that obtained for the whole period of 1993-2006. The difference in the results is due to the difference in the time dimension. More specifically, the period from 1998-2002 show a large adjustment speed of 72.7% and 81.6% per year for book leverage and market leverage respectively. This high adjustment speed supports the tradeoff theory, but contradicts the persistent effect of past securities issues documented before. As a result, Table 9 is repeated by restricting the firms to the period of 1998-2002. The unreported results show that equity issues have no long term impact on the capital structure.

In summary, the long lasting impact of equity issuance on the capital structure can be explained more by the tradeoff theory with the presence of security issuance flotation costs and the fact that firms slowly adjust toward their target leverage ratio. In the period where the adjustment speed is high, the equity issuance shows only a short term impact on capital structure. At the same time, with a slow adjustment speed, the long lasting impact of securities issues on the capital structure is persistent, consistent with the dynamic tradeoff theory. The results are inconsistent with the market timing theory, where the capital structure is the simple outcome of past attempts to time the equity markets.

As mentioned before, the results obtained from the pooled OLS estimator with and without firm fixed effects might be biased. Therefore, the most common approach involves using both first-differenced instrumental estimators and generalized method of moments (GMM) estimators (Anderson and Hsiao, 1981; Arellano and Bond, 1991; Arellano and Bover 1995). However, these standard first differenced estimators are documented to perform poorly with high persistent data series. Blundell, et al. (2000) suggest that an extended GMM estimator (also called system GMM, which imposes additional restrictions) can offer efficiency gains in the situations where GMM estimators perform poorly.

Table 12: Speed of Adjustment toward Target Leverage

Panel A: Regressions on firms continuously listed on Compustat from 1993-2006

	Book Leverage				**Market Leverage**			
	Without Firm Fixed effects		**With Firm Fixed effects**		**Without Firm Fixed effects**		**With Firm Fixed effects**	
	Coeff	**t-stat**	**Coeff**	**t-stat**	**Coeff**	**t-stat**	**Coeff**	**t-stat**
TNG_{t-1}	0.016	2.53**	0.011	0.870	0.010	1.560	-0.009	-0.76
PRF_{t-1}	-0.011	-0.570	-0.040	-2.24**	-0.017	-1.350	-0.048	-2.87***
$R\&D_{t-1}$	-0.055	-1.540	0.025	0.400	-0.069	-3.12***	-0.026	-0.46
$R\&Dd_{t-1}$	0.002	0.770	-0.009	-1.360	0.005	2.16**	-0.010	-1.75*
$SIZE_{t-1}$	0.002	2.79***	0.000	-0.170	0.001	2.43*	0.009	4.60***
M/B_{t-1}	0.000	0.030	-0.002	-1.140	-0.001	-1.400	-0.002	-1.40
BL_{t-1}	0.840	76.95***	0.630	63.99***				
ML_{t-1}					0.824	67.59***	0.611	56.34***
R^2	0.8014		0.7915		0.8205		0.7882	
N	7,029		7,029		7,029		7,029	

Panel B: Regressions using only five years of data (1993-1997) on firms continuously listed on Compustat during 1993-2006

	Book Leverage				**Market Leverage**			
	Without Firm Fixed effects		**With Firm Fixed effects**		**Without Firm Fixed effects**		**With Firm Fixed effects**	
	Coeff	**t-stat**	**Coeff**	**t-stat**	**Coeff**	**t-stat**	**Coeff**	**t-stat**
TNG_{t-1}	0.016	2.04**	0.006	0.27	0.012	1.50	-0.014	-0.65
PRF_{t-1}	-0.025	-1.30	-0.086	-3.25***	-0.030	-2.06**	-0.085	-3.28***
$R\&D_{t-1}$	-0.019	-0.37	0.000	0.00	-0.044	-1.43	-0.071	-0.75
$R\&Dd_{t-1}$	0.005	1.56	-0.011	-1.09	0.007	2.41**	-0.012	-1.22
$SIZE_{t-1}$	0.003	3.30***	-0.003	-0.84	0.003	4.42***	0.016	4.38***
M/B_{t-1}	0.001	0.47	-0.001	-0.46	-0.002	-1.51	-0.002	-1.11
BL_{t-1}	0.830	64.36***	0.483	31.85***	0.802	48.82***	0.464	28.23***
R^2	0.8034		0.7668		0.8120		0.7181	
N	4,012		4,012		4,012		4,012	

Panel C: Regressions using only five years of data (1998-2002) on firms continuously listed on Compustat during 1993-2006

	Book Leverage				**Market Leverage**			
	Without Firm Fixed effects		**With Firm Fixed effects**		**Without Firm Fixed effects**		**With Firm Fixed effects**	
	Coeff	**t-stat**	**Coeff**	**t-stat**	**Coeff**	**t-stat**	**Coeff**	**t-stat**
TNG_{t-1}	0.027	2.26**	0.032	1.060	0.019	1.440	-0.041	-1.36
PRF_{t-1}	0.038	1.210	-0.074	-2.18**	-0.008	-0.310	-0.094	-2.73***
$R\&D_{t-1}$	0.003	0.040	0.308	2.65***	-0.046	-1.050	0.240	2.05**
$R\&Dd_{t-1}$	0.010	1.93*	0.055	2.67***	0.013	2.57***	0.041	1.99**
$SIZE_{t-1}$	0.003	2.89***	0.027	4.65***	0.003	2.93***	0.042	7.34***
M/B_{t-1}	0.000	-0.010	-0.004	-1.400	-0.001	-0.810	-0.003	-1.05
BL_{t-1}	0.835	49.72***	0.273	12.51***	0.816	36.29***	0.184	7.61***
R^2	0.7796		0.5049		0.7758		0.2130	
N	2,503		2,503		2,503		2,503	

Panel D: Regressions using only four years of data (2003-2006) on firms continuously listed on Compustat during 1993-2006

	Book Leverage				Market Leverage			
	Without Firm Fixed effects		With Firm Fixed effects		Without Firm Fixed effects		With Firm Fixed effects	
	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat
TNG_{t-1}	0.008	0.650	-0.001	-0.030	0.007	0.650	-0.008	-0.24
PRF_{t-1}	-0.065	-2.96***	-0.066	-1.400	-0.045	-2.46**	-0.032	-0.77
$R\&D_{t-1}$	-0.059	-0.890	0.003	0.020	-0.078	-1.660	-0.052	-0.44
$R\&Dd_{t-1}$	-0.001	-0.230	-0.010	-0.620	0.002	0.490	-0.007	-0.50
$SIZE_{t-1}$	0.001	1.270	-0.008	-0.800	0.002	1.870	0.008	0.96
M/B_{t-1}	0.001	0.280	0.004	0.930	-0.001	-0.610	0.009	2.43**
BL_{t-1}	0.833	59.98***	0.340	13.58***	0.795	50.34***	0.439	18.18***
R^2	0.8211		0.7353		0.8511		0.7896	
N	2,011		2,011		2,011		2,011	

$$BL_{i,t} = (1-\lambda)BL_{it-1} + \lambda\beta X_{i,t-1} + e_{it}$$

$$BL_{i,t} = (1-\lambda)BL_{it-1} + \lambda\alpha_{it} + \lambda\beta X_{i,t-1} + e_{i,t}$$

The first equation is estimated using the pooled OLS estimator. The second equation is estimated using firm fixed effects. The dependent variable is either book leverage or market leverage of firm i at the end of year t. X includes lagged firm characteristics, industries dummies and year dummies. Variables are defined in Appendix B. Panel A presents the results for firms continuously listed on Compustat from 1992-2006. This restriction results in a sample of 505 firms for which there are 14 years of lagged data. Panel B presents results for the same 505 firms but uses only five years of data during 1993-1997 and Panel C presents the results for the next five years of data during 1998-2002. Panel D reports the results for the last four years during 2003-2006. For brevity, the coefficients on industry dummies, year dummies and the intercept are not reported. For the firm fixed effect regressions, the total R^2 statistics are reported. The pooled OLS t-statistics use heteroscedastic consistent standard errors (White, 1980), further adjusted for correlation across observations of a given firm (Rogers, 1993).

Table 13 reports the results using dynamic panel data or System Generalized method of moments (SYS-GMM) developed by Arellano and Bover (1995) and Blundell and Bond (1998). The results again come in support for the tradeoff theory and in contrast to market timing theory. The firms have a slow adjustment speed of 13.5% for book leverage and 7.3% for market leverage. Hence, the persistent effect of equity issues is explained by a slow adjustment speed rather than market timing theory.

Table 13: Speed of Adjustment toward Target Leverage (Alternative Estimation)

	Book Leverage		Market Leverage	
	Coeff	t-stat	Coeff	t-stat
TNG_{t-1}	0.010	0.170	-0.023	-0.400
PRF_{t-1}	0.332	5.06***	0.301	4.64***
$R\&D_{t-1}$	0.269	1.390	0.038	0.420
$R\&Dd_{t-1}$	0.016	1.040	0.021	1.370
$SIZE_{t-1}$	-0.021	-2.48**	0.001	0.120
M/B_{t-1}	0.009	2.48**	0.025	7.84***
BL_{t-1}	0.866	21.47***		
ML_{t-1}			0.937	18.62***
Chi2	1197.37		1359.26	
N	7,029		7,029	

$BL_{it} = (1-\lambda)BL_{it-1} + \lambda\alpha_{it} + \lambda\beta X_{it-1} + \varepsilon_{it}$

The dependent variable is either book leverage or market leverage of firm i at the end of year t. X includes lagged firm characteristics, industries dummies and year dummies. Only firms continuously listed on Compustat from 1992-2006 are included. This restriction results in a sample of 505 firms for which there are 14 years of lagged data. For brevity, the coefficients on industry dummies, year dummies and the intercept are not reported.

8.2. Post Adjustment Subsample

To discriminate between the market timing theory and the adjustment cost theory, a post adjustment subsample is constructed, which consists of firm year observations when firms are most likely to be near their target leverage. Following Hovakimian, et al. (2004), dual debt and equity issues are used as the post-adjustment sample. Hovakimian, et al. (2004) argue that dual issuers are most likely to be those firms that just made capital structure adjustments and find that dual issuers offset the deviation from the target resulting from the accumulation of earnings and losses, consistent with dynamic tradeoff theories[16]. Following this logic, the leverage ratio is regressed on the same set of control variables (as in Table 9) for this subsample to check whether there is a change in the significance of the explanatory power of past securities issues when compared to the results using the whole sample. The dynamic tradeoff theory predicts that the historical values, such as past equity issuances, will lose their explanatory power in the post adjustment subsample.

*H*5: *The negative relationship between past equity issues and leverage persists, in post adjustment subsample (dual issues).*

The results reported in Table 14 show that the net equity issuances lose their explanatory power in explaining the book leverage in k=7 and k=10 when compared to the whole sample (inconsistent with hypothesis 5, which predicts that the effect of net equity issues should remain significant). These results are consistent with dynamic tradeoff theories, which hypothesize that past values can affect the observed leverage ratios because firms cannot adjust their capital structure instantaneously. This finding along with the previous one emphasizes the importance of considering adjustment costs in empirical capital structure tests. The traditional tradeoff theory has been challenged by recent empirical studies that show that firms' leverage ratios heavily depend on historical variables and market timing. Although firms time their equity issuance decisions and past securities issues have an effect on leverage ratio, the results obtained in this paper are still consistent with a dynamic tradeoff model with adjustment costs.

Table 14: Post Adjustment Subsample

	(1) k=5		(2) k=7		(3) k=10	
	Coeff	**t-stat**	**Coeff**	**t-stat**	**Coeff**	**t-stat**
TNG_{t-1}	0.055	1.76*	0.047	1.470	0.039	0.870
PRF_{t-1}	-0.174	-2.20**	-0.221	-2.49**	-0.148	-1.83*
$R\&D_{t-1}$	0.227	0.850	0.281	0.960	-0.532	-1.340
$R\&Dd_{t-1}$	0.050	2.84***	0.048	2.46**	0.002	0.100
$SIZE_{t-1}$	-0.008	-1.560	-0.016	-2.84***	-0.011	-1.380
M/B_{t-1}	-0.006	-1.060	-0.013	-1.83*	0.014	1.210
$KZ\ index^{(2)}_{t-1}$	0.014	0.970	-0.003	-0.250	0.048	3.24**
Net Debt $Issue_{t-k}$	0.057	1.320	0.063	2.19**	0.031	0.520
Net Equity $Issue_{t-k}$	-0.066	-3.01***	0.014	0.580	-0.045	-0.990
R^2	0.1741		0.2281		0.2659	
N	389		261		113	
F-stat	4.98		5.10		3.90	

This table reports the results from the following regression in a post adjustment subsample.
The following equation is estimated:
$BL_{it} = f$ (*target leverge proxies*$_{t-1}$, *Net Equity* $_{it-k}$, *Net Debt*$_{it-k}$)
The dependent variable $L_{it,}$ is book leverage at firm i at the end of year t. The post adjustment subsample construction follows Hovakimian, et al. (2004) who include only firm years in which firms issue both equity and debt. All issuance is required to exceed 5% of the pre-issue book value of total assets.
Results for k=5, 7, and 10 are reported in column 1-3 respectively.

[16] This paper differs from theirs in that they focus on historical profitability, while we investigate the role of historical security issuances

The panel shows the ordinary least squares regression of leverage with robust t-statistics reflecting standard errors adjusted for Heteroscedasticity and for correlations across observations of a given firm (White, 1980; Rogers, 1993). Year dummies and the intercept are included but their coefficients are not reported. Values significantly different from zero at the 10%, 5% and 1% levels are marked *, **, and *** respectively.

9. Conclusion

This paper analyses the implications of equity market timing on capital structure. While many previous studies find convincing evidence of timing attempts by firms, there was no consensus on the extent to which timing considerations affect capital structure. By using insider trade as a measure of market timing, the results obtained question the main conclusions in Baker and Wurgler (2002). Specifically while there is evidence that timing behavior has a short term influence on leverage ratio and on the change in leverage ratio, the results suggest that timing effects on capital structure do not tend to persist for long. Furthermore, this paper emphasizes the importance of considering adjustment costs in capital structure.

First, the short term impact of the market timing attempts on capital structure is negative; net sellers firms experience a greater decline in their leverage ratios and their leverage ratios are too low to be explained by underlying firm characteristics. However, the negative impact on capital structure quickly reverses and completely vanishes in two years. Second, while the results are consistent with market timing of equity issues, the effect of these transactions on capital structure is small, implying that equity transactions timing is unlikely to be responsible for a long impact on capital structure. Third, the patterns of change in leverage ratios around equity issuance show that these transactions have no significant long lasting impact on capital structure. Fourth, although securities issued in year t have persistent effects on firm's capital structure for many years, misvaluation in year t does not have long lasting effect on leverage through their influence on securities issuance decisions. This finding provides further support against the market timing theory. Moreover, due to adjustment costs, past securities might continue to affect the leverage ratio. Consistent with adjustment cost hypothesis and inconsistent with the market timing theory, the persistent effect of securities on capital structure is the result of slow adjustment speed. When firms adjust faster to their leverage ratios, past securities issues lose their significant effect on the capital structure.

Overall, the results show that market timing is an important determinant of financing activity in the short run (hypotheses 1 and 2), but its long run effects are limited. There was no evidence for hypotheses 3, 4, or 5. The results do not support the hypothesis that the capital structure is the cumulative outcome of firms' attempts to time the market. Firms' capital structure policies in the long run appear to be largely consistent with the existence of leverage targets.

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Appendices

Appendix A: Industry Classification of 4-Digit SIC Codes

Issuing firms are assigned to one of the 48 industries used by Fama and French (1997) using their 4-digit primary SIC codes reported by SDC. This study excludes financial firms, whose industry code is between 5000 and 6000, resulting in the elimination of 4 industry groups. Thus, 44 industry groups are included in this paper, and they are represented by 44 industry dummies

Industry Abbr	Industry Name	SIC Codes
Aero	Aircraft	3720-3729
Agric	Agriculture	0100-0799, 2048
Autos	Automobiles and Trucks	2296,2396,3010 , 3011, 3537,3647, 3694,3700-3716, 3790-3792, 3799
Banks	Banking	6000-6099, 6100-6199 (EXCLUDED)
Beet	Alcoholic beverages	2080-2085
BldMt	Construction materials	0800-0899, 2400-2439, 2450-2459, 2490-2499, 2950-2952, 3200-3219, 3240-3259, 3261, 3264, 3270-3299, 3420-3442, 3446-3452, 3490-3499, 3996
Books	Printing and publishing	2700-2749, 2770-2799
Boxes	Shipping companies	2440-2449, 2640-2659, 3210-3221, 3410-3412
BusSv	Business services	2750-2759, 3993, 7300-7372, 7374-7394, 7379, 7399, 7510-7519, 8700-8748, 8900-8999
Chem	Chemicals	2800-2829, 2850-2899
Chips	Electronic equipment	3622, 3661-3669, 3810, 3812
Clths	Apparel	2300-2390, 3020-3021, 3100-3111, 3130-3159, 3965
Cnstr	Construction	1500-1549, 1600-1699, 1700-1799
Coal	Coal	1200-1299
Comps	Computers	3570-3579, 3680-3689, 3695, 7373
Drugs	Pharmaceutical Products	2830-2836
ElcEq	Electrical equipment	3600-3621, 3623-3629, 3640-3646, 3648-3649, 3660, 3691-3692, 3699
Enrgy	Petroleum and natural gas	1310-1389, 2900-2911, 2990-2999
FabPr	Fabricated products	3400, 3443-3444, 3460-3479
Fin	Trading	6200-6299, 6700-6799 (EXCLUDED)
Food	Food Products	2000-2046, 2050-2063, 2070-2079, 2090-2095, 2098-2099
Fun	Entertainment	7800-7841, 7900-7999
Gold	Precious metals	1040-1049
Guns	Defense	3480-3489, 3760-3769, 3795
Hlth	Healthcare	8000-8099
Hshld	Consumer goods	2047,2391-2392, 2510-2519, 2590-2599, 2840-2844, 3160-3199, 3229-3231, 3262-3263, 3630-3639, 3750-3751, 3800, 3860-3879, 3910-3919, 3960-3961, 3991, 3995
Insur	Insurance	6300-6399, 6400-6411 (EXCLUDED)
LabEq	Measuring and Control Equipment	3811, 3820-3830
Mach	Machinery	3510-3536, 3540-3569, 3580-3599
Meals	Restaurants, hotel, motel	5800-5813, 5890, 7000-7019, 7040-7049, 7213
MedEq	Medical equipment	3693, 3480-3851
Mines	Nonmetallic equipment	1000-1039, 1060-1099, 1400-1499
Misc	Miscellanous	3900, 3990, 3999, 9900-9999
Paper	Business Supplies	2520-2549, 2600-2639, 2670-2699, 2760-2761, 3950-3955
PerSv	Personal Services	7020-7021, 7030-7039, 7200-7212, 7215-7299, 7395, 7500, 7520-7549, 7600-7699, 8100-8199, 8200-8299, 8300-8399, 8400-8499, 8600-8699, 8800-8899
RIEst	Real Estate	6500-6553 (EXCLUDED)
Rtail	Retail	5200-5299, 5300-5399, 5400-5499, 5500-5599, 5600-5699, 5700-5736, 5900-5999
Rubbr	Rubber and Plastic products	3000, 3050-3099
Ships	Shipbuilding, railroad equipment	3730-3731, 3740-3743

Smoke	Tobacco products	2100-2199
Soda	Candy and soda	2064-2068, 2086-2087, 2096-2097
Steel	Steel works, etc	3300-3369, 3390-3399
Telcom	Telecommunications	4800-4899
Toys	Recreational products	0900-0999, 3650-3652, 3732, 3930-3949
Trans	Transportation	4000-4099, 4100-4199, 4200-4299, 4400-4499, 4500-4599, 4600-4699, 4700-4799
Txtls	Textiles	2200-2295, 2297-2299, 2393-2395, 2397-2399
Util	Utilities	4900-4999
Whlsl	Wholesale	5000-5099, 5100-5199

Appendix B: Definition of Variables

Abbreviation	Variable:	Definition:
BL	Book Leverage	Book Debt D/ Total Assets (COMPUSTAT Item 6)
BL*	Target leverage Ratio	
C	Cash Balance	Cash and Marketable Securities (COMPUSTAT Item 1)/ Beginning Year Total Assets (COMPUSTAT Item 6)
CF	Cash Flow	[Earning before extraordinary items (COMPUSTAT Item 18) + depreciation (COMPUSTAT Item 14)]/ beginning year assets (COMPUSTAT item 6).
D	Book Debt	[Long Term debt (COMPSUTAT Item 9) + Short term debt (COMPUSTAT Item 34)]
DEF	Financial Deficit	$(\Delta D + \Delta E)/ A_{t-1}$
DIV	Cash dividends	[Dividends on Common Stock (COMPUSTAT Item 21) + Dividends on Preferred Stock (COMPUSTAT Item 19)]/ Beginning Total Assets (COMPUSTAT Item 6)
E	Book Equity	Total Assets (COMPUSTAT Item 6) - [Total Liabilities (COMPUSTAT Item 181) + Preferred Stock (COMPUSTAT Item 10] + Deferred Taxes (COMPUSTAT Item 35) OR Total Assets - [Total Liabilities + Deferred Taxes + redemption value of preferred stock (COMPUSTAT Item 56) if Item 10 is missed
INS	Insider Dummy	=1 if net insider selling>0, 0 otherwise
KZ index[1]	Financial Constraints	-1.002 CF-39.368DIV-1.315C + 3.139BL + 0.283M/B
KZ index[2]	Financial Constraints	-1.002 CF-39.368DIV-1.315C + 3.139BL
M/B Q	Market to Book Ratio	[Total Assets (COMPUSTAT Item 6) – Book value of Equity + Market value of equity]/ Total Assets (COMPUSTAT Item 6)
ME	Market Value of Equity	Common Shares Outstanding (COMPUSTAT item 25) * Fiscal year end share price (COMPUSTAT item 199)
ML	Market Leverage	Book Debt/ (Total Assets- Book Value of Equity + Market Value of Equity)
PRF EBITDA/A	Profitability	Earnings before interest, tax and depreciation (COMPUSTAT Item 13)/Total Assets (COMPUSTAT Item 6)
R&D	Research and Development Expense	Research and development expense (COMPUSTAT item 46) / Beginning Year Assets (COMPUSTAT item 6)
RDd	Dummy Variable	=1 if Research and development expense is missed, 0 otherwise
SIZE	Size	Ln(net sales) (COMPUSTAT Item 12)
TNG	Asset Tangibility	Net plant, property and equipment (COMPUSTAT item 8) / Total Assets (COMPUSTAT Item 6)
ΔD	Net Debt Issuance	[Book Debt $_t$ – Book Debt $_{t-1}$]
$\Delta D/A_{t-1}$	Net Debt Issuance	[Book Debt $_t$ – Book Debt $_{t-1}$]/ Beginning Year Total Assets
ΔE	Net Equity Issuance	[Book Equity $_t$ – Book Equity $_{t-1}$- ΔRE]
$\Delta E/A_{t-1}$	Net Equity Issuance	[Book Equity $_t$ – Book Equity $_{t-1}$- ΔRE]/ Beginning Year total Assets
ΔRE	Change in Retained Earning	[Retained Earning $_t$ – Retained Earning $_{t-1}$ (Change in COMPUSTAT item 36)
	Net Insider Selling	-[Change in share holdings + Change in option holding – Option granted-Shares granted]
	Net Insider Buyers	Net insider selling<0
	Net Insider Sellers	Net Insider selling>0

	Equity Issuer	$\Delta E/A_{t-1} > 5\%$
	Debt Issuer	$\Delta D/A_{t-1} > 5\%$
	Equity repurchaser	$\Delta E/A_{t-1} < -5\%$
	Debt retired	$\Delta D/A_{t-1} < -5\%$
	Total Proceeds	**Sale of common and Preferred Stocks (COMPUSTAT Item 108)**

Appendix C: Robustness for Changes in Leverage around Financial Transactions 10% Screen is used Instead of 5% to Identify Security Issuance and Repurchases

Panel A: Pure Transactions

	$Lev_0 - Lev_{-1}$			**$Lev_3 - Lev_{-1}$**		
Transaction	**Mean**	**Median**	**Obs**	**Mean**	**Median**	**Obs**
Equity Issue	-.041***	-.030***	586	.003	-.006	469
Equity Repurchase	.0245***	.007***	249	.056***	.016	157
Debt Issue	.108***	.089***	986	.066***	.056***	818
Debt Reduction	-.131***	-.117***	433	-.146***	-.135***	337

Panel B: Mixed Transactions

	$Lev_0 - Lev_{-1}$			**$Lev_3 - Lev_{-1}$**		
Transaction	**Mean**	**Median**	**Obs**	**Mean**	**Median**	**Obs**
Dual Issue	.065***	.042***	774	.047***	.029***	624
Debt Issue and Equity Repurchase	.178***	.146***	89	.146***	.157***	60
Debt Reduction and Equity Issue	-.198***	-.171***	160	-.142***	-.158***	125
Dual Reduction	-.087***	-.069***	90	-.071***	-.088***	60

The reported significance levels for medians are based on the Wilcoxon signed rank test while the levels for means are based on t-test. Coefficients significantly different from zero at 10%, 5% and 1% levels are marked *, ** and ***, respectively.