STOCK MISPRICING AND CORPORATE INVESTMENT DECISIONS

By

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TABLE OF CONTENTS

Chapter page

I. INTRODUCTION --1

II. LITERATURE REVIEW

2.1 INTRODUCTION---12
2.2 THE STOCK MARKET AND INVESTMENT------------------------13
2.2.1 Early Studies --13
2.2.2 Market irrationality and the capital budgeting Decisions--15
2.2.3 Does Stock Mispricing Affect Corporate Investment Decisions? The Equity Market Timing Explanation-----------17
2.2.4 Does Stock Mispricing Affect Corporate Investment Decisions? The Catering Explanation----------------------------22
2.2.5 Mergers and Acquisitions: The Mispricing Story-------------26

III. STOCK MARKET AND CORPORATE INVESTMENT DECISIONS

3.1 BACKGROUND---30

3.2 THEORETICAL FRAMEWORK-------------------------------------32

3.2.1 Case 1--41
3.2.2 Case 2 ---42
3.2.3 Case 3 ---43
3.2.4 Case 4 ---48
3.2.5 Case 5 ---49

3.3 TESTABLE HYPOTHESES--53

IV. DATA AND METHODOLOGY

4.1 MISPRICING MEASURE--59

4.1.1 Background --59
4.1.2 M/B Decomposition--63
4.1.3 Fundamental Value Measure-------------------------------65
4.1.4 Misvaluation Components -----------------------------71

4.2 DATA--73

4.2.1 Investment--74
4.2.2 Financing---75
4.2.3 Market-- 76
4.2.4 Other Investment Determinants--------------------------- 79

4.3 EMPIRICAL RESULTS--82

4.3.1 Corporate Investment and Market Determinants------- 82
4.3.2 Testing Hypothesis 1a------------------------------------- 88
4.3.3 Testing Hypothesis 1b------------------------------------- 95
4.3.4 Testing Hypothesis 2a------------------------------------- 99
4.3.5 Testing Hypothesis 2b------------------------------------ 102
4.3.6 Testing Hypothesis 3------------------------------------- 105
4.3.7 Is the mispricing –investment relation a one-sided phenomenon? ---107

V. CONCLUSION ---114

VI. BIBLIOGRAPHY--- 118

APPENDIXES

APPENDIX A: Mathematical Details of the Optimization Problem -----------124
APPENDIX B: More Insights on Investment and Financing Policies in an Inefficient Market --128
APPENDIX C: RIM and Firm Value in a Linear Model -----------------------130
APPENDIX D: Data Definitions and Calculation Details--------------------- --132

LIST OF TABLES

Table page

1. SUMMARY OF CORPORATE INVESTMENT AND FINANCING DECISIONS IN AN INEFFICIENT MARKET---136

2. FUNDAMENTAL VALUE REGRESSIONS FOR THE WHOLE MARKET AND ACROSS INDUSTRIES---137

3. SUMMARY STATISTICS FOR INVESTMENTS, FINANCING, AND INVESTMENT DETERMINANTS---138

4. PEARSON CORRELATION COEFFICIENTS AMONG INVESTMENT, FINANCING, AND OTHER INVESTMENT DETERMINANTS---------140

5.FIRM INVESTMENT DECISIONS AND MARKET DETERMINANTS--142

6. NET EQUITY ISSUANCE AND FIRM INVESTMENT DECISIONS----------145

7. NET DEBT ISSUANCE AND FIRM INVESTMENT DECISIONS-------------147

8. NET CAPITAL ISSUANCE AND FIRM INVESTMENT DECISIONS--------149

9.FINANCIAL CONSTRAINTS AND INVESTMENT-MISPRICING SENSITIVITY--151

10.SHAREHOLDERS INVESTMENT HORIZON AND INVESTMENT-MISPRICING SENSITIVITY--153

11. OVERVALUATION AND FIRM INVESTMENT DECISIONS---------------155

12.UNDERVALUATION AND FIRM INVESTMENT DECISIONS--------------158

Chapter I

Introduction

Stock mispricing is a phenomenon that can be encountered in rational as well as irrational environments. Information asymmetry under the rational framework can lead to stock price deviation from the true value just because investors, who set the price through their trading behavior, do not have all the information they need to reach a consensus price that reflects the true value of the stock. On the other hand, behavioral finance theories explain stock mispricing by assuming irrationality, where investors make systematic errors in forming their beliefs and expectations about the stock value.

Traditional finance theories assume investors to be rational. The capital asset pricing model and the efficient market hypothesis are significant examples of such a paradigm. The unbounded ability of rational agents to exploit any irrational mispricings in the stock market was the main argument behind the assumption of rationality. However, the overwhelming evidence against the traditional framework of asset pricing calls for a new paradigm that takes into account the fact that some agents are less than rational and their trading behaviors affect stock prices. Shleifer and Summers (1990) mention limited arbitrage and individuals' biases as the driving forces behind mispricings in the market. Investors adopt biased beliefs about a certain stock or a certain industry, or about the market as a whole. Such biases are systematic enough to affect the stock price through investors' trading behaviors. With limited arbitrage, rational investors are not able to exploit such mispricings in the market and as a result, irrationality can have a persistent effect on stock prices[1].

However, with the numerous theoretical and empirical studies that address mispricing in the stock market, the question of whether information asymmetry or investor biases causes stock mispricing is still under debate in the finance literature. Rather than trying to determine the cause of stock mispricing, this study considers a more important aspect of stock mispricing, which is the effect of stock mispricing on real activities in the economy. Specifically, this study asks the question whether stock mispricing leads to misallocations of resources in the economy through corporate investment distortions.

The effect of mispricing will be limited if the market is a sideshow for the real economic activities. In that case, the only effect will be the redistribution of wealth between irrational investors (noise traders) and arbitrageurs (smart traders). However, if the market is not a sideshow and stock prices affect corporate decisions, then mispricing, being a component of the stock price, can also affect corporate decisions.

The purpose of this study is to analyze the effect of stock market mispricings on corporate investment decisions. Particularly, this study addresses the three possible explanations of the relation between mispricings and corporate investments that are mentioned in Morck, Shleifer and Vishny (1990), (MSV) hereafter, and Stein (1996).

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[1] Shleifer and Summers (1990), Hirshleifer (2001), and Barberis and Thaler (2003) provide thorough reviews of the limited arbitrage and belief biases literature.

MSV address three theories that can explain the relation between investments and stock mispricing. The first theory states that the stock market affects investments through its influence on the cost of external financing. The second theory states that when managers make their investment decisions, they are forced to cater to shareholders' opinions in order to protect their jobs. The third theory states that managers use the stock market as a source of information about the state of the economy, the condition of the industry, and the value of the firm. Such information is intended to help managers in making their investment decisions. However, some of that information may be based on irrational beliefs, which will affect investments as well. Stein (1996) developed a model that is consistent with MSV's first and second theories. Stein argues that the investment decision is more responsive to the market valuation when the firm depends more on equity. By taking an extreme case, where the firm cannot raise any debt, any new investment must be fully funded by equity. In that case, the important determinant of the investment decision is the market's assessment of how attractive is the investment. If the investment can be only partially funded by equity, market valuation becomes less important to the investment decision. Stein also argues that if a manager is acting on behalf of shareholders (including himself) who have to sell their stocks in the near future for liquidity reasons, she will be more inclined to maximize the current stock price. In contrast, if the manager is acting on behalf of shareholders who will be holding the stock for a longer term, she will be more inclined to maximize the long-term value of the firm.

The first channel through which mispricing affects investments is the equity transactions channel. Stock market conditions help the firm decide when to raise additional capital. Overvalued firms will issue equity and undervalued firms will repurchase equity. Issuing more equity will help finance more investments and repurchasing equity may be more profitable than engaging in undervalued investment projects. Therefore, market timing activities can determine the cost of investing the firm's capital. For overvalued equity, the cost of raising additional equity is lower, which gives an opportunity to increase investments in positive NPV projects or even accept negative NPV projects that would not be accepted otherwise. However, if the stock is undervalued, the firm may pass up some positive NPV projects because they will not be worth undertaking. The more the firm depends on equity as an external source of capital, the more sensitive the investment is to stock mispricing. Overvalued financially constrained firms issue more equity to invest in projects that they are not able to finance otherwise. Undervalued financially constrained firms do not have enough cash to engage in both repurchases and real investments at the same time. Consequently, since investment projects are undervalued, there is a higher chance that those firms will engage in repurchases rather than real investments.

The second channel through which mispricings affect investment decisions is investor catering. Managers cater to shareholders' perception about the firm and this is reflected in corporate investment decisions. Managers make investment decisions that are consistent with the shareholders' investment horizon. Short-term investors are more concerned about the current stock price than the fundamental value of the firm. When the firm is overvalued, the manager increases investments or packages the firm's assets in a way that justifies the overoptimistic view about the firm's growth. In that case, the gain from catering will more than offset any future losses from inefficient investments because short-term investors require a lower rate of return on such investments. On the other hand, when the firm is undervalued, managers will refrain from investing in projects that do not seem to be attractive to short-horizon shareholders because those shareholders will ask for a higher required return on those projects and the losses from investment in undervalued projects will not be fully compensated by future gains that might result from those projects. Obviously, the shorter the horizon of shareholders, the larger the distortions in investment decisions due to stock mispricings.

The third channel through which mispricings affect investment decisions is the noisy signal from the market about the firm, the industry, or the market as whole. Investors' assessment of the future state of the economy and their expectations about the performance of the industry or the firm are reflected in the stock price. Therefore, if investors are rational and can correctly predict the future state of the economy, then the market should not affect investments beyond the effect of the fundamentals because market expectations and fundamentals will be correlated in an efficient market. However, if investors are less rational and the market is not efficient, then there will be some errors in predicting the future state of the economy. If managers listen to the market and cannot separate the rational part of the market's prediction from the irrational part, then the market will affect investments and the effect will be due to investors' sentiment.

To test the three channels of the mispricing effect on investments, the M/B ratio is decomposed into mispricing and growth components. Equity and investor catering channels can be tested separately by regressing corporate investments against the mispricing component and the external equity transactions. Controlling for equity transactions allows for an independent test of the investor-catering channel. Shareholder investment horizon, measured by share turnover, is used as an instrument to represent the investor catering effect. In addition, the decomposition approach provides an aggregate mispricing component at the industry or at the market level. This component is used to test the market's noisy signal channel.

This study contributes to the literature in several ways. First, the study analyzes a model that includes both financing and shareholder horizons as channels of the effect of mispricing on investments. Stein's model only applies to the financing channel. Stein presented a separate treatment for shareholder horizons. This model includes both channels and shows how each channel relates mispricing with investment. The model is similar to the one in Baker, Ruback, and Wurgler (2004); however, rather than using their reduced form model, this study presents a fuller model that includes capital structure constraints and the price impact of equity transactions. Table 1 summarizes the special cases of the model that are discussed in the study. These cases include but are not limited to the cases analyzed in Stein (1996).

[Insert Table 1 about here]

Second, a new methodology presented by Rohdes-Kropf, Robinson, and Viswanathan (2004) is used to decompose the M/B ratio into mispricing and growth components. This approach avoids the measurement errors in Tobin's q and the inseparability of mispricing and growth components that haunts several empirical studies.

Decomposition provides an approach to assess the role of aggregate mispricing in investments. The relation between aggregate mispricing and corporate investments has not previously been analyzed at the firm level.

By using a separate growth component, I provide a better understanding of the market's role in the corporate decision-making process. By measuring the effect of investment opportunities on investment, this study can determine how much of the relation between the market and investments is driven by the fundamental component of the stock price and how much of the relation is driven by mispricing.

Third, the study analyzes the investment-mispricing relation for different categories of investments. Previous studies usually concentrate on one category of corporate investment decisions. This study analyses the mispricing effect on capital expenditures, acquisitions, and R&D. It is worthwhile to determine the extent of the mispricing effect and know which investment categories are more sensitive to mispricing than the other.

Fourth, unlike previous studies, the theoretical treatment in this study addresses the effect of mispricing on both sides of investment distortions, overinvestment and underinvestment. Other studies either assume one side of the story or do not analyze the two sides of distortions separately. This study answers the question as to whether one side of investment distortions is more sensitive to mispricing than the other.

Finally, the study sheds some light on the disinvestment decisions of the firm and whether mispricing affects such decisions. It is quite possible that undervalued firms may switch strategies from investment growth to cost cutting. Managers may shut down some projects that are not applauded by investors or they may sell some assets to cut operating or maintenance costs.

The results in the study show that the market is not a sideshow and that it affects corporate investments in two ways: first, the market value of the firm reflects the growth prospects of the firm that are not contained in other fundamentals like cash flow. Second, the deviation of the market value of the firm from the true value through stock mispricing also affects corporate investment through the three channels suggested in MSV and Stein (1996).

Tests for the first channel show that total investments and net investments are determined by market timing motivated equity and debt issuance. In individual investment categories, capital expenditure and increase in investments are driven by market timing motivated equity issuance; acquisitions and R&D are driven by market timing motivated debt issuance. Disinvestment decisions, measured by assets sale and percentage decrease in assets, do not seem to be determined by market timing driven financing activities differently from non-market timing driven financing activities.

More evidence related to the first channel indicates that highly financially constrained firms show higher sensitivity between investment and stock mispricing. This result reflects the fact that firms with low debt capacity depend on equity to finance their investments, and thus they are more prone to the stock mispricing effect when making their decisions.

Tests for the second channel involve measuring the effect of shareholder catering by examining the remaining explanatory power of firm mispricing after controlling for net issuance activities, which act as a proxy for the first channel. The results show that shareholders catering is significant in explaining the relation between total/net investment and firm mispricing. In particular, R&D, increase in investments, and percentage decrease in assets are affected by catering to shareholders. Other investment decisions including capital expenditure, acquisition, asset sales, and increase in total assets are not significantly determined by catering behavior.

Another test for the second channel examines whether firms owned by short-horizon shareholders maintain higher mispricing-investment sensitivity than firms owned by long-horizon shareholders. The logic of this test is the fact that short-horizon shareholders are more concerned about the current stock price than the value of the firm in the long-run. Thus, to the extent that managers cater to those shareholders, higher sensitivity between mispricing (contained in the current stock price) and investment decisions will appear. Shareholder investment horizon is measured by the average of the daily shares turnover ratio during the last month of the fiscal year. A higher turnover ratio reflects a short shareholder investment horizon. The results of this test show that investment-mispricing sensitivity is significantly higher in firms with a short shareholder investment horizon than it is in firms with a long shareholder investment horizon. This is true when considering total and net investments.

The third channel is tested by examining the significance of the mispricing at the industry or at the market level in determining the level of investments in the firm. A significant relation between aggregate mispricing and investment suggests that managers use current market and/or industry conditions as sources of information when they make their investment decisions. Thus, any bubble in the industry or the market can affect investment. The results in this study confirm the effect of short-term innovations in aggregate market conditions on all kinds of corporate investments under consideration.

After confirming the existence of investment distortion in response to stock mispricing, the study examines separately the two types of distortions in investment: overinvestment and underinvestment. The response of investment to overvaluation is classified as overinvestment while the response of investment to undervaluation is classified as underinvestment. The results show that firms overinvest in almost all types of investments.

Overinvestment in acquisitions, research and development, and capital expenditure is caused by the issuance of overvalued forms of capital and by catering to optimistic shareholders. Disinvestment, measured by assets sale, is significantly decreased by firm overvaluation. In contrast, firms are shown to underinvest in capital expenditure, R&D, and increase in investment. However, there is no evidence on underinvestment in acquisition. Disinvestment, measured by percentage decrease in total assets, moves in the same direction as undervaluation.

The rest of the study proceeds as follows: chapter II summarizes the existing literature on the effect of stock mispricing on financing and investment decisions. Chapter III develops testable hypotheses about the relation between investment decisions and mispricing based on the theoretical framework that addresses the role of equity transactions and shareholder investment horizon in the investment – mispricing relation. Chapter IV includes the empirical testing methodology along with data descriptions, predictions, and empirical results. Chapter V concludes the study.

Chapter II

Literature Review

2.1 Introduction

The first part of this review discusses the early studies of the market's role in corporate investment decisions. The main theme in these studies was that the market is efficient and the information contained in the market return is reliably useful in evaluating the investment opportunities of the firm. Early studies were concerned about whether the market reveals more information about the firm's investment opportunities than is already revealed by the firm's fundamentals, such as cash flows. Empirical studies that tried to answer this question came up with conflicting answers. Other studies have tried to find the reasons for the conflicting results and have come up with innovative methodological and theoretical justifications for the reported weak role of the market.

The second part of this review discusses another view of the role of the market. This view disagrees with the main theme in the early studies. These studies suggest that market inefficiency and investors irrationality are among the driving forces behind the market role in corporate investment. These studies in total suggest three mediums by which market irrationality or inefficiency may affect corporate investment decisions. I review these mediums in the third and fourth parts of the review. The final part of the review discusses acquisitions as natural experiments that show the effect of mispricing on the investment decisions of the firm.

2.2 The Stock Market and Investment

2.2.1 Early Studies

The relation between corporate investments and the stock market has long been examined within the q theory framework, under which the corporate investment decision should only depend on the present value of the future marginal products of the new capital (marginal q). Brainard and Tobin (1968) and Tobin (1969) argue that stock prices reflect the marginal product of capital where firms invest until the market value of the existing capital assets equals their replacement cost. Accordingly, when the market value of the capital assets increases, either because of the expected increase in the return on capital or because of the decrease in the perceived discount rate, the firm should continue to invest until the marginal product of capital equals the cost of capital (q=1). Therefore, in an efficient market, investment is related to Tobin's q to the extent that the latter reflects information about the firm's investment opportunities.

Several empirical studies, such as Von Furstenberg (1977), Clark (1979), and Summers (1981), show that the market valuation has limited power in explaining shocks to the firm's investments. Other studies provide conflicting conclusions on how important the market valuation is to the investment decision. Controlling for the fundamental variables that the stock market might be forecasting, Barro (1990) concluded that the stock market has a significant effect on the investment decision, beyond that of the fundamental variables, like cash flows. However, Blanchard, Rhee, and Summers (1993) find a limited role for market valuation. MSV show that in a firm-level regression, the movements in relative share prices are associated with fairly large and statistically significant investment changes when fundamentals are held constant, but the incremental explanation of the variations in investment by the market is fairly small. They argue that the market's effect is not central to the investment decision. MSV also point out that the rise in stock prices through the 1920s did not lead to a rise in investment, nor did the crash of 1987 lead to a drop in investment.

Some theoretical literature tries to explain the weak performance of the q theory under the supposition of an efficient capital market. The central theme in these studies is the poor proxy used for the marginal q and the fact that Tobin's q is measured with error when calculating the replacement cost[2]. However, it is important to note that, as the information about profitability and investment opportunities in Tobin's q is masked by the measurement error, mispricing in the market can also mask it. Abel and Blanchard (1986) argue that when the market is inefficient, deviations from fundamental value become random errors that blur the information in average q about the firm's investment opportunities and result in a weaker relation between Tobin's q and investments. Abel and Blanchard's argument is based on the assumption that managers invest optimally regardless of the noise in the market. This assumption has long been debated in the capital-budgeting literature. Some researchers argue that the role of mispricing is not limited to its effect on the relation between Tobin's q and investments but also extends to affect the investment decision of the firm directly. The following section will shed some light on that debate.

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[2] Erickson and Whited (2000) assert that, for Tobin's q to be a good proxy, the marginal q should equal the average q and this holds only under linearly homogenous technology and perfect competition. Hayashi (1982) discussed those conditions and showed that the q theory performs well when the investment decision is associated with changes in expected returns on all forms of capital. However, there are certain situations where the change in expected return is only associated with investment in new capital rather than investment in existing capital. Hence, the marginal q, which reflects the investment in the new capital, will differ from the average q, which reflects the investment in both existing and new capital. Abel (1980) introduced marginal adjustment costs and argued that the investment decision may be related to the current and lagged values of q. For example, due to the time to build technology, the investment decision may be correlated with the lagged values of q. Marginal adjustment costs may cause the relation between investment and marginal q to be non-linear as indicated by Abel and Eberly (1996). Abel and Blanchard (1986) and Gilchrist and Himmelberg (1995) show that the constructed marginal q they used does not do better than Tobin's q in explaining investments. Erickson and Whited (2000) found a higher significance for Tobin's q and less significance for the fundamental variable when using a measurement error –consistent generalized method of moment estimator.

2.2.2 Market irrationality and the capital budgeting decisions

The question of whether the rational manager should consider the market valuation when making corporate decisions even if it is different from his own valuation receives different answers in the literature[3]. Bosworth (1975) argues that managers should simply ignore the sideshow provided by the market and act upon their own valuation. However, Blanchard et al. (1993) indicate that Bosworth's argument would be correct only if the stock market were used to value existing projects and if shareholders never sold their shares. But the stock market is obviously also a market where firms can issue new shares and where existing shareholders can realize capital gains.

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[3] In our study we hold the assumption that managers are rational. There is a branch of studies in behavioral finance that relaxes this assumption. Heaton (2002) developed a model of managerial overoptimism, where managers believe that the market undervalues their firm's risky securities and at the same time managers overvalue their own corporate investments. Therefore, managers will be reluctant to raise external capital in the market and may decline some positive NPV projects that need external financing. In addition, managers will be more inclined to invest in negative NPV projects because they overvalue those projects.

Malmendier and Tate (2004) test Heaton's model and find that investment decisions of firms with overconfident managers are more responsive to cash flow shocks than other firms. This high sensitivity reflects the fact that overconfident managers cut investment that needs external financing and increase investments even in negative NPV projects if they have enough internal funds. Malmendier and Tate also find that other CEO characteristics like education and expertise affect the sensitivity between cash flow and investment. Gervais, Heaton, and Odean (2003) argue that moderate overconfidence and optimism on the part of the managers may help align their interests with those of the share holders. They also suggest that executive stock options are not needed if managers show symptoms of overconfidence. In fact, in that case, executive stock options will be like putting more gas on the fire.

Fischer and Merton (1984) argue that investment decisions should simply be based on the market valuation. If the market is ready to accept a lower rate of return, the firm should invest until the marginal product of capital is equal to that rate of return. However, this argument does not differentiate between the possible causes of the discrepancy between managers and market valuations. Keynes (1936) suggests that stock prices reflect an element of irrationality that makes the effective cost of equity different from the cost of other forms of capital and that will affect the investment decision. Blanchard et al. (1993) list bubbles and fads along with information asymmetry as sources of the differences between market valuation of the firm and its true value.

Panageas (2003) argues that managers should consider the fundamental and the speculative parts of the stock price as values to shareholders and should invest based on the part that will make investors better off. The manager should invest to maximize the fundamental part if holding the stock and reaping dividends is better than reselling the stock to more optimistic investors and vice versa. Stein (1996) argues that if managers are acting on behalf of shareholders who have to sell their stock in the near future for liquidity reasons, they will be more inclined to maximize the current stock price. In contrast, if they are acting on behalf of shareholders who will be holding the stock for a longer term, they will be more inclined to maximize the long-run value of the firm.

2.2.3 Does Stock Mispricing Affect Corporate Investment Decisions? The Equity Market Timing Explanation

Stein (1996) develops a model that determines the optimal investment for rational managers who raise equity in an irrational market. Stein argues that stock mispricing affects the investment decision if the firm has to issue equity in order to invest. Firms that issue overvalued stocks will be more likely to increase investments because of the cheaper cost of capital provided to them. Undervalued firms, however, are less likely to invest because of the cost attached to issuing undervalued equity. Baker, Stein, and Wurgler (2003) provide an empirical test for Stein's argument and find that equity-dependent firms have higher investment sensitivity to Tobin's q than non-equity-dependent firms. In addition, to test exclusively for the sensitivity of investment to market mispricing, Baker et al. use future realized stock returns as a proxy for the nonfundamental component of the stock price. The intuition is that positive future returns will indicate an undervaluation of the stock at the time the investment decision was made. Therefore, if undervaluation is related to investments, future returns will also be related to investments. Baker et al. find a negative relation between investments and future returns. The relation is stronger for equity-dependent firms. In their analysis, Baker et al. assume underinvestment by undervalued firms and do not incorporate the possibility of overinvestment by overvalued firms. On the other hand, Gilchrist, Himmelberg, and Huberman (2004) develop a model of overvaluation based on the dispersion of investors' beliefs under short-selling constraints. Using the variance of analysts' forecasts as a proxy for belief dispersions, they find that managers issue new equity and increase capital expenditure in response to overvaluation[4].

Stein's argument that overvalued firms issue shares and undervalued firms repurchase shares is called market timing. Market timing can exist even in a rational market. Myers and Majluf (1984) develop an adverse selection model where it is optimal for firms with information asymmetry to raise equity when the stocks are overvalued.

In support of equity market timing, Graham and Harvey (2001) report that 67% of the surveyed CFOs time the market when issuing stocks. In Brav et al. (2004), over 86% of the surveyed CFOs agree that undervaluation is the most prominent motive for stock repurchases. Several empirical studies show a positive relation between equity issuance decisions and ex-ante market valuation at the firm level (see e.g., Marsh (1982), Jung, Kim, and Stulz (1996), and Hovakimian, Opler, and Titman (2001)); at the industry level (see e.g., Pagano, Panetta, and Zingales (1998) and Lerner (1994)); and at the aggregate market level (see e.g., Loughran, Ritter, and Rydqvist (1994)).

As evidence of market timing behavior, several studies show that new equity issuers earn low future returns. Ritter (1991) and Speiss and Affleck-Graves (1995) examine IPOs and SEOs respectively and report underperformance of issuers relative to the benchmark. Stigler (1964) and Loughran and Ritter (1995) find negative long-term returns after both IPO and SEO offerings, which indicates that stocks were overvalued at the time of the issue and firms issue in a hot market. Ikenberry, Lakonishok and Vermaelen (1995),(2000) find positive long-term returns after stock repurchases in samples of American and Canadian firms, which indicates that stocks were undervalued at the time of the repurchase. On the aggregate level, Baker and Wurgler (2000) show that equity share in new equity and debt issues can predict aggregate US stock market returns. Henderson, Jegadeesh, and Weisbach (2004) show similar results in several international markets. These findings indicate that firms tend to be overvalued at the same time and thus equity issuance tends to predict the aggregate return.

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[4] The model presented by Gilchrist et al. is not based on investors' irrationality; rather, it assumes unbiased beliefs on average with short sale constraints.

However, long-run return event studies, as evidence of market timing, are subject to some criticisms. For example, some researchers argue that equity issuers earn lower returns because they are less risky. After controlling for leverage and liquidity risks in their multifactor model, Eckbo, Masulis, and Norli (2000) and Eckbo and Norli (2004) find no abnormal returns after issuance. Schultz (2003, 2004) and Butler, Grullon, and Weston (2004) argue that pseudo market timing or, as known by others, the small sample bias, can lead to a false belief of the underperformance of equity issuers[5]. However, the size of the pseudo market timing bias has been shown empirically to be trivial. See for example, Baker, Taliaferro, and Wurgler (2004), Ang, Gu, and Hochberg (2004), Dahlquist and de Jong (2004), and Viswanathan and Wei (2004).

Baker and Wurgler (2002) argue that historical average market-to-book ratios explain the cross-sectional leverage of a firm and interpret the result as more evidence of the effect of market timing on capital structure. Hovakimian (2003) and Liu (2005) argue that historical market-to-book ratios reflect a firm's past investment opportunity set, which determines current leverage. Both studies show that market timing does not have a persistent effect on capital structure. Liu (2005) shows that historical market-to-book ratios obtain their explanatory power from time-varying target leverage ratios and adjustment costs rather than market timing.

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[5] See for example, Stambaugh (1986, 1999), Mankiw and Shapiro (1986), Nelson and Kim (1993), Kothari and Shanken (1997), Lewellen (2004), Polk, Thompson,and Vuolteenaho (2004), Amihud and Hurvich (2004), and others.

Although the above mentioned criticisms raise some doubts about the interpretations of the findings of long-run return event studies, the market timing hypothesis gets strong support from other strands of empirical studies that use specific proxies for stock mispricing. Using accounting-based valuation models, D'Mello and Shrof (2000) and Jindra (2000) report a significant relation between stocks misvaluation and equity repurchases and issuance respectively. Other empirical studies provide results that are more consistent with the market timing story. Jegadeesh (2000) and Denis and Sarin (2001) show evidence that issuing firms perform poorly in the subsequent earning announcement dates compared to non-issuers. Teoh, Wong, and Rao (1998), Teoh, Welch, and Wong (1998a, 1998b), and Rangan (1998) provide evidence that firms manage their earnings at the time of IPO and SEO issues and those firms that manage earnings earn lower subsequent long-run abnormal stock returns than firms that do not manage returns. Jain and Kini (1994), Mikkelson, Partch, and Shah (1997), and Pagano et al. (1998) report a decline in profitability following the IPO. Loughran and Ritter (1997) report the same result following SEOs. Jenter (2004) finds that insider selling coincides with stock issuance activities, which indicates that managers believe the stock to be overvalued at the time of the issue.

Ljungqvist, Nanda, and Singh (2001) present a model of IPO underpricing and long run underperformance based on investor sentiment. The model suggests that some investors are irrationally optimistic about certain IPOs (hot market); however, in the long-run, more information flows and the optimism fades, which results in the underperformance of these IPOs. Ljungqvist et al. argue that the underpricing is needed to compensate rational investors (institutional investors who usually get a greater share of the offerings) for the risk of the hot market's ending and having to sell their shares at a loss. According to the model, underpricing will not be needed if sentimental demand is high enough to absorb the entire offering. Cook, Jarrell, and Kieschnick (2003) examine the predictions of Ljungqvist et al.'s model and find evidence of the role of investor sentiment in explaining the different patterns in IPO activities. Helwege and Liang (2002) find support for the view that hot market IPOs reflect greater investor optimism, though not necessarily active manipulation by managers.

Interestingly enough, other studies uncover a pattern of low stock returns after debt issuance. Speiss and Affleck-Graves (1999) show that straight and convertible debt issuers underperform the size and book to market matched portfolios significantly. With a refined measure of net external financing, Richardson and Sloan (2003) report low stock returns following net debt issuance. These results suggest that overvalued firms issue more debt as they enjoy lower credit risk.

2.2.4 Does Stock Mispricing Affect Corporate Investment Decisions? The Catering Explanation

Many arguments in the literature try to find the logic behind the possible relation between stock mispricing and corporate investment decisions. Agency explanations provide possible channels by which investments can be affected by stock mispricing. MSV and Jensen (2005) argued that managers might cater to investors because they are afraid of being fired or being taken over. If stock prices are used to reveal the market's assessment of the managers' competence and ability to make good investments, managers become averse to low stock prices. Consequently, stock mispricing will affect investments as the market's assessment is contaminated with irrationality. Holmstrom (1999) develops a model based on the idea discussed by Fama (1980) about the effect of career concerns on agents' behavior. Narayanan (1985) argues that managers who are concerned about their labor market reputations may engage in actions that enhance the short-term value of the stock at the expense of the long-term value. Managers concerned about their career future may favor safe projects over riskier ones (Hirshleifer and Thakor (1992)); hesitate to start a new line of business (Bertrand and Mullainathan (2003)); and hesitate to shut down a poorly performing line of business (Boot (1992), Baker (2000), Bertrand and Mullainathan (2003)). In addition, managers with pay performance that is more tied to stock prices will be more interested in maximizing current stock prices. Bolton, Scheinkman, and Xiong (2003) present a model where managers engage in more investments to increase the growth option component of the stock price at the expense of the long-run value. Ka, Linck, and Rubin (2004) argue that agency theory can explain managers' propensity to listen to the market. Particularly, firms with smaller boards, more outside monitors, and higher pay-performance sensitivities are more likely to cancel an uncelebrated acquisition deal.

Gaspar, Massa, and Matos (2004a) provide a different logic behind the effect of investor horizons on investment decisions. Gaspar et al. find that firms with short shareholder investment horizons are more likely to acquire another firm and experience worse abnormal short- and long-run returns. Gaspar et al. argue that such results are consistent with the argument that short-horizon shareholders provide weak monitoring of managers' activities, which allows managers to proceed with value-reducing acquisitions toward big empires. Qiu (2004) also argues that the monitoring activities from certain types of shareholders affect the acquisition decision of the firm. Qiu finds that the presence of large mutual fund shareholders, who are known to be passive in their monitoring activities, encourages managers to make value-reducing types of acquisitions while the presence of large public pension fund shareholders, who are known to be active in their monitoring activities, discourages managers from making empire-building types of acquisitions. In addition, the long-run post-acquisition performance of firms with large public pension funds ownership is better than that of firms with large mutual funds ownership. Although, Qiu (2004) and Gaspar et al. (2004a) use the same monitoring story to explain the likelihood of acquisition activity, Qiu did not find evidence of the role of shareholder horizons used in Gaspar et al. (2004).

Polk and Sapienza (2002) model the effect of mispricing on corporate investments and argue that the effect is stronger for firms with short-horizon shareholders. By using different proxies for mispricing, Polk and Sapienza find a positive relation between investment and mispricing proxies after controlling for financial slack and investment opportunities. They also provide a direct test of the role of investor catering in the mispricing-investment relation and report higher sensitivity between mispricing and investment in firms with shorter horizon shareholders. In addition, Polk and Sapienza show that firms with high (low) investment have low (high) subsequent stock returns, and this pattern is stronger for firms with short-horizon shareholders.

Panageas (2003) introduces an infinite horizon continuous time model with short-sale constraints and heterogeneous beliefs. The model shows that investments increase in response to the speculative bubbles created by the fact that only optimistic beliefs are reflected in stock prices[6]. Unlike other studies that assume an exogenous short horizon, the short horizons in Panageas's model arise endogenously. The manager will decide whether maximizing the fundamental component (long term value) or maximizing the speculative component (current price) is more profitable for the investor. However, Panageas points out that the model works best for investors who have short horizons and are willing to sell the stocks in the near future. Panageas applied his model to firms that were introduced into the "loan crowd" in 1926 because they were perceived to be overvalued and reported an increase (decrease) in investment before (after) introduction to the loan crowd.

McConnell and Muscarella (1985) study the return around capital expenditure announcements and find that increases (decreases) in capital expenditures are associated with positive (negative) abnormal returns for industrial firms while utility firms do not receive any significant reaction from the market regarding their announcements. Such results are consistent with firm value maximization. Investors capitalize on the new information about capital expenditures and revalue the industrial firms' stocks accordingly. McConnell and Muscarella argue that utility firms are expected to have zero NPV projects (rather than positive NPV projects) and that should not affect the value of the stock. Rather than using industry classification, Chung, Wright, and Charoenwong (1998) measured investment opportunities of firms using the level of Tobin's q. Chung, Wright, and Charoenwong find evidence that increases (decreases) in capital expenditures are associated with positive (negative) abnormal returns for firms with high growth opportunities. On the contrary, increases (decreases) in capital expenditures are associated with negative (positive) abnormal returns for firms with low growth opportunities. The findings related to increases in capital expenditures in low growth firms are not as strong as other findings. Szewczyk, Tsetsekos, and Zantout (1996) find insignificant market response to such announcements. Brailsford and Yeoh (2004) find free cash flow to have a negative impact on the market response to increases in capital expenditure when it is in the hands of low growth firms' managers.

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[6] If pessimists are constrained in their ability to short the stocks, then market prices reflect the beliefs of optimists and thus market prices rise above fundamental values.

Although researchers interpret the above results as consistent with the maximization of firm value, these results are also consistent with investor catering theory. When an overvalued firm announces an increase in capital expenditure, optimistic investors react positively to the announcement; however, when an undervalued firm announces an increase in capital expenditure, investors react negatively to the announcement. The weak empirical finding regarding the negative reaction to the increase in capital expenditure by the undervalued firm might be explained by the fact that some pessimistic investors actually update their beliefs about the firm based on the new information. Titman, Wei, and Xie (2004) argue that the positive response to capital expenditure increases can reflect the fact that firms only announce favorable capital expenditures. In addition, higher stock prices around a capital expenditure may be a result of market timing rather than a favorable response from the market.

2.2.5 Mergers and Acquisitions: The Mispricing Story

Shleifer and Vishny (2003) present a theoretical explanation of mergers and acquisitions based on the behavior of rational managers who take advantage of an inefficient market[7]. When the stock is overvalued, rational managers try to exchange their overvalued equity for the real assets of other firms that are either undervalued or at least less overvalued than their own firms[8]. Such behavior will justify the overvaluation, increase earnings, and protect long-term investors when the market corrects for overvaluation. In this model, the long-term combined benefit from the acquisition is zero. Therefore, what the acquirer gains, the target loses. Shleifer and Vishny (2003) assume that the target managers have a short-run horizon and are expected to engage in mergers because they either want to cash out their stocks or they are offered other benefits by the bidder.

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[7] This model is the opposite of the hubris hypothesis in Roll (1986). In the hubris hypothesis, irrational managers of the bidding firms engage in takeover activities because they are overconfident about their assessment of targets' values. The hubris hypothesis predicts that managers' irrationality (overconfidence) drives the premium for the target up and also increases merger activities. Roll argues that managerial overconfidence is as powerful as other rational market hypotheses in explaining mergers and acquisitions activities. Malmendier and Tate (2002) develop a model of the acquisition decision of an overconfident CEO and find that overconfident CEOs are more likely to engage and to overpay in diversifying mergers. Malmendier and Tate (2002) also find that overconfidence boosts the number of takeovers on average and the market reacts more negatively to takeover bids by overconfident managers. Managerial overconfidence is measured by how long CEOs hold on to their stock options in excess of what is recommended by normative models of optimal exercise. The longer the CEO holds his options, the more optimistic he is about the stock's future price. Lys and Vincent (1995) analyzed the acquisition of NCR by AT&T. The wealth of AT&T shareholders decreased dramatically due to the acquisition. Lys and Vincent (1995) suggest managerial overconfidence as one explanation for the acquisition decision by AT&T's managers.

[8] Shleifer and Vishny (2003) argue that the manager of an overvalued firm finds low return T-bills and high cost new investments to be unattractive choices relative to the stock-based acquisitions as excuses to raise large amounts of equity. Fama and French (2004) report that the amount of equity raised in mergers is roughly 40 times what is raised in SEOs.

The model of Shleifer and Vishny (2003) explains the empirical findings of Mulherin and Boone (2000), DeLong (2001), and Houston et al. (2001), among others, very well. The negative short- and long-run abnormal returns for the bidders are due to the overvaluation of the acquiring firms' stocks. The negative long-run abnormal returns, as reported by Rau and Vermaelen (1998) and Gregory (1997), are expected to be even worse had the acquisition not taken place. Also, the positive abnormal announcement returns are due to the undervaluation or less overvaluation of the target relative to the bidder.

In addition, the model suggests that overvalued bidders use cash in more hostile acquisitions if the target is undervalued and use stock in less hostile acquisitions if the target is less overvalued relative to the bidder. Since it is hard to convince managers of undervalued firms to engage in acquisitions, hostile cash tender offers are used because they do not require management approval.

However, because it is easier to convince managers of overvalued firms to cash out to relatively overvalued equity offers, bidders use friendly stock offers for overvalued targets. The model also explains the findings of Loughran and Vijh (1997) and Rau and

Vermaelen (1998) that the long-run abnormal return to acquirers who used cash is positive while the long-run abnormal return to acquirers who used stocks is negative. The model suggests that stock bidders are more overvalued than cash bidders; therefore, stock bidders suffer negative long-run abnormal returns.

The model also explains some features of the different merger waves. The 1960s diversification wave and the 1990s consolidation wave were clustered in high valuation markets and the medium of payment was mostly stocks. However, the 1980s hostile takeover wave was during a down-market valuation and involved mostly cash acquisitions (see Andrade at al. (2001)).

Ang and Cheng (2003) and Dong, Hirshleifer, Richardson, and Teoh (2003) test the misvaluation hypothesis and find that bidders are overvalued relative to their targets in both cash and equity offers, and in both mergers and tender offers. Dong et al. also find that the higher the bidder's overvaluation, the higher the premium paid, the lower the announcement abnormal returns, the more likely friendly mergers are used, and the more likely stock-based acquisitions are used. In addition, the more undervalued the target, the higher the announcement return, the higher the premium paid, the more likely it is to be a hostile offer, and the less likely to be a successful acquisition. Bouwman, Fuller, and Nain (2003) argue that investors welcome acquisition announcements during high valuation periods even though such acquisitions produce the worst future returns. Such a result is consistent with an investor catering motive behind the acquisition decisions.

Rhodes-Kropf and Viswanathan (2003) present a rational theory that posits misvaluation as a factor that affects mergers and acquisitions. In their model, target firms accept the bidder's overvalued shares not because they have short-horizon managers as suggested by Shleifer and Vishny (2003), but rather because managers overestimate the gains from the takeover synergies, and such overestimation is correlated with the overall valuation error in the market. In the model, the misvaluation can be market wide, industry specific, or firm specific. Managers of the target firms discount for possible overvaluation of the bidder, but they do not know the source of the overvaluation and whether it is market, industry, or firm specific. Hence, when the market is overvalued, the target is more likely to overestimate the synergies because it underestimates the component of misvaluation that it shares with the bidder and the target manager is more likely to accept the merger. Rhodes-Kropf et al. (2004) test the model and show that mispricing drives takeover activities.

Chapter III

Stock Market and Corporate Investment Decisions

3.1 Background

MSV is one of the early studies that suggest the direct effect of mispricing on the firm's investment decision. MSV argue that the direct effect of mispricing on investments exists simply because managers respond to such mispricing and do not ignore it. MSV provide three explanations of why managers would respond to mispricing in the market. First, managers care about the cost of external financing. Managers exploit mispricing by either issuing overvalued equity or repurchasing undervalued equity. For financially constrained firms, these exploitations will determine the amount of funds available for the firm to invest. If the financially constrained firm has positive NPV projects, then overvalued equity will enable the firm to issue and invest more in its profitable projects. However, undervalued firms are more likely to pass up some profitable projects because the cost of capital outweighs the gains from the projects. Moreover, even if the firm is not financially constrained or does not have positive NPV projects, managers will try to lessen the negative impact of the issuance event on the stock price by justifying the equity issuance and engaging in real investments. Shleifer and Vishny (2003) argue that overvalued firms wishing to issue equity should do something that will be perceived by shareholders as valuable to the firm like acquiring another firm. This intuition answers the question why a firm would invest in negative NPV projects where it can issue equity and park the proceeds in treasury bills.

Second, managers may cater to investors who happen to be more concerned about selling the overvalued stock at a maximum price. Managers may cater to investors because they want to protect their jobs (Jensen (2005) and Narayanan (1985)), maintain their reputation (Holmstrom (1999)), or maximize their stock-based compensation (Bolton, Scheinkman, and Xiong (2003)). Panageas (2003) indicates that maximizing current stock price is part of maximizing shareholders' wealth. Stein (1996) argues that investors' and managers' horizons are determined by their liquidity needs.

Third, managers use market prices as a guide for predicting the future state of the economy and industry. The manager invests more if the economy or the industry is expected to grow and holds if the future of the economy or the industry is not that promising. However, stock prices may be contaminated by investors' biased expectations, which will affect the investment decisions as well.

Blanchard et al. (1993) point out that the effect of mispricing on investment does not depend only on cheaper new equity but also on how long the market value is expected to deviate from fundamentals and how long shareholders are expected to hold on to their shares.

Stein (1996) developed a model that is consistent with MSV's first and second explanations. Stein argued that the investment decision is more responsive to the market valuation if the firm is financially constrained and thus relies more on equity. By taking the extreme case where the firm cannot raise any debt, any new investment must be fully funded by equity. In that case, the important determinant of the investment decision is the market's assessment of how attractive the investment is. If the investment can be only partially funded by equity, the market valuation becomes less important for the investment decision.

Stein also argued that if managers are acting on behalf of shareholders (including themselves) who have to sell their stocks in the near future for liquidity reasons, they will be more inclined to maximize the current stock price (use market perception). In contrast, if they are acting on behalf of shareholders who will be holding the stock for a longer term, they will be more inclined to maximize the present value of the future cash flows (use fundamental valuation).

3.2 Theoretical Framework

This theoretical framework summarizes the rational manager's objective function in an inefficient market and addresses the role of investor horizon and the cost of external financing in linking mispricing to investment decisions. The framework is adapted from the work of Baker, Ruback, and Wurgler (2004) and borrows most from Stein's model.

In efficient markets, investors and managers evaluate firms using the same information set. The fundamental value of the stock in an efficient market reflects all information regarding the expected future cash flows of the firm discounted at the rationally risk-adjusted expected return. However, in a less than efficient market, investors make systematic errors when they predict the mean and variance of the future cash flows. Limited arbitrage makes it hard to eliminate those errors. Consequently, stock price will deviate from the fundamental value of the firm.

In efficient markets, the value set by investors (market price) is expected to be the same as the fundamental value of the firm because there are no systematic biases that make the stock price deviate from the fundamental value. Accordingly, when a manager maximizes the value of the firm, she is maximizing the fundamental value and the market price at the same time. However, when the market is inefficient, market price is not necessarily equal to the fundamental value[9]. Therefore, the manager has two different objectives. The first objective is to maximize the fundamental value of the firm by maximizing the present value of the future cash flows based on the rationally risk-adjusted expected return.

The fundamental value is modeled as

$$f(K,E)-K$$

Where f is the expected cash flow at time 1 resulting from investing K at time 0; it is an increasing and concave function in the new investment K. E is the amount of external financing raised at time 0. Due to market inefficiency, financing may affect the firm value and enter f in conjunction with investments[10]. To simplify the algebra, the discount rate is set to zero.

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[9] We are not discussing here what might cause the discrepancy between the fundamental value and the market value of the firm. However, asset-pricing literature confirms the existence of mispricing in the market and behavioral finance literature refers us to the limits of arbitrage and noise trader's as two main causes of persistent mispricing.

The second objective is to maximize the current market price. Stein addresses one version of investor catering, which is the managerial horizon effect, whereby managers may be concerned about maximizing current price rather than fundamental value if they (or the investors they are catering to) are interested in selling their shares in the near future for liquidity reasons.

Managerial horizon is modeled by λ, where $0 \leq \lambda \leq 1$. If λ equals zero, the manager has a short horizon and cares only about maximizing the current stock price. As λ approaches one, managers become more concerned about maximizing the fundamental value of the firm and less concerned about maximizing the current stock price.

The mispricing is represented by a percentage δ. The stock is overpriced when $(\delta > 0)$ and underpriced when $(\delta < 0)$. δ is modeled as $\delta(K, E)$, where $\delta(.)$ is a function of investment and financing activities. It is expected that managers' financing and investing behaviors affect the degree of mispricing. Catering to shareholders through investment decisions affects the degree of mispricing by increasing the stock price of overvalued firms and limiting the undervalued stock from going down further[11].

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[10] Inefficiency entails the existence of information asymmetry and adverse selection costs in the form proposed by Myers and Majluf (1984).

[11] Empirical results are consistent with this assumption. Panageas (2003) shows that investment significantly amplifies the effects of speculation on the asset prices by affecting the value of growth options embedded in the company's price. Also, Titman, Wei, and Xie (2004) show that mispricing can persist for a longer time due to investment choices. Titman et al. report negative long run abnormal returns for five years after overinvestments.

Managers cater to investors by selecting projects that seem more appealing to those investors either because of the projects' perceived low risk or because of the irrational expectations about the projects' future cash flows. Also managers may avoid investing in some projects because they are not applauded by shareholders. In addition, managers may avoid some long-term projects if they believe that the stock is underpriced and the mispricing will take a longer time to be corrected[12]. Exploiting mispricing through financing decisions, like issuing or repurchasing equity, can lessen the mispricing but it is not expected to eliminate it completely[13]. Managers will exploit the current mispricing to benefit the current shareholders by issuing overvalued equity or repurchasing undervalued equity. Such behavior, which is called market timing, is intended to produce a gain transferred from the new shareholders to the existing shareholders, and such gain will be realized when stock prices are corrected in the long run. The gross market timing gain is modeled as $E\delta$, where E is the dollar amount of net equity issued at time 0.

In addition, a manager should consider the effect of his financing and investment decisions on the firm's capital structure. If we assume that at time 0, the firm is at the optimal debt ratio, then to maintain that ratio, the firm should use $K(1-\bar{d})$ of equity to finance the new project. $\bar{d}$ is the percentage of the new debt the firm can issue to finance the new investment. A low value of $\bar{d}$ indicates that the firm already exhausted too much of its debt capacity and should rather use more equity to finance the new investment. If the firm did not have enough cash on hand (C) and did not raise enough equity (E), then the firm will be over-levered by the amount $D \equiv K(1-\bar{d})-C-E$. This amount of over-leverage represents a deviation from the optimal capital structure and entails a cost of $Z(D)$. Due to market imperfections, the deviation from the optimal debt ratio is costly whether it involves less debt or more debt in the capital structure mix[14]. Therefore, when $D>0$, $\partial Z/\partial D \geq 0$ while $\partial Z/\partial D \leq 0$ when $D<0$; and $\partial^2 Z/\partial D^2 \geq 0$ everywhere, and $Z(0)=0$.

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[12] In a recent study, Aghion and Stein (2004) develop a multi-tasking model where a manager prefers to invest more at those times when the market is paying more attention to the growth dimension of the firm's performance. On the other hand, the manager will put more effort into reducing costs when the market is more concerned about the profit margin of the firm.

[13] I assume that corporate decisions that intend to exploit the mispricing do not eliminate the mispricing in the market. Issuance or repurchasing of shares usually move prices toward the fundamental value. However, these activities are not expected to eliminate mispricing, as managers of mispriced firms will act like monopolists when dealing with the firm's shares. This is in contrast to the rational expectation world of Myers and Majluf (1984), where managers' equity issuance will eliminate the discrepancy between the market value and the true value of the firm. My assumption is consistent with the empirical studies that report market underreaction to financing and investment decisions. See for example, Loughran and Ritter (1995) on seasoned equity offerings and Ikenberry, Lakonishok, and Vermaelen (1995) on share repurchases, and Titman, Wei, and Xie (2004) on empire building.

The overall objective function constitutes maximizing the fundamental value of the firm, maximizing the current stock price, and maximizing the market timing net gain while taking into consideration the cost of deviation from the optimal debt ratio.

The manager's objective function is

$$\text{MAX } \lambda\left[f(K,E)-K+E\delta(K,E)-Z(D)\right]+(1-\lambda)\delta(K,E) \tag{3.1}$$

Subject to

$$D \equiv K(1-\bar{d})-C-E$$

Maximization of the fundamental value and timing the equity market are intended to serve the long-term investors; therefore, they are weighted by the managerial horizon λ, while maximizing the current stock price is weighted by $(1-\lambda)$ [15]. In an efficient market, the current price equals the fundamental value and the maximization problem is reduced to maximizing the fundamental value without any consideration of the managerial horizon or market timing activities because they will be irrelevant in such an environment. However, even in an inefficient market, maximizing the current stock price may not enter the maximization problem if the manager is maximizing the long-term value of the firm. In that case, $\lambda = 1$ and the last term drops out. However, as we can see in equation (3.1), the mispricing variable will still play a role for long-horizon managers to the extent that mispricing determines the market timing gain to the existing long-term shareholders.

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[14] Such imperfections include taxes, cost of financial distress, and agency costs.

The optimal investment and financing decisions are given by the first order conditions of the maximization problem[16]:

$$\lambda f'(K) - \lambda + \lambda E\delta'(K) - \lambda(1-\bar{d})Z'(D) + (1-\lambda)\,\delta'(K) = 0 \qquad (3.2)$$

$$\lambda f'(E) + \lambda\delta(K,E) + \lambda E\delta'(E) + \lambda Z'(D) + (1-\lambda)\,\delta'(E) = 0 \qquad (3.3)$$

With a little algebra, the optimal investment and financing decisions satisfy,

$$f'(K) = \left(1 + (1-\bar{d})Z'(D)\right) - \left(E + \frac{1-\lambda}{\lambda}\right)\delta'(K) \qquad (3.2)`$$

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[15] I follow Stein's (1996) assumption that the managerial horizon is exogenous in this framework. However, it is possible that the managerial horizon becomes endogenous in the model; for example, the compensation contract may load more on short-term types of incentives because they are more attractive when the stock is overvalued. It is also possible that when the stock is overvalued, managers become more concerned about the current price because they are afraid of being taken over. In addition, as in all other studies, this framework assumes that the manager's horizon coincides with the shareholders' horizon. This makes sense if we believe that managers maximize the existing shareholders' wealth based on those shareholders' horizon preference or if we believe that compensation contracts and career concerns shape the manager's horizon and make it coincide with the investors' horizon.

[16] For detailed calculations of the equations in section 3.2, please refer to Appendix A.

$$-\left(f'(E)+Z'(D)\right)=\delta(K,E)+\left(E+\frac{1-\lambda}{\lambda}\right)\delta'(E) \tag{3.3`}$$

Equation (3.2)` determines the optimal investment decision that a rational manager makes in an inefficient market. The marginal value created from the new investment is weighted against the cost of capital that is normalized to be one plus the cost of deviation from the optimal capital structure. Market timing and investor catering gains that result from the impact of investment on mispricing reduce the cost of capital. When mispricing exists, $\delta \neq 0$, corporate investment decisions are subject to mispricing $\delta'(K)$[17]. Such mispricing will help managers gain from timing the equity market by either issuing equity when the mispricing is positive or repurchasing equity if the mispricing is negative. In addition, the mispricing of investment projects will also be a factor in determining the required return on those projects. If the manager cares about the current stock price and invests in projects that receive positive reactions in the market, she will enjoy a lower required return by shareholders.

Due to market timing and investor catering gains, the marginal value created from the new investment projects may be less than the standard cost of capital under an efficient market, and yet it is the optimal decision for the manager. For example, when the manager spots an overvaluation, she will respond to the mispricing by issuing overvalued equity and at the same time, depending on the horizon length, she will cater to short-horizon investors by investing more in what is perceived to be profitable. These two actions will reduce the cost of capital and increase investments. Moreover, some negative NPV projects become positive and the firm will be able to finance and invest in those projects. On the other hand, when the manager spots an undervaluation, depending on the horizon length, she will respond to the mispricing by decreasing investments in what is perceived to be less profitable by the market. Decreasing investments will make more cash available to repurchase undervalued equity. These two actions will increase the marginal value that should be created by the optimal investment.

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[17] See detailed analysis of the relation between mispricing and corporate decisions in Appendix B.

Equation (3.3)` determines the optimal level of equity issued or repurchased by a rational manager in an inefficient market. For equity issuance, the marginal value lost from issuing more equity plus the cost of deviating from the optimal capital structure is weighted against the marginal revenue from market timing δ net of the price impact associated with the issuance $-E\delta'(E)$. The impact of the new equity issued on mispricing $\delta'(E)$ is expected to be negative. When a manager issues more equity the mispricing will decrease and the more equity issued, the less the gain from market timing. Hence, the negative impact on mispricing due to stock issuance is proportional to the amount of equity issued E . This argument is consistent with the reported equity issuance announcement effect. The stock price usually goes down when the firm announces equity issuance and the larger the size of the issue, the larger the drop in the price[18].

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[18] This argument is consistent with most studies of the cross-sectional determinants of abnormal returns around SEO announcements, See, e.g. Asquith and Mullins, (1986) and Masulis and Korwar (1986).

In addition, the negative impact on mispricing and hence on the marginal net gain from market timing is proportional to shareholder investment horizons $-\left(\frac{1-\lambda}{\lambda}\right)\delta'(E)$. Managers issue less equity when they cater to shareholders with short investment horizons. Because short-horizon shareholders care about the current stock price, they will not applaud the equity issuance. As a result, equity issuance becomes more costly for firms with short-horizon shareholders.

For equity repurchase, the marginal value created from the repurchase activities depends on the extent of undervaluation δ net of the cost of deviation from optimal capital structure $Z'(D)$ and the price impact associated with repurchase $E\delta'(E)$[19]. When a manager repurchases more equity, the mispricing will decrease; and the more equity repurchased, the less the gain from market timing. Unlike equity issuance, short-horizon investors celebrate stock repurchases. Accordingly, stock repurchase becomes less costly because the firm will not need to offer very high prices to convince short-horizon shareholders to sell their stocks[20]. Therefore, the price impact due to more repurchases is weaker when short-horizon shareholders exist.

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[19] Equation (3.3) provides the optimal level of equity issuance or repurchase. The gains from equity issuance or repurchase are weighted against the costs attached to them. The gains from equity issuance take the positive sign, while the cost of equity issuance takes the negative sign as shown above each term as follows, $\overset{-}{f'(E)}+\overset{+}{\delta}+\overset{-}{\delta'E(E)}+\overset{-}{Z'(D)}+\overset{-}{[1-\lambda/\lambda]\delta'(E)}=0$. However, in equity repurchases, gains switch signs and become (-) while the costs attached to repurchases take the (+) signs as follows, $\overset{-}{f'(E)}+\overset{-}{\delta}+\overset{+}{\delta'E(E)}+\overset{+}{Z'(D)}+\overset{-}{[1-\lambda/\lambda]\delta'(E)}=0$.

[20] Gaspar et al. (2004b) argue that firms' payout decisions can be explained by shareholder investment horizons. Firms held by short-term shareholders have a higher propensity to buybacks shares instead of using dividends. Gaspar et al. provide evidence that repurchases are used if managers want to cater to short-term oriented shareholders.

By combining the two optimal decisions, we can see how a manager invests while keeping in mind the effect of the financing decision.

$$f'(K) = 1 - \left(E + \frac{1-\lambda}{\lambda}\right)\delta'(K) - \left(1 - \bar{d}\right)\left[f'(E) + \delta(K, E) + \left(E + \frac{1-\lambda}{\lambda}\right)\delta'(E)\right] \quad (3.4)$$

Here, we can see that the cost of capital is reduced by the net gain from market timing. Also the marginal value that should be created by the new investment is reduced by the impact of investments on mispricing and the effect of the latter on catering and market timing gains. The following cases help us to understand the optimal investment decision specified in (3.4)

3.2.1 Case 1

The first case describes the corporate investment decision in perfect and efficient markets. Modigliani and Miller (1985) show that in an efficient and frictionless market, capital structure is irrelevant. Therefore, there is no cost of deviating from optimal capital structure, $Z'(D) = 0$, no effect of equity transactions on firm value, $f'(E)$, and no systematic mispricing in the market that can affect stock prices, $\delta'(K) = 0$. Therefore, in a perfect and efficient market, where $\delta'(K) = f'(E) = Z'(D) = 0$, equation (3.4) reduces to

$$f'(K) = 1 \quad (3.5)$$

Here, investment and financing decisions are separate. The marginal value created from optimal investment will be set to one and there will be no gain from timing the market. The firm can issue equity or debt to invest with no constraints.

3.2.2 *Case 2*

The second case describes the corporate investment decisions of firms that do not issue or repurchase equity ($E=0$), have a long-term investment horizon ($\lambda=1$), and exist in an inefficient market ($\delta'(K)\neq 0$). In this case, the second term on the right-hand side of equation (3.4) equals zero because $E=0$ and $\lambda=1$. In addition, the last term in equation (3.4) equals zero because the firm does not issue or repurchase equity and therefore there are no possible gains from equity market timing. Consequently, for a firm with $E=0$ and $\lambda=1$, equation (3.4) reduces almost to equation (3.5) .

Thus, even with mispricing, $\delta'(K)\neq 0$, the optimal investment decision can be similar to the optimal investment decision under a perfect and efficient market. This happens only if the firm does not react to the mispricing, i.e. if $E=0$ and $\lambda=1$, then $\left(E+\frac{1-\lambda}{\lambda}\right)\delta'(K)=0$. The firm's reaction may take the form of issuing or repurchasing equity and/or responding to the market's biased perceptions about the investment projects of the firm. If the firm does not issue or repurchase equity, $E=0$, then there will be no effect of equity transactions on firm value ($f'(E)=0$) and no distortions in the capital structure mix ($Z'(D)=0$).

3.2.3 Case 3

The third case describes the corporate investment decisions of firms that issue or repurchase equity ($E \neq 0$), have a long-term investment horizon ($\lambda = 1$), and exist in an inefficient market ($\delta'(K) \neq 0$). In this case, equation (3.4) reduces to

$$f'(K) = 1 - \left(1 - \bar{d}\right)\left[f'(E) + \delta(K,E) + E\delta'(E)\right] - E\delta'(K) \tag{3.6}$$

In equation (3.6), the marginal value created by the optimal investment will be determined by the direct net gain from market timing (the second term on the right-hand side) and by the effect of investment on mispricing and hence the effect of the latter on the gains from market timing (the third term on the right-hand side).

The gains from market timing alter the cost of capital, and that generates two outcomes. First, the marginal value created from the optimal investment is different from the standard cost of capital (normalized to be one here), and therefore the new optimal investment level is different from the firm's optimal investment level under efficient market conditions. For example, when the stock is overvalued, $\delta > 0$, the firm issues equity to gain from the overvaluation and as a result, the cost of capital is reduced. Consequently, some negative NPV projects under efficient market conditions become acceptable under the new cost of capital; and that is called overinvestment. Conversely, when the stock is undervalued, $\delta < 0$, the cost of equity rises. As a result, firms may pass up some positive NPV projects because they cannot issue equity to invest; that is called underinvestment.

Second, as the firm departs further from the optimal investment level under the efficient market, the firm will increase or decrease investments until it reaches a new equilibrium where the marginal value created from the new investment equals the new cost of capital under inefficient market conditions. In the case of overvalued equity, $\delta > 0$, the firm will enjoy a cheaper source of capital that will allow it to increase investments as long as the new cost of capital is less than the marginal value created from those investments. The firm will continue to issue equity and invest until it reaches a new equilibrium where there are no significant benefits from market timing. In the case of undervalued equity, $\delta < 0$, the firm will continue to repurchase stocks and cut investments until the gains from stock repurchases start to disappear[21].

However, it is important to recognize that the direct gain from equity transactions is weighted by the debt capacity of the firm $\bar{d}$. If the firm is more dependent on equity, i.e. $\bar{d}$ is closer to zero, the effect of the net market timing gain on the cost of optimal investment will be more pronounced. However, if the firm has a higher debt capacity, i.e. $\bar{d}$ is closer to one, the optimal investment decision becomes closer to optimal investment under perfect market conditions. In this case, investment and financing decisions are not separate and the more dependent the firm is on equity, the more sensitive the investment decision is to market imperfections.

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[21] I assume that the new equilibrium will be different from the equilibrium under efficient market conditions because market timing strategies are not expected to eliminate mispricing completely. Managers issue or repurchase shares to the extent that the marginal revenue is equal to the marginal cost and that occurs when prices are above fundamental values.

To make this intuition more clear, consider the situation where the stock is undervalued$\left(\delta < 0\right)$. Here, the manager would like to repurchase shares and at the same time she needs the same funds to invest. If the firm is financially flexible, the manager can invest and repurchase stocks at the same time without having to balance between them. However, if the firm is financially constrained, the manager will have to weigh the gains from repurchases against the gains from investments. In that case, the marginal value created from the new investment should be higher than one to account for the opportunity cost of using that fund for investment rather than for stock repurchases. The opportunity cost in this example is particularly the last term in equation (3.4), which is the net gain from stock repurchases[22]. Therefore, the investment should create a higher value than is considered under perfect market conditions to be acceptable. Consequently, the manager will pass up some investment projects that do not compensate for the gains that would rather result from repurchasing shares. Thus, stock undervaluation leads to underinvestment even if the firm does not have to issue equity in order to invest. The firm may find it more profitable to direct its limited resources toward stock repurchases than to investments and that may lead to cutting investments in order to increase repurchases.

In the case of overvalued stock$\left(\delta > 0\right)$, the firm will have access to cheaper funds for its investments. Even projects that have negative NPV under perfect market conditions become acceptable because of the lower cost of capital that is used to finance them[23].

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[22] In the case of stock repurchase, the net gain will be added to the marginal value rather than subtracted.

[23] Although equity issuance is expected to be the main theme here, it is possible that debt becomes cheaper when the firm is overvalued. If the equity value increases, the debt capacity increases as lenders will tend to use such information in assessing the firm quality. Using the same argument; when the stock

The lower cost of capital is a result of issuing overvalued equity. Again, the effect of market timing will depend on the debt capacity of the firm and the proportion of equity used to finance the investment. If the firm does not have enough debt capacity and depends on equity to finance its investments, then the market required rate of return is going to determine which projects to invest in. Case 3 leads us to two main conclusions. First, stock mispricing affects corporate investment positively through corporate equity transactions, which are driven by market timing strategies. Second, the effect of mispricing on investments is more pronounced in financially constrained firms that have to depend on equity in order to invest. These two conclusions are to be tested later in the study.

It is important to consider the impact of stock issuance or repurchase activities on mispricing $\delta'(E)$. In general, market timing activities will have a negative effect on the magnitude of mispricing and therefore will lower the gain from timing the market as large quantities of equity issued or repurchased are involved $\left[\delta'(E) < 0\right]$.

In the case of overvalued stock, any decrease in the cost of capital due to issuing overvalued equity will disappear as more equity is issued; thus, the cost of capital may even become higher than the required return under efficient market conditions, and thus the optimal investment should create a marginal value that exceeds both the

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is undervalued, the debt value may decline as well. Speiss and Affleck-Graves (1999) and Richardson and Sloan (2003) find that debt issuance is followed by lower returns, which suggests an overvaluation at the time of the issue.

standard cost of capital under efficient market conditions and the reduced cost of capital in an inefficient market.

However, when the undervalued firm repurchases stocks, the benefits from stock repurchases start to diminish as more equity is repurchased. As a result, the opportunity cost of investments declines and the cost of capital approaches the standard cost of capital under efficient market conditions. Nevertheless, if the manager of the undervalued firm issues stocks in order to fund investments, the cost of capital becomes even higher than the required return under perfect market conditions, and thus the optimal investment should create a marginal value that exceeds both the standard cost of capital under efficient market conditions and the reduced cost of capital in an inefficient market.

The different situations discussed so far in case 3 summarize Stein's (1996) propositions about the effect of capital structure constraints and price pressure on the investment decisions of the firm. As we did here, Stein (1996) shows that financing considerations are important to the investment decision, especially in financially constrained firms. The manager of a financially constrained firm will be forced to maximize the current stock price because equity is the firm's main source of funds. Hence, the market's assessment of the quality of the investments is all that matters.

Baker, Stein, and Wurgler (2003) present a model where equity-dependent firms with undervalued stocks show higher investment sensitivity to stock mispricing than non-equity-dependent firms. The intuition behind that is simple. A financially constrained firm will have to depend on external equity to finance its new investments. However, issuing undervalued equity in order to invest will make projects more costly and will discourage investments. Baker, Stein, and Wurgler (2003) did not put too much structure into their model. They assume no stock repurchases and argue that investments are sensitive to stock prices only when stocks are undervalued. In this model, however, I borrowed from Stein's fuller model by assuming a cost of deviation from the optimal capital structure and a price pressure effect. Such generalizations allow me to present the sensitivity of investment to mispricing even in overvalued firms.

Alternatively, Gilchrist, Himmelberg, and Huberman (2004) develop a model where investment is sensitive to mispricing when the firm is overvalued. They model the source of mispricing based on dispersion of investor beliefs under short-selling constraints, which predicts an overvaluation[24]. When the stock is overvalued, managers issue cheap equity, which reduces the cost of capital and increases investment.

3.2.4 Case 4

Case 4 describes the corporate investment decisions of firms that do not issue or repurchase equity ($E=0$), have a short-term investment horizon ($\lambda=0$), and exist in an inefficient market ($\delta'(K)\neq 0$).

In this case, equation (3.4) reduces to

$$f'(K)=1-\left(\frac{1-\lambda}{\lambda}\right)\delta'(K) \tag{3.7}$$

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[24] In the model, pessimists are constrained in their ability to short the stock, which means that prices in the market reflect the beliefs of the optimists and therefore the stock gets overvalued.

A manager who is maximizing short-horizon investors' wealth (including his own) will be interested in maximizing the current stock price, even without considering market timing. The maximization of current stock price through catering behavior will reduce the marginal value created from the optimal investment and as a result, managers will find it cheaper to invest in projects that are more appealing to short-term investors and continue to invest more in those projects even over what is considered optimal under efficient market conditions. On the other side, managers will refrain from investing in projects that do not attract short-horizon shareholders because those shareholders will require a higher return on those projects. This case provides two main conclusions. First, a manager who is maximizing short-horizon investors' wealth (including his own) $(\lambda < 1)$, will be interested in maximizing the current stock price, even distinctly from market timing considerations. Second, because the gain from catering is a function of λ, the shorter the investment horizons of shareholders, the more pronounced the effect of stock mispricing on corporate investment.

3.2.5 Case 5

The final case, 5, describes the corporate investment decisions of firms that issue or repurchase equity ($E \neq 0$), have a short-term investment horizon ($\lambda = 0$), and exist in an inefficient market ($\delta'(K) \neq 0$). In this general case, investment is affected by mispricing through both equity and investor catering channels. The marginal value created from optimal investment will be weighted against the standard cost of capital net of investor catering and market timing gains.

It is important to recognize the effect of shareholder investment horizon on market timing gains. Short-horizon shareholders care more about the current stock price. Therefore, activities that result in an increase (decrease) in current stock price are accepted at low (high) required rates of return by short-horizon shareholders. With that in mind, the shorter the shareholder investment horizon, the higher the gains from repurchasing undervalued equity and the lower the gain from issuing overvalued equity. Interestingly, higher (lower) gains from repurchases (issuance) make investment more costly. For example, when the firm repurchases undervalued shares, investors might respond positively to the repurchase program and not feel as excited about directing the firm's cash to any investments other than stock repurchases. Also, when the firm responds to overvaluation by issuing more equity, the stock price will go down and investors will not be as enthusiastic about the quality of the new investments; also, they might update their beliefs and re-evaluate the firm's investments. This is the reason managers who issue overvalued equity should justify the issuing activity by investing physically to minimize the issuance cost. This is consistent with Shleifer and Vishny's (2003) argument that overvalued firms wishing to issue equity should do something that shareholders will perceive as valuable to the firm, like acquiring another firm. This intuition answers the question why the firm would invest in negative NPV projects where it can issue equity and park the proceeds in treasury bills; hence it is like a zero NPV project and will not drive down the marginal product of capital. Blanchard et al. (1993) indicate that issuing equity and using the proceeds to send a signal to the market through investment will affect the valuation of the firm; however, this is not possible if the proceeds are used to buy treasury bills.

Polk and Sapienza (2002) assert that the acceptance of negative NPV projects by overvalued firms may result in a high perceived value of the firm and the market's tendency to overvalue the investment projects more than compensates for the losses from the value-destroying investments. Polk and Sapienza (2002) build on Stein's short-horizon model and present a framework that describes the optimal investment decisions for a manager of a mispriced firm who caters to short-horizon investors. Polk and Sapienza conclude that even in the absence of an equity financing channel, mispricing can affect investment through catering to short-term investors. Overvaluation (undervaluation) encourages managers to invest more (less) as long as their strategy increases the current stock price. This catering channel may also encourage managers of overvalued firms to invest in negative NPV projects since overvaluation of the projects is high enough to compensate for any punishment from the shareholders when they update their beliefs.

Panageas (2003) presents a model of overpriced firms with short-sale constraints and heterogeneous beliefs. Panageas's model shows that market based q and investment both respond positively to the mispricing, even though such response is not justified on the basis of long-run value maximization. In Panageas's model, investment significantly amplifies the effect of speculation on the asset prices by affecting the value of growth options embedded in the company's price, $\delta'(K) > 0$. Panageas asserts that the model does not need to assume any objective other than maximizing shareholders wealth since the manager will consider the fundamental and the speculative parts as values to the shareholders and will decide whether holding the asset and reaping dividends is better than reselling the stock to more optimistic investors. In this case, a short horizon is modeled endogenously rather than exogenously, as in Stein (1996). However, Panageas argued that his intuition might not work if the firm has bulk shareholders who care about the fundamental value and may not care much about the speculative bubble. Therefore, his intuition is more relevant for short-horizon shareholders.

3.3 Testable Hypotheses

After exploring the theoretical underpinnings of the effect of stock mispricing on corporate investments, we can identify at least three channels by which stock mispricing can affect corporate investment. I shall summarize those channels in five hypotheses:

Hypothesis 1a

Stock mispricing affects corporate investment positively through corporate equity transactions that are driven by market timing strategies.

Stock market conditions help the firm decide when to raise additional capital. Overvalued firms issue equity and undervalued firms repurchase equity. Issuing more equity will help finance more investments and repurchasing equity may be more profitable than engaging in undervalued investment projects. In this case, the market timing activities can determine the cost of investing the firm's capital.

For overvalued equity, the cost of raising additional equity is lower, which provides the opportunity to accept some negative NPV projects that would not be accepted otherwise. However, if the stock is undervalued, the firm may pass up some positive NPV projects simply because they will not be worth doing.

Hypothesis 1b

The more the firm depends on equity (Financially constrained) the higher the sensitivity of investment to stock mispricing.

The counter argument to the first hypothesis is that, although mispricing can affect the way investment projects are financed, it may not necessarily affect the investment decisions themselves.[25] This argument is easily refuted when we consider financially constrained firms. Financially constrained firms depend more on the equity issuance proceeds to invest in the projects that could not be financed otherwise. Thus, when these firms become overvalued, the cheap cost of equity will allow them to increase investments, while when these firms become undervalued, they will not have enough cash to engage in both repurchases and real investments at the same time. Consequently, since the firm's projects are undervalued, there is a higher chance that the firms will engage in stock repurchases rather than real investments.

From another perspective, the firm that has a limited debt capacity and cannot raise more debt to finance its new investment projects will rely on equity. In the extreme case, where the project is funded solely by equity, the market's assessment of the project's quality, and hence the required return on it, becomes the main determinant of the corporate investment decision.

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[25] Baker and Wurgler (2002) show that firms with higher market-to-book ratios in the past issue more equity today and that increase in equity is used to increase cash balances rather than to increase investment.

These two hypotheses are the main conclusions of (case 3) where, $E \neq 0 \ \ \lambda = 1$. In this case the cost of capital will be reduced by the net gain from market timing. The net gain is weighted by the debt capacity of the firm $\bar{d}$. If the firm is more dependent on equity, i.e. $\bar{d}$ is closer to zero, the effect of the net market timing gain on the cost of optimal investment will be more pronounced. However, if the firm has a higher debt capacity, i.e. $\bar{d}$ is closer to one, the optimal investment decision becomes closer to the optimal investment under perfect market conditions. In this case, the investment and financing decisions are not separate, and the more dependent the firm is on equity, the more the market imperfections affect the investment decisions.

Hypothesis 2a

Managers cater to the shareholders' perception about the firm and this is reflected in corporate investment decisions.

Hypothesis 2b

The shorter-sighted the investors, the more pronounced the effect of stock mispricing on corporate investments.

As in (case 4), if $\delta'(K) > 0$, and $(0 \leq \lambda < 1)$, a manager who is maximizing short-horizon investors' wealth (including his own) will be interested in maximizing the current stock price, even in the absence of market timing. The maximization of current stock price through catering behavior will reduce the marginal value that should be created by the optimal investment, and as a result, managers will find it cheaper to invest in projects that are more appealing to short-term investors and continue to invest more in those projects even above what is considered optimal under efficient market conditions. Managers will increase investments or package the firm's assets in a way that justifies the overoptimistic view about the firm's growth. Such strategies aim to maximize the short-horizon shareholders' wealth by maximizing the current stock price since these shareholders are expected to sell their stocks in the near future. In addition, when the firm is overvalued, short-term investors require a lower rate of return and thus, the gain from catering will more than offset any future losses from inefficient investments. On the other hand, managers will refrain from investing in projects that do not seem to attract short-horizon shareholders because these shareholders will ask for a higher required return on those projects. More specifically, when the firm is undervalued, short-term investors require a higher rate of return, and thus the losses from investment in undervalued projects will not be fully compensated by the projects' future gains.

Hypothesis 2a provides a direct test for the investors catering channel by examining the gain from catering to short-horizon shareholders and its effect on investments. Because the gain from catering is a function of λ, the shorter the investment horizons of shareholders, the more pronounced the effect of stock mispricing on corporate investments.

Hypothesis 3

Mispricing affects investment decisions through the noisy signal about the future state of the economy and the industry sent by market participants.

Although this hypothesis is not based on the theoretical model presented earlier, it suggests another explanation for the relation between investment and market mispricing. The unique element in this explanation is the effect of aggregate mispricing on investments.

MSV provide an explanation of how this channel can affect investments. The market reveals different kinds of information about the firm, the industry, and the economy. Managers use market information to assess the future state of the economy and to form expectations about the performance of the industry and the firm. In an efficient market, the market should not affect investments beyond the effect of fundamentals because market expectations and fundamentals will be correlated. However, in a less efficient market there will be some errors in predicting the future state of the economy. If managers listen to the market and cannot filter out the error in its predictions, then the market will affect investments. MSV assert that this effect is expected to be more plausible if managers are confused about the market or the industry conditions but not about their own firms since managers are expected to know more about their firms than investors[26].

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[26] Insider trading literatures show that managers make money on trading in their own firms. Insiders successfully predict both future idiosyncratic returns and future market return.

Recent studies show that managers listen to the market when they make acquisitions. Luo (2004) shows that abnormal returns around the acquisition announcement can help predict whether the firm will go ahead with the acquisition or not. Thus, firms extract information from the market reaction and use it to make final decisions. Luo shows that the propensity to learn is higher when it is easier to cancel the deal, less expertise is needed to value the deal, and the bidder is small. Luo argues that the last two conditions indicate that the learning is more significant when the market knows more than the manager. Ka, Linck, and Rubin (2004) argue that agency theory can explain managers' propensity to listen to the market. Particularly, firms with a smaller board and more outside monitors, and firms with higher pay-performance sensitivities are more likely to cancel an uncelebrated deal.

Chapter IV

Data and Methodology

4.1 Mispricing Measure

4.1.1 Background

Empirical studies that investigate the relation between mispricing and corporate investments come up with different ways to measure unobservable mispricing. Polk and Sapienza (2002) argue that discretionary accruals and equity issuance can proxy for mispricing because they are usually followed by negative future returns. The negative future returns indicate that discretionary accruals and equity issuance are conducted by overvalued firms. However, Polk and Sapienza fail to recognize that these two measures are parts of the various corporate decisions that managers make. Therefore, any relation between these variables and investment decisions may stem from the fact that managerial decisions are interrelated in nature. Empirically, these two activities are shown to be done simultaneously by managers. Teoh, Welch, and Wong (1998b) show that issuing firms have high discretionary accruals. Thus, the significant relation between accruals and investments may stem from the relation between accruals and equity issuance. In addition, any significant relation between these decisions and the investment decision may not necessarily indicate a direct relation between mispricing and investment. For example, a significant relation between equity issuance and investment may point to the mechanical process of raising more capital to finance the already-scheduled investment projects. In addition, even if high accruals indicate overvaluation, lower accruals do not necessary indicate undervaluation. Therefore, accruals may point to only one side of the mispricing story.

The last measure that has been used by Polk and Sapienza (2002) is the previous period stock returns. Stock returns are used as a proxy for mispricing also by MSV and Baker, Stein, and Wurgler (2003). It is important to notice that stock returns contain information about growth opportunities and varying discount rates. It is hard to disentangle the mispricing component of stock returns from other components. Baker, Stein, and Wurgler (2003) admit that the negative relation between investment and future returns could be a result of changes in the rational cost of capital. Lamont (2000) reports the same relation between planned investments and future returns and interprets the results as evidence that time-varying risk premia affect aggregate investments. Lamont (2000), however, does not make a strong argument about whether his results address market efficiency beyond any doubts. Panageas (2003) shows that investment can predict future returns, and one cannot interpret this result as a support of either efficient market or inefficient market hypotheses because investments react to both the fundamental and the non-fundamental components of stock prices. Panageas argues that returns' explanatory power becomes strongest when both fundamentals and disagreement about fundamentals are high. As support for using stock returns as a mispricing proxy, Titman, Wei, and Xie (2004) argue that increases in investments are associated with negative long-run abnormal returns for five years. The result is interpreted as the market's underreaction to empire-builder strategies. Richardson and Sloan (2003) find that the negative relation between external financing and future stock returns is strongest when the proceeds are invested in real investment activities.

As we can see, it is hard to distinguish between these two views of the relation between future returns and corporate investments. As stock returns reflect profitability and investment opportunities, they also reflect mispricing by the market. Therefore, it is hard to attribute the role of the stock market to any hypothesis unless one separates the stock price into fundamental and nonfundamental components. Chirinko and Schaller (2001) provide an approach that extracts the efficient part of the price and separates it from the mispricing part by the assumption that bubbles lead to predictable returns along with other structural assumptions. From these assumptions, they derive the result that if investment reacts to bubbles, certain Euler relations should fail.

Apart from investors' irrationality, some researchers suggest another source of mispricing in their models. Models based on short-sale constraints and heterogeneous beliefs predict an overvaluation bubble in the market. Even in the absence of biased investors, on average, short-sale constraints prevent pessimistic investors from short-selling the stock and as a result only optimistic investors participate in the market and drive the price above the fundamental value. As a proxy for heterogeneous beliefs, Gilchrist, Himmelberg, and Huberman (2004) used the variance of analysts' earnings forecast. Diether, Malloy, and Scherbina (2002) show that firms with a higher variance of analysts forecast earn abnormally lower future returns, which is consistent with the view that firms with high dispersion beliefs are overvalued. A short-sale constraint is also modeled by Panageas (2003) who uses a natural experiment to study mispricing. In the 1920s, the *Wall Street Journal* reports the names of the firms in the loan crowd market along with their rebate rates. According to Jones and Lamont (2002), overvaluation was the most likely reason for the introduction into the loan crowd, and the lower the rebate rates, the more expensive the short-selling of the stock. It is important to note that short-sale constraints models imply overvaluation bubbles in the market and are not applicable to undervaluation episodes.

The use of M/B as the market variable follows Kaplan and Zingales (1997). Also, Perfect and Wiles (1994) indicate that improvements obtained from the more involved computations of Tobin's q are limited. In addition, the study uses an approach that decomposes the M/B ratio into mispricing and growth components. The decomposition provides a clear answer to the question of whether the market is a sideshow. The answer is not distorted by limitations in previous studies, such as the measurement error in Tobin's q and the inseparability of mispricing and growth components. The decomposition of the M/B ratio measures the effect of growth and mispricing components separately and hence provides an unambiguous view about the market role in investments.

4.1.2 M/B Decomposition

Following the methodology innovated by Rhodes-Kropf, Robinson, and Viswanathan (2004), (RKV) henceforth, M/B[27] is decomposed into growth and mispricing components and the fundamental value of the firm is measured using the firm's accounting information.

The firm's market to book ratio (M/B) can break into two components as follows:

$$\frac{M}{B}=\frac{M}{V}\times\frac{V}{B} \tag{4.1}$$

In equation (4.1), the first term on the right-hand side represents the ratio of the market value of the firm to the fundamental value of the firm. This ratio measures the discrepancy between the stock price and its true value and thus represents the mispricing component of the market to book ratio. The second term on the right side is the ratio of the fundamental value of the firm to its book value and that represents the growth component in the market to book ratio. In a perfect market where there is no mispricing, the (M/V) ratio equals one and the market to book ratio (M/B) becomes the fundamental value to book ratio (V/B) and thus, the M/B ratio becomes a clear indicator of the growth opportunities of the firm.

In a log form, (4.1) becomes:

$$ln\left(\frac{M}{B}\right)=ln\left(\frac{M}{V}\right)+ln\left(\frac{V}{B}\right) \tag{4.2}$$

and thus,

$$lnM-lnB=\underbrace{\left[lnM-lnV\right]}_{Mispricing}+\underbrace{\left[lnV-lnB\right]}_{Growth} \tag{4.3}$$

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[27] M/B is the ratio of the market value of the firm to the book value of the firm and is calculated as the market value of equity (Common shares outstanding #25 times price #199) + book assets #6 – book equity #60-deferred taxes #74 all divided by total assets #6.

Now, let us assume that the fundamental value of firm i at time t can be expressed as a linear function of the firm's specific accounting information at time t, (θ_{it}), and a vector of conditional accounting multiples (α), thus,

$$ln(V)_{it} = v(\theta_{it};\alpha) \tag{4.4}$$

Using the identification assumption (4.4), we can break equation (4.3) further into three components. First, a firm specific error, which is the difference between observed market price at time t and the valuation measure based on time-t fundamentals, $\left[lnM_{it} - v(\theta_{it};\alpha_t)\right]$.

Second, a time series error, which is the difference between the fundamental value based on time-t fundamentals and the fundamental value based on long-run multiples, $\left[v(\theta_{it};\alpha_t) - v(\theta_{it};\alpha)\right]$.

Third, the growth component, which is the difference between the fundamental value based on long-run multiples and the book value, $\left[v(\theta_{it};\alpha) - lnB_{it}\right]$. Thus, equation (4.3) can be written as,

$$lnM_{it} - lnB_{it} = \underbrace{\left[lnM_{it} - v(\theta_{it};\alpha_t)\right]}_{firm-error} + \underbrace{\left[v(\theta_{it};\alpha_t) - v(\theta_{it};\alpha)\right]}_{aggregate-error} + \underbrace{\left[v(\theta_{it};\alpha) - lnB_{it}\right]}_{growth} \tag{4.5}$$

The first term in the decomposition is the firm mispricing. It is the difference between the market price of the stock at time t and the fundamental value of the stock based on the firm's accounting information at time t and the aggregate multiples at time t. Therefore, if the market is hot at time t, this will show up in the multiples, α_t, and consequently in the fundamental value of the stock, $v(\theta_{it};\alpha_t)$. Thus, the firm mispricing, $lnM_{it} - v(\theta_{it};\alpha_t)$, reflects only firm-specific deviations from the fundamentals but not the market-wide deviation at time t. The second term is the aggregate mispricing which is the difference between the fundamental value of the stock based on accounting information and the market multiples at time t, $v\,(\theta_{it};\alpha_t)$, and the fundamental value of the stock based on long-run market multiples, $v\,(\theta_{it};\alpha)$. As we can see, the value based on α without the time t subscript represents the value of the firm based on multiples that do not vary over time. Thus, $v\,(\theta_{it};\alpha_t)-v\,(\theta_{it};\alpha)$ measures the time series error that is due to the fact that the market is acting abnormally at time t relative to the long-run average. The third term is the growth component of the book to market ratio that is not contaminated by the mispricing element.

4.1.3 Fundamental Value Measure

Before we discuss how to decompose the M/B ratio empirically, we need to find a measure for the unobserved fundamental value (V). RKV use the help of the value relevance literature in accounting to build three models that measure the fundamental value using accounting data. The theoretical underpinning of these models stems from imposing identifying restrictions on the residual income model. According to Ohlson's (1995) residual income model, the intrinsic value of the firm can be written as the book value of the assets in place plus the discounted value of the infinite sum of expected residual income,

$$V_t = B_t + E_t \sum_{\tau=t+1}^{\infty} \frac{\left[ROE_\tau - r_\tau\right] B_{\tau-1}}{(1+r_\tau)^\tau} \tag{4.6}$$

where, V_t is the fundamental value of equity at time t, B_t is the book value of assets at time t, ROE_τ is the return on equity in future periods, and r_τ is the time-varying discount rate. The residual income model is a transformation of the dividends discount model that is obtained under the clean surplus assumption, where the change in the book value of equity equals earnings minus dividends. The residual income model expresses value as the sum of current book value and the discounted present value of expected earnings that is above the cost of capital. Dechow at al. (1999), Francis at al. (1998), Hand and Landsman (1998), and Myers (1999) show that, although the residual income model is identical to the dividend discount model, the former does a far better job in explaining the cross-sectional variation in market values. Frankel and Lee (1998) find that the ratio of a fundamental value computed by the residual income model to price can predict stock return even after controlling for the B/M. Chang, Chen, and Dong (1999), Lee, Myers, and Swaminathan (1999), Piotroski (2001), and Ali, Hwang, and Trombley (2003) show the ability of the residual income model to predict future returns[28].

Barth, Beaver, and Landsman (2001) argue that with the additional assumptions of linear information dynamics, firm value can be restated as a linear function of equity book value, net income, dividends, and other information. By assuming constant growth rates in book value and net income, RKV assert that the intrinsic value in the residual income model can be a linear function of current book value and current net income; hence, equation (4.6) can be written as:

$$V_t = \alpha_0 + \alpha_1 B_t + \alpha_2 NI_t \tag{4.7}$$

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[28] According to Kothari (2001), "Assuming efficient capital markets, one objective of a valuation model is to explain observed share prices. Alternatively, in an inefficient capital market, a good model of intrinsic or fundamental value should predictably generate positive or negative abnormal returns," p.178. Based on this criterion, the residual income model is a good model for fundamental value.

As we can see, the value of the firm at a certain time is a function of the book value of assets and the net income at that time. The coefficients ($\alpha's$) are multiples that reflect discount rates and growth rates[29].

The genre of equation (4.7) is quite popular in the accounting literature. Kothari (2001), Holthausen and Watts (2001), and Barth, Beaver, and Landsman (2001) provide excellent reviews of the capital market research in accounting and show how equations like (4.7) can be used in fundamental analysis or in testing the relevance of the accounting numbers for the value of the stock. Francis and Schipper (1999) raise the question whether financial statements are still relevant to equity valuation and find a decline in the earnings relevance and an increase in the book value relevance to the value of equity. On the other hand, Amir and Lev (1996) and Lev (1997) argue that book value is less relevant to the value of firms with a considerable portion of intangible assets. Collins, Maydew, and Weiss (1997) point to the role of net income in explaining the cross sectional variation in market value of firms with intangibles. Penman (1998) shows how to combine the earnings and book value in equity valuation by calculating the weights on these two factors.

However, as the coefficients ($\alpha's$) are proportional to discount rates and growth rates, one would expect those multiples to vary over time as the rates they embody may vary over time. Ang and Liu (2001) and Feltham and Ohlson (1999) point to such a possibility when they discuss time-varying risk premia and expected growth opportunities. To address this concern, I estimate separate equations for each year in our sample. In this case, discount rates and growth rates do not have to be constant over time. Equation (4.7) is estimated using the following model:

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[29] See Appendix C for the derivation of the multiples.

$$ln(M)_{it} = \alpha_{0t} + \alpha_{1t} ln(B)_{it} + \alpha_{2t} ln(|NI|)_{it} + \alpha_{3t} D_{(NI_{it}<0)} + \alpha_{4t} LEV_{it} + \varepsilon_{it} \qquad (4.8)$$

Because the variables are estimated in logs, negative net incomes will not be included. To avoid having to remove firms with negative net income, I follow the suggestion of RKV and input net income in absolute value form $|NI|_{it}$ and use $D_{(NI_{it}<0)}$ as a dummy variable that equals one if the net income is negative and zero otherwise. By interacting the dummy variable with the natural log of the absolute value of net income, negative net income observations can enter into the estimation process without contaminating the earning's multiple interpretation of α_2.

Model (4.8) implicitly imposes the restriction that firms be priced against the multiples of the average firm in the market at year t. However, some firms have higher or lower leverage than the average firm in the market and that difference in leverage level may affect the firm value. Therefore, I include leverage in the model as follows:

$$ln(M)_{it} = \alpha_{0t} + \alpha_{1t} ln(B)_{it} + \alpha_{2t} ln(|NI|)_{it} + \alpha_{3t} [ln(|NI|)_{it} \times D_{(NI_{it}<0)}] + \alpha_{4t} LEV_{it} + \varepsilon_{it} \qquad (4.9)$$

where LEV_{it} stands for the leverage ratio of the firm at time t. Model (4.9) is similar to the third model used by RKV.

Now, to obtain $v(\theta_{it}; \alpha_t)$, I first perform the cross-sectional regressions (4.9) for all firms in the market for each year separately to come up with annual estimates of the coefficients. Then, I use model (4.9) to predict the value of the stock using the estimated coefficients as follows:

$$v\,(B_{it}, NI_{it}, LEV_{it}; \hat{\alpha}_{0t}, \hat{\alpha}_{1t}, \hat{\alpha}_{2t}, \hat{\alpha}_{3t}, \hat{\alpha}_{4t}) =$$

$$\hat{\alpha}_{0t} + \hat{\alpha}_{1t} ln(B)_{it} + \hat{\alpha}_{2t} ln(|NI|)_{it} + \hat{\alpha}_{3t}[ln(|NI|)_{it} \times D_{(NI_{it}<0)}] + \hat{\alpha}_{4t} LEV_{it} \qquad (4.10)$$

To obtain $v\,(\theta_{it}; \alpha)$, I average each coefficient over time such that

$$\bar{\alpha}_k = \frac{1}{T}\sum \alpha_{kt} \qquad \text{for k = 0,1,2,3,4} \qquad (4.11)$$

Then, I predict the long-run value of the stock using the average coefficients as follows:

$$v\,(B_{it}, NI_{it}, LEV_{it}; \bar{\alpha}_0, \bar{\alpha}_1, \bar{\alpha}_2, \bar{\alpha}_3, \bar{\alpha}_4) =$$

$$\bar{\alpha}_0 + \bar{\alpha}_1 ln(B)_{it} + \bar{\alpha}_2 ln(|NI|)_{it} + \bar{\alpha}_3[ln(|NI|)_{it} \times D_{(NI_{it}<0)}] + \bar{\alpha}_4 LEV_{it} \qquad (4.12)$$

Therefore, the long-run value of the stock varies over time as the accounting information of the firm varies over time.

Model (4.9) can also be used to obtain industry-level mispricing. After grouping firms into different industries, I perform separate regressions for each industry j at year t and allow the estimated coefficients to vary across time and across industries as follows,

$$ln(M)_{it} = \alpha_{0jt} + \alpha_{1jt} ln(B)_{it} + \alpha_{2jt} ln(|NI|)_{it} + \alpha_{3jt}[ln(|NI|)_{it} \times D_{(NI_{it}<0)}] + \alpha_{4jt} LEV_{it} + \varepsilon_{it} \qquad (4.13)$$

To obtain the fundamental value of the stock using industry multiples, $v\,(\theta_{it}; \alpha_{jt})$ and $v\,(\theta_{it}; \alpha_j)$, I repeat (4.10),(4.11), and (4.12) for each industry alone.

Coefficient estimates from model (4.12) along with P-values based on Fama-Macbeth standard errors are summarized in Table 2. The estimates are the time series average of the estimates from cross-sectional regressions of a model similar to (4.9) at industry-year level and at market-year level. Industries are classified based on Fama and French's 12 industry classes. The intercept for each industry $\bar{\bar{\alpha}}_{0j}$ is the time series average of the intercepts from annual cross-sectional regression for the industry j, denoted as $\bar{\alpha}_{0j}$ in model (4.12). The intercept for each industry could indicate the loading on intangible assets and how relevant intangibles are to the value of the average firm in that particular industry. The results in Table 2 are consistent with this interpretation. Industries that have higher intercepts are the ones that are expected to have large amounts of intangible assets. For example, consistent with the findings of RKV, Chemicals (industry 5), Business Equipment (industry 6), Telecom (industry 7), and Healthcare (industry 10) have the highest intercepts because they are expected to have considerable portions of intangible assets that are relevant to the firm value. On the other hand, Non-durable Products (industry 1) and Utilities (industry 8) have the lowest intercept because they are expected to have minimal amounts of intangibles.

[Insert Table 2 about here]

The loadings on book value and on net income are positive and significant in all industries and in the market as a whole. The loadings on the negative net income indicator variable, $\bar{\bar{\alpha}}_3$, are negative and significant in most of the industries and in the market, which indicates a lower loading on net income when the firm realizes a loss. The leverage factor plays an insignificant role in most industries. However, Manufacturing Firms (industry 3), Energy (industry 4), and Utilities (industry 8) seem to load positively on leverage, which indicates a higher capacity of debt on average in these low growth industries. Conversely, some high growth industries, like Chemicals (industry 5) and Healthcare (industry 10) load negatively on leverage, which may suggest a higher preference for equity. These findings are consistent with Myers's (1977) hypothesis about the tendency of firms with growth opportunities to issue equity rather than debt to avoid underinvestment and maximize shareholder wealth. Moreover, Table 2 reports average R^2 above 89%, which indicates that accounting information and leverage explains a large portion of variations in market values of firms at the industry-year level and at the market-year level.

4.1.4 Misvaluation Components

The fundamental value $v(\theta_{it};\alpha_{jt})$ is calculated using contemporaneous aggregate average loadings, which represent average growth and discount rates in the industry or the market at a certain time. Although the fundamental value measure is calculated using contemporaneous aggregate-average multiples α_{jt} and long-run aggregate-average multiples α_j, it varies across firms and over time as the underlying accounting information varies over time and across firms.

The misvaluation measure $Dev^{Firm} = \left[lnM_{it} - v(\theta_{it};\alpha_{jt}) \right]$ represents the difference between the market value of the firm and the value of the firm based on aggregate-average contemporaneous multiples. This difference is attributed to firm-specific deviations from the contemporaneous average of the aggregate growth and discount rates. That deviation might be caused by market irrationality or the firm's degree of informational asymmetry. The firm-specific deviation is free from any mispricing at the aggregate level. If the market or the industry is heating up at time t, the multiples

α_{jt} will incorporate that into the fundamental value of the firm; therefore, the mispricing will only measure the pure firm deviation that is not related to any aggregate valuation wave.

The misvaluation measure $Dev^{Agg} = \left[v(\theta_{it}; \alpha_{jt}) - v(\theta_{it}; \alpha_{j}) \right]$ reflects the time series error or the difference between short-term industry multiples α_{jt} and long-term industry multiples α_{j}. The deviation of the firm value based on the contemporaneous average of the aggregate growth and discount rates from the firm value based on the long-run average of the aggregate growth and discount rates suggests a certain valuation wave in the industry. Therefore, we call this component the mispricing at the aggregate level. It is important to notice that the long-run multiples are a forward-looking averaging process where ex ante multiples are used to calculate the long-run multiples. Therefore, long-run multiples may reflect some information in the future that was not known to investors at the time. In that case, the deviation of the value based on current multiples from the value based on long-run multiples may not necessarily indicate irrationality on the part of investors because investors are not expected to have some of that information. It may, however, proxy for information that was unknown to investors but known to management at a certain time. The effect of this mispricing component on corporate investment decisions has nothing to do with investors' ability to discover the firm value but rests on management's ability to value the firm. Confusion on the part of the manager as to whether the current valuation multiples are rational or not will channel the effect of aggregate mispricing on investment. Hence, this component is used to test the third hypothesis concerning the role of a noisy signal about the future state of the economy or the industry in determining investment.

The third component G= $\left[v\,(\theta_{it};\alpha_j)-lnB_{it}\right]$ is the difference between the value of the firm based on long-run multiples and the book value of the firm. It varies over time as the accounting information varies over time and is not contaminated by firm-specific or aggregate-wide misvaluations. It is rather based on the value of the firm based on long-run aggregate-average growth and discount rates that are applied to the average firm in the industry or in the market. This component reflects the growth in the value of the firm.

4.2 Data

The sample in this study includes panel data for all U.S. firms in Compustat between 1971 and 2004 with data on investment, financing, market, and other determinants, as described in the sections below. Due to the one period lag structure in the methodology, the sample period starts from 1972. In addition, each firm is required to have at least two consecutive years of data. The sample does not include financial firms (SIC code between 6000 and 6999) and firms in the Utilities industry (SIC code between 4900 and 4949). Firm-year observations that are in the 1st and 99th percentile of total assets are not included in the sample to reduce the effect of reporting errors in the data. The full sample includes 89,464 firm-year observations, for an average of 4,236 firms each year. To get the share turnover ratio, the initial sample is intersected with the CRSP database to create a Compustat-CRSP sample that includes 57,781 observations running from 1971 to 2003.

4.2.1 Investment

Corporate Investment decisions are measured in several ways. Total Investment (I_{it}) is the sum of capital expenditures $(CAPX_{it})$ #128, acquisitions (ACQ_{it}) #129, R&D expense (RD_{it}) #46, and increase in investments $(IINC_{it})$ #113[30]. In addition to the total, each investment category is analyzed separately. Corporate disinvestment or asset sales are measured by the sale property, plant, and equipment $(SalePPE_{it})$ #107. Net corporate investment is the difference between total investments and asset sales $(NetI_{it})$. All investment variables are divided by the total assets at the beginning of the period (A_{it-1}) #6.

The percentage change in total assets over the year $(\Delta A_{it} / A_{it-1})$ is also analyzed as an alternative measure of investment. To differentiate between investment and disinvestment, I examine the percentage increase in total assets $(\Delta A_{it}^{+} / A_{it-1})$ and the percentage decrease in total assets $(\Delta A_{it}^{-} / A_{it-1})$ separately. Percentage change in total assets $(\Delta A_{it} / A_{it-1})$ is the difference between total assets #6 at time t and the total assets #6 at time t-1 divided by total assets #6 at time t-1, $\Delta A_{it} / A_{it-1} = (A_{it} - A_{it-1}) / A_{it-1}$. Percentage increase in total assets includes only positive changes in total assets, $\Delta A_{it}^{+} / A_{it-1} = (A_{it} - A_{it-1}) / A_{it-1}$ where $(A_{it} - A_{it-1}) > 0$. Percentage decrease in total assets includes only negative changes in total assets. Percentage decrease in total assets is represented by the absolute value of the percentage decrease of total assets, $\Delta A_{it}^{-} / A_{it-1} = |(A_{it} - A_{it-1}) / A_{it-1}|$

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[30] The item numbers refer to the annual data numbers in Compustat. The symbols in parentheses refer to the name of the variable used in this study. (i) is the firm indicator and (t) is the year indicator.

where $(A_{it} - A_{it-1}) < 0$. Calculation details are also tabulated in Appendix D. Firm-year observations with negative values on individual investment variables are not included in the sample. Panel A of Table 3 presents summary statistics for the investment variables.

[Insert Table 3 about here]

4.2.2 Financing

Corporate financing activities are equity and debt external financing. These two categories are examined on a net and gross basis separately as well as collectively as external capital. Net capital ($NetCap_{it}$) is the sum of net equity issued ($NetEq_{it}$) and net debt issued ($NetDbt_{it}$) for firm i at time t. Net equity ($NetEq_{it}$) is the difference between gross equity issued ($EIssue_{it}$) #108 and gross equity repurchased ($E\,\mathrm{Re}\,p_{it}$) #115. Net debt ($NetDbt_{it}$) is the difference between gross debt issued ($DIssue_{it}$)#111 and gross debt retired($D\,\mathrm{Ret}_{it}$) #114. In addition, the sum of gross equity issued ($EIssue_{it}$) and gross debt issued ($DIssue_{it}$) is the gross capital issued ($CapIssue_{it}$). The sum of gross equity repurchased ($E\,\mathrm{Re}\,p_{it}$) and gross debt retired ($D\,\mathrm{Ret}_{it}$) is gross capital retired ($Cap\,\mathrm{Ret}_{it}$).All financing variables are divided by total assets at the beginning of the year (A_{it-1}) #6. Calculation details are also tabulated in Appendix D.

Panel B of Table 3 presents summary statistics for the different financing variables. By looking at the averages of the debt and equity ratios, we can see that the mean ratios of external debt to assets are significantly higher than the mean ratios of equity to total assets. Firms issue and retire debt more actively and with larger amounts than equity.

4.2.3 Market

The market measures used to determine investments are outcomes of decomposing the market to book ratio $(M/B)_{it-1}$ into three components: mispricing at the firm level (Dev_{it-1}^{firm}), mispricing at the aggregate level (Dev_{it-1}^{Agg}), and the growth component (G_{it-1}) for firm i at time t-1.

Mispricing at the firm level (Dev_{it}^{firm}) is the difference between the market value of firm i at time t and the fundamental value of firm i at time t [$lnM_{it}-v(\theta_{it};\alpha_t)$]. The fundamental value of firm i [$v(\theta_{it};\alpha_t)$] is obtained by applying annual, aggregate regression multiples (α's) to the firm-level accounting values (θ). The individual time t values of the (α_t's) are obtained using the model, $ln(V)_{it}=\alpha_{0jt}+\alpha_{1jt}ln(B)_{it}+\alpha_{2jt}ln(|NI|)_{it}+\alpha_{3jt}ln(|NI|)_{it}\times D_{(NI_{it}<0)}+\alpha_{4jt}LEV_{it}+\varepsilon_{it}$. Firms are classified as over- or under-valued based on the firm mispricing measure. If mispricing at the firm level (Dev_{it}^{firm}) is positive (negative) then the firm is overvalued (undervalued).

Mispricing at the aggregate level (Dev_{it}^{Agg}) is the difference between the fundamental value of the firm at time t based on time t accounting values (θ_t) and time t aggregate multiples (α_t's) and the fundamental value of the firm at time t based on time t accounting values (θ_t) and long-run aggregate multiples ($\bar{\alpha}$'s), $\left[v(\theta_{it};\alpha_t)-v(\theta_{it};\bar{\alpha})\right]$. The long-run aggregate multiples ($\bar{\alpha}$'s) are the over time average of (α_t's). If industries are used as the aggregate measure, then industries are hot (cold) if they have a positive (negative) aggregate mispricing measure (Dev_{it}^{Agg}).If the market is used as the aggregate measure, then the market is hot (cold) if it has a positive (negative) aggregate mispricing measure (Dev_{it}^{Agg}).

Growth (G_{it}) is the difference between the valuations implied by long-run multiples and current book values, [$v(\theta_{it};\alpha)-lnB_{it}$].

The decomposition methodology requires a measure of the fundamental value of the firm. Such fundamental values can be calculated based on industry multiples or market multiples. All the analyses reported in this study are based on industry valuation multiples. The Industry classification is based on Fama & French's 12 industry classes. Results that are based on market valuation multiples are qualitatively similar; however, they are not reported because of space considerations.

The decomposition methodology and the fundamental value measures are explained in detail in the previous section of this chapter. Calculation details are also tabulated in Appendix D.

Panel C of Table 3 presents summary statistics for the market to book ratio as well as for the decomposition components based on both market and industry multiples. The mean values of the decomposition components using industry multiples are similar to their counterparts where market multiples are used. However, industry mispricing and growth based on industry multiples are more volatile than market mispricing and growth based on market multiples. In fact, the correlation coefficient between firm mispricing using industry multiples and firm mispricing using market multiples is over 0.93 (not reported), which indicates that the two measures are almost identical. That is not true, however, when considering the correlation between industry mispricing and market-mispricing or when considering the correlation between growth components. In addition, the correlations between the three components and the market to book ratio are 0.59 for firm mispricing, 0.06 for industry mispricing, and 0.12 for growth (not reported). The significant correlations indicate that the three components of the decomposed market to book ratio carry much of the information in the market to book ratio.

Table 4 presents the correlation coefficients between investment variables and both financing and market determinants. The correlations between investment variables and both financing and cash flow variables are much higher than the correlation between investment variables and market variables.

[Insert Table 4 about here]

Moreover, investment variables are positively related to both financing and market variables, while disinvestment variables, like asset sales and percentage decrease in total assets, have a negative correlation with the market variables. Except for the correlation between net debt issuance and the percentage decrease in total assets, disinvestment variables are positively correlated to financing variables, which may indicate that firms sell assets and issue capital simultaneously for funding purposes. The negative correlation between research and development and cash flow is due to the fact that research and development is expensed and subtracted from net income, which is one of the ingredients of cash flow.

4.2.4 Other Investment Determinants

The degree of financial constraints (Z_{it}) measures the extent to which a firm is financially constrained and thus depends on equity. The measure is based on the index introduced by Kaplan and Zingales (KZ) (1997) to measure the degree of financial constraint. KZ classify low-dividend manufacturing firms into categories of financial constraints and use an ordered logit model to relate the degree of financial constraints to the relevant accounting variables. The KZ index assigns higher value for firms that are more financially constrained.

KZ introduced a five-variable index that includes Tobin's q as one of the relevant variables that measure the degree of financial constraints. However, Tobin's q is also a proxy for investment opportunity and market mispricing. The main purpose of this study is to examine the effect of those two components on corporate investment and see how this effect is sensitive to the degree of financial constraints. To make sure any change in the sensitivity is driven by the degree of financial constraints rather than the level of Tobin's q, we need an index that is a clean indicator of financial constraints and does not proxy for investment opportunity or market mispricing. Therefore, I follow Baker, Stein, and Wurgler (2003) and calculate Z based on a modified four-variable version of the index, as follows:

$$Z_{it} = -1.002\frac{CF_{it}}{A_{i(t-1)}} - 39.368\frac{DIV_{it}}{A_{i(t-1)}} - 1.315\frac{C_{it}}{A_{i(t-1)}} + 3.139 Lev_{it} \tag{4.14}$$

Where the cash flow (CF) ratio is income before extraordinary items (#18) plus depreciation and amortization (#14) over beginning-of-the-period book asset (#6), (DIV) is cash dividends (preferred dividends #19 + common dividends #21), (C) is cash and short-term investments (#1), and (Lev) is the ratio of debt over the total of debt and equity (long-term debt #9 + current portion of debt #34/[long-term debt #9 + current portion of debt #34+ stockholders' equity #216). Firms with negative values for dividends, cash, or leverage are not included in the sample.

Baker, Stein, and Wurgler show that Tobin's q is orthogonal to the liner combination of the other four variables and thus, dropping Tobin's q from the index does not affect other variables' coefficients. In the model above we can see that cash flow, dividends, and cash have a negative sign, which is consistent with the fact that profitable firms that pay dividends and keep cash are less constrained and are expected to have higher debt capacity. Leverage, however, enters with a positive sign to indicate that firms with low debt capacity are expected to be more financially constrained. It is important to note that the coefficients in equation (4.14) may not necessarily be the correct loadings for the sample used in this study; however, using the index without re-estimating the coefficients is a way to avoid data mining. In addition, as long as the loadings have the expected sign, the variable choice is what is important to the index rather than the variable loadings. Baker, Stein, and Wurgler show that their results obtain even when they reset the weights so that each variable explains an equal portion of the variation in the index.

Another determinant of corporate investment is shareholder investment horizon (H_{it}). Long-horizon shareholders are those who hold on to their stocks and are not keen to sell the stocks for capital gains. Short-horizon shareholders are those who are willing to sell their stocks in the near future to profit from stock price appreciation.

Since shareholder investment horizon can be measured by the length of time investors hold their stocks, the share turnover ratio provides a good gauge for that time length. Firms that are owned by short (long) horizon shareholders are more likely to have high (low) share turnover ratios. Share turnover ratio is calculated as the average of the monthly ratios of shares traded to shares outstanding during the fiscal year. Data on shares traded and shares outstanding are taken from the CRSP database between 1971 and 2003. Due to the fact that some firms in Compustat do not have shares data in CRSP, the Compustat-CRSP sample has fewer observations than the initial sample.

Calculation details are also tabulated in Appendix D. Panel D of Table 3 presents summary statistics for the degree of financial constraint index and its ingredients as well as summary statistics for share turnover ratios.

4.3 Empirical Results

4.3.1 Corporate Investment and Market Determinants

Before testing the main hypotheses in this study, let us take a look at the two main determinants of corporate investments that are mentioned in the literature. Fazzari, Hubbard, and Petersen (1988) and many others introduce Tobin's q and cash flow as the main explanatory variables for corporate investment, especially capital expenditure. The cash flow to total assets ratio summarizes the fundamental information about the firm. It is supposed to reflect the profitability of the investment opportunities of the firm. The market's role in explaining investment has been reported in many studies, although the interpretation of that role is still under debate. Efficient market advocates suggest that the market reveals more information about the firm's investment opportunities than is already revealed by the firm's fundamentals, such as, cash flows; hence the significant relation between investment and Tobin's q. Other researchers suggest another role of the market that precludes market efficiency and/or market rationality. In this alternative view, at least part of the significant relation between investment and Tobin's q arises from the fact that Tobin's q contains elements of market's irrationality and/or inefficiency.

In order to differentiate between theses two views, this study unpacks or decomposes the market variable into three different components: firm mispricing, industry mispricing, and firm growth. Each component carries a different explanation of the role of the market. Firm growth is related to the first view, where the market reveals important information about the firm's investment opportunities. On the other hand, firm and industry mispricings are related to the second view, where inefficiency and/or irrationality in the market affect investment. To evaluate the relative strength of each explanation of market role, I estimate the following investment equation:

$$\frac{Inv_{it}}{A_{it-1}} = \beta_0 + \beta_1 \frac{CF_{it}}{A_{it-1}} + \beta_2 Dev_{it-1}^{firm} + \beta_3 Dev_{t-1}^{Agg} + \beta_4 G_{it-1} + \varepsilon_{it} \qquad (4.15)$$

Where (i) refers to the firm and (t) refers to the year. The dependent and independent variables in all regressions are adjusted for firm and year averages in a way similar to the least squares dummy approach.[31] The efficient market view expects only the growth component coefficient β_4 to be significant, while the inefficient market view expects the Firm-mispricing coefficient β_2 and/or the industry-mispricing coefficient β_3 to be significant. Because all variables are adjusted for the firm and year averages, β_0 is not different from zero in all regressions and thus, it is not reported.

Table 5 shows the results of regressions similar to (4.15) for different investment decisions. The results (in the first row for each investment variable) show that the two hypotheses about the market role are irrefutable. All three components affect the capital expenditure, acquisitions, research and development, and increase in investment decisions.

The best interpretation for the market role is that the market carries fundamental information about the firm's growth prospects beyond what is already reflected in the firm's cash flow; however, this fundamental information is contaminated by the irrationality and/or inefficiency inherent in the market. The different investment variables in panel A and the percentage change and the percentage increase in total assets in panel B show positive and significant sensitivity to all market components. Therefore, a firm is expected to increase its investment activities (including capital expenditure, acquisitions, research and development, increase in investment, and increase in total assets) in response to a high growth prospect, a high valuation from the market, and /or a positive wave in the industry.

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[31] Consider a two-way fixed effect model in a form: $y_{it} = x'_{it}\beta + \mu + \alpha_i + \gamma_t + \varepsilon_{it}$, where α_i and γ_t refer to firm and year fixed effects respectively. Least squares estimates of the slopes in this model are obtained by regression of $y_{*it} = y_{it} - \bar{y}_{i\bullet} - \bar{y}_{\bullet t} + \bar{\bar{y}}$ on $x_{*it} = x_{it} - \bar{x}_{i\bullet} - \bar{x}_{\bullet t} + \bar{\bar{x}}$, where $\bar{y}_{i\bullet} = \frac{1}{T}\sum_{t=1}^{T} y_{it}$, $\bar{y}_{\bullet t} = \frac{1}{n}\sum_{i=1}^{n} y_{it}$, and $\bar{\bar{y}} = \frac{1}{nT}\sum_{i=1}^{n}\sum_{t=1}^{T} y_{it}$, and like wise for $\bar{x}_{i\bullet}$, $\bar{x}_{\bullet t}$, and $\bar{\bar{x}}$. For more details see Greene, 5th ed. 2003, pages 291-293.

Disinvestment decisions, however, do not seem to respond to all three market components similarly. In Panel A, a sale of assets decision is not significantly determined by the growth component of the market variable. The coefficient of the growth component has a predicted but insignificant negative sign. The mispricing at the firm level is also insignificant for the sale of assets decision. Thus, firm undervaluation and lack of growth prospects do not seem to affect sale of assets decisions significantly. The only significant market role for the sale of assets is the industry mispricing, which has a negative and significant coefficient. This result is consistent with the expectation that firms sell assets in response to an undervaluation wave in their industries. In Panel B, the percentage decrease in total assets (in absolute value form) is not driven by the firm's growth opportunities. It, however, responds negatively to the firm mispricing component, which reflects the propensity of an undervalued firm to decrease its assets over the year. Strangely, the percentage decrease in total assets responds positively to the industry mispricing component. This result means that firms decrease their assets more when the industry experiences a positive wave, and this is inconsistent with the predicted role of the market. Combining the results from asset sales with results from the decrease in total assets, we can be assured that the positive relation between decrease in assets and industry mispricing is not driven by the sale of property, plant, and equipment. It might be driven by changes in current assets.

In addition to the regression that uses market variable components as a replacement for the market to book ratio, Table 5 includes two more regressions that include market to book ratio in the analysis. The regression in the second row for each investment variable includes the market to book ratio along with its components as market proxies, while the regression in the third row for each investment variable includes the market to book ratio as the sole market variable.

[Insert Table 5 about here]

The comparison among all three regressions allows us to evaluate the performance of the separate components of the market to book ratio in explaining investment decisions and to see how effectively these components mimic the explanatory role of the market to book ratio. If the three components are true parts of the market to book ratio, we expect the market to book ratio to have less power, if any, in explaining investment after controlling for the three variables.

In Panel A, market to book ratio is significantly related to all investment variables when it is used as a sole market proxy. However, when the three market components are added to the regression, market to book ratio becomes insignificant for acquisition, increase in investment, and sale of assets.

In Panel B, firm mispricing is not significant to the percentage change in total assets or to the percentage increase in total assets after controlling for market to book ratio. In contrast, market to book ratio becomes insignificant to the percentage decrease in total assets when the three components are added to the regression.

The market to book ratio and the three market components retain significance when regressed against total and net investments, capital expenditure, and research and development as the dependent variables. However, the magnitudes of the coefficients are reduced significantly when all market proxies are included. This reduction in the size of the coefficients is true for all investment variables. Moreover, the three market components explain as much variation in all investment variables as the market to book ratio. The R square values for the regressions with only the three market components are either close to, or higher than, the R square values for regression with only the market to book ratio. The reported change in R square (ΔR^2) due to adding market to book ratio in the regression is very small and varies between 0.0005 up to 0.0047. In addition, I run a partial F test that examines whether the change in the F statistics due to the addition of market to book ratio is significantly different from zero. The reported p-values of the partial F test show that the addition of market to book ratio is significant to the regression of total investment, net investment, capital expenditure, research and development, and increase in investment.

Therefore, the three components seem to mimic the effect of the market to book ratio and in some cases do better than the market to book ratio in determining the different investment variables. However, to make sure that we add all relevant variables that affect investment decisions in my regressions, I regress the market to book ratio against the three components of the market and use the residual from that regression as a controlling variable (RME) for the remaining effect of the market to book ratio that is not accounted for by the three components. This remaining effect of the market to book ratio is orthogonal to the three components and is added to all regressions in this study. Although we can not be sure of the nature of this variable, it may reflect the nonlinear relation between market to book ratio and the different investment decisions. Since the components of the market that we use are in log form, they do not account for any nonlinear relation between market to book ratio and investment.

The cash flow variable indicates that profitability determines the level of total and net investments as well as capital expenditure and changes in total assets. The cash flow variable is not significant for acquisition decisions when we control for market variables. Thus, market perception rather than firm performance is what drives the acquisition decision. This is consistent with the general observations about the destructive nature of many recent acquisitions, and it may also indicate that some firms try to enhance their performance by buying other firms. The cash flow variable is negative and insignificant for research and development investment. The negative sign attached to the cash flow variable is probably due to the fact that research and development is considered to be an expense which is subtracted from the net income. In addition, the cash flow variable is positive and significant to the sale of property and equipment. One would expect a negative relation between profitability and sale of assets. However, gains from selling assets or tax savings from loss of selling assets might affect the relation between asset sales and the cotemporaneous cash flow variable. By using a one-period lag cash flow variable instead of the cotemporaneous cash flow, I find a negative relation between asset sales and the lag cash flow variable (results not reported). Thus, the lower the firm's profitability in one period, the higher the firm's asset sales in the following period. The percentage decrease in the total assets variable, however, has a negative and significant relation with the cotemporaneous cash flow variable. This is also consistent with prediction that less profitable firms reduce their assets.

4.3.2 Testing Hypothesis 1a

Hypothesis 1a predicts that equity transactions, especially the transactions that are driven by market timing, affect the investment decisions of the firm. The basic test for hypothesis 1a involves adding financing variables to the basic regression (4.15). Although the main financing method in hypothesis 1a is equity, I examine debt and total capital as well.

It is important to notice that hypothesis 1a concerns the market timing-driven financing transactions. Thus, two dummy variables are created and interacted with the financing variable under consideration. The first dummy variable is named (Time) and it equals one (Time=1) if the overvalued firm has a positive net issuance activity or if the undervalued firm has a negative net issuance activity; Time=0 otherwise. The second dummy variable is named (NOTime) and it equals one (NOTime=1) if the overvalued firm does not have positive net issuance activities or if the undervalued firm does not have negative net issuance activities; NOTime=0 otherwise. Firms are classified as over-

or under-valued based on the beginning-of-the-period firm-level mispricing. If Dev_{it-1}^{firm} is greater (less) than zero, then the firm is overvalued (undervalued).

The basic regressions used to test hypothesis 1a are:

$$\frac{Inv_{it}}{A_{it-1}} = \beta_0 + \beta_1 \frac{CF_{it}}{A_{it-1}} + \beta_2 Dev_{it-1}^{firm} + \beta_3 Dev_{t-1}^{Agg} + \beta_4 G_{it-1} + \beta_5 \frac{NetEq_{it}}{A_{it-1}} + \varepsilon_{it} \qquad (4.16a)$$

$$\frac{Inv_{it}}{A_{it-1}} = \beta_0 + \beta_1 \frac{CF_{it}}{A_{it-1}} + \beta_2 Dev_{it-1}^{firm} + \beta_3 Dev_{t-1}^{Agg} + \beta_4 G_{it-1}$$

$$+\beta_{5a}\left(Time \times \frac{NetEq_{it}}{A_{it-1}} \right) + \beta_{5b}\left(NOTime \times \frac{NetEq_{it}}{A_{it-1}} \right) + \varepsilon_{it} \qquad (4.16b)$$

Where (i) refers to the firm and (t) refers to the year. In regression model (4.16a) the equity financing variable has a coefficient β_5. In model (4.16b) the coefficient β_5 is divided into parts based on the market timing behavior of the manager. β_{5a} is the coefficient of equity financing if this financing activity is driven by market timing. β_{5b} is the coefficient of equity financing if this financing activity is not driven by market timing.

For the purpose of examining the financing role, market and cash flow variables act as controlling variables in regressions (4.16a,b). Panel A in Table 6 reports two regressions for each investment variable. The first regression (4.16a) (on the first row for each investment variable) includes net equity issuance with no interaction. The second regression (4.16b) (on the second row for each investment variable) includes the net equity issuance that is interacted with both (Time) and (NOTime) dummies.

[Insert Table 6 about here]

Results in Table 6 show that net equity issuance is significantly related to acquisitions and to research and development decisions after controlling for fundamentals and market variables. However, both (Time) and (NOTime) interactions are statistically significant with about the same magnitude. Thus, market timing-driven net equity issuance activities do not affect acquisitions and research and development decisions differently from the net equity issuance activities that are not driven by market timing.

In regressions where capital expenditure, increase in investments, net investment, or total investments is the dependent variable, net equity issuance (in the first regression) and market timing (Time) interactions (in the second regression) are significant, while the coefficient of the (NOTime) interaction is not statistically different from zero. Thus, the significant relation between net equity issuance and the investment decisions (capital expenditure, increase in investments, net investment, and total investments) is driven mostly by market timing of issuance activities[32]. Therefore, market timing interaction (Time1) and net equity issuance are measuring the same relation and hence, both become insignificant.

The inclusion of the financing variables in asset sales regressions improves the relation between the market variables and the asset sales. The coefficient of the Firm-mispricing variable becomes significant, while it was insignificant before financing variables are added. In addition, market timing interactions, (Time) and (NOTime), are both significant, which indicates that market timing-driven equity transactions do not affect asset sales differently from equity transactions that are not driven by market timing. The positive relation between net equity issuance and asset sales indicates that firms that need funding use asset sales and equity issuance simultaneously to raise funds.

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[32] It is interesting to note that market timers are always significantly less than non-timers in all samples. Thus, the significance of market timing transactions compared to non-market timing transaction is not driven by the possibility that timers significantly outweigh non-timers.

In Panel B, the percentage change in total assets and the percentage increase in total assets are significantly determined by net equity issuance, which is driven by firm mispricing. The market timing interaction (Time) is significant while the (NOTime) interaction is not significant. However, net equity issuance is negatively related to the percentage decrease in total assets (in absolute form), and that is consistent with the prediction that firms who issue more equity reduce their assets less. However, this relation seems to be related to the decrease in current assets rather than the decrease in fixed assets since the relation between asset sales and net equity issuance is positive and significant. Since both (Time) and (NOTime) have significantly negative coefficients with a percentage decrease in total assets, market timing-driven activities do not affect the decrease in assets differently from activities that are not related to market timing. In fact, activities that are not driven by market timing may have a stronger economic and statistical effect on the percentage decrease in total assets.

To summarize the results in Table 6, net equity issuance explains relatively more variations in all investment decisions examined, particularly the variation in acquisitions, research and development, and increase in investments. Although net equity issuance seems to affect most investment decisions, the market timing-driven net equity issuance does not seem to add anything to the effect of equity financing on acquisitions, research and development, asset sales, and percentage decrease in total assets. In contrast, most of the significance between net equity issuance and capital expenditure, increase in investments, net investments, total investments, and percentage increase in total assets is driven by market timing (Time). Net equity issuance activities that are not driven by market timing do not seem to affect those investments.

A caveat is in order here. Although my theory and empirical design follow most empirical studies that link only equity transactions to market timing, in this part of the analysis I consider debt transactions to be driven by stock mispricing. If the firm is timing the market, equity transactions would be the natural choice, as equity is more sensitive to changes in firm value. However, debt transactions show a tendency to follow stock mispricing. Empirical findings of underperformance after both equity and debt IPOs (Ritter (1991)), public debt issues (Spiess and Affleck-Graves (1999)), and bank loans (Billett, Flannery, and Garfinkel (2002)) suggest that firms issue debt when they are overvalued. Spiess and Affleck-Graves (1999) find underperforming issuers to be small, young, and NASDAQ-listed. These are features of firms that are more likely to be mispriced. Spiess and Affleck-Graves (1999) also find strong evidence that the underperformance is limited to offerings that occur in periods with high issue volume. All of this evidence is consistent with interpreting debt offerings as a signal that the firm is overvalued. The fact that debt issues result in valuation effects that are so similar to the previously documented effect for equity offerings is consistent with capital structure models, such as Miller and Rock (1985), that suggest that all security issues should result in negative stock price effects. Richardson and Sloan (2003) find a consistently strong and negative relation between equity and debt financing and future stock returns and link the negative future returns to overinvestment of the proceeds from debt and equity issuance.

Now, let us take a look at the role of net debt issuance that is driven by market timing in explaining investment decisions. The net equity variables in regression models (4.16a,b) are replaced by net debt variables. The market timing dummy and no market timing dummy are interacted with net debt issuance.

Panel A in Table 7 shows that acquisitions, R&D, total investments, and net investment decisions are determined by the net debt issuance activities that are driven by firm mispricing only. The interaction term (Time) is significant and higher in magnitude than the net debt issuance, while the (NOTime) interaction is insignificant for all these variables. Net debt issuance is not significant for capital expenditure and increase in investments even when considering the market timing interactions. The positive relation between net debt issuance and asset sales indicate that firms with financing needs use asset sales and debt issuance to simultaneously raise fund. Market timing and no market timing interactions are significant in asset sales regressions.

[Insert Table 7 about here]

In panel B, the percentage change in total assets and the percentage increase in total assets are significantly determined by the net debt issues that are driven by firm mispricing. Net debt issuance that is not motivated by market timing does not affect the changes in assets and the increase in assets in particular. The percentage decrease in assets does not seem to be determined by net debt issuance activities whether they are market timing-driven or not.

In general, R square is higher when adding the debt financing variable to the baseline regression (4.15). Debt financing explains more variations in total investments, acquisitions, asset sales, and net investments than does equity financing. In summary, net debt issuance that is driven by firm mispricing significantly affects acquisitions, R&D, total investments, net investments, and increases in total assets. Net debt issuance is not a significant determinant to capital expenditure, increase in investment, and percentage decrease in total assets.

Now, net equity and debt issuance are examined at the same time through net capital issuance activities. In Table 8, net capital is examined for a possible relation with the different investment decisions after controlling for market and fundamental variables. Panel A shows that net capital issuance activities affect all investment decisions. Moreover, net capital issuance that is motivated by market timing significantly affects capital expenditure, total investments, and net investments while issuance activities that are not driven by market timing are not significant to these decisions. The other separate investment decisions do not show any difference in their sensitivities to timing-motivated versus non-timing-motivated net capital issued. Moreover, the positive relation between net capital issuance and asset sales indicates that firms that need funding use asset sales, equity, and debt issuance to simultaneously raise funds.

[Insert Table 8 about here]

Panel B shows that percentage change in total assets in general and percentage increase in total assets in particular have a strong relation with net capital issuance activities that are driven by market timing (Time). Net capital issuance activities that are not necessarily motivated by market timing do not affect the increase in assets. In contrast, the percentage decrease in assets is not affected by net capital issuance activities in general.

After reviewing the results of testing hypothesis 1a for equity issuance activities as well as for debt issuance activities, I can conclude the following: although net equity and net debt issuance activities affect most investment decisions in general, only capital expenditure and increase in investments are especially sensitive to net equity issuance activities that are driven by market timing of firm mispricing (Time). Market timing of equity issuance does not affect the acquisition and R&D decisions. However, acquisitions and R&D show higher sensitivity to net debt issuance that is driven by firm mispricing. In addition, net investments, total investment, and increases in total assets are sensitive to net equity and debt issues that are driven by market timing (Time) only.

4.3.3 Testing Hypothesis 1b

Hypothesis 1b asserts that the relation between stock mispricing and investment decisions is economically stronger in financially constrained firms. The Kaplan and Zingales financial constraint index is used to assign firms into quartiles based on the value of their index score. For each quartile, I estimate a model similar to (4.15) for each investment variable. The pattern of the coefficients on firm- and industry mispricing is examined and compared among the different quartiles. The best measure of the economic effect of the financial constraint on the investment-mispricing sensitivity is the difference in mispricing coefficients between the bottom quartile and the top quartile. Hypothesis 1b predicts the coefficients of mispricing to be significantly higher as we move to the top quartile. The top quartile is supposed to include the most financially constrained firms. In Table 9, each row corresponds to the investment variable used in the regression. The coefficient of the firm mispricing (b) and the coefficient of industry mispricing (c) for each quartile are reported, as well as the t-test of the difference in coefficients b and c between the top and the bottom quartiles.

[Insert Table 9 about here]

Table 9 shows a strong relation between the degree of financial constraints and the effect of mispricing on investment. The effect of firm mispricing on investment is significantly higher in the top quartile of the financial constraint index than it is in the bottom quartile of the index. Total investment, capital expenditure, acquisition, and net investment decisions in financially constrained firms are almost three times as sensitive to firm mispricing as those decisions in unconstrained firms. The difference in the sensitivity of research and development to firm mispricing between top and bottom quartiles is smaller in magnitude but significant. The degree of financial constraint does not affect the relation between mispricing and the increase in investment variable. In addition, the asset sales variable is positively related to firm- and industry mispricing in the top quartile but negatively related to firm- and industry mispricing in the bottom quartile. This result suggests that highly constrained firms may use asset sales as a source of funds rather than an investment strategy. Therefore, when a financially constrained firm is overpriced and tries to invest more, it uses the proceeds from selling old assets to invest in the new projects. The degree of financial constraints significantly affects the relation between changes in assets and firm mispricing. Percentage increase and decrease in total assets are significantly more sensitive to firm mispricing in the top quartile compared to the bottom quartile.

The sensitivity between investment decisions and industry mispricing is significantly different between the top and the bottom quartiles only in total investment, capital expenditure, acquisition, and net investment. In addition, the sensitivity of the percentage decrease in total assets to industry mispricing is positive and significant in the top and bottom quartiles, with lower magnitude in the top quartile compared to the bottom quartile.

Although the differences in the (b) and (c) coefficients between the top and the bottom quartiles are significant for most of the investment variables, the patterns in the (b) and (c) coefficients are non-monotonic, except for the (b) coefficient across quartiles in capital expenditure and in percentage change in total assets and the (c) coefficient across quartiles in percentage change in total assets. In all other investment variables, the (b) and (c) coefficients bounce around quartiles non-monotonically.

The result (not reported) of capital expenditure sensitivities to the market to book variable is consistent with the prediction that the higher the constraints index, the higher the sensitivity. The market to book coefficient in the bottom quartile (0.011) is significantly smaller than the coefficient in the top quartile (0.029). This result is quite similar to the results reported by Baker, Stein, and Wurgler (2003), where the sensitivity of capital expenditure to Tobin's q is 0.012 in the bottom quintile and 0.033 in the top quintile.

Although it is not a concern in this study, capital expenditure sensitivity to cash flows has been shown to be affected by the degree of financial constraints. It is interesting to look at the pattern of the cash flow coefficient in capital expenditure regressions across the quartiles of the financial constraint index. The results (not reported) show that the cash flow coefficient is significantly larger in the bottom quartile (0.30) than in the top quartile (0.07) and it keeps decreasing monotonically as we move toward the most financially constrained firm. This result adds more to the controversy in this issue. This result is consistent with the empirical findings of Kaplan and Zingales (1997) and Cleary (1999) and is contrary to the empirical findings of Fazzari, Hubbard, and Petersen (1988) that financially constrained firms have higher sensitivity between investment and cash flow. The review of the different studies in this issue suggests that the results are sample-specific. Allayannis and Mozumdar (2004) argue that findings similar to the ones here can be explained by the negative cash flow that occurs to the most financially constrained firms which weakens the cash flow-investment sensitivity. Although it is not applicable to the sample used here, Allayannis and Mozumdar also mention influential observation in a small sample as a possible cause of the results. Baker, Stein, and Wurgler (2003) could not find a significant difference in cash flow coefficients between financially constrained and unconstrained firms. However, their sampling process might have caused that result since I included many small firms that have been excluded in their sample.

4.3.4 Testing Hypothesis 2a

Hypothesis 2a asserts that corporate investment decisions are in part determined by the general perception in the market about the firm's future. Managers use the stock price as a guide to understand the perception of the market and invest accordingly. In this hypothesis, managers recognize the probable bias in the shareholders' view but that does not stop them from following the shareholders' perception. This hypothesis suggests another cause for the relation between investment and firm mispricing. Obviously, confirming the significant relation between firm mispricing and investment does not tell us much about what might cause that relationship. Therefore, in order to test for a particular cause (which is catering to shareholders here), we need to control for any other cause (which is equity issuance, especially equity issuance activities that are related to market timing). If firm mispricing is still a significant factor in determining investment even after controlling for market timing issuance activities, then at least there is a proof that the equity issuance channel is not the only cause of the relation between firm mispricing and investment. To test this hypothesis, I do not need to run new regressions. Rather, I use the results from regression (4.16). However, instead of testing the significance of net equity variables by controlling for firm mispricing, I look at the significance of the Firm-mispricing variable while controlling for the net equity variables. I also use other financing variables (net debt and net capital) as controlling variables.

In Table 6, the control variables are the net equity issuance along with interaction terms for the market timing motives. The purpose here is to examine the behavior of the Firm-mispricing coefficient when regressed against the different investment variables. Panel A shows that all investment decisions, except for capital expenditures, are still significantly related to firm mispricing even after controlling for net equity issuance activities. In general, the size of the coefficient of firm mispricing is reduced when we add the financing variables into the regression. Interestingly, the asset sales variable shows a negative and significant (at 0.10 level) relation to firm mispricing only after controlling for equity issuance. Without adding the equity issuance variable to the regression, the coefficient of firm mispricing is not significant in asset sales regressions. However, the effect of firm mispricing on asset sales is very small in magnitude.

In Panel B, the percentage change in total assets and the percentage increase in total assets are no longer related to firm mispricing after controlling for net equity issuance. In contrast, the percentage decrease in total assets is negatively and significantly related to firm mispricing, while it is negatively and insignificantly related to net equity issuance.

Panel A in Table 7 summarizes the regressions with net debt issuance control variables. The Firm-mispricing variable retains significance even after the inclusion of the debt financing variables for all investment variables, except for asset sales. Firm mispricing is not significant for asset sales after controlling for net debt issuance variables. This may indicate that undervalued firms that need financing usually issue debt more than equity and at the same time use asset sales as another way to raise funds.

In Panel B, the inclusion of the debt financing variables did not have any effect on the significance of the Firm-mispricing variable in relation to the percentage changes in total assets. However, the magnitude of the effect of firm mispricing is reduced to nearly half when the market timing interaction terms are used rather than the net debt issuance without interaction. In addition, the percentage increase in total assets is not significantly determined by firm mispricing after controlling for market timing-driven net debt issuance. For percentage decrease in total assets, firm mispricing is significant while debt issuance is not significant.

In Table 8, I control for both net equity and net debt by including net capital issuance variables. The Firm-mispricing variable is significant for all investment variables except for acquisitions. The net capital issuance absorbs most of the explanatory power of the Firm-mispricing variable. In addition, the sum of equity and debt help clarify the relation between asset sales and firm mispricing. The relation between asset sales and firm mispricing is significantly negative, while it is insignificant when we consider debt only and it is significant but smaller when we consider equity only. Panel B shows that the inclusion of net capital neutralizes the effect of firm mispricing in explaining the percentage change in total assets and the percentage increase in total assets. However, the percentage decrease in total assets is still negatively and significantly related to firm mispricing.

In sum, if we measure the effect of shareholder catering by examining the remaining explanatory power of firm mispricing after controlling for net issuance activities, then we can say that shareholder catering is significant in explaining the relation between investment and firm mispricing. After controlling for net financing activities, the remaining effect of firm mispricing is due to catering to the shareholder perception that is inherited in the mispricing variable. There are four cases where shareholder catering may not be the significant channel for the investment-mispricing relationship. First, after controlling for net equity and/or net debt financing variables, percentage increase in total assets is no longer determined by firm mispricing. Second, after controlling for net capital financing variables, acquisition is no longer determined by firm mispricing. Third, after controlling for net debt financing variables, asset sales is no longer determined by firm mispricing. Fourth, after controlling for net equity financing variables, capital expenditure is no longer determined by firm mispricing.

4.3.5 Testing Hypothesis 2b

Hypothesis 2b asserts that firms owned by short-horizon shareholders maintain higher mispricing-investment sensitivity due to the fact that short-horizon shareholders are more concerned about the current stock price than the value of the firm in the long-run. In a world where managers maximize shareholders' wealth, it is quite logical to find a stronger relation between investment and mispricing in firms where the majority of shareholders measure their wealth based on short-run capital gains. In contrast, firms with long-horizon shareholders are expected to maintain weaker mispricing-investment sensitivity because their shareholders are not concerned about the current stock price movements and the best way to cater to them is by investing in long-term value enhancement projects that may not necessarily be related to current stock price movements.

The investment horizon for shareholders is measured by the trading volume of the stock relative to the total number of shares in the firm, i.e. the share turnover ratio. Specifically, for each firm-year, I calculate the average of the monthly shares turnover ratio during the fiscal year. Then, I sort firms into quartiles based on the average turnover ratio for all firm-years. The highest turnover ratio reflects the shortest investment horizon. For each quartile, I estimate a model similar to (4.15) for each investment variable. The pattern of the coefficient of stock mispricing is examined and compared among the different horizon quartiles. Hypothesis 2b predicts the coefficients of firm mispricing to be significantly higher as we move toward the top quartile. The top quartile is supposed to include firms with the shortest shareholder investment horizon. The pattern of the industry-mispricing coefficient is also examined.

In Table 10, each row corresponds to the investment variable used in the regression. The coefficient of firm mispricing (b) and the coefficient of industry mispricing (c) for each quartile are reported as well as the t-test of the difference in coefficients b and c between the top and the bottom quartiles.

The test for hypothesis 2b is an essential step to confirm the role of shareholder catering in enhancing the mispricing-investment sensitivity. In hypothesis 2a, I showed that firm mispricing has a separate effect on investment beyond that of the equity issuance channel. The test for hypothesis 2a provides a necessary but insufficient proof of the existence of the catering effect. In hypothesis 2b, I examine the difference in mispricing-investment sensitivity between firms with short-horizon shareholders and firms with long-horizon investors. These two parts of the second hypothesis become collective evidence for how shareholder catering causes the mispricing-investment sensitivity.

[Insert Table 10 about here]

Table 10 shows that mispricing-investment sensitivity is significantly higher in firms with short-horizon shareholders (top quartile) than it is in firms with long-horizon shareholders (bottom quartile). Total investment, capital expenditure, acquisitions, increase in investments, and percentage change in total assets show significant differences in the sensitivity to firm- and industry mispricing between top and bottom quartiles.

R&D, net investment, and percentage increase in total assets show significant differences between top and bottom quartiles only in the sensitivity to firm mispricing. However, the sensitivity of asset sales to firm- and industry mispricing is not affected by shareholder investment horizons. Coefficient b in the asset sales regression is not significant in the top and bottom quartiles. It is interesting to notice that firms with the shortest and longest investor horizons base their asset sales decisions in part according to industry mispricing rather than firm mispricing.

Percentage decrease in total assets is significantly more sensitive to industry mispricing when the firm has short-horizon shareholders. Coefficient c is not significantly different from zero in the first quartile and it is significantly negative in the top quartile.

In general, coefficients b and c bounce around quartiles non-monotonically for all investment variables. In addition to the statistical significance of the difference in coefficients b and c between the extreme quartiles, the economic difference is also large. At the least, coefficients b and c in the top quartile are 1.3 times those in the bottom quartile. This relative amount goes up to 2 times in percentage increase in total assets, and up to 4 times in increase in investment.

The results in Table 10 show clearly that managers do cater to investors by establishing investment strategies that are believed, by those investors, to be the best for their wealth. The strong relation between investment and mispricing in firms with short-horizon shareholders is a direct indication of this clientele effect. In sum, acquisition, R&D, increase in investment, and total and net investment decisions are determined by stock mispricing due in part to the catering behavior of the manager. Capital expenditure decisions, however, do not pass the necessary test (hypothesis 2a) and therefore, we can not prove its relation to mispricing through catering even though it has passed the sufficient test (hypothesis 2b).

4.3.6 Testing Hypothesis 3

The third hypothesis is tested by examining the coefficient of the aggregate mispricing variable. A significant coefficient suggests that managers use market and/or industry conditions as sources of information when they make their investment decisions. Thus, any bubble in the industry or the market can affect investment. This study reports the results for industry mispricing only. A similar analysis using the market mispricing variable produces similar results. However, those results are not reported because of space considerations.

Across all the previous tables (5 through 8) presented, industry mispricing significantly affects all investment decisions. The coefficient of the industry-mispricing variable maintains its magnitude and significance after controlling for all financing variables, which indicates the uniqueness of this variable and how relevant it is in testing the third hypothesis without interfering with the previous two hypotheses. However, when controlling for market timing-driven net equity issuance, the industry-mispricing variable become insignificant to the capital expenditure decision. This result may indicate that when managers try to raise funds for capital expenditure purposes, they not only time the firm mispricing but they also time the industry mispricing as well.

Industry mispricing is positively related to investment variables and negatively related to asset sales. Thus, firms in cold industries are prone to sell more of their assets and have low investment levels, while firms in hot industries have high investment levels with less asset sales.

Moreover, the percentage change in total assets and the percentage increases in total assets are positively related to industry mispricing, which indicates that firms increase their assets in accordance with the positive movements in the industry. On the other hand, the relation between percentage decrease in total assets and industry mispricing is positive. This result suggests that firms decrease their assets when the industry is over-heating, and that is inconsistent with the predicted role of industry mispricing. This result is hard to reconcile with the rest of the results, but it is surely not driven by the sale of property, plant, and equipment. It may rather be driven by changes in current assets. The positive relation between the percentage decrease in total assets (in absolute form) and industry mispricing is consistent with the view that firms in over-heating industries tend to draw more cash and use up more of their current assets to invest.

4.3.7 Is the mispricing –investment relation a one-sided phenomenon?

Previous studies that examine the relation between mispricing and investment depend on certain theoretical treatments that force them to assume one side of the mispricing. For example, Baker, Stein and Wurgler (2003) present the equity dependence model of the mispricing –investment relation and the model is assumed to work only for undervalued firms. Panageas (2003) and Gilchrist, Himmelberg, and Huberman (2004) present models based on heterogeneous beliefs and short-sale constraints which imply overvaluation only. Polk and Sapienza (2002) argue that the relation between mispricing and investment works for both sides of mispricing, under- and over- valuation; however, in their testing methodology, they did not separate the two types of mispricing to know whether both sides can show a mispricing –investment relation.

In this section, I classify firms as undervalued ($Dev^{Firm}<0$) or overvalued ($Dev^{Firm}>0$) based on firm mispricing. Then, I estimate equation (4.15) for every investment variable in each class of firms separately. The effect of firm mispricing on every investment variable is compared between the two classes of firms based on the significance and size of the Firm-mispricing coefficient.

The beauty of the analysis in this section is the chance to examine overinvestment and underinvestment in firms. The theoretical treatment in this study addresses the effect of mispricing on both sides of investment distortions, overinvestment and underinvestment. Overvaluation of the firm value will lead to overinvestment and undervaluation of the firm value will lead to underinvestment. Although, we can not measure over- or under- investment directly without having a model for expected investment level, we can measure the effect of both investment distortions using firm mispricing. Regressions that include only overvalued firms are supposed to analyze the overinvestment distortion, while regressions that include only undervalued firms are supposed to analyze the underinvestment distortion.

The following two tables include separate analyses for overvalued firms (Table 11) and undervalued firms (Table 12).

[Insert Table 11 about here]

Table 11 summarizes the investment response to mispricing in overvalued firms. The first regression (in the first row for each investment variable) includes only cash flow and market variables. The next three rows add gross capital issued, gross equity issued, and gross debt issued, respectively. Controlling for gross issuance activities is relevant for overvalued firms. Overvalued firms are more likely to issue equity and debt in response to overvaluation, which might also lead to overinvestment. Overinvestment can be caused by either the issuance of overvalued capital or by catering to shareholders or by a combination of the two. The effect of the issuance of overvalued capital (whether equity or debt or both) is measured by the coefficients of capital, equity, and debt. The effect of catering to shareholders is measured by the coefficient of firm mispricing after controlling for the different financing variables.

Panel A shows that acquisition, research and development, total investment, and net investment variables are significantly determined by firm overvaluation and total capital issuance activities. Capital expenditure is significantly determined by firm overvaluation. However, equity but not debt is significant for the capital expenditure decision in overvalued firms. Equity issuance is the main determinant of increase in investment decisions in overvalued firms. Firm mispricing becomes insignificant to the increase in investment decision after controlling for gross equity issued. The asset sales variable is negatively related to firm overvaluation, which indicates the tendency of overvalued firms to reduce asset sales as the overvaluation increases. Equity and debt issuance variables are positively related to asset sales which indicate that overvalued firms use asset sales along with equity and debt for funding purposes. In general, although the overvaluation measure retains significance after controlling for gross issuance activities, the size of the coefficient declines significantly. The reduction in the economic effect of the mispricing is due to the fact that gross issuance of debt or equity is motivated in part by overvaluation.

In Panel B, percentage change in total assets and percentage increase in total assets are mainly determined by issuance of overvalued capital. Firm mispricing is no longer significant after controlling for capital issuance. This result suggests that the effect of overvaluation on the increase in total assets is absorbed by the issuance of overvalued capital. In contrast, the percentage decrease in total assets is neither determined by overvaluation nor by capital issuance. The coefficients of firm mispricing and debt issuance are insignificant, while the coefficient of equity issuance is negative and significant at the 0.1 level. The negative coefficient of equity issuance indicates the propensity of overvalued firms to reduce fewer of their assets when they issue equity.

This result suggests that the degree of mispricing in overvalued firms has no effect on the decrease in total assets. Industry mispricing is positively and significantly related to a decrease in assets. Thus, overvalued firms tend to decrease their assets when their industries experience a bubble. That might be related to decrease in current assets more than it is related to decrease in fixed assets since the sale of property, plant, and equipment is negatively related to industry mispricing. Also, it is quite expected that overvalued firms may draw large amounts of cash to invest more in hot industries.

From the above results, we can see that overinvestment exists either because of the issuance of overvalued capital and/or because of catering to shareholders. These two causes lead to overinvestment in total and net basis. Overinvestment in acquisitions, R&D, and capital expenditure is also caused by the two factors; however, equity issuance rather than debt issuance affects capital expenditure decisions. Overinvestment in increase in investments and increase in overvalued assets are not caused by catering to shareholders. They are mainly caused by the issuance of overvalued forms of capital; equity for increase in investment, and total capital for increase in overvalued assets. Disinvestment measured by asset sales is significantly decreased by firm overvaluation. However, the decrease in total assets is not affected by mispricing in overvalued firms.

[Insert Table 12 about here]

Table 12 presents the investment behavior of undervalued firms. The first regression (in the first row for each investment variable) includes only the cash flow and market variables. The next three rows add gross capital retired, gross equity repurchased, and gross debt retired, respectively. The repurchase of equity is an expected behavior of undervalued firms. Stock repurchases compete with investment for the same funds that are available to the firm. If the firm repurchases more equity, it will have fewer funds for investment (underinvestment). Debt retirement might play a similar role to equity repurchase. In addition, underinvestment by undervalued firms may not necessarily be related to financing activities. Instead, catering to shareholders may also cause underinvestment by undervalued firms. Therefore, underinvestment can be caused by either the repurchase of undervalued capital or by catering to shareholders or by a combination of the two. The effect of the repurchase of undervalued capital (whether equity or debt or both) is measured by the coefficients of retired capital, equity, and debt. The effect of catering to shareholders is measured by the coefficient of firm mispricing after controlling for the different financing variables.

Panel A in Table 12 shows that underinvestment is supported in the data for total investment, net investment, research and development, and increase in total assets. Capital expenditure is significantly determined by firm undervaluation only before controlling for retirement and repurchasing activities. The positive coefficient of firm mispricing against these investments shows that firms invest more as the undervaluation become less severe. For acquisitions and asset sales, there is no significant relations to firm mispricing in undervalued firms. In addition, all financing variables are significant and positively related to all kinds of investments. These results do not support the proposition that capital retirement leads to underinvestment. The results, however, show that firms invest and retire capital simultaneously and do not chose between them.

Panel B reports a positive and significant relation between firm mispricing and percentage change in total assets. This positive relation suggests two interpretations: first, as undervaluation loosens, firms increase total assets. Second, as undervaluation soars, firms decrease total assets. However, the first interpretation does not seem to be supported when we look at the insignificant coefficient of firm mispricing against the percentage increase in total assets. In contrast, firm mispricing is negatively related to percentage decrease in total assets, which is consistent with the second interpretation that severely undervalued firms tend to decrease more of their assets. Capital retired (equity and /or debt) is positively related to percentage decrease and percentage increase in total assets. The relation between percentage decrease in total assets (in absolute form) and capital retired is consistent with the view that the decrease in equity or liability is also a decrease in assets. However, the positive relation between percentage increase in total assets and capital retired is not consistent with the previous view and it indicates that firms increase assets and buy back capital at the same time.

In sum, evidence shows that firms underinvest in capital expenditure, R&D, and increase in investment. However, there is no evidence for underinvestment in acquisition. This result makes more sense if we think of acquisition as a one-time decision that is made by the firm at the appropriate time (overvaluation) and when the time is not right (undervaluation), the acquisition is not made. This is different from capital expenditure and R&D, which are part of the firm's operation and can be adjusted (but not necessarily canceled) when the firm is undervalued. In addition, although firm reduction of fixed assets does not seem to be affected by the level of undervaluation, firm reduction of current assets is negatively determined by the level of undervaluation. The positive relations between capital retired and all investments and between capital retired and percentage increase in total assets show that capital retirement and investment are done simultaneously and undervalued firms do not choose one over the other.

Chapter V

Conclusion

In this study I try to shed more light on the role of the market in determining corporate investments. The market role is related to fundamental information contained in the market to book ratio or non-fundamental information inherited in the market to book ratio because of market inefficiency. By decomposing the market to book ratio into fundamental parts (growth) and nonfundamental parts (firm and aggregate mispricing), the study can test for the relation between these separate components and corporate investment decisions while controlling for financial slack.

It is agreed that the fundamental component of the market to book ratio reflects the investment opportunities of the firm and hence the significance of such a component in determining investment level. However, the non-fundamental component of the market to book ratio receives a different explanation in the literature. Morck, Shleifer, and Vishny (1990) and Stein (1996) suggest two reasons why stock mispricing can affect corporate investment. First, stock mispricing affects the cost of external financing and thus affects the cost of capital used to evaluate investments. Managers raise funds when the stock is overvalued (market timing) to enjoy a lower cost of external financing, and they refrain from raising funds when the stock is undervalued to avoid the high cost of external financing. The low cost of external financing translates into a low discount rate used to evaluate investment projects and a higher chance of accepting negative NPV projects.

Second, managers base their investment decisions, in part, on shareholder investment horizons (the catering effect). When shareholders have a short investment horizon (care about current stock price), any temporary mispricing in the stock price will affect the investment decisions of the firm. Morck, Shleifer and Vishny (1990) suggest a third explanation based on managers' confusion about the future state of the industry or the economy. In that explanation, managers use the stock market as a source of information about the state of the economy, the condition of the industry, and the value of the firm. Such information is intended to help managers when making their investment decisions. However, some of that information may be based on irrational beliefs, which will affect investments as well.

The purpose of this study is to analyze the effect of stock market mispricings on corporate investment decisions through testing these three explanations. Corporate investments analyzed include capital expenditure, acquisitions, R&D, increase in investments, asset sales, and changes in total assets.

The study starts with a model that includes both financing and shareholder horizons as channels of the effect of mispricing on investments. The model is similar to the one in Baker, Ruback, and Wurgler (2004); however, rather than using their reduced form model, this study presents a fuller model that includes the capital structure constraints and the price impact of equity transactions that are imposed in Stein's (1996) model.

The results in the study can be summarized as follows: First, both fundamental (growth) and non-fundamental components of the market to book ratio significantly determine the level of corporate investments.

Second, the cost of external financing is significant in explaining the relation between total/net investment and firm mispricing. In particular, capital expenditure and increase in investments are driven by market timing-motivated equity issuance. Acquisitions and R&D are driven by market timing-motivated debt issuance.

Third, highly financially constrained (and thus equity dependent) firms show higher sensitivity between investments and stock mispricing.

Fourth, shareholder catering is significant in explaining the relation between total/net investment and firm mispricing. In particular, acquisitions, R&D, increase in investments, and percentage decrease in assets are affected by catering to shareholders. Other investment decisions, including capital expenditure, asset sales, and increase in total assets, are not significantly determined by the catering behavior.

Fifth, investment-mispricing sensitivity is significantly higher in firms with a short shareholder investment horizon (firms with a high shares turnover ratio) than it is in firms with a long shareholder investment horizon (firms with a low shares turnover ratio). Because managers cater to shareholders, their investment decisions become more sensitive to current stock movements if shareholders are concerned about current stock prices.

Sixth, there is a significant relation between industry mispricing and all corporate investments under consideration. Thus, corporate investments are determined, in part, by bubbles in the industry or the market.

Finally, to the extent that overvalued firms tend to overinvest and undervalued firms tend to underinvest, overinvestment is confirmed in acquisitions, R&D, and capital expenditures, while underinvestment is confirmed in capital expenditure, R&D, and increase in investment. There is no evidence of underinvestment in acquisition. Disinvestment measured by asset sales is significantly decreased by firm overvaluation while disinvestment measured by percentage decrease in total assets moves in the same direction as undervaluation.

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Appendix A: Mathematical Details of the Optimization Problem

The maximization problem in section 3.2 is

Max S $= \lambda\left[f(K,E) - K + E\delta(K,E) - Z(D)\right] + (1-\lambda)\,\delta(K,E)$ (A.1)

s.t.

$D \equiv K(1-\bar{d}) - C - E$

The first order conditions of the maximization problems are the partial derivatives of the objective function S with respect to the variables K and E

The partial derivative of S with respect to K:

By using chain rule:

$$\frac{\partial - Z(D)}{\partial K} = \frac{\partial - Z\left(K(1-\bar{d}) - C - E\right)}{\partial K} = -Z'(D) * \frac{\partial\left(K(1-\bar{d}) - C - E\right)}{\partial K} = -(1-\bar{d})Z'(D)$$

Thus,

$$\frac{\partial S}{\partial K} = \lambda\left[f'(K) - 1 + E\delta'(K) - (1-\bar{d})Z'(D)\right] + (1-\lambda)\,\delta'(K) = 0 \qquad \text{(A.2)}$$

Equation (A.2) is similar to equation (3.2) of section 3.2

The partial derivative of S with respect to E:

By using product rule:

$$\frac{\partial\left[E\delta(K,E)\right]}{\partial E} = \frac{\partial E}{\partial E} * \delta(K,E) + E * \frac{\partial \delta(K,E)}{\partial E} = \delta(K,E) + E\delta'(E).$$

By using chain rule:

$$\frac{\partial - Z(D)}{\partial E} = \frac{\partial - Z\left(K(1-\bar{d}) - C - E\right)}{\partial E} = -Z'(D) * \frac{\partial\left(K(1-\bar{d}) - C - E\right)}{\partial E} = Z'(D)$$

Thus,

$$\frac{\partial S}{\partial E} = \lambda\left[f'(E) + \delta(K,E) + E\delta'(E) + Z'(D)\right] + (1-\lambda)\,\delta'(E) = 0 \qquad \text{(A.3)}$$

Equation (A.3) is similar to equation (3.3) of section 3.2.

Algebraic simplifications of the partial derivative of S with respect to K:

Equation (A.2) can be written as:

$$\lambda f'(K) = \lambda - \lambda E\delta'(K) + \lambda(1-\bar{d})Z'(D) - (1-\lambda)\delta'(K) \tag{A.4}$$

By taking common factors (A.4) is written as:

$$\lambda f'(K) = \lambda\left[1+(1-\bar{d})Z'(D)\right] - \left[\lambda E + (1-\lambda)\right]\delta'(K) \tag{A.5}$$

By dividing both sides of (A.5) by $1/\lambda$, we get

$$f'(K) = \left(1+(1-\bar{d})Z'(D)\right) - \left(E + \frac{1-\lambda}{\lambda}\right)\delta'(K) \tag{A.6}$$

Equation (A.6) is similar to equation (3.2)` of section 3.2.

Algebraic simplifications of the partial derivative of S with respect to E:

Equation (A.3) can be written as:

$$\lambda f'(E) = -\lambda\delta(K,E) - \lambda E\delta'(E) - \lambda Z'(D) - (1-\lambda)\delta'(E) \tag{A.7}$$

By taking common factors (A.7) is written as:

$$\lambda f'(E) = -\lambda\left[\delta(K,E) + Z'(D)\right] - \left[\lambda E + (1-\lambda)\right]\delta'(E) \tag{A.8}$$

By dividing both sides of (A.8) by $-1/\lambda$, we get

$$-\left(f'(E) + Z'(D)\right) = \delta(K,E) + \left(E + \frac{1-\lambda}{\lambda}\right)\delta'(E) \tag{A.9}$$

Equation (A.9) is similar to equation (3.3)` of section 3.2.

Combining A.6 and A.9 in one equation

We can re-write equation A.9 as

$$Z'(D) = -f'(E) - \delta(K,E) - \left(E + \frac{1-\lambda}{\lambda}\right)\delta'(E) \tag{A.10}$$

By substituting A.10 into A.6, we get

$$f'(K) = 1 - \left(E + \frac{1-\lambda}{\lambda}\right)\delta'(K) - (1-\bar{d})\left[f'(E) + \delta(K,E) + \left(E + \frac{1-\lambda}{\lambda}\right)\delta'(E)\right] \tag{A.11}$$

Equation (A.11) is similar to equation (3.4) of section 3.2.

Alternative method:

We can solve the maximization problem using the Lagrange method and obtain A.11 directly.

Max S $= \lambda\left[f(K,E) - K + E\delta(K,E) - Z(D)\right] + (1-\lambda)\delta(K,E)$

s.t.

$D \equiv K(1-\bar{d}) - C - E$

The Lagrangian equation is:

$$\begin{aligned} L = {} & \lambda\Big[f(K,E) - K + E\delta(K,E) - Z(D)\big(K(1-\bar{d}) - C - E\big)\Big] \\ & + (1-\lambda)\delta(K,E) - \gamma\big(D - K(1-\bar{d}) + C + E\big) \end{aligned} \tag{A.12}$$

The first order conditions of the Lagrangian equation are:

$$\frac{\partial L}{\partial K} = \lambda\left[f'(K) - 1 + E\delta'(K)\right] + (1-\lambda)\delta'(K) + \gamma(1-\bar{d}) = 0 \tag{A.13}$$

$$\frac{\partial L}{\partial E} = \lambda\left[f'(E) + \delta(K,E) + E\delta'(E)\right] + (1-\lambda)\delta'(E) - \gamma = 0 \tag{A.14}$$

$$\frac{\partial L}{\partial \gamma} = -\big(D - K(1-\bar{d}) + C + E\big) = 0 \tag{A.15}$$

From equation (A.14) ,

$$\gamma = \lambda\left[f'(E) + \delta(K,E) + E\delta'(E)\right]\left(1-\lambda\right)\delta'(E) \tag{A.16}$$

By substitute equation (A.16) into (A.13), we get

$$\begin{aligned}\frac{\partial L}{\partial K} &= \lambda\left[f'(K) - 1 + E\delta'(K)\right] + \left(1-\lambda\right)\delta'(K) \\ &\quad + \left(\lambda\left[f'(E) + \delta(K,E) + E\delta'(E)\right] + \left(1-\lambda\right)\delta'(E)\right)(1-\bar{d}) = 0\end{aligned} \tag{A.17}$$

By dividing both sides of (A.17) by $1/\lambda$, we get

$$\begin{aligned}\frac{\partial L}{\partial K} &= f'(K) - 1 + E\delta'(K) + \frac{1-\lambda}{\lambda}\delta'(K) \\ &+ (1-\bar{d})\left[f'(E) + \delta(K,E) + E\delta'(E) + \frac{1-\lambda}{\lambda}\delta'(E)\right] = 0\end{aligned} \tag{A.18}$$

By re-arranging and taking common factors, we get

$$f'(K) = 1 - \left(E + \frac{1-\lambda}{\lambda}\right)\delta'(K) - (1-\bar{d})\left[f'(E) + \delta(K,E) + E\delta'(E) + \frac{1-\lambda}{\lambda}\delta'(E)\right] \tag{A.19}$$

Equation (A.19) is similar to equation (3.4) of section 3.2.

Appendix B: More Insights on Investment and Financing policies in an Inefficient Market

The two first order conditions in section 3.2, (3.2)` and (3.3)`, determine the optimal investment and financing decisions.

$$f'(K) = \left(1+(1-\bar{d})Z'(D)\right) - \left(E + \frac{1-\lambda}{\lambda}\right)\delta'(K) \tag{B.1}$$

$$-\left(f'(E) + Z'(D)\right) = \delta(K,E) + \left(E + \frac{1-\lambda}{\lambda}\right)\delta'(E) \tag{B.2}$$

These two equations help us to calculate the comparative statistics, $\frac{\partial K}{\partial \delta}$, $\frac{\partial E}{\partial \delta}$ and determine how financing and investment respond to changes in stock mispricing. To do that, I differentiate equation (B.1) and (B.2) with respect to mispricing δ as follows:

Differentiae (B.1) with respect to δ

$$\frac{\partial K}{\partial \delta} f''(K) = \left(1-\bar{d}\right)\frac{\partial D}{\partial \delta} Z''(D) - \left[\frac{\partial E}{\partial \delta}\delta'(K) + \left(E + \frac{1-\lambda}{\lambda}\right)\frac{\partial^2 \delta}{\partial \delta \partial K}\right] \tag{B.3}$$

$$\frac{\partial K}{\partial \delta} f''(K) - \left(1-\bar{d}\right)\frac{\partial D}{\partial K}\frac{\partial K}{\partial \delta} Z''(D) - \left[\frac{\partial E}{\partial \delta}\delta'(K) + \left(E + \frac{1-\lambda}{\lambda}\right)\frac{\partial^2 \delta}{\partial \delta \partial K}\right] \tag{B.4}$$

$$\frac{\partial K}{\partial \delta}\left[f''(K) - \left(1-\bar{d}\right)^2 Z''(D)\right] - \left[\frac{\partial E}{\partial \delta}\delta'(K) + \left(E + \frac{1-\lambda}{\lambda}\right)\frac{\partial^2 \delta}{\partial \delta \partial K}\right] \tag{B.5}$$

Differentiae (B.2) with respect to δ

$$\frac{\partial E}{\partial \delta} f''(E) + \frac{\partial D}{\partial E}\frac{\partial E}{\partial \delta} Z''(D) = -\left[1 + \frac{\partial E}{\partial \delta}\delta'(E) + \left(E + \frac{1-\lambda}{\lambda}\right)\frac{\partial^2 \delta}{\partial \delta \partial E}\right] \tag{B.6}$$

$$\frac{\partial E}{\partial \delta}[f''(E) - Z''(D)] = -\left[2 + \left(E + \frac{1-\lambda}{\lambda}\right)\frac{\partial^2 \delta}{\partial \delta \partial E}\right] \tag{B.7}$$

From (B.5) and (B.7), there are two comparative statistics:

$$\frac{\partial K}{\partial \delta} = \frac{-\left[\frac{\partial E}{\partial K} + \left(E + \frac{1-\lambda}{\lambda}\right)\frac{\partial^2 \delta}{\partial \delta \partial K}\right]}{\left[f''(K) - \left(1-\bar{d}\right)^2 Z''(D)\right]} \tag{B.8}$$

$$\frac{\partial E}{\partial \delta} = \frac{-\left[2 + \left(E + \frac{1-\lambda}{\lambda}\right)\frac{\partial^2 \delta}{\partial \delta \partial E}\right]}{\left[f''(E) - Z''(D)\right]} \tag{B.9}$$

In (B.8), the denominator is negative because $f''(K)<0$ and $Z''(D)>0$, by definition. Also, consistent with the model, the equity and investment will move in the same direction, thus $\frac{\partial E}{\partial K}>0$. Although the model does not have enough structure to specify a sign for cross partial derivative $\frac{\partial^2 \delta}{\partial \delta \partial K}$, it is expected to be positive as the sensitivity of mispricing to investment becomes higher with more irrationality in the market. Consequently, the numerator in (B.8) is negative and $\frac{\partial K}{\partial \delta}$ is positive, .i.e. investment increases with overvaluation and decreases with undervaluation. It is also worth noting that the response of investment to mispricing is proportional to investor catering and market timing gains and also determined by the response of mispricing to investment.

In (B.9), $Z''(D)>0$ and $f''(E)>0$. Thus, the sign depends on whether $Z''(D)$ dominates $f''(E)$. If $Z''(D)$ is higher than $f''(E)$, then $\frac{\partial E}{\partial \delta}$ is positive and vice versa. With such abstractive model and no specifications of the different functions, it is hard to be assured of the signs of this partial derivative. However, the model implies a positive relation between equity and mispricing.

Appendix C: RIM and Firm Value in a Linear Model

Let us start from the residual income model (RIM):

$$V_t = B_t + E_t \sum_{\tau=t+1}^{\infty} \frac{\left[ROE_\tau - r_\tau\right] B_{\tau-1}}{(1+r_\tau)^\tau} \tag{C.1}$$

if $$ROE_\tau \times B_{\tau-1} = NI_\tau \tag{C.2}$$

Then, by substituting (C.2) in (C.1), we can write (RIM) as:

$$V_t = B_t + E_t \sum_{\tau=t+1}^{\infty} \frac{\left[NI_\tau - r_\tau B_{\tau-1}\right]}{(1+r_\tau)^\tau} \tag{C.3}$$

$$V_t = B_t + E_t \left[\sum_{\tau=t+1}^{\infty} (1+r_\tau)^{-\tau} \left[NI_\tau - r_\tau B_{\tau-1}\right] \right] \tag{C.4}$$

if we assume that net income grows at a constant rate, such as, $NI_{t+1} = \gamma NI_t$

then,

$$\sum_{\tau=t+1}^{\infty} NI_\tau = NI_{t+1} + NI_{t+2} + NI_{t+3} + \ldots.. = \sum_{i=1}^{\infty} NI_{t+i}$$

$$= \gamma NI_t + \gamma NI_{t+1} + \gamma NI_{t+2} + \ldots\ldots. = NI_t \sum_{i=1}^{\infty} \gamma^i$$

and $$\sum_{\tau=t+1}^{\infty} NI_\tau = NI_t \sum_{i=1}^{\infty} \gamma^i \tag{C.5}$$

if the equity book value grows at a constant rate, such as, $B_\tau = \theta B_{\tau-1}$ then,

$$\sum_{\tau=t+1}^{\infty} B_{\tau-1} = B_t + B_{t+1} + B_{t+2} + B_{t+3} + \ldots\ldots.. = \sum_{i=0}^{\infty} B_{t+i}$$

$$= B_t + \theta B_t + \theta B_{t+1} + \theta B_{t+2} + \ldots\ldots... = B_t \sum_{i=0}^{\infty} \theta^i$$

and $$\sum_{\tau=t+1}^{\infty} B_{\tau-1} = B_t \sum_{i=0}^{\infty} \theta^i \tag{C.6}$$

Now, using (C.5) and (C.6), we can rewrite the (RIM) as:

$$V_t = B_t + E_t\left[\sum_{\tau=t+1}^{\infty}(1+r_\tau)^{-\tau}\left[NI_\tau - r_\tau B_{\tau-1}\right]\right]$$

$$V_t = B_t + E_t\sum_{\tau=t+1}^{\infty} NI_\tau(1+r_\tau)^{-\tau} - E_t\sum_{\tau=t+1}^{\infty} r_\tau B_{\tau-1}(1+r_\tau)^{-\tau}$$

$$V_t = B_t + NI_t\left(E_t\sum_{\tau=t+1}^{\infty}\sum_{i=1}^{\infty}\gamma^i(1+r_\tau)^{-\tau}\right) - B_t\left(E_t\sum_{\tau=t+1}^{\infty}\sum_{i=0}^{\infty}\theta^i r_\tau(1+r_\tau)^{-\tau}\right) \qquad \text{(C.7)}$$

Equation (C.7) shows that the intrinsic value of the firm can be written in terms of the book value of assets in place and the net income at time t. knowing the constant growth rate of both is enough to calculate the intrinsic value.

Appendix D: Data Definitions and Calculation Details

Variable	Symbol	Definition	Source	Notes
Investment	I	Corporate investment can be defined as capital expenditures ($CAPX$), acquisitions (ACQ), Research and Development expenses (RD), or increase in investments ($IINC$) . Investment can be also a total of all the four components.	Investment (I) = capital expenditures ($CAPX$)#128 + acquisitions (ACQ) #129 + R&D expense(RD) #46 + increase in investments ($IINC$) #113.*	I analyze each type of investment and disinvestment separately and collectively.
Asset Sales	$SalePPE$	Asset sales are considered to be disinvestments or negative Investments.	Asset Sales can be measured as sale of property, plant, and equipment ($SalePPE$)#107.	
Net Investment	$NetI$	Net corporate investment is total investments minus asset sales. $NetI = I - SalePPE$.	Net Investment (NetI) = [capital expenditures ($CAPX$)#128 + acquisitions (ACQ) #129 + R&D expense(RD) #46 + increase in investments ($IINC$) #113]- [sale of property, plant, and equipment ($SalePPE$)#107].	
Change In Total Assets	$\Delta A_t / A_{t-1}$	An alternative measure of investment is the percentage change in total assets ($\Delta A / A$) or more specifically the percentage increase in total assets ($\Delta A^{+} / A$). An alternative measure of disinvestment is the percentage decrease in total assets ($\Delta A^{-} / A$).	Percentage change in total assets ($\Delta A / A$) is the difference between total assets #6 at time t and the total assets #6 at time t-1 divided by total assets#6 at time t-1, $\Delta A / A = (A_t - A_{t-1}) / A_{t-1}$. Percentage increase in total assets include only positive differences between total assets #6 at time t and the total assets #6 at time t-1. $\Delta A^{+} / A = (A_t - A_{t-1}) / A_{t-1}$ where $(A_t - A_{t-1}) > 0$. Percentage decrease in total assets include only negative differences between total assets #6 at time t and the total assets #6 at time t-1. Decrease in total assets is represented by the absolute value of the decrease percentage of total assets, $\Delta A^{-} / A = \lvert (A_t - A_{t-1}) / A_{t-1} \rvert$ where $(A_t - A_{t-1}) < 0$.	

Variable	Symbol	Definition	Source	Notes
Market-to-book ratio	M / B	The ratio of the market value of the firm to the book value of the firm.	M / B = the market value of equity (Common shares outstanding #25 x closing stock price #199) + book assets #6 – book equity #60- deferred taxes #74 all divided by total assets #6.	
Net Capital	$NetCap$	Net capital is the sum of net equity issued (*NetEq*) and net debt issued (*NetDbt*).	Net capital(*NetCap*)=Net equity (*NetEq*)+Net Debt (*NetDbt*). Net equity (*NetEq*) = equity issued(*EIssue*) #108 – equity repurchased(ERep) #115. Net debt (*NetDbt*) = debt issued (*DIssue*)#111 – debt retired(*DRet*) #114.	In some models, gross equity issued (*EIssue*) and gross debt issued (*DIssue*) are used in sum and separately. The sum of gross equity issued (*EIssue*) and gross debt issued (*DIssue*) is the gross capital issued (*CapIssue*). In some models, equity repurchased (*ERep*) and debt retired (*DRet*) are used in sum and separately. The sum of equity repurchased (*ERep*) and debt retired (*DRet*) is capital retired (*CapRet*).
Mispricing at the firm level	Dev^{Firm}	The difference between the market price of the stock and the fundamental value of the stock implied by the firm's accounting information and aggregate multiples.	$Dev^{Firm} = lnM_{it} - v(\theta_{it};\alpha_t)$, which is the difference between the market value of firm at time t and the fundamental value of the firm at time t . The fundamental value of the firm is obtained by applying annual, aggregate regression multiples αs to the firm-level accounting values θ . The individual time t values of the αs are obtained using this model , $ln(M)_{it} = \alpha_{0jt} + \alpha_{1jt} ln(B)_{it} + \alpha_{2jt} ln(\lvert NI \rvert)_{it} + \alpha_{3jt} ln(\lvert NI \rvert)_{it} \times D_{(NI_{it}<0)} + \alpha_{4jt} LEV_{it} + \varepsilon_{it}$	

Variable	Symbol	Definition	Source	Notes
Mispricing at the aggregate level	Dev^{Agg}	The difference between the fundamental value of the stock implied by current aggregate multiples and the fundamental value of the stock implied long run aggregate multiples. any difference between the long run value and the current fundamental value suggests a time series error and indicate a certain valuation wave at the aggregate level.	$Dev^{Agg} = \left[v(\theta_{it};\alpha_{jt}) - v(\theta_{it};\alpha_{j})\right]$, which is the difference between the fundamental value of the firm at time t based on time t accounting values θ and time t aggregate multiples αs and fundamental value of the firm at time t based on time t accounting values θ and long run aggregate multiples. The fundamental value of the firm is obtained by applying annual, aggregate regression multiples αs to the firm-level accounting values θ . The individual time t values of the αs are obtained using this model , $ln(M)_{it} = \alpha_{0jt} + \alpha_{1jt} ln(B)_{it} + \alpha_{2jt} ln(\lvert NI \rvert)_{it} + \alpha_{3jt} ln(\lvert NI \rvert)_{it} \times D_{(NI_{it}<0)} + \alpha_{4jt} LEV_{it} + \varepsilon_{it}$. the long run aggregate multiples $\bar{\alpha} s$ are the over time average of αs .	The aggregate level can be evaluated at the industry level or at the overall market level. The Industry classification is based on Fama & French 12 industry classification. Although all analysis are done using both levels, only the results using industry level are reported. Results are similar when using overall market level as the aggregate level.
Growth component	G	The difference between the valuations implied by long run multiples and current book values. The difference between these two values can be used as a proxy for the growth of the firm.	Growth= $v(\theta_{it};\alpha) - lnB_{it}$. The fundamental value of the firm is based on the long run multiples $\bar{\alpha} s$ and the accounting numbers at time t. The book value is the book assets #6.	
Investor Horizon	H	The degree of shareholder investment horizon. Shareholders have either short investment horizon or long investment horizon. Long horizon shareholders are the ones who hold their stock and are not keen to sell their stocks for capital gain. Short horizon shareholders are those who are welling to sell their stocks in the near future.	Investor horizon is measured by the turnover ratio which is the average of the monthly ratios of shares traded to shares outstanding during the fiscal year.	The data for this variable is taken from CRSP database.

Variable	Symbol	Definition	Source	Notes
Degree of Financial constraints	Z	Z measures the extent to which the firm is financially constrained. A high value of Z implies more binding constraints and less ability to issue debt and thus more dependence on equity.	Kaplan and Zingales (1997) Z index is measured as $Z_{it}=-1.002\frac{CF_{it}}{A_{i(t-1)}}-39.368\frac{DIV_{it}}{A_{i(t-1)}}-1.315\frac{C_{it}}{A_{i(t-1)}}+3.139\,Lev_{it}$	Cash flow (CF) ratio is income before extra ordinary items #18 plus deprecation and amortization #14 over beginning of the period book asset #6. (DIV) is the cash dividends (preferred dividends#19+ common dividends#21. (C) is cash and short-term investments #1. (Lev) is the ratio of debt over the total of debt and equity. Lev= [long-term debt #9 + current portion of debt #34]/[long-term debt #9 + current portion of debt #34+ stockholders' equity#216].

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* Number signs refer to the data item number in Compustat and names between parentheses refer to the variable name in the paper.

Table 1
Summary of Corporate Investment and Financing Decisions in an Inefficient Market

The table summarizes the special cases of the model presented in section 3.2. $E \neq 0$ refers to equity issuance or repurchases. $E=0$ means the firm does not enter the equity market through neither issuance nor repurchases. λ refers to the degree of managerial horizon., where $0 \geq \lambda \leq 1$. If λ equals zero, the manager has a short horizon and cares only about maximizing the current stock price. As λ approaches one, managers become more concerned about maximizing the fundamental value of the firm and less concerned about maximizing the current stock price. $\bar{d}$ is the percentage of the new debt the firm can issue to finance the new investment. A low value of $\bar{d}$ indicates that the firm already exhausted too much of its debt capacity and should rather use more equity to finance the new investment.

Undervaluation Underinvestment Repurchase

Mispricing	Investment	Financing	Notes
a) No equity transactions ($E=0$) and Long term investment horizon ($\lambda=1$)			
Overvaluation	Optimal	-	Similar to efficient market case, investment decision is not distorted by mispricing.
Undervaluation	Optimal	-	
b) Equity transactions $E \neq 0$ and Long term investment horizon $\lambda=1$			
Overvaluation	Overinvestment	Issue	The relation between investment and mispricing is stronger when the firm is financially constrained and has to depend on equity to finance its investments (as $\bar{d}$ approaches zero).
Undervaluation	Underinvestment	Repurchase	
c) No equity transactions $E=0$ and Short term investment horizon $\lambda=0$			
Overvaluation	Overinvestment	-	The relation between investment and mispricing is stronger the shorter the investment horizon (as λ approaches zero).
Undervaluation	Underinvestment	-	
d) Equity transactions $E \neq 0$ and Short term investment horizon $\lambda=0$			
Overvaluation	Overinvestment	Issue	The relation between investment and mispricing is stronger the shorter the investment

Table 2
Fundamental Value Regressions for the Whole Market and across Industries

The cross sectional regression model $ln(M)_{it} = \alpha_{0jt} + \alpha_{1jt} ln(B)_{it} + \alpha_{2jt} ln(|NI|)_{it} + \alpha_{3jt} ln(|NI|)_{it} \times D_{(NI_{it}<0)} + \alpha_{4jt} LEV_{it} + \varepsilon_{it}$ is estimated at industry-year level and at market-year level. The subscripts i,j, and t denote firm, industry, and year, respectively. Industry classification is based on Fama and French 12 industry classifications. Results for industry number 11 which refer to financial firms are not reported because the sample does not include financial firms. $ln(V)_{it}$ is the log of market value of firm i at time t. $ln(B)_{it}$ is the log of book value of firm i at time t. $ln(|NI|)_{it}$ the log of net income of firm i at time t. $D_{(NI_{it}<0)}$ is a dummy variable that indicate negative net income interacted with the log of absolute value of net income. LEV_{it} is the leverage of firm i at time t. Lev= [long-term debt #9 + current portion of debt #34]/[long-term debt #9 + current portion of debt #34+ stockholders' equity#216]. $\hat{\alpha}_k$ is the time series average of estimated coefficients in the model for k=0 to 4. $\bar{R}^2$ is the time series average of R squares for each industry or for the market in percentage form $\bar{N}$ is the time series average of the number of firms in each industry or in the whole market. P-values (in parentheses) are obtained using Fama-Macbeth standard errors.

	$\bar{\hat{\alpha}}_0$	$\bar{\hat{\alpha}}_1$	$\bar{\hat{\alpha}}_2$	$\bar{\hat{\alpha}}_3$	$\bar{\hat{\alpha}}_4$	$\bar{R}^2$ $\bar{N}$
Industry 1	0.7272	0.8054	0.2324	-0.1083	0.0499	95.27
Non Durables	(0.000)	(0.000)	(0.000)	(0.000)	(0.131)	N=340
2	0.9435	0.7618	0.2368	-0.0797	0.0494	95.65
Durables	(0.000)	(0.000)	(0.000)	(0.010)	(0.372)	N=149
3	0.8321	0.7811	0.2173	-0.0898	0.0888	95.33
Manufacturing	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	N=665
4	0.8213	0.8186	0.1522	0.0444	0.1269	95.06
Energy	(0.000)	(0.000)	(0.000)	(0.726)	(0.002)	N=239
5	1.4401	0.6431	0.3432	-0.1445	-0.1286	95.44
Chemicals	(0.000)	(0.000)	(0.000)	(0.011)	(0.040)	N=118
6	1.1814	0.7476	0.2695	-0.1141	0.0210	90.33
Business Equipment	(0.000)	(0.000)	(0.000)	(0.000)	(0.368)	N=783
7	1.0261	0.8224	0.1329	-0.0288	0.0727	95.95
Telecom	(0.000)	(0.000)	(0.000)	(0.370)	(0.232)	N=134
8	0.4565	0.8477	0.1436	-0.0588	0.2482	98.79
Utilities	(0.000)	(0.000)	(0.000)	(0.006)	(0.008)	N=174
9	0.9122	0.7743	0.2449	-0.1393	0.0389	94.04
Shops	(0.000)	(0.000)	(0.000)	(0.000)	(0.192)	N=556
10	1.6134	0.6882	0.2904	-0.1031	-0.1931	89.53
Healthcare	(0.000)	(0.000)	(0.000)	(0.002)	(0.026)	N=362
12	1.1408	0.7357	0.2340	-0.1012	0.0250	92.02
Other	(0.000)	(0.000)	(0.000)	(0.000)	(0.006)	N=717
Market	1.1019	0.7440	0.2403	-0.0896	0.0196	93.27
	(0.000)	(0.000)	(0.000)	(0.000)	(0.294)	N=4,236

Table 3
Summary Statistics for Investments, financing, and investment determinants

The table presents the number of observations, mean, median, and standard deviation of investment variables and their determinants for US firms from compustat between 1971 and 2004. Total assets variable is winsorized at the 1st and 99th percentiles. Negative values for investment variables are ignored. Financial and Utilities firms are not included in the analysis.

Investment I_t / A_{t-1} is defined as the sum of capital expenditures, acquisitions, R&D expenses, and increase in investment at time t divided by total assets (compustat item #6) at time t-1. $CAPX_t / A_{t-1}$ is capital expenditures at time t (compustat item #128) divided by total assets at time t-1. ACQ_t / A_{t-1} is acquisitions (compustat item #129) at time t divided by total assets at time t-1. RD_t / A_{t-1} is R&D expenses at time t (compustat item #46) divided by total assets at time t-1. $IINC_t / A_{t-1}$ is increase in investments (compustat item #113) divided by total assets at time t-1. $SalePPE_t / A_{t-1}$ is sale of PP&E at time t (compustat item #107) divided by total assets at time t-1. Net investment $NetI_t / A_{t-1}$ is the difference between Investment (I) and the sale of PP&E (SalePPE) at time t divided by total assets at time t-1.

Change in total assets $\Delta A_t / A_{t-1}$ is the difference between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. $\Delta A_t^+ / A_{t-1}$ is increase in total assets include only positive differences between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. $\Delta A_t^- / A_{t-1}$ is decrease in total assets include only negative differences between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. Decrease in total assets is represented by the absolute value of the decrease percentage of total assets.

$EIssue_t / A_{t-1}$ is equity issued at time t (compustat item #108) divided by total assets at time t-1. $E\,\mathrm{Re}p_t / A_{t-1}$ is equity repurchased at time t(compustat item #115) divided by total assets at time t-1. $NetEq_t / A_{t-1}$ is the difference between $EIssue_t / A_{t-1}$ and $E\,\mathrm{Re}p_t / A_{t-1}$. $DIssue_t / A_{t-1}$ is debt issued at time t (compustat item #111) divided by total assets at time t-1. $D\,\mathrm{Re}t_t / A_{t-1}$ is debt retired at time t (compustat item #114) divided by total assets at time t-1. $NetDbt_t / A_{t-1}$ is the difference between $DIssue_t / A_{t-1}$ and $D\,\mathrm{Re}t_t / A_{t-1}$. $CapIssue_t / A_{t-1}$ is the sum of $EIssue_t / A_{t-1}$ and $DIssue_t / A_{t-1}$. $Cap\,\mathrm{Re}t_t / A_{t-1}$ is the sum of $E\,\mathrm{Re}p_t / A_{t-1}$ and $D\,\mathrm{Re}t_t / A_{t-1}$. $NetCap_t / A_{t-1}$ is the sum of $NetEq_t / A_{t-1}$ and $NetDbt_t / A_{t-1}$.

Mispricing at the firm level (Dev_{it}^{firm}) is the difference between the market value of firm i at time t and the fundamental value of the firm i at time t [$lnM_{it} - v(\theta_{it};\alpha_t)$]. The fundamental value of the firm i[$v(\theta_{it};\alpha_t)$] is obtained by applying annual, aggregate regression multiples (α's) to the firm-level accounting values (θ). The individual time t values of the (α_t's) are obtained using the model, $ln(M)_{it} = \alpha_{0jt} + \alpha_{1jt} ln(B)_{it} + \alpha_{2jt} ln(|NI|)_{it} + \alpha_{3jt} ln(|NI|)_{it} \times D_{(NI_{it}<0)} + \alpha_{4jt} LEV_{it} + \varepsilon_{it}$. Mispricing at the aggregate level (Dev_{it}^{Agg}) is the difference between the fundamental value of the firm at time t based on time t accounting values (θ_t) and time t aggregate multiples (α_t's) and the fundamental value of the firm at time t based on time t accounting values (θ_t) and long run aggregate multiples ($\bar{\alpha}$'s), $\left[v(\theta_{it};\alpha_t) - v(\theta_{it};\bar{\alpha})\right]$. The long run aggregate multiples ($\bar{\alpha}$'s) are the over time average of (α_t's). Growth (G_{it}) is the difference between the valuations implied by long run multiples and current book values, [$v(\theta_{it};\alpha) - lnB_{it}$]. The aggregate level is either at the industry or at the market level. The Industry classification is based on Fama & French 12 industry classification. Degree of financial constraints is measured by Kaplan and Zingales (1997) Z index. Z is calculated using Baker, Stein, and Wurgler (2003) four variable version, $Z_{it} = -1.002\frac{CF_{it}}{A_{i(t-1)}} - 39.368\frac{DIV_{it}}{A_{i(t-1)}} - 1.315\frac{C_{it}}{A_{i(t-1)}} + 3.139\,Lev_{it}$. Cash flow (CF) is income before extra ordinary items(compustat item #18) plus deprecation and amortization (compustat item #14). Dividends (DIV) is preferred dividends (compustat item #19)+ common dividends (compustat item #21). Cash (C) is cash and short-term investments (compustat item #1). Leverage (Lev) is the ratio of debt (compustat item #9) + current portion of debt(compustat item #34) over the total of debt and equity (compustat item #216). Investor horizon is measured by the turnover ratio which is the average of the monthly ratios of shares traded to shares outstanding during the fiscal year. High turnover ratio indicates short investor horizon and vice versa. Total Assets is compustat item #6. Net Income is compustat item #172.

Variable	Symbol	N	Mean	Median	Standard Deviation
Panel A: Investment					
Investment to Total Assets	I_t / A_{t-1}	**78,639**	**0.202**	**0.108**	**1.118**
Capital Expenditures to Total Assets	$CAPX_t / A_{t-1}$	83,604	0.094	0.053	0.417
Acquisition to Total Assets	ACQ_t / A_{t-1}	76,018	0.034	0.000	0.249
Research & Development to Total Assets	RD_t / A_{t-1}	44,737	0.083	0.032	0.226
Increase in Investment to Total Assets	$IINC_t / A_{t-1}$	79,998	0.029	0.000	0.301

Variable	Symbol	N	Mean	Median	Standard Deviation
Sale of PPE to Total Assets	$SalePPE_t / A_{t-1}$	60,965	0.011	0.000	0.050
Net Investment to Total Assets	$NetI_t / A_{t-1}$	**78,558**	**0.193**	**0.102**	**1.107**
Change in Total Assets	$\Delta A_t / A_{t-1}$	**85,105**	**0.291**	**0.069**	**6.098**
Increase in Total Assets	$\Delta A_t^+ / A_{t-1}$	56,317	0.526	0.154	7.484
Decrease in Total Assets	$\Delta A_t^- / A_{t-1}$	28,571	0.169	0.109	0.175

Panel B: Financing

Variable	Symbol	N	Mean	Median	Standard Deviation
Net Capital Issued to Total Assets	$NetCap_t / A_{t-1}$	**89,464**	**0.096**	**0.001**	**1.080**
Gross Capital Issued to Total Assets	$CapIssue_t / A_{t-1}$	**89,464**	0.213	0.038	1.601
Gross Capital Retired to Total Assets	$Cap\,\mathrm{Ret}_t / A_{t-1}$	**89,464**	0.117	0.032	1.147
Net Equity Issued to Total Assets	$NetEq_t / A_{t-1}$	**89,464**	**0.062**	**0.000**	**0.547**
Gross Equity Issued to Total Assets	$EIssue_t / A_{t-1}$	**89,464**	0.075	0.002	0.531
Gross Equity Retired to Total Assets	$E\,\mathrm{Re}\,p_t / A_{t-1}$	**89,464**	0.013	0.000	0.163
Net Debt Issued to Total Assets	$NetDbt_t / A_{t-1}$	**89,464**	**0.034**	**0.000**	**0.923**
Gross Debt Issued to Total Assets	$DIssue_t / A_{t-1}$	**89,464**	0.139	0.011	1.384
Gross Debt Retired to Total Assets	$D\,\mathrm{Ret}_t / A_{t-1}$	**89,464**	0.104	0.022	1.106

Panel C: Market

Variable	Symbol	N	Mean	Median	Standard Deviation
Market to Book Ratio	$(M / B)_{it-1}$	**89,464**	**1.785**	**1.208**	**2.312**
Firm Value using Industry Multiples					
Mispricing at the firm level	$Dev_{Ind.}^{Firm}$	89,448	-0.041	-0.071	0.477
Mispricing at the aggregate level	Dev^{Ind}	89,448	0.031	0.055	0.807
Growth	$G_{Ind.}$	89,448	0.330	0.316	0.833
Firm Value using Market Multiples					
Mispricing at the firm level	Dev_{Mkt}^{Firm}	89,448	-0.049	-0.102	0.509
Mispricing at the aggregate level	Dev^{Mkt}	89,448	0.043	0.084	0.215
Growth	G_{Mkt}	89,448	0.326	0.341	0.282

Panel D: Other Investment Determinants

Variable	Symbol	N	Mean	Median	Standard Deviation
Degree of Financial constraints	**Z**	**89,464**	**0.465**	**0.382**	**18.311**
Cash Flow to Total Assets	CF_t / A_{t-1}	**89,464**	0.047	0.084	0.984
Dividends to Total Assets	DIV_t / A_{t-1}	**89,464**	0.016	0.000	0.287
Cash to Total Assets	C_t / A_{t-1}	**89,464**	0.177	0.066	0.605
Leverage	Lev	**89,464**	0.442	0.332	4.283
Investor Horizon	**H**	**57,781**	**0.001**	**0.000**	**0.001**
Other Variables					
Total Assets (millions)	A	**89,464**	835.82	89.039	2345.91
Net Income (millions)	NI	**89,464**	30.28	2.113	177.28

Table 4
Pearson Correlation Coefficients among Investment, Financing, and other investment determinants

The table presents Pearson correlations among investment variables and their determinants for US firms from compustat between 1971 and 2004. Total assets variable is winsorized at the 1st and 99th percentiles. Negative values for investment variables are ignored. Financial and Utilities firms are not included in the analysis. Investment I_t / A_{t-1} is defined as the sum of capital expenditures, acquisitions, R&D expenses, and increase in investment at time t divided by total assets (compustat item #6) at time t-1. $CAPX_t / A_{t-1}$ is capital expenditures at time t (compustat item #128) divided by total assets at time t-1. ACQ_t / A_{t-1} is acquisitions (compustat item #129) at time t divided by total assets at time t-1. RD_t / A_{t-1} is R&D expenses at time t (compustat item #46) divided by total assets at time t-1. $IINC_t / A_{t-1}$ is increase in investments (compustat item #113) divided by total assets at time t-1. $SalePPE_t / A_{t-1}$ is sale of PP&E at time t (compustat item #107) divided by total assets at time t-1. Net investment $NetI_t / A_{t-1}$ is the difference between Investment (I) and the sale of PP&E (SalePPE) at time t divided by total assets at time t-1. Change in total assets $\Delta A_t / A_{t-1}$ is the difference between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. $\Delta A_t^+ / A_{t-1}$ is increase in total assets include only positive differences between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. $\Delta A_t^- / A_{t-1}$ is decrease in total assets include only negative differences between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. Decrease in total assets is represented by the absolute value of the decrease percentage of total assets. CF_t / A_{t-1} is cash flow at time t calculated as income before extra ordinary items (compustat item #18) plus deprecation and amortization(compustat item #14) divided by total assets at time t-1. M/B_{t-1} is the market value of equity (Common shares outstanding (compustat item #25) x closing stock price (compustat item #199)) + book assets (compustat item #6) – book equity (compustat item #60)-deferred taxes (compustat item #74) all divided by total assets (compustat item #6) all at time t-1. $Dev^{Firm}_{Ind.}$ is the mispricing at the firm level using industry multiples to calculate fundamental value. Dev^{Ind} is the mispricing at the industry level. $G_{Ind.}$ is the difference between the book value of the firm and the fundamental value obtained using industry multiples. Dev^{Firm}_{Mkt} is the mispricing at the firm level using market multiples to calculate fundamental value. Dev^{Mkt} is the mispricing at the market level. G_{Mkt} is the difference between the book value of the firm and the fundamental value obtained using market multiples. $NetEq_t / A_{t-1}$ is the difference between equity issued at time t (compustat item #108) and equity repurchased at time t(compustat item #115) divided by total assets at time t-1. $NetDbt_t / A_{t-1}$ is the difference between debt issued at time t (compustat item #111) and debt retired at time t (compustat item #114) divided by total assets at time t-1. $NetCap_t / A_{t-1}$ is the sum of $NetEq_t / A_{t-1}$ and $NetDbt_t / A_{t-1}$. P-values are in parentheses.

	CF_t / A_{t-1}	M/B_{t-1}	$Dev^{Firm}_{Ind,t-1}$	Dev^{Ind}_{t-1}	$G_{Ind,t-1}$	$Dev^{Firm}_{Mkt,t-1}$	Dev^{Mkt}_{t-1}	$G_{Mkt,t-1}$	$NetCap_t / A_{t-1}$	$NetEq_t / A_{t-1}$	$NetDbt_t / A_{t-1}$
I_t / A_{t-1}	0.54	0.05	0.05	0.01	0.01	0.06	0.03	0.00	0.68	0.22	0.59
	(0.000)	(0.000)	(0.000)	(0.064)	(0.003)	(0.000)	(0.000)	(0.278)	(0.000)	(0.000)	(0.000)
$CAPX_t / A_{t-1}$	0.49	0.01	0.05	0.00	0.00	0.04	0.00	-0.02	0.35	0.29	0.22
	(0.000)	(0.042)	(0.000)	(0.489)	(0.198)	(0.000)	(0.483)	(0.000)	(0.000)	(0.000)	(0.000)
ACQ_t / A_{t-1}	0.01	0.00	0.03	0.04	-0.03	0.03	0.05	-0.05	0.34	0.17	0.24
	(0.008)	(0.904)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
RD_t / A_{t-1}	-0.33	0.23	0.13	0.06	0.22	0.19	0.10	0.18	0.35	0.36	0.06
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$IINC_t / A_{t-1}$	0.02	0.03	0.03	0.01	0.01	0.05	0.03	0.00	0.10	0.15	0.03
	(0.000)	(0.000)	(0.000)	(0.005)	(0.014)	(0.000)	(0.000)	(0.190)	(0.000)	(0.000)	(0.000)
$SalePPE_t / A_{t-1}$	0.05	-0.03	-0.02	0.00	-0.01	-0.03	-0.03	-0.01	0.05	0.02	0.06
	(0.000)	(0.000)	(0.000)	(0.258)	(0.007)	(0.000)	(0.000)	(0.038)	(0.000)	(0.000)	(0.000)
$NetI_t / A_{t-1}$	0.53	0.05	0.05	0.01	0.01	0.07	0.03	0.00	0.68	0.23	0.59
	(0.000)	(0.000)	(0.000)	(0.054)	(0.002)	(0.000)	(0.000)	(0.262)	(0.000)	(0.000)	(0.000)
$\Delta A_t / A_{t-1}$	0.68	0.01	0.02	0.00	0.00	0.02	0.01	-0.02	0.34	0.30	0.20
	(0.000)	(0.089)	(0.000)	(0.282)	(0.176)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
$\Delta A_t^+ / A_{t-1}$	0.70	0.01	0.01	0.02	-0.01	0.02	0.02	-0.02	0.34	0.30	0.20
	(0.000)	(0.041)	(0.003)	(0.000)	(0.105)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$\Delta A_t^- / A_{t-1}$	-0.39	0.17	-0.05	0.00	0.11	-0.06	0.01	0.46	0.01	0.07	-0.06
	(0.000)	(0.000)	(0.000)	(0.479)	(0.000)	(0.000)	(0.367)	(0.000)	(0.016)	(0.000)	(0.000)

Table 5

Firm Investment Decisions and Market Determinants

Dependent variables: Investment I_t / A_{t-1} is defined as the sum of capital expenditures, acquisitions, R&D expenses, and increase in investment at time t divided by total assets (compustat item #6) at time t-1. $CAPX_t / A_{t-1}$ is capital expenditures at time t (compustat item #128) divided by total assets at time t-1. ACQ_t / A_{t-1} is acquisitions (compustat item #129) at time t divided by total assets at time t-1. RD_t / A_{t-1} is R&D expenses at time t (compustat item #46) divided by total assets at time t-1. $IINC_t / A_{t-1}$ is increase in investments (compustat item #113) divided by total assets at time t-1. $SalePPE_t / A_{t-1}$ is sale of PP&E at time t (compustat item #107) divided by total assets at time t-1. Net investment $NetI_t / A_{t-1}$ is the difference between Investment (I) and the sale of PP&E (SalePPE) at time t divided by total assets at time t-1. Change in total assets $\Delta A_t / A_{t-1}$ is the difference between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. $\Delta A_t^{+} / A_{t-1}$ is increase in total assets include only positive differences between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. $\Delta A_t^{-} / A_{t-1}$ is decrease in total assets include only negative differences between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. Decrease in total assets is represented by the absolute value of the decrease percentage of total assets.

Independent variables: CF_t / A_{t-1} is is income before extra ordinary items(compustat item #18) plus deprecation and amortization (compustat item #14) at time t divided by total assets at time t-1. $(M / B)_{t-1}$ is the market value of equity (Common shares outstanding #25 x closing stock price #199) + book assets #6 – book equity #60-deferred taxes #74 all at time t-1 divided by total assets #6 at time t-1. Mispricing at the firm level (Dev_{it}^{firm}) is the difference between the market value of firm i at time t and the fundamental value of the firm i at time t [$lnM_{it} - v(\theta_{it};\alpha_t)$]. The fundamental value of the firm i[$v(\theta_{it};\alpha_t)$] is obtained by applying annual, aggregate regression multiples (α's) to the firm-level accounting values (θ). The individual time t values of the (α_t's) are obtained using the model, $ln(M)_{it} = \alpha_{0jt} + \alpha_{1jt} ln(B)_{it} + \alpha_{2jt} ln(|NI|)_{it} + \alpha_{3jt} ln(|NI|)_{it} \times D_{(NI_{it}<0)} + \alpha_{4jt} LEV_{it} + \varepsilon_{it}$. Mispricing at the aggregate level (Dev_{it}^{Agg}) is the difference between the fundamental value of the firm at time t based on time t accounting values (θ_t) and time t aggregate multiples (α_t's) and the fundamental value of the firm at time t based on time t accounting values (θ_t) and long run aggregate multiples ($\bar{\alpha}$'s), $[v(\theta_{it};\alpha_t) - v(\theta_{it};\bar{\alpha})]$. The long run aggregate multiples ($\bar{\alpha}$'s) are the over time average of (α_t's). Growth (G_{it}) is the difference between the valuations implied by long run multiples and current book values, [$v(\theta_{it};\alpha) - lnB_{it}$]. The aggregate level is either at the industry or at the market level. The Industry classification is based on Fama & French 12 industry classification.

The data contains US firms in compustat between 1971 and 2004. Total assets variable is winsorized at the 1st and 99th percentiles. Negative values for investment variables are ignored. Financial and Utilities firms are not included in the analysis.

Panel A shows the results for investment variables. Panel B shows results for the changes in total assets. Regression coefficients are estimated using OLS regression with p-values based on heteroskedasticity-robust standard errors. All Variables are firm and year mean adjusted. The P-values are in parentheses. ΔR^2 is the change in R-square and the associated p-values of the partial F statistics as $(M / B)_{t-1}$ variable is added to the regression. Coefficients starred with one, two, and three asterisks are statistically significant at the ten, five, and one percent respectively.

Panel A: Investment Decisions as the Dependent Variables

Dependent Variable	CF_t / A_{t-1}	$(M / B)_{t-1}$	Dev_{t-1}^{Firm}	$Dev_{t-1}^{Agg.}$	G_{t-1}	R^2 (%) N	ΔR^2 (%)
I_t / A_{t-1}	0.7651***		0.1663***	0.2966***	0.2858***	32.19	
	(0.000)		(0.000)	(0.000)	(0.000)	N=78,639	
	0.7684***	0.0365***	0.0553***	0.2009***	0.1864***	32.47	0.28
	(0.000)	(0.000)	(0.010)	(0.000)	(0.000)	N=78,639	(0.000)
	0.7674***	0.0519***				32.18	
	(0.000)	(0.000)				N=78,639	
$CAPX_t / A_{t-1}$	0.3706***		0.0558***	0.1036***	0.0834***	30.35	
	(0.000)		(0.000)	(0.000)	(0.000)	N=83,604	
	0.3718***	0.0104***	0.0233***	0.0745***	0.0541***	30.46	0.11
	(0.000)	(0.000)	(0.007)	(0.000)	(0.000)	N=83,604	(0.000)
	0.3711***	0.0159***				30.33	
	(0.000)	(0.000)				N=83,604	

Dependent Variable	CF_t / A_{t-1}	$(M / B)_{t-1}$	Dev_{t-1}^{Firm}	$Dev_{t-1}^{Agg.}$	G_{t-1}	R^2 (%) N	ΔR^2 (%)
ACQ_t / A_{t-1}	0.0091		0.0365***	0.0515***	0.0838***	0.81	
	(0.557)		(0.000)	(0.000)	(0.000)	N=76,018	
	0.0091	-0.0001	0.0367***	0.0516***	0.0839***	0.81	0.00
	(0.559)	(0.961)	(0.000)	(0.000)	(0.000)	N=76,018	(0.937)
	0.0096	0.0069***				0.28	
	(0.535)	(0.000)				N=76,018	
RD_t / A_{t-1}	-0.0675		0.0595***	0.0956***	0.0897***	7.49	
	(0.282)		(0.000)	(0.000)	(0.000)	N=44,737	
	-0.0659	0.0077***	0.0302***	0.0720***	0.0659***	7.96	0.47
	(0.294)	(0.000)	(0.000)	(0.000)	(0.000)	N=44,737	(0.000)
	-0.0674	0.0135***				6.97	
	(0.281)	(0.000)				N=44,737	
$IINC_t / A_{t-1}$	0.0109		0.0301***	0.0537***	0.0473***	0.46	
	(0.248)		(0.000)	(0.000)	(0.000)	N=79,998	
	0.0111	0.0048	0.0151**	0.0402***	0.0338***	0.51	0.05
	(0.240)	(0.152)	(0.034)	(0.000)	(0.000)	N=79,998	(0.000)
	0.0110	0.0080***				0.42	
	(0.243)	(0.001)				N=79,998	
$SalePPE_t / A_{t-1}$	0.0037**		-0.0005	-0.0056***	-0.0002	0.34	
	(0.036)		(0.303)	(0.000)	(0.833)	N=60,965	
	0.0037**	0.0001	-0.0008	-0.0058***	-0.0004	0.34	0.00
	(0.036)	(0.451)	(0.236)	(0.000)	(0.663)	N=60,965	(0.580)
	0.0038**	-0.0002*				0.27	
	(0.031)	(0.056)				N=60,965	
$NetI_t / A_{t-1}$	0.7321***		0.1668***	0.2961***	0.2873***	30.68	
	(0.000)		(0.000)	(0.000)	(0.000)	N=78,558	
	0.7353***	0.0357***	0.0581***	0.2024***	0.1900***	30.96	0.28
	(0.000)	(0.000)	(0.006)	(0.000)	(0.000)	N=78,558	(0.000)
	0.7343***	0.0516***				30.66	
	(0.000)	(0.000)				N=78,558	

Panel B: Changes in Total Assets as the Dependent Variables

Dependent Variable	CF_t / A_{t-1}	$(M / B)_{t-1}$	Dev_{t-1}^{Firm}	$Dev_{t-1}^{Agg.}$	G_{t-1}	R^2 (%) N	ΔR^2 (%)
$\Delta A_t / A_{t-1}$	7.4989*** (0.000)		0.6118*** (0.000)	1.8751*** (0.000)	1.0612*** (0.000)	55.41 N=85,105	
	7.5254*** (0.000)	0.2292*** (0.000)	-0.1035 (0.417)	1.2363*** (0.000)	0.4178** (0.021)	55.65 N=85,105	0.24 (0.000)
	7.4994*** (0.000)	0.2540*** (0.000)				55.47 N=85,105	
$\Delta A_t^+ / A_{t-1}$	7.6190*** (0.000)		0.5265*** (0.000)	2.2752*** (0.000)	1.2650*** (0.000)	57.59 N=56,317	
	7.6351*** (0.000)	0.1967*** (0.000)	-0.1255 (0.426)	1.7239*** (0.000)	0.7036*** (0.003)	57.73 N=56,317	0.14 (0.000)
	7.6039*** (0.000)	0.2314*** (0.000)				57.47 N=56,317	
$\Delta A_t^- / A_{t-1}$	-0.0600*** (0.000)		-0.0185*** (0.000)	0.0120** (0.025)	0.0014 (0.733)	2.04 N=28,571	
	-0.0607*** (0.000)	-0.0014 (0.120)	-0.0146*** (0.000)	0.0159*** (0.005)	0.0051 (0.271)	2.05 N=28,571	0.01 (0.044)
	-0.0627*** (0.000)	-0.0028*** (0.002)				1.82 N=28,571	

Table 6

Net Equity Issuance and Firm Investment Decisions

Dependent variables: Investment I_t / A_{t-1} is defined as the sum of capital expenditures, acquisitions, R&D expenses, and increase in investment at time t divided by total assets (compustat item #6) at time t-1. $CAPX_t / A_{t-1}$ is capital expenditures at time t (compustat item #128) divided by total assets at time t-1. ACQ_t / A_{t-1} is acquisitions (compustat item #129) at time t divided by total assets at time t-1. RD_t / A_{t-1} is R&D expenses at time t (compustat item #46) divided by total assets at time t-1. $IINC_t / A_{t-1}$ is increase in investments (compustat item #113) divided by total assets at time t-1. $SalePPE_t / A_{t-1}$ is sale of PP&E at time t (compustat item #107) divided by total assets at time t-1. Net investment $NetI_t / A_{t-1}$ is the difference between Investment (I) and the sale of PP&E (SalePPE) at time t divided by total assets at time t-1. Change in total assets $\Delta A_t / A_{t-1}$ is the difference between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. $\Delta A_t^{+} / A_{t-1}$ is increase in total assets include only positive differences between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. $\Delta A_t^{-} / A_{t-1}$ is decrease in total assets include only negative differences between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. Decrease in total assets is represented by the absolute value of the decrease percentage of total assets.

Independent variables: CF_t / A_{t-1} is income before extra ordinary items(compustat item #18) plus deprecation and amortization (compustat item #14) at time t divided by total assets at time t-1. Mispricing at the firm level (Dev_{it}^{firm}) is the difference between the market value of firm i at time t and the fundamental value of the firm i at time t [$lnM_{it} - v(\theta_{it};\alpha_t)$]. The fundamental value of the firm i[$v(\theta_{it};\alpha_t)$] is obtained by applying annual, aggregate regression multiples (α's) to the firm-level accounting values (θ). The individual time t values of the (α_t's) are obtained using the model, $ln(M)_{it} = \alpha_{0jt} + \alpha_{1jt} ln(B)_{it} + \alpha_{2jt} ln(|NI|)_{it} + \alpha_{3jt} ln(|NI|)_{it} \times D_{(NI_{it}<0)} + \alpha_{4jt} LEV_{it} + \varepsilon_{it}$. Mispricing at the aggregate level (Dev_{it}^{Agg}) is the difference between the fundamental value of the firm at time t based on time t accounting values (θ_t) and time t aggregate multiples (α_t's) and the fundamental value of the firm at time t based on time t accounting values (θ_t) and long run aggregate multiples ($\bar{\alpha}$'s), $[v(\theta_{it};\alpha_t) - v(\theta_{it};\bar{\alpha})]$. The long-run aggregate multiples ($\bar{\alpha}$'s) are the over time average of (α_t's). Growth (G_{it}) is the difference between the valuations implied by long run multiples and current book values, [$v(\theta_{it};\alpha) - lnB_{it}$]. The aggregate level is either at the industry or at the market level. The Industry classification is based on Fama & French 12 industry classification. $NetEq_t / A_{t-1}$ is net equity issued at time t divided by total assets at time t-1. Net equity issued is equity issued (compustat item #108)- equity repurchased(compustat item #115). $Time * NetEq_t / A_{t-1}$ is the interaction between the firm mispricing timing (Time) and the net equity issuance. Time=1 if net equity issued ($NetEq_t$) and mispricing at firm level (Dev_{t-1}^{Firm}) carry the same sign and Time=0 otherwise. $NOTime1 * NetEq_t / A_{t-1}$ is the interaction between the firm mispricing non-timing (NOTime) and the net equity issuance. NOTime=1 if net equity issued ($NetEq_t$) and mispricing at firm level (Dev_{t-1}^{Firm}) do not carry the same sign and NOTime=0 otherwise. RME is the residual market effect. It is represented by the residual from the following regressing: $(M/B)_{it-1} = \alpha_0 + \alpha_1 Dev_{it}^{firm} + \alpha_2 Dev_{it}^{Agg} + \alpha_3 G_{it} + \varepsilon_{it}$

The data contains US firms in compustat between 1971 and 2004. Total assets variable is winsorized at the 1st and 99th percentiles. Negative values for investment variables are ignored. Financial and Utilities firms are not included in the analysis.

Panel A shows the results for investment variables. Panel B shows the results for the changes in total assets. Regression coefficients are estimated using OLS regression with p-values based on heteroskedasticity-robust standard errors. All Variables are firm and year mean adjusted. P-values are in parentheses. Coefficients starred with one, two, and three asterisks are statistically significant at the ten, five, and one percent respectively.

Panel A: Investment Decisions as the Dependent Variables

Dependent Variable	CF_t / A_{t-1}	Dev_{t-1}^{Firm}	$Dev_{t-1}^{Agg.}$	G_{t-1}	$NetEq_t / A_{t-1}$	$Time *$ $NetEq_t / A_{t-1}$	$NOTime *$ $NetEq_t / A_{t-1}$	RME	R^2 (%) N
I_t / A_{t-1}	0.7434*** (0.000)	0.1053*** (0.000)	0.2300*** (0.000)	0.2059*** (0.000)	0.3547*** (0.001)			0.0192** (0.031)	36.34 N=78,639
	0.7409*** (0.000)	0.1045*** (0.000)	0.2325*** (0.000)	0.2066*** (0.000)		0.3695*** (0.000)	0.3147 (0.210)	0.0186** (0.029)	36.36 N=78,639
$CAPX_t / A_{t-1}$	0.3602*** (0.000)	0.0169 (0.345)	0.0542** (0.038)	0.0336 (0.150)	0.2208*** (0.006)			-0.0001 (0.984)	36.85 N=83,604
	0.3628*** (0.000)	0.0179 (0.202)	0.0513 (0.165)	0.0325 (0.247)		0.2033*** (0.000)	0.2685 (0.331)	0.0006 (0.839)	36.97 N=83,604

Dependent Variable	CF_t / A_{t-1}	Dev_{t-1}^{Firm}	$Dev_{t-1}^{Agg.}$	G_{t-1}	$NetEq_t / A_{t-1}$	$Time * NetEq_t / A_{t-1}$	$NOTime * NetEq_t / A_{t-1}$	RME	R^2 (%) N
ACQ_t / A_{t-1}	0.0151	0.0214***	0.0372***	0.0637***	0.0842***			-0.0036**	3.45
	(0.415)	(0.000)	(0.000)	(0.000)	(0.000)			(0.011)	N=76,018
	0.0150	0.0214***	0.0373***	0.0637***		0.0846***	0.0830***	-0.0036**	3.45
	(0.404)	(0.000)	(0.000)	(0.000)		(0.001)	(0.008)	(0.014)	N=76,018
RD_t / A_{t-1}	-0.0525	0.0404***	0.0809***	0.0649***	0.0913***			0.0040***	13.33
	(0.398)	(0.000)	(0.000)	(0.000)	(0.000)			(0.007)	N=44,737
	-0.0525	0.0404***	0.0813***	0.0651***		0.0927***	0.0870***	0.0040***	13.34
	(0.398)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.009)	N=44,737
$IINC_t / A_{t-1}$	0.0009	0.0190**	0.0379***	0.0323***	0.0690**			0.0014	2.27
	(0.942)	(0.016)	(0.000)	(0.000)	(0.048)			(0.713)	N=79,998
	0.0044	0.0164*	0.0397***	0.0315***		0.0918*	0.0316	0.0006	2.61
	(0.693)	(0.077)	(0.000)	(0.000)		(0.076)	(0.152)	(0.877)	N=79,998
$SalePPE_t / A_{t-1}$	0.0038**	-0.0009*	-0.0060***	-0.0007	0.0025***			0.0000	0.40
	(0.036)	(0.074)	(0.000)	(0.374)	(0.006)			(0.762)	N=60,965
	0.0038**	-0.0009*	-0.0062***	-0.0008		0.0017*	0.0042**	0.0000	0.41
	(0.035)	(0.083)	(0.000)	(0.342)		(0.051)	(0.022)	(0.945)	N=60,965
$NetI_t / A_{t-1}$	0.7103***	0.1057***	0.2293***	0.2073***	0.3550***			0.0184**	34.99
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)			(0.038)	N=78,558
	0.7070***	0.1046***	0.2327***	0.2082***		0.3748***	0.3016	0.0177**	35.02
	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.234)	(0.037)	N=78,558

Panel B: Changes in Total Assets Decisions as the Dependent Variables

Dependent Variable	CF_t / A_{t-1}	Dev_{t-1}^{Firm}	$Dev_{t-1}^{Agg.}$	G_{t-1}	$NetEq_t / A_{t-1}$	$Time * NetEq_t / A_{t-1}$	$NOTime * NetEq_t / A_{t-1}$	RME	R^2 N
$\Delta A_t / A_{t-1}$	7.3485***	0.0152	1.1241***	0.3058	3.3992***			0.0699	62.49
	(0.000)	(0.937)	(0.001)	(0.251)	(0.001)			(0.222)	N=85,105
	7.2424***	-0.0269	1.2412***	0.3536		4.1278***	1.4357	0.0428	63.35
	(0.000)	(0.878)	(0.000)	(0.153)		(0.000)	(0.385)	(0.446)	N=85,105
$\Delta A_t^{+} / A_{t-1}$	7.4328***	-0.0725	1.7374***	0.6134**	3.0368***			0.0435	63.04
	(0.000)	(0.737)	(0.000)	(0.037)	(0.005)			(0.498)	N=56,317
	7.3081***	-0.2614	1.8164***	0.6352**		3.8313***	0.6523	0.0051	64.11
	(0.000)	(0.241)	(0.000)	(0.017)		(0.001)	(0.707)	(0.936)	N=56,317
$\Delta A_t^{-} / A_{t-1}$	-0.0636***	-0.0172***	0.0159***	0.0036	-0.0182***			-0.0008	2.17
	(0.000)	(0.000)	(0.002)	(0.381)	(0.001)			(0.361)	N=28,571
	-0.0636***	-0.0169***	0.0161***	0.0037		-0.0155**	-0.0215***	-0.0008	2.18
	(0.000)	(0.000)	(0.002)	(0.364)		(0.024)	(0.006)	(0.348)	N=28,571

Table 7

Net Debt Issuance and Firm Investment Decisions

Dependent variables: Investment I_t / A_{t-1} is defined as the sum of capital expenditures, acquisitions, R&D expenses, and increase in investment at time t divided by total assets (compustat item #6) at time t-1. $CAPX_t / A_{t-1}$ is capital expenditures at time t (compustat item #128) divided by total assets at time t-1. ACQ_t / A_{t-1} is acquisitions (compustat item #129) at time t divided by total assets at time t-1. RD_t / A_{t-1} is R&D expenses at time t (compustat item #46) divided by total assets at time t-1. $IINC_t / A_{t-1}$ is increase in investments (compustat item #113) divided by total assets at time t-1. $SalePPE_t / A_{t-1}$ is sale of PP&E at time t (compustat item #107) divided by total assets at time t-1. Net investment $NetI_t / A_{t-1}$ is the difference between Investment (I) and the sale of PP&E (SalePPE) at time t divided by total assets at time t-1. Change in total assets $\Delta A_t / A_{t-1}$ is the difference between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. $\Delta A_t^+ / A_{t-1}$ is increase in total assets include only positive differences between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. $\Delta A_t^- / A_{t-1}$ is decrease in total assets include only negative differences between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. Decrease in total assets is represented by the absolute value of the decrease percentage of total assets.

Independent variables: CF_t / A_{t-1} is income before extra ordinary items(compustat item #18) plus deprecation and amortization (compustat item #14) at time t divided by total assets at time t-1. Mispricing at the firm level (Dev_{it}^{firm}) is the difference between the market value of firm i at time t and the fundamental value of the firm i at time t [$lnM_{it} - v(\theta_{it};\alpha_t)$]. The fundamental value of the firm i[$v(\theta_{it};\alpha_t)$] is obtained by applying annual, aggregate regression multiples (α's) to the firm-level accounting values (θ). The individual time t values of the (α_t's) are obtained using the model, $ln(M)_{it} = \alpha_{0jt} + \alpha_{1jt} ln(B)_{it} + \alpha_{2jt} ln(|NI|)_{it} + \alpha_{3jt} ln(|NI|)_{it} \times D_{(NI_{it}<0)} + \alpha_{4jt} LEV_{it} + \varepsilon_{it}$. Mispricing at the aggregate level (Dev_{it}^{Agg}) is the difference between the fundamental value of the firm at time t based on time t accounting values (θ_t) and time t aggregate multiples (α_t's) and the fundamental value of the firm at time t based on time t accounting values (θ_t) and long run aggregate multiples ($\bar{\alpha}$'s), $[v(\theta_{it};\alpha_t) - v(\theta_{it};\bar{\alpha})]$. The long run aggregate multiples ($\bar{\alpha}$'s) are the over time average of (α_t's). Growth (G_{it}) is the difference between the valuations implied by long run multiples and current book values, [$v(\theta_{it};\alpha) - lnB_{it}$]. The aggregate level is either at the industry or at the market level. The Industry classification is based on Fama & French 12 industry classification. $NetDbt_t / A_{t-1}$ is net debt issued at time t divided by total assets at time t-1. Net debt issued is debt issued (compustat item#111)- debt retired(compustat item#114). $Time * NetDbt_t / A_{t-1}$ is the interaction between the firm mispricing timing (Time) and the net debt issuance. Time=1 if net debt issued ($NetDbt_t$) and mispricing at firm level (Dev_{t-1}^{Firm}) carry the same sign and Time=0 otherwise. $NOTime * NetDbt_t / A_{t-1}$ is the interaction between the firm mispricing non-timing (NOTime) and the net debt issuance. NOTime=1 if net debt issued ($NetDbt_t$) and mispricing at firm level (Dev_{t-1}^{Firm}) do not carry the same sign and NOTime=0 otherwise. RME is the residual market effect. It is represented by the residual from the following regressing: $(M/B)_{it-1} = \alpha_0 + \alpha_1 Dev_{it}^{firm} + \alpha_2 Dev_{it}^{Agg} + \alpha_3 G_{it} + \varepsilon_{it}$.

The data contains US firms in compustat between 1971 and 2004. Total assets variable is winsorized at the 1st and 99th percentiles. Negative values for investment variables are ignored. Financial and Utilities firms are not included in the analysis.

Panel A shows the results for investment variables. Panel B shows the results for the changes in total assets. Regression coefficients are estimated using OLS regression with p-values based on heteroskedasticity-robust standard errors. All Variables are firm and year mean adjusted. P-values are in parentheses. Coefficients starred with one, two, and three asterisks are statistically significant at the ten, five, and one percent respectively.

Panel A: Investment Decisions as the Dependent Variables

Dependent Variable	CF_t / A_{t-1}	Dev_{t-1}^{Firm}	$Dev_{t-1}^{Agg.}$	G_{t-1}	$NetDbt_t / A_{t-1}$	$Time *$ $NetDbt_t / A_{t-1}$	$NOTime *$ $NetDbt_t / A_{t-1}$	RME	R^2 (%) N
I_t / A_{t-1}	0.7497*** (0.000)	0.1513*** (0.000)	0.2807*** (0.000)	0.2634*** (0.000)	0.3221* (0.082)			0.0350*** (0.000)	40.46 N=78,639
	0.6507*** (0.000)	0.1123*** (0.000)	0.2659*** (0.000)	0.2605*** (0.000)		0.6558*** (0.000)	0.1297 (0.371)	0.0339*** (0.000)	44.91 N=78,639
$CAPX_t / A_{t-1}$	0.3570*** (0.000)	0.0528*** (0.000)	0.0985*** (0.000)	0.0789*** (0.000)	0.0479 (0.384)			0.0100*** (0.000)	31.56 N=83,604
	0.3419*** (0.000)	0.0491*** (0.000)	0.0958*** (0.000)	0.0789*** (0.000)		0.0730 (0.143)	0.0194 (0.821)	0.0097*** (0.000)	31.86 N=83,604

Dependent Variable	CF_t / A_{t-1}	Dev_{t-1}^{Firm}	$Dev_{t-1}^{Agg.}$	G_{t-1}	$NetDbt_t / A_{t-1}$	$Time * NetDbt_t / A_{t-1}$	$NOTime * NetDbt_t / A_{t-1}$	RME	R^2 (%) N
ACQ_t / A_{t-1}	0.0301	0.0330***	0.0510***	0.0767***	0.0904			0.0000	6.26
	(0.101)	(0.000)	(0.000)	(0.000)	(0.108)			(0.970)	N=76,018
	0.0267	0.0162***	0.0469***	0.0736***		0.2792***	0.0604	-0.0002	10.05
	(0.135)	(0.001)	(0.000)	(0.000)		(0.000)	(0.169)	(0.853)	N=76,018
RD_t / A_{t-1}	-0.0694	0.0582***	0.0938***	0.0887***	0.0322**			0.0075***	8.58
	(0.284)	(0.000)	(0.000)	(0.000)	(0.042)			(0.000)	N=44,737
	-0.0689	0.0575***	0.0936***	0.0887***		0.0406***	0.0298	0.0075***	8.59
	(0.296)	(0.000)	(0.000)	(0.000)		(0.010)	(0.176)	(0.000)	N=44,737
$IINC_t / A_{t-1}$	0.0097	0.0299***	0.0533***	0.0469***	0.0042			0.0047	0.53
	(0.354)	(0.000)	(0.000)	(0.000)	(0.485)			(0.157)	N=79,998
	0.0098	0.0304***	0.0533***	0.0469***		0.0008	0.0079	0.0047	0.54
	(0.347)	(0.000)	(0.000)	(0.000)		(0.878)	(0.442)	(0.158)	N=79,998
$SalePPE_t / A_{t-1}$	0.0027**	-0.0007	-0.0059***	-0.0005	0.0032***			0.0000	0.55
	(0.012)	(0.146)	(0.000)	(0.507)	(0.004)			(0.688)	N=60,965
	0.0028**	-0.0007	-0.0059***	-0.0005		0.0029**	0.0036*	0.0000	0.55
	(0.015)	(0.175)	(0.000)	(0.497)		(0.046)	(0.091)	(0.675)	N=60,965
$NetI_t / A_{t-1}$	0.7170***	0.1520***	0.2805***	0.2654***	0.3154**			0.0343***	38.92
	(0.000)	(0.000)	(0.000)	(0.000)	(0.090)			(0.000)	N=78,558
	0.6140***	0.1115***	0.2651***	0.2623***		0.6623***	0.1155	0.0331***	43.91
	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.406)	(0.000)	N=78,558

Panel B: Changes in Total Assets Decisions as the Dependent Variables

Dependent Variable	CF_t / A_{t-1}	Dev_{t-1}^{Firm}	$Dev_{t-1}^{Agg.}$	G_{t-1}	$NetDbt_t / A_{t-1}$	$Time * NetDbt_t / A_{t-1}$	$NOTime * NetDbt_t / A_{t-1}$	RME	R^2 (%) N
$\Delta A_t / A_{t-1}$	7.4558***	0.5973***	1.8545***	1.0398***	0.2250			0.2266***	55.76
	(0.000)	(0.000)	(0.000)	(0.000)	(0.853)			(0.000)	N=85,105
	6.4014***	0.3447***	1.6649***	1.0459***		1.9919***	-1.7630	0.2057***	62.44
	(0.000)	(0.000)	(0.000)	(0.000)		(0.009)	(0.155)	(0.000)	N=85,105
$\Delta A_t^{+} / A_{t-1}$	7.6137***	0.4840***	2.2703***	1.2500***	0.0672			0.1960***	57.74
	(0.000)	(0.000)	(0.000)	(0.000)	(0.952)			(0.000)	N=56,317
	6.6125***	0.1801	2.070***	1.2502***		1.6390**	-1.7010	0.1792***	63.19
	(0.000)	(0.156)	(0.000)	(0.000)		(0.015)	(0.148)	(0.000)	N=56,317
$\Delta A_t^{-} / A_{t-1}$	-0.0607***	-0.0190***	0.0120**	0.0012	-0.0002			-0.0014	2.05
	(0.000)	(0.000)	(0.024)	(0.776)	(0.979)			(0.118)	N=28,571
	-0.0597***	-0.0186***	0.0121**	0.0010		-0.0063	0.0061	-0.0014	2.08
	(0.000)	(0.000)	(0.023)	(0.808)		(0.637)	(0.489)	(0.119)	N=28,571

Table 8

Net Capital Issuance and Firm Investment Decisions

Dependent variables: Investment I_t / A_{t-1} is defined as the sum of capital expenditures, acquisitions, R&D expenses, and increase in investment at time t divided by total assets (compustat item #6) at time t-1. $CAPX_t / A_{t-1}$ is capital expenditures at time t (compustat item #128) divided by total assets at time t-1. ACQ_t / A_{t-1} is acquisitions (compustat item #129) at time t divided by total assets at time t-1. RD_t / A_{t-1} is R&D expenses at time t (compustat item #46) divided by total assets at time t-1. $IINC_t / A_{t-1}$ is increase in investments (compustat item #113) divided by total assets at time t-1. $SalePPE_t / A_{t-1}$ is sale of PP&E at time t (compustat item #107) divided by total assets at time t-1. Net investment $NetI_t / A_{t-1}$ is the difference between Investment (I) and the sale of PP&E (SalePPE) at time t divided by total assets at time t-1. Change in total assets $\Delta A_t / A_{t-1}$ is the difference between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. $\Delta A_t^+ / A_{t-1}$ is increase in total assets include only positive differences between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. $\Delta A_t^- / A_{t-1}$ is decrease in total assets include only negative differences between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. Decrease in total assets is represented by the absolute value of the decrease percentage of total assets.

Independent variables: CF_t / A_{t-1} is income before extra ordinary items(compustat item #18) plus deprecation and amortization (compustat item #14) at time t divided by total assets at time t-1. Mispricing at the firm level (Dev_{it}^{firm}) is the difference between the market value of firm i at time t and the fundamental value of the firm i at time t [$lnM_{it} - v(\theta_{it};\alpha_t)$]. The fundamental value of the firm i[$v(\theta_{it};\alpha_t)$] is obtained by applying annual, aggregate regression multiples (α's) to the firm-level accounting values (θ). The individual time t values of the (α_t's) are obtained using the model, $ln(M)_{it} = \alpha_{0jt} + \alpha_{1jt}ln(B)_{it} + \alpha_{2jt}ln(|NI|)_{it} + \alpha_{3jt}ln(|NI|)_{it} \times D_{(NI_{it}<0)} + \alpha_{4jt}LEV_{it} + \varepsilon_{it}$. Mispricing at the aggregate level (Dev_{it}^{Agg}) is the difference between the fundamental value of the firm at time t based on time t accounting values (θ_t) and time t aggregate multiples (α_t's) and the fundamental value of the firm at time t based on time t accounting values (θ_t) and long run aggregate multiples ($\bar{\alpha}$'s), $[v(\theta_{it};\alpha_t) - v(\theta_{it};\bar{\alpha})]$. The long run aggregate multiples ($\bar{\alpha}$'s) are the over time average of (α_t's). Growth (G_{it}) is the difference between the valuations implied by long run multiples and current book values, [$v(\theta_{it};\alpha) - lnB_{it}$]. The aggregate level is either at the industry or at the market level. The Industry classification is based on Fama & French 12 industry classification. $NetCap_t / A_{t-1}$ is net capital issued at time t divided by total assets at time t-1. Net capital issued is the sum of net equity issued [equity issued(compustat item #108)- equity repurchased(compustat item #115)]and net debt issued [debt issued(compustat item #111)- debt retired(compustat item #114)]. $Time * NetCap_t / A_{t-1}$ is the interaction between the firm mispricing timing (Time) and the net capital issuance. Time=1 if net capital issued ($NetCap_t$) and mispricing at firm level (Dev_{t-1}^{Firm}) carry the same sign and Time=0 otherwise. $NOTime * NetCap_t / A_{t-1}$ is the interaction between the firm mispricing non-timing (NOTime) and the net capital issuance. NOTime=1 if net capital issued ($NetCap_t$) and mispricing at firm level (Dev_{t-1}^{Firm}) do not carry the same sign and NOTime=0 otherwise. RME is the residual market effect. It is represented by the residual from the following regressing: $(M/B)_{it-1} = \alpha_0 + \alpha_1 Dev_{it}^{firm} + \alpha_2 Dev_{it}^{Agg} + \alpha_3 G_{it} + \varepsilon_{it}$.

The data contains US firms in compustat between 1971 and 2004. Total assets variable is winsorized at the 1st and 99th percentiles. Negative values for investment variables are ignored. Financial and Utilities firms are not included in the analysis.

Panel A shows the results for investment variables. Panel B shows results for the changes in total assets. Regression coefficients are estimated using OLS regression with p-values based on heteroskedasticity-robust standard errors. All Variables are firm and year mean adjusted. P-values are in parentheses. Coefficients starred with one, two, and three asterisks are statistically significant at the ten, five, and one percent respectively.

Panel A: Investment Decisions as the Dependent Variables

Dependent Variable	CF_t / A_{t-1}	Dev_{t-1}^{Firm}	$Dev_{t-1}^{Agg.}$	G_{t-1}	$NetCap_t / A_{t-1}$	$Time * NetCap_t / A_{t-1}$	$NOTime * NetCap_t / A_{t-1}$	RME	R^2 (%) N
I_t / A_{t-1}	0.7111***	0.0688**	0.1901***	0.1542***	0.4459***			0.0127	48.40
	(0.000)	(0.019)	(0.000)	(0.000)	(0.000)			(0.175)	N=78,639
	0.6607***	0.0329**	0.1833***	0.1453***		0.5949***	0.2577	0.0069	50.54
	(0.000)	(0.020)	(0.000)	(0.000)		(0.000)	(0.131)	(0.344)	N=78,639
$CAPX_t / A_{t-1}$	0.3363***	0.0325**	0.0710***	0.0521***	0.0977**			0.0048	35.53
	(0.000)	(0.028)	(0.003)	(0.009)	(0.045)			(0.158)	N=83,604
	0.3364***	0.0326***	0.0710***	0.0521***		0.0976***	0.0980	0.0048*	37.07
	(0.000)	(0.000)	(0.001)	(0.008)		(0.007)	(0.378)	(0.069)	N=83,604

Dependent Variable	CF_t / A_{t-1}	Dev_{t-1}^{Firm}	$Dev_{t-1}^{Agg.}$	G_{t-1}	$NetCap_t / A_{t-1}$	$Time *$ $NetCap_t / A_{t-1}$	$NOTime *$ $NetCap_t / A_{t-1}$	RME	R^2 (%) N
ACQ_t / A_{t-1}	0.0481**	0.0085	0.0290***	0.0431***	0.1285***			-0.0054***	12.60
	(0.037)	(0.312)	(0.001)	(0.001)	(0.000)			(0.005)	N=76,018
	0.0465**	0.0006	0.0269***	0.0399***		0.1626***	0.1019**	-0.0067***	13.28
	(0.035)	(0.889)	(0.000)	(0.000)		(0.000)	(0.019)	(0.000)	N=76,018
RD_t / A_{t-1}	-0.0628	0.0397***	0.0775***	0.0657***	0.0789***			0.0041**	14.12
	(0.311)	(0.000)	(0.000)	(0.000)	(0.000)			(0.014)	N=44,737
	-0.0612	0.0383***	0.0779***	0.0655***		0.0860***	0.0682***	0.0039***	14.20
	(0.333)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.010)	N=44,737
$IINC_t / A_{t-1}$	-0.0001	0.0251***	0.0456***	0.0400***	0.0233*			0.0033	1.21
	(0.994)	(0.000)	(0.000)	(0.000)	(0.085)			(0.342)	N=79,998
	0.0007	0.0240***	0.0457***	0.0398***		0.0276	0.0175	0.0032	1.25
	(0.954)	(0.001)	(0.000)	(0.000)		(0.191)	(0.107)	(0.365)	N=79,998
$SalePPE_t / A_{t-1}$	0.0030**	-0.0012**	-0.0064***	-0.0011	0.0026***			-0.0001	0.58
	(0.014)	(0.031)	(0.000)	(0.192)	(0.002)			(0.502)	N=60,965
	0.0032**	-0.0010*	-0.0063***	-0.0011		0.0021**	0.0035**	0.000	0.59
	(0.013)	(0.059)	(0.000)	(0.197)		(0.050)	(0.047)	(0.656)	N=60,965
$NetI_t / A_{t-1}$	0.6788***	0.0706**	0.1909***	0.1575***	0.4397***			0.0122	47.04
	(0.000)	(0.017)	(0.000)	(0.000)	(0.000)			(0.192)	N=78,558
	0.6251***	0.0324**	0.1837***	0.1480***		0.5982***	0.2392	0.0061	49.55
	(0.000)	(0.025)	(0.000)	(0.000)		(0.000)	(0.154)	(0.403)	N=78,558

Panel B: Changes in Total Assets Decisions as the Dependent Variables

Dependent Variable	CF_t / A_{t-1}	Dev_{t-1}^{Firm}	$Dev_{t-1}^{Agg.}$	G_{t-1}	$NetCap_t / A_{t-1}$	$Time *$ $NetCap_t / A_{t-1}$	$NOTime *$ $NetCap_t / A_{t-1}$	RME	R^2 (%) N
$\Delta A_t / A_{t-1}$	7.1473***	0.3602*	1.5263***	0.7252**	1.0458			0.1681**	58.26
	(0.000)	(0.097)	(0.001)	(0.029)	(0.199)			(0.011)	N=85,105
	6.5587***	0.1101	1.4592***	0.7175***		2.0504***	-0.6786	0.1216**	62.15
	(0.000)	(0.405)	(0.000)	(0.007)		(0.000)	(0.657)	(0.013)	N=85,105
$\Delta A_t^+ / A_{t-1}$	7.3319***	0.2898	2.0592***	1.0132***	0.7872			0.1482**	59.63
	(0.000)	(0.205)	(0.000)	(0.004)	(0.320)			(0.030)	N=56,317
	6.7633***	-0.0806	1.9481***	0.9810***		1.7046***	-0.7875	0.0984*	62.45
	(0.000)	(0.636)	(0.000)	(0.004)		(0.001)	(0.601)	(0.051)	N=56,317
$\Delta A_t^- / A_{t-1}$	-0.0604***	-0.0182***	0.0140***	0.0023	-0.0065			-0.0011	2.10
	(0.000)	(0.000)	(0.008)	(0.579)	(0.236)			(0.207)	N=28,571
	-0.0609***	-0.0181***	0.0141***	0.0025		-0.0039	-0.0105*	-0.0011	2.11
	(0.000)	(0.000)	(0.007)	(0.549)		(0.599)	(0.073)	(0.201)	N=28,571

Table 9

Financial Constraints and Investment-Mispricing Sensitivity

Dependent variables: Investment I_t / A_{t-1} is defined as the sum of capital expenditures, acquisitions, R&D expenses, and increase in investment at time t divided by total assets (compustat item #6) at time t-1. $CAPX_t / A_{t-1}$ is capital expenditures at time t (compustat item #128) divided by total assets at time t-1. ACQ_t / A_{t-1} is acquisitions (compustat item #129) at time t divided by total assets at time t-1. RD_t / A_{t-1} is R&D expenses at time t (compustat item #46) divided by total assets at time t-1. $IINC_t / A_{t-1}$ is increase in investments (compustat item #113) divided by total assets at time t-1. $SalePPE_t / A_{t-1}$ is sale of PP&E at time t (compustat item #107) divided by total assets at time t-1. Net investment $NetI_t / A_{t-1}$ is the difference between Investment (I) and the sale of PP&E (SalePPE) at time t divided by total assets at time t-1. Change in total assets $\Delta A_t / A_{t-1}$ is the difference between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. $\Delta A_t^+ / A_{t-1}$ is increase in total assets include only positive differences between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. $\Delta A_t^- / A_{t-1}$ is decrease in total assets include only negative differences between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. Decrease in total assets is represented by the absolute value of the decrease percentage of total assets.

Independent variables: CF_t / A_{t-1} is is income before extra ordinary items(compustat item #18) plus deprecation and amortization (compustat item #14) at time t divided by total assets at time t-1. Mispricing at the firm level (Dev_{it}^{firm}) is the difference between the market value of firm i at time t and the fundamental value of the firm i at time t [$lnM_{it} - v(\theta_{it};\alpha_t)$]. The fundamental value of the firm i[$v(\theta_{it};\alpha_t)$] is obtained by applying annual, aggregate regression multiples (α's) to the firm-level accounting values (θ). The individual time t values of the (α_t's) are obtained using the model, $ln(M)_{it} = \alpha_{0jt} + \alpha_{1jt} ln(B)_{it} + \alpha_{2jt} ln(|NI|)_{it} + \alpha_{3jt} ln(|NI|)_{it} \times D_{(NI_{it}<0)} + \alpha_{4jt} LEV_{it} + \varepsilon_{it}$. Mispricing at the aggregate level (Dev_{it}^{Agg}) is the difference between the fundamental value of the firm at time t based on time t accounting values (θ_t) and time t aggregate multiples (α_t's) and the fundamental value of the firm at time t based on time t accounting values (θ_t) and long run aggregate multiples ($\bar{\alpha}$'s), $[v(\theta_{it};\alpha_t) - v(\theta_{it};\bar{\alpha})]$. The long run aggregate multiples ($\bar{\alpha}$'s) are the over time average of (α_t's). Growth (G_{it}) is the difference between the valuations implied by long run multiples and current book values, [$v(\theta_{it};\alpha) - lnB_{it}$]. The aggregate level is either at the industry or at the market level. The Industry classification is based on Fama & French 12 industry classification.

Firms are sorted into quartiles based on the degree of financial constraints which is measured by Kaplan and Zingales (1997) index. (Z) which is calculated using Baker, Stein, and Wurgler (2003) four variable version, $Z_{it} = -1.002 \frac{CF_{it}}{A_{i(t-1)}} - 39.368 \frac{DIV_{it}}{A_{i(t-1)}} - 1.315 \frac{C_{it}}{A_{i(t-1)}} + 3.139 Lev_{it}$. The higher the value of Z, the more financially constrained the firm. The following regression is separately performed for each group,

Dependent Variable = Intercept $+ aCF_t / A_{t-1} + bDev_{t-1}^{Firm} + cDev_{t-1}^{Agg.} + dG_{t-1} + \varepsilon$. The coefficients b and c are reported for each group as well as the difference in these coefficients between the group in the top Z quartile and the group in the bottom Z quartile. The data contains US firms in compustat between 1971 and 2004. Total assets variable is winsorized at the 1st and 99th percentiles. Negative values for investment variables are ignored. Financial and Utilities firms are not included in the analysis. All Variables are firm and year mean adjusted. P-values are in parentheses. Coefficients starred with one, two, and three asterisks are statistically significant at the ten, five, and one percent respectively.

Dependent variable	Bottom Quartile		2nd Quartile		3rd Quartile		Top Quartile		Top – Bottom	
	b	c	b	c	b	c	b	c	Δb	Δc
I_t / A_{t-1}	0.0877 *** (0.000)	0.2059*** (0.000)	0.0850*** (0.000)	0.2734*** (0.000)	0.1554*** (0.000)	0.2211*** (0.000)	0.2449*** (0.000)	0.3001*** (0.000)	0.1572*** (0.000)	0.0942*** (0.000)
$CAPX_t / A_{t-1}$	0.0223*** (0.000)	0.0513*** (0.000)	0.0411*** (0.000)	0.0563*** (0.000)	0.0570*** (0.000)	0.0386*** (0.000)	0.0843*** (0.000)	0.0788*** (0.000)	0.0620*** (0.000)	0.0275** (0.022)

Dependent variable	Bottom Quartile		2nd Quartile		3rd Quartile		Top Quartile		Top – Bottom	
	b	c	b	c	b	c	b	c	Δb	Δc
ACQ_t / A_{t-1}	0.0225***	0.0490***	0.0115***	0.0585***	0.0468***	0.0398***	0.0562***	0.0753***	0.0337***	0.0262**
	(0.000)	(0.000)	(0.003)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.014)
RD_t / A_{t-1}	0.0444***	0.0606***	0.0444***	0.0573***	0.0505***	0.0625***	0.0556***	0.0616***	0.0112***	0.0002
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.977)
$IINC_t / A_{t-1}$	0.0301***	0.0379***	0.0188***	0.0756***	0.0190***	0.0346***	0.0234***	0.0388***	-0.0067	0.0009
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.245)	(0.931)
$SalePPE_t / A_{t-1}$	-0.0020**	-0.0068***	-0.0005	-0.0059***	-0.0016	-0.0061***	0.0025**	0.0034*	0.0045***	0.0035
	(0.025)	(0.000)	(0.567)	(0.001)	(0.133)	(0.001)	(0.023)	(0.062)	(0.002)	(0.171)
$NetI_t / A_{t-1}$	0.0900***	0.2069***	0.0856***	0.2767***	0.1554***	0.2260***	0.2416***	0.3014***	0.1516***	0.0944***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$\Delta A_t / A_{t-1}$	0.2445***	0.7960***	0.2918***	0.8923***	0.4739***	0.9324***	0.7754***	1.1390***	0.5309***	0.3430***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
$\Delta A_t^+ / A_{t-1}$	0.0306	1.4850***	0.2021***	1.5248***	0.4636***	1.9537***	0.7242***	1.4940***	0.6936***	0.0090
	(0.608)	(0.000)	(0.006)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.959)
$\Delta A_t^- / A_{t-1}$	0.0022	0.0664***	-0.0182***	0.0069	-0.0218***	0.0127	-0.0229***	0.0172**	-0.0251***	-0.0492***
	(0.670)	(0.000)	(0.000)	(0.438)	(0.001)	(0.140)	(0.000)	(0.011)	(0.000)	(0.001)

Table10

Shareholders Investment Horizon and Investment-Mispricing Sensitivity

Dependent variables: Investment I_t / A_{t-1} is defined as the sum of capital expenditures, acquisitions, R&D expenses, and increase in investment at time t divided by total assets (compustat item #6) at time t-1. $CAPX_t / A_{t-1}$ is capital expenditures at time t (compustat item #128) divided by total assets at time t-1. ACQ_t / A_{t-1} is acquisitions (compustat item #129) at time t divided by total assets at time t-1. RD_t / A_{t-1} is R&D expenses at time t (compustat item #46) divided by total assets at time t-1. $IINC_t / A_{t-1}$ is increase in investments (compustat item #113) divided by total assets at time t-1. $SalePPE_t / A_{t-1}$ is sale of PP&E at time t (compustat item #107) divided by total assets at time t-1. Net investment $NetI_t / A_{t-1}$ is the difference between Investment (I) and the sale of PP&E (SalePPE) at time t divided by total assets at time t-1. Change in total assets $\Delta A_t / A_{t-1}$ is the difference between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. $\Delta A_t^+ / A_{t-1}$ is increase in total assets include only positive differences between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. $\Delta A_t^- / A_{t-1}$ is decrease in total assets include only negative differences between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. Decrease in total assets is represented by the absolute value of the decrease percentage of total assets.

Independent variables: CF_t / A_{t-1} is is income before extra ordinary items(compustat item #18) plus deprecation and amortization (compustat item #14) at time t divided by total assets at time t-1. Mispricing at the firm level (Dev_{it}^{firm}) is the difference between the market value of firm i at time t and the fundamental value of the firm i at time t [$lnM_{it} - v(\theta_{it};\alpha_t)$]. The fundamental value of the firm i[$v(\theta_{it};\alpha_t)$] is obtained by applying annual, aggregate regression multiples (α's) to the firm-level accounting values (θ). The individual time t values of the (α_t's) are obtained using the model, $ln(M)_{it} = \alpha_{0jt} + \alpha_{1jt} ln(B)_{it} + \alpha_{2jt} ln(|NI|)_{it} + \alpha_{3jt} ln(|NI|)_{it} \times D_{(NI_{it}<0)} + \alpha_{4jt} LEV_{it} + \varepsilon_{it}$. Mispricing at the aggregate level (Dev_{it}^{Agg}) is the difference between the fundamental value of the firm at time t based on time t accounting values (θ_t) and time t aggregate multiples (α_t's) and the fundamental value of the firm at time t based on time t accounting values (θ_t) and long run aggregate multiples ($\bar{\alpha}$'s), $[v(\theta_{it};\alpha_t) - v(\theta_{it};\bar{\alpha})]$. The long run aggregate multiples ($\bar{\alpha}$'s) are the over time average of (α_t's). Growth (G_{it}) is the difference between the valuations implied by long run multiples and current book values, [$v(\theta_{it};\alpha) - lnB_{it}$]. The aggregate level is either at the industry or at the market level. The Industry classification is based on Fama & French 12 industry classification.

Firms are sorted into quartiles based on the degree of shareholder investment horizon (H). Investor horizon is measured by the turnover ratio which is the average of the monthly ratio of shares traded to shares outstanding during the fiscal year. The higher the turnover ratio the shorter the shareholders investment horizon. The following regression is separately performed for each group,

Dependent Variable = Intercept $+ aCF_t / A_{t-1} + bDev_{t-1}^{Firm} + cDev_{t-1}^{Agg.} + dG_{t-1} + \varepsilon$. The coefficients b and c are reported for each group as well as the difference in these coefficients between the group in the top H quartile and the group in the bottom H quartile. The data contains US firms in compustat datasets between 1971 and 2003 that have data available in CRSP. Total assets variable is winsorized at the 1st and 99th percentiles. Negative values for investment variables are ignored. Financial and Utilities firms are not included in the analysis. All Variables are firm and year mean adjusted. P-values are in parentheses. Coefficients starred with one, two, and three asterisks are statistically significant at the ten, five, and one percent respectively.

Dependent variable	Bottom Quartile		2nd Quartile		3rd Quartile		Top Quartile		Top – Bottom	
	b	c	b	c	b	c	b	c	Δb	Δc
I_t / A_{t-1}	0.1020*** (0.000)	0.1640*** (0.000)	0.1360*** (0.000)	0.1864*** (0.000)	0.1292*** (0.000)	0.1937*** (0.000)	0.1773*** (0.000)	0.2272*** (0.000)	0.0752*** (0.000)	0.0633*** (0.001)
$CAPX_t / A_{t-1}$	0.0364*** (0.000)	0.0317*** (0.000)	0.0447*** (0.000)	0.0407*** (0.000)	0.0477*** (0.000)	0.0459*** (0.000)	0.0609*** (0.000)	0.0605*** (0.000)	0.0246*** (0.000)	0.0288*** (0.000)
ACQ_t / A_{t-1}	0.0237*** (0.000)	0.0404*** (0.000)	0.0216*** (0.000)	0.0377*** (0.000)	0.0217*** (0.000)	0.0435*** (0.000)	0.0383*** (0.000)	0.0612*** (0.000)	0.0146** (0.025)	0.0207** (0.026)

Dependent variable	Bottom Quartile		2nd Quartile		3rd Quartile		Top Quartile		Top – Bottom	
	b	c	b	c	b	c	b	c	Δb	Δc
RD_t / A_{t-1}	0.0591*** (0.000)	0.0811*** (0.000)	0.0515*** (0.000)	0.0691*** (0.000)	0.0558*** (0.000)	0.0809*** (0.000)	0.0720*** (0.000)	0.0784*** (0.000)	0.0129** (0.039)	-0.0027 (0.721)
$IINC_t / A_{t-1}$	0.0194** (0.049)	0.0356*** (0.004)	0.0716*** (0.000)	0.0622*** (0.000)	0.0311*** (0.000)	0.0756*** (0.000)	0.0762*** (0.000)	0.0726*** (0.000)	0.0568*** (0.000)	0.0370** (0.029)
$SalePPE_t / A_{t-1}$	-0.0016 (0.228)	-0.0051*** (0.001)	-0.0030** (0.016)	-0.0054*** (0.002)	-0.0021* (0.059)	-0.0048*** (0.004)	-0.0013 (0.168)	-0.0031* (0.059)	-0.0002 (0.862)	-0.0021 (0.364)
$NetI_t / A_{t-1}$	0.1643*** (0.000)	0.2319*** (0.000)	0.1221*** (0.000)	0.1889*** (0.000)	0.1425*** (0.000)	0.2054*** (0.000)	0.2083*** (0.000)	0.2370*** (0.000)	0.0440** (0.025)	0.0051 (0.857)
$\Delta A_t / A_{t-1}$	0.3724*** (0.000)	0.4499*** (0.000)	0.4490*** (0.000)	0.3946*** (0.000)	0.3810*** (0.000)	0.4402*** (0.000)	0.6961*** (0.000)	0.6392*** (0.000)	0.3237*** (0.000)	0.1894** (0.004)
$\Delta A_t^{+} / A_{t-1}$	0.4266*** (0.000)	0.6440*** (0.000)	0.4339*** (0.000)	0.4897*** (0.000)	0.2946*** (0.000)	0.3785*** (0.000)	0.6036*** (0.000)	0.5638*** (0.000)	0.1770*** (0.008)	-0.0802 (0.354)
$\Delta A_t^{-} / A_{t-1}$	-0.0160*** (0.003)	0.0073 (0.373)	-0.0264*** (0.000)	-0.0148* (0.072)	-0.0247*** (0.000)	-0.0070 (0.380)	-0.0196*** (0.000)	-0.0222*** (0.006)	-0.0036 (0.621)	-0.0296** (0.010)

Table 11

Overvaluation and Firm Investment Decisions

Dependent variables: Investment I_t / A_{t-1} is defined as the sum of capital expenditures, acquisitions, R&D expenses, and increase in investment at time t divided by total assets (compustat item #6) at time t-1. $CAPX_t / A_{t-1}$ is capital expenditures at time t (compustat item #128) divided by total assets at time t-1. ACQ_t / A_{t-1} is acquisitions (compustat item #129) at time t divided by total assets at time t-1. RD_t / A_{t-1} is R&D expenses at time t (compustat item #46) divided by total assets at time t-1. $IINC_t / A_{t-1}$ is increase in investments (compustat item #113) divided by total assets at time t-1. $SalePPE_t / A_{t-1}$ is sale of PP&E at time t (compustat item #107) divided by total assets at time t-1. Net investment $NetI_t / A_{t-1}$ is the difference between Investment (I) and the sale of PP&E (SalePPE) at time t divided by total assets at time t-1. Change in total assets $\Delta A_t / A_{t-1}$ is the difference between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. $\Delta A_t^+ / A_{t-1}$ is increase in total assets include only positive differences between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. $\Delta A_t^- / A_{t-1}$ is decrease in total assets include only negative differences between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. Decrease in total assets is represented by the absolute value of the decrease percentage of total assets.

Independent variables: CF_t / A_{t-1} is income before extra ordinary items(compustat item #18) plus deprecation and amortization (compustat item #14) at time t divided by total assets at time t-1. ${}_{>0}Dev_{t-1}^{Firm}$ is firm overvaluation measure at time t-1 which is the positive difference between the market value of firm at time t and the fundamental value of the firm at time t [$lnM_{it} - v(\theta_{it};\alpha_t)$]. The fundamental value of the firm i[$v(\theta_{it};\alpha_t)$] is obtained by applying annual, aggregate regression multiples (α's) to the firm-level accounting values (θ). The individual time t values of the (α_t's) are obtained using the model, $ln(M)_{it} = \alpha_{0jt} + \alpha_{1jt} ln(B)_{it} + \alpha_{2jt} ln(|NI|)_{it} + \alpha_{3jt} ln(|NI|)_{it} \times D_{(NI_{it}<0)} + \alpha_{4jt} LEV_{it} + \varepsilon_{it}$. Mispricing at the aggregate level (Dev_{it}^{Agg}) is the difference between the fundamental value of the firm at time t based on time t accounting values (θ_t) and time t aggregate multiples (α_t's) and the fundamental value of the firm at time t based on time t accounting values (θ_t) and long run aggregate multiples ($\bar{\alpha}$'s), $\left[v(\theta_{it};\alpha_t) - v(\theta_{it};\bar{\alpha})\right]$. The long run aggregate multiples ($\bar{\alpha}$'s) are the over time average of (α_t's). Growth (G_{it}) is the difference between the valuations implied by long run multiples and current book values, [$v(\theta_{it};\alpha) - lnB_{it}$]. The aggregate level is either at the industry or at the market level. The Industry classification is based on Fama & French 12 industry classification. $CapIssue_t / A_{t-1}$ is the sum of equity issued and debt issued at time t divided by total assets at time t-1. $EIssue_t / A_{t-1}$ is equity issued at time t (compustat item #108) divided by total assets at time t-1. $DIssue_t / A_{t-1}$ is debt issued at time t (compustat item #111) divided by total assets at time t-1. RME is the residual market effect. It is represented by the residual from the following regressing: $(M/B)_{it-1} = \alpha_0 + \alpha_1 Dev_{it}^{firm} + \alpha_2 Dev_{it}^{Agg} + \alpha_3 G_{it} + \varepsilon_{it}$.

The data contains US firms in compustat between 1971 and 2004. Total assets variable is winsorized at the 1st and 99th percentiles. Negative values for investment variables are ignored. Financial and Utilities firms are not included in the analysis.

Panel A shows the results for investment variables. Panel B shows the results for the changes in total assets. Regression coefficients are estimated using OLS regression with p-values based on heteroskedasticity-robust standard errors. All Variables are firm and year mean adjusted. P-values are in parentheses. Coefficients starred with one, two, and three asterisks are statistically significant at the ten, five, and one percent respectively.

Panel A: Investment Decisions as the Dependent Variables

Dependent Variable	CF_t / A_{t-1}	${}_{>0}Dev_{t-1}^{Firm}$	$Dev_{t-1}^{Agg.}$	G_{t-1}	$\frac{CapIssue_t}{A_{t-1}}$	$\frac{EIssue_t}{A_{t-1}}$	$\frac{DIssue_t}{A_{t-1}}$	RME	R^2 (%) N
I_t / A_{t-1}	0.8221***	0.1780***	0.2613***	0.2637***				0.0292***	38.84
	(0.000)	(0.000)	(0.000)	(0.000)				(0.001)	N=33,071
	0.5632***	0.0886***	0.1682***	0.1596***	0.3081***			0.0101	58.33
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)			(0.193)	N=33,071
	0.7762***	0.1173***	0.2133***	0.1713***		0.3814***		0.0110	43.31
	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)		(0.213)	N=33,071
	0.5839***	0.1346***	0.2030***	0.2320***			0.3310***	0.0244***	55.89
	(0.000)	(0.000)	(0.000)	(0.000)			(0.000)	(0.002)	N=33,071

Dependent Variable	CF_t / A_{t-1}	$_{>0}Dev^{Firm}_{t-1}$	$Dev^{Agg.}_{t-1}$	G_{t-1}	$\frac{CapIssue_t}{A_{t-1}}$	$\frac{EIssue_t}{A_{t-1}}$	$\frac{DIssue_t}{A_{t-1}}$	RME	R^2 (%) N
$CAPX_t / A_{t-1}$	0.3754***	0.0637***	0.1138***	0.0792***				0.0081***	40.75
	(0.000)	(0.000)	(0.000)	(0.000)				(0.000)	N=35,276
	0.2934***	0.0408***	0.0771***	0.0537***	0.0743*			0.0030	47.19
	(0.000)	(0.005)	(0.001)	(0.006)	(0.081)			(0.278)	N=35,276
	0.3549***	0.0298***	0.0746***	0.0312**		0.2128***		-0.0019	48.12
	(0.000)	(0.001)	(0.000)	(0.023)		(0.000)		(0.502)	N=35,276
	0.3181***	0.0552***	0.0961***	0.0725***			0.0570	0.0069***	43.71
	(0.000)	(0.000)	(0.000)	(0.000)			(0.256)	(0.001)	N=35,276
ACQ_t / A_{t-1}	0.0117	0.0444***	0.0314***	0.0689***				-0.0022***	0.62
	(0.351)	(0.000)	(0.000)	(0.000)				(0.000)	N=31,829
	-0.0102	0.0199*	0.0142*	0.0402***	0.0755**			-0.0059***	10.88
	(0.589)	(0.083)	(0.076)	(0.000)	(0.013)			(0.000)	N=31,829
	0.0122	0.0290***	0.0227***	0.0461***		0.0888***		-0.0059***	4.93
	(0.494)	(0.000)	(0.004)	(0.000)		(0.000)		(0.000)	N=31,829
	-0.0209	0.0277***	0.0171**	0.0552***			0.1100**	-0.0031***	10.27
	(0.229)	(0.002)	(0.048)	(0.000)			(0.015)	(0.000)	N=31,829
RD_t / A_{t-1}	-0.0092	0.0474***	0.0971***	0.0731***				0.0078***	3.94
	(0.927)	(0.000)	(0.007)	(0.000)				(0.003)	N=19,106
	0.0004	0.0289***	0.0862***	0.0516***	0.0720***			0.0050**	15.05
	(0.997)	(0.000)	(0.006)	(0.001)	(0.000)			(0.024)	N=19,106
	0.0096	0.0266***	0.0880***	0.0418***		0.1188***		0.0032*	15.76
	(0.918)	(0.000)	(0.004)	(0.006)		(0.000)		(0.074)	N=19,106
	-0.0103	0.0438***	0.0938***	0.0715***			0.0451***	0.0078***	6.41
	(0.918)	(0.000)	(0.008)	(0.000)			(0.000)	(0.003)	N=19,106
$IINC_t / A_{t-1}$	-0.0037	0.0309***	0.0452***	0.0468***				0.0035	0.32
	(0.699)	(0.004)	(0.000)	(0.000)				(0.323)	N=33,842
	-0.0327	0.0237*	0.0323***	0.0384***	0.0238**			0.0018	1.54
	(0.108)	(0.063)	(0.001)	(0.000)	(0.049)			(0.616)	N=33,842
	-0.0170	0.0144	0.0251*	0.0226**		0.1031**		-0.0014	3.96
	(0.238)	(0.391)	(0.051)	(0.047)		(0.049)		(0.747)	N=33,842
	-0.0143	0.0295***	0.0418***	0.0456***			0.0098*	0.0032	0.47
	(0.299)	(0.006)	(0.000)	(0.000)			(0.060)	(0.355)	N=33,842
$SalePPE_t / A_{t-}$	0.0028	-0.0029**	-0.0030*	0.0003				0.0002*	0.32
	(0.148)	(0.021)	(0.051)	(0.805)				(0.097)	N=25,784
	0.0011	-0.0034***	-0.0038***	-0.0004	0.0017***			0.0001	0.76
	(0.193)	(0.006)	(0.007)	(0.722)	(0.001)			(0.578)	N=25,784
	0.0029	-0.0032***	-0.0032**	-0.0001		0.0020**		0.0001	0.38
	(0.146)	(0.010)	(0.029)	(0.897)		(0.032)		(0.392)	N=25,784
	0.0010	-0.0032**	-0.0036**	-0.0000			0.0018***	0.0001	0.73
	(0.227)	(0.010)	(0.012)	(0.971)			(0.003)	(0.209)	N=25,784

Dependent Variable	CF_t / A_{t-1}	$_{>0}Dev_{t-1}^{Firm}$	$Dev_{t-1}^{Agg.}$	G_{t-1}	$\frac{CapIssue_t}{A_{t-1}}$	$\frac{EIssue_t}{A_{t-1}}$	$\frac{DIssue_t}{A_{t-1}}$	RME	R^2 (%) N
$NetI_t / A_{t-1}$	0.8203*** (0.000)	0.1778*** (0.000)	0.2646*** (0.000)	0.2650*** (0.000)				0.0292*** (0.001)	39.03 N=33,032
	0.5640*** (0.000)	0.0894*** (0.000)	0.1724*** (0.000)	0.1619*** (0.000)	0.3049*** (0.000)			0.0103 (0.184)	58.28 N=33,032
	0.7746*** (0.000)	0.1175*** (0.000)	0.2166*** (0.000)	0.1730*** (0.000)		0.3792*** (0.000)		0.0111 (0.208)	43.49 N=33,032
	0.5848*** (0.000)	0.1349*** (0.000)	0.2070*** (0.000)	0.2336*** (0.000)			0.3272*** (0.000)	0.0245*** (0.002)	55.84 N=33,032

Panel B: Changes in Total Assets Decisions as the Dependent Variables

Dependent Variable	CF_t / A_{t-1}	$_{>0}Dev_{t-1}^{Firm}$	$Dev_{t-1}^{Agg.}$	G_{t-1}	$\frac{CapIssue_t}{A_{t-1}}$	$\frac{EIssue_t}{A_{t-1}}$	$\frac{DIssue_t}{A_{t-1}}$	RME	R^2 (%) N
$\Delta A_t / A_{t-1}$	7.8010*** (0.000)	0.4943*** (0.000)	1.9866** (0.000)	0.8131*** (0.000)				0.2046*** (0.000)	59.82 N=35,914
	5.4982*** (0.000)	-0.1507 (0.281)	0.9546** (0.041)	0.1018 (0.513)	2.0951*** (0.000)			0.0604** (0.217)	77.30 N=35,914
	7.4012*** (0.000)	-0.1690 (0.397)	1.2307*** (0.003)	-0.1061 (0.674)		4.1601*** (0.000)		0.0119 (0.837)	69.47 N=35,914
	5.8618*** (0.001)	0.2073* (0.085)	1.3855** (0.012)	0.5840*** (0.000)			1.9335*** (0.001)	0.1611**** (0.001)	71.47 N=35,914
$\Delta A_t^+ / A_{t-1}$	7.5358*** (0.000)	0.4165*** (0.004)	2.3284*** (0.000)	0.8893*** (0.003)				0.1788*** (0.001)	62.01 N=25,987
	5.3777*** (0.000)	-0.1460 (0.345)	1.5060*** (0.001)	0.3258** (0.045)	1.8732*** (0.000)			0.0325 (0.505)	77.57 N=25,987
	7.1204*** (0.000)	-0.1325 (0.521)	1.8329*** (0.000)	0.0521 (0.845)		3.8718*** (0.000)		-0.0306 (0.654)	70.77 N=25,987
	5.7515*** (0.000)	0.1458 (0.302)	1.7972*** (0.001)	0.7448*** (0.000)			1.7077*** (0.000)	0.1378*** (0.003)	72.33 N=25,987
$\Delta A_t^- / A_{t-1}$	-0.0354*** (0.000)	-0.0042 (0.446)	0.0213*** (0.004)	0.0065 (0.208)				-0.0016 (0.135)	0.93 N=9,840
	-0.0368*** (0.000)	-0.0026 (0.648)	0.0243*** (0.001)	0.0078 (0.128)	-0.0094 (0.113)			-0.0014 (0.174)	1.04 N=9,840
	-0.0380*** (0.000)	-0.0028 (0.615)	0.0236*** (0.001)	0.0074 (0.148)		-0.0124* (0.092)		-0.0014 (0.192)	1.03 N=9,840
	-0.0348*** (0.000)	-0.0036 (0.512)	0.0225*** (0.002)	0.0071 (0.169)			-0.0090 (0.377)	-0.0016 (0.133)	0.97 N=9,840

Table 12

Undervaluation and Firm Investment Decisions

Dependent variables: Investment I_t / A_{t-1} is defined as the sum of capital expenditures, acquisitions, R&D expenses, and increase in investment at time t divided by total assets (compustat item #6) at time t-1. $CAPX_t / A_{t-1}$ is capital expenditures at time t (compustat item #128) divided by total assets at time t-1. ACQ_t / A_{t-1} is acquisitions (compustat item #129) at time t divided by total assets at time t-1. RD_t / A_{t-1} is R&D expenses at time t (compustat item #46) divided by total assets at time t-1. $IINC_t / A_{t-1}$ is increase in investments (compustat item #113) divided by total assets at time t-1. $SalePPE_t / A_{t-1}$ is sale of PP&E at time t (compustat item #107) divided by total assets at time t-1. Net investment $NetI_t / A_{t-1}$ is the difference between Investment (I) and the sale of PP&E (SalePPE) at time t divided by total assets at time t-1. Change in total assets $\Delta A_t / A_{t-1}$ is the difference between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. $\Delta A_t^+ / A_{t-1}$ is increase in total assets include only positive differences between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. $\Delta A_t^- / A_{t-1}$ is decrease in total assets include only negative differences between total assets at time t and the total assets at time t-1 divided by total assets at time t-1. Decrease in total assets is represented by the absolute value of the decrease percentage of total assets.

Independent variables: CF_t / A_{t-1} is income before extra ordinary items(compustat item #18) plus deprecation and amortization (compustat item #14) at time t divided by total assets at time t-1. ${}_{<0}Dev_{t-1}^{Firm}$ is firm undervaluation measure at time t-1 which is the negative difference between the market value of firm at time t and the fundamental value of the firm at time t [$lnM_{it} - v(\theta_{it};\alpha_t)$]. The fundamental value of the firm i[$v(\theta_{it};\alpha_t)$] is obtained by applying annual, aggregate regression multiples (α's) to the firm-level accounting values (θ). The individual time t values of the (α_t's) are obtained using the model, $ln(M)_{it} = \alpha_{0jt} + \alpha_{1jt} ln(B)_{it} + \alpha_{2jt} ln(|NI|)_{it} + \alpha_{3jt} ln(|NI|)_{it} \times D_{(NI_{it}<0)} + \alpha_{4jt} LEV_{it} + \varepsilon_{it}$. Mispricing at the aggregate level (Dev_{it}^{Agg}) is the difference between the fundamental value of the firm at time t based on time t accounting values (θ_t) and time t aggregate multiples (α_t's) and the fundamental value of the firm at time t based on time t accounting values (θ_t) and long run aggregate multiples ($\bar{\alpha}$'s), $[v(\theta_{it};\alpha_t) - v(\theta_{it};\bar{\alpha})]$. The long run aggregate multiples ($\bar{\alpha}$'s) are the over time average of (α_t's). Growth (G_{it}) is the difference between the valuations implied by long run multiples and current book values, [$v(\theta_{it};\alpha) - lnB_{it}$]. The aggregate level is either at the industry or at the market level. The Industry classification is based on Fama & French 12 industry classification.
$Cap\,\mathrm{Ret}_t / A_{t-1}$ is the sum of equity repurchased and debt retired at time t divided by total assets at time t-1. $E\,\mathrm{Re}p_t / A_{t-1}$ is equity repurchased at time t (compustat item #115) divided by total assets at time t-1. $D\,\mathrm{Ret}_t / A_{t-1}$ is debt retired at time t (compustat item #114) divided by total assets at time t-1. RME is the residual market effect. It is represented by the residual from the following regressing: $(M/B)_{it-1} = \alpha_0 + \alpha_1 Dev_{it}^{firm} + \alpha_2 Dev_{it}^{Agg} + \alpha_3 G_{it} + \varepsilon_{it}$.

The data contains US firms in compustat between 1971 and 2004. Total assets variable is winsorized at the 1st and 99th percentiles. Negative values for investment variables are ignored. Financial and Utilities firms are not included in the analysis.

Panel A shows the results for investment variables. Panel B shows the results for the changes in total assets. Regression coefficients are estimated using OLS regression with p-values based on heteroskedasticity-robust standard errors. All Variables are firm and year mean adjusted. P-values are in parentheses. Coefficients starred with one, two, and three asterisks are statistically significant at the ten, five, and one percent respectively.

Panel A: Investment Decisions as the Dependent Variables

Dependent Variable	CF_t / A_{t-1}	${}_{<0}Dev_{t-1}^{Firm}$	$Dev_{t-1}^{Agg.}$	G_{t-1}	$\frac{Cap\,\mathrm{Ret}_t}{A_{t-1}}$	$\frac{E\,\mathrm{Re}p_t}{A_{t-1}}$	$\frac{D\,\mathrm{Ret}_t}{A_{t-1}}$	RME	R^2 (%) N
I_t / A_{t-1}	0.5678***	0.1660***	0.3361***	0.3098***				0.0855***	15.08
	(0.007)	(0.000)	(0.000)	(0.000)				(0.000)	N=45,567
	0.0606	0.1211***	0.2052***	0.2290***	0.4303***			0.0506**	37.37
	(0.684)	(0.002)	(0.000)	(0.000)	(0.000)			(0.012)	N=45,567
	0.5544***	0.1444***	0.2989***	0.2686***		1.7666***		0.0768***	18.27
	(0.007)	(0.000)	(0.000)	(0.000)		(0.001)		(0.000)	N=45,567
	0.0564	0.1258***	0.2125***	0.2380***			0.4367***	0.0523**	36.90
	(0.708)	(0.002)	(0.000)	(0.000)			(0.000)	(0.012)	N=45,567

Dependent Variable	CF_t / A_{t-1}	${}_{<0}Dev_{t-1}^{Firm}$	$Dev_{t-1}^{Agg.}$	G_{t-1}	$\frac{Cap\,Ret_t}{A_{t-1}}$	$\frac{E\,Rep_t}{A_{t-1}}$	$\frac{D\,Ret_t}{A_{t-1}}$	RME	R^2 (%) N
$CAPX_t / A_{t-1}$	0.3584*** (0.002)	0.0338** (0.017)	0.0906*** (0.001)	0.0766*** (0.000)				0.0166* (0.071)	14.70 N=48,326
	0.1780*** (0.006)	0.0167 (0.131)	0.0373** (0.048)	0.0440*** (0.003)	0.1626*** (0.000)			0.0041 (0.528)	22.56 N=48,326
	0.3530*** (0.002)	0.0254 (0.109)	0.0752*** (0.008)	0.0594*** (0.002)		0.7987** (0.032)		0.0137 (0.158)	16.34 N=48,326
	0.1778*** (0.006)	0.0183* (0.091)	0.0400** (0.031)	0.0473*** (0.001)			0.1637*** (0.000)	0.0046 (0.471)	22.28 N=48,326
ACQ_t / A_{t-1}	0.0059 (0.855)	0.0467 (0.213)	0.0839*** (0.000)	0.1121*** (0.005)				0.0189 (0.269)	0.92 N=44,186
	-0.0434 (0.334)	0.0426 (0.260)	0.0702*** (0.004)	0.1031** (0.012)	0.0533** (0.035)			0.0162 (0.350)	3.04 N=44,186
	0.0027 (0.933)	0.0436 (0.225)	0.0774*** (0.000)	0.1050*** (0.006)		0.3359** (0.022)		0.0177 (0.280)	1.54 N=44,186
	-0.0424 (0.345)	0.0431 (0.257)	0.0713*** (0.004)	0.1043** (0.011)			0.0527** (0.040)	0.0164 (0.346)	2.92 N=44,186
RD_t / A_{t-1}	-0.1155** (0.032)	0.0662*** (0.000)	0.1097*** (0.000)	0.1078*** (0.000)				0.0198*** (0.000)	16.43 N=25,628
	-0.1873*** (0.000)	0.0601*** (0.000)	0.0884*** (0.000)	0.0985*** (0.000)	0.0793*** (0.000)			0.0158*** (0.000)	26.75 N=25,628
	-0.1301** (0.023)	0.0644*** (0.000)	0.1048*** (0.000)	0.1024*** (0.000)		0.1703*** (0.000)		0.0188*** (0.000)	19.14 N=25,628
	-0.1754*** (0.001)	0.0614*** (0.000)	0.0921*** (0.000)	0.1015*** (0.000)			0.0730*** (0.000)	0.0165*** (0.000)	24.77 N=25,628
$IINC_t / A_{t-1}$	0.0176 (0.190)	0.0262** (0.023)	0.0596*** (0.000)	0.0450*** (0.000)				0.0102** (0.012)	1.04 N=46,154
	-0.0062 (0.720)	0.0218* (0.071)	0.0487*** (0.000)	0.0373*** (0.000)	0.0578** (0.029)			0.0089** (0.041)	6.37 N=46,154
	0.0159 (0.228)	0.0241** (0.035)	0.0553*** (0.000)	0.0404*** (0.000)		0.1686*** (0.001)		0.0091** (0.025)	1.78 N=46,154
	-0.0056 (0.741)	0.0225* (0.062)	0.0502*** (0.000)	0.0389*** (0.000)			0.0579** (0.035)	0.0093** (0.032)	6.12 N=46,154
$SalePPE_t / A_{t-1}$	0.0077*** (0.003)	-0.0021 (0.119)	-0.0076*** (0.000)	-0.0006 (0.604)				-0.0002 (0.722)	0.53 N=35,180
	0.0049* (0.099)	-0.0023* (0.098)	-0.0087*** (0.000)	-0.0012 (0.335)	0.0050*** (0.001)			-0.0003 (0.532)	0.82 N=35,180
	0.0075*** (0.004)	-0.0023 (0.101)	-0.0079*** (0.000)	-0.0009 (0.471)		0.0142* (0.079)		-0.0002 (0.656)	0.56 N=35,180
	0.0050* (0.091)	-0.0022 (0.105)	-0.0086*** (0.000)	-0.0011 (0.375)			0.0049*** (0.001)	-0.0003 (0.556)	0.80 N=35,180

Dependent Variable	CF_t / A_{t-1}	$_{<0}Dev_{t-1}^{Firm}$	$Dev_{t-1}^{Agg.}$	G_{t-1}	$\frac{Cap\,Ret_t}{A_{t-1}}$	$\frac{E\,Rep_t}{A_{t-1}}$	$\frac{D\,Ret_t}{A_{t-1}}$	RME	R^2 (%) N
$NetI_t / A_{t-1}$	0.4165*** (0.006)	0.1586*** (0.000)	0.3177*** (0.000)	0.3017*** (0.000)				0.0768*** (0.000)	9.67 N=45,525
	0.0039 (0.979)	0.1224*** (0.003)	0.2114*** (0.000)	0.2362*** (0.000)	0.3500*** (0.000)			0.0485** (0.017)	26.41 N=45,525
	0.4038*** (0.006)	0.1382*** (0.000)	0.2826*** (0.000)	0.2628*** (0.000)		1.6717*** (0.000)		0.0685*** (0.000)	12.92 N=45,525
	0.0029 (0.985)	0.1263*** (0.002)	0.2179*** (0.000)	0.2439*** (0.000)			0.3530*** (0.000)	0.0500** (0.017)	25.87 N=45,525

Panel B: Changes in Total Assets Decisions as the Dependent Variables

Dependent Variable	CF_t / A_{t-1}	$_{<0}Dev_{t-1}^{Firm}$	$Dev_{t-1}^{Agg.}$	G_{t-1}	$\frac{Cap\,Ret_t}{A_{t-1}}$	$\frac{E\,Rep_t}{A_{t-1}}$	$\frac{D\,Ret_t}{A_{t-1}}$	RME	R^2 (%) N
$\Delta A_t / A_{t-1}$	6.4958*** (0.000)	0.7411*** (0.000)	1.9559*** (0.000)	1.4250*** (0.000)				0.5020*** (0.000)	41.10 N=49,190
	3.1251*** (0.000)	0.4304*** (0.000)	0.9620*** (0.000)	0.8324*** (0.000)	3.0648*** (0.000)			0.2759*** (0.000)	64.77 N=49,190
	6.4416*** (0.000)	0.6478*** (0.000)	1.7857*** (0.000)	1.2363*** (0.000)		8.9441*** (0.000)		0.4701*** (0.000)	42.85 N=49,190
	3.0623*** (0.000)	0.4556*** (0.000)	0.9976*** (0.000)	0.8842*** (0.000)			3.1392*** (0.000)	0.2816*** (0.000)	64.73 N=49,190
$\Delta A_t^+ / A_{t-1}$	8.1263*** (0.000)	0.2711 (0.301)	2.4505*** (0.000)	1.7958*** (0.000)				0.4514*** (0.000)	45.29 N=30,329
	4.2461*** (0.000)	0.0522 (0.825)	1.3736*** (0.000)	1.0625*** (0.000)	3.0793*** (0.000)			0.2200** (0.032)	62.31 N=30,329
	8.0622*** (0.000)	0.1020 (0.717)	2.1863*** (0.000)	1.4956*** (0.000)		10.3934*** (0.000)		0.3760*** (0.003)	46.91 N=30,329
	4.1762*** (0.000)	0.0984 (0.684)	1.4289*** (0.000)	1.1366*** (0.000)			3.1502*** (0.000)	0.2375** (0.025)	62.21 N=30,329

Dependent Variable	CF_t / A_{t-1}	${}_{<0}Dev_{t-1}^{Firm}$	$Dev_{t-1}^{Agg.}$	G_{t-1}	$\frac{Cap\,Ret_t}{A_{t-1}}$	$\frac{E\,Rep_t}{A_{t-1}}$	$\frac{D\,Ret_t}{A_{t-1}}$	RME	R^2 (%) N
$\Delta A_t^- / A_{t-1}$	-0.0793*** (0.000)	-0.0325*** (0.000)	-0.0020 (0.824)	-0.0033 (0.636)				-0.0050** (0.044)	2.76 N=18,730
	-0.0998*** (0.000)	-0.0349*** (0.000)	-0.0098 (0.271)	-0.0067 (0.353)	0.0328*** (0.000)			-0.0063*** (0.009)	3.69 N=18,730
	-0.0805*** (0.000)	-0.0333*** (0.000)	-0.0039 (0.662)	-0.0048 (0.494)		0.1101**** (0.003)		-0.0052** (0.038)	2.89 N=18,730
	-0.0997*** (0.000)	-0.0346*** (0.000)	-0.0093 (0.296)	-0.0062 (0.384)			0.0331*** (0.000)	-0.0062** (0.009)	3.66- N=18,730

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This study analyzes the effect of stock market mispricings on corporate investment decisions. Particularly, this study addresses the three possible explanations of the relation between mispricings and corporate investments that are mentioned in Morck, Shleifer and Vishny (1990) and Stein (1996). The study finds evidence supporting the three explanations: Managers' market timing activities, managers' catering behavior, and managers' confusion about the future state of the industry.

By decomposing the market to book ratio into firm mispricing, industry mispricing, and growth components, the study shows that corporate investment decisions are determined by all of these components after controlling for financial slack. In addition, the study finds that corporate investments in general are determined by market timing-motivated equity and debt transactions. Consistent with our predictions, the study shows that the relation between mispricing and investment is more pronounced in financially constrained firms and in firms held by short horizon shareholders. Further testing the types of investment distortions caused by stock mispricing, the study finds that firms overinvest in capital expenditure, R&D, and acquisitions but underinvest in capital expenditure and R&D only. In addition, overvalued firms tend to reduce their fixed assets less while undervalued firms tend to reduce their current assets more.

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