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Earnings Smoothness and Investment Sensitivity to Stock Prices

Xiaochuan Huang

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**EARNINGS SMOOTHNESS AND INVESTMENT SENSITIVITY TO
STOCK PRICES**

BY

XIAOCHUAN HUANG

**A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree
of
Doctor of Philosophy
in the Robinson College of Business
of
Georgia State University**

**GEORGIA STATE UNIVERSITY
ROBINSON COLLEGE OF BUSINESS
2011**

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ACCEPTANCE

This dissertation was prepared under the direction of the Xiaochuan Huang's Dissertation Committee. It has been approved and accepted by all members of that committee, and it has been accepted in partial fulfillment of the requirements for the degree of Doctoral of Philosophy in Business Administration in the J. Mack Robinson College of Business of Georgia State University.

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TABLE OF CONTENTS

ABSTRACT	xi
CHAPTER 1: INTRODUCTION	1
CHAPTER 2: PRIOR LITERATURE AND HYPOTHESES DEVELOPMENT	7
2.1 Stock Prices and Corporate Investment	7
2.2 Earnings Smoothness	10
2.3 Hypotheses Development	11
CHAPTER 3: SAMPLE SELECTION AND RESEARCH DESIGN	15
3.1 Data Selection	15
3.2 Measure of Earnings Smoothness	15
3.3 Empirical models for hypotheses testing	16
3.3.1 Basic effect of earnings smoothing	17
3.3.2 Effect of innate and discretionary earnings smoothing	18
3.3.3 Cross-sectional variation in the effect of earnings smoothing	19
3.3.4 Earnings Smoothness and equity financing sensitivity to stock prices	20
CHAPTER 4: EMPIRICAL RESULTS	22
4.1 Descriptive Statistics	22
4.2 Regression Results	23
4.2.1 Results for H1	23
4.2.2 Results for H2	24
4.2.3 Results for H3	25
4.2.4 Results for H4	25
CHAPTER 5: EFFICIENCY IMPLICATION OF EARNINGS SMOOTHING	27
5.1 Over- and under-investment	27
5.2 Future Operating Performance	29
CHAPTER 6: ADDITIONAL TESTS AND ANALYSES	31
6.1 Alternative Measures of Investment	31
6.2 Abnormal Investment Sensitivity to Stock Prices	32
6.3 Alternative Interpretation of Investment Sensitivity to Q	33
6.4 Controlling for Capital Constraints	34
6.5 Managerial Attributes	35
CHAPTER 7: CONCLUSIONS	36

BIBLIOGRAPHY	38
APPENDIX - VARIABLE DEFINITION	43
FIGURES	46
TABLES	49
VITA	60

LIST OF FIGURES

FIGURE 1: TOBIN'S Q, CORPORATE INVESTMENT, AND FUTURE ROA BY YEAR	46
FIGURE 2: RELATIONS AMONG EARNINGS SMOOTHNESS, STOCK PRICES, AND CORPORATE INVESTMENT	47
FIGURE 3: INVESTMENT SENSITIVITY TO STOCK PRICES ACROSS EARNINGS SMOOTHNESS GROUPS	48

LIST OF TABLES

TABLE 1: SUMMARY STATISTICS FOR VARIABLES USED FOR HYPOTHESES TESTING	49
TABLE 2: EARNINGS SMOOTHNESS AND INVESTMENT SENSITIVITY TO STOCK PRICES	51
TABLE 3: INNATE AND DISCRETIONARY EARNINGS SMOOTHNESS AND INVESTMENT SENSITIVITY TO STOCK PRICES	52
TABLE 4: FIRM OPERATING ENVIRONMENTS AND RELATION BETWEEN EARNINGS SMOOTHING AND INVESTMENT SENSITIVITY TO STOCK PRICES	53
TABLE 5: EARNINGS SMOOTHNESS AND EXTERNAL FINANCING SENSITIVITY TO STOCK PRICES	55
TABLE 6: EARNINGS SMOOTHNESS AND DEVIATIONS FROM EXPECTED INVESTMENT	56
TABLE 7: EARNINGS SMOOTHNESS AND FUTURE OPERATING PERFORMANCE	57
TABLE 8: EARNINGS SMOOTHNESS AND INVESTMENT SENSITIVITY TO STOCK PRICES – ALTERNATIVE MEASURES	58
TABLE 9: EARNINGS SMOOTHNESS AND INVESTMENT SENSITIVITY TO STOCK PRICES – ABNORMAL INVESTMENT	59

ABSTRACT

EARNINGS SMOOTHNESS AND INVESTMENT SENSITIVITY TO STOCK PRICES

By

XIAOCHUAN HUANG

April 26, 2011

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Existing research suggests that market misvaluations affect corporate investment, often leading to suboptimal investment. I examine whether earnings smoothness reduces the impact of market valuations on corporate investment and in turn enhances investment efficiency. I find that earnings smoothness has a strong negative effect on the sensitivity of corporate investment to stock prices. Further analyses indicate that this negative effect is driven by both innate and discretionary components of earnings smoothness and is more pronounced for firms operating in more volatile business environments. I complement these findings by demonstrating that firms with smoother earnings have lower over- (under-)investment and higher future operating performance. Collectively, the evidence suggests that earnings smoothness improves corporate investment efficiency by reducing the impact of market valuations on investment.

CHAPTER 1

INTRODUCTION

It is well known that firms are more likely to make investment when their market values are high than when they are low.¹ While the traditional interpretations of this pattern is that firms respond to the information about investment opportunities embedded in stock prices, recent research in behavioral corporate finance argues that stock prices do not always reflect firm fundamentals and nonfundamental movements in stock prices impact managers' investing behavior.² Researchers who take the behavioral view further point out that managers' responses to nonfundamentals may have detrimental effects on real economic productivity. For example, Rhodes-Kropf and Viswanathan (2004) suggest that that firm-specific and market-wide misvaluations lead to an excess of mergers, which are value destroying. If firms tend to over-invest when their stocks are overpriced and under-invest when their stocks are underpriced (Polk and Sapienza 2009), managers should be discouraged from undertaking investment when stock prices are high and encouraged to undertake investment when their stock prices are low.

In this paper, I investigate how a particular accounting attribute - earnings smoothness, affects the impact of stock prices on firm investment decisions. Recent accounting studies have documented the effect of financial reporting on corporate investment efficiency (e.g., Biddle and Hilary 2006, Biddle, Hilary, and Verdi 2009,

¹ This pattern can be clearly seen from Figure 1, which plots the time series of the aggregated market-to-book ratio and the aggregated corporate investment.

² Behavioral finance research has identified two channels through which stock misvaluations may affect corporate investment. First, mispricing affects the pattern of firm equity financing and in turn corporate investment (Morck, Shleifer, and Vishny 1990). Second, mispricing affects investment directly when the market misprices firms according to their level of investment, market pressure drives managers to use investment to cater to investor demand (Polk and Sapienza 2009).

Francis and Martin 2010). These studies emphasize that superior financial reporting affects corporate investment by reducing adverse selection and improving monitoring. My study draws on the literature examining the effect of misvaluations on investment and links earnings smoothness to corporate investment through its impact on stock prices.

I define earnings smoothness as the ratio of cash flow volatility to earnings volatility, which captures the extent to which accrual accounting has smoothed out the underlying volatility of the firm's operations. I expect that earnings smoothness is negatively associated with investment sensitivity to stock prices. The key insight underlying this prediction is that: if a given stock price contains a greater proportion of mispricing, then managers have greater incentives and opportunities to respond to stock prices in their financing and investing decisions (Lamont and Stein 2006). By removing transient earnings components and revealing permanent earnings components, earnings smoothness reduces pricing errors caused by investors' uncertainty about the permanence of firm earnings (Arya, Glover, and Sunder 2003).³ If the stock prices of firms with smoother earnings are less likely to deviate from firm fundamentals, relative to firms with volatile earnings, firms with smooth earnings are less likely to time the market in their equity issuance or use firm investment to cater to investor demand and maximize short-run stock prices. As a result, investment of these firms will react less sensitively to stock prices.

To examine the effect of earnings smoothness on the relation between corporate investment and stock prices, I design my tests based on Baker, Stein, and Wurgler (2003).

³ When investors are uncertain about the permanence of firm earnings, they may misprice firm stocks by capitalizing the transient component of earnings and interpreting the permanent component of earnings as transient.

My baseline test consists of regressing investment on Tobin's Q (market-to-book ratio), future stock returns, the interaction terms between earnings smoothness and these two proxies for stock prices, and control variables.⁴ As firms invest more when stock prices are high and less when prices are low, I expect the coefficients on Q and future stock returns to be positive and negative respectively. If earnings smoothness reduces the impact of stock prices on investment, I expect the coefficient on the interaction between smoothness and Q (future returns) to be negative (positive). I confirm this prediction. In particular, firms that rank in the top tercile of earnings smoothness have investment (proxied by asset growth) that is only roughly a third as sensitive to stock prices as firms in the bottom tercile of earnings smoothness.

I perform several additional tests to complement the main finding that earnings smoothness is negatively associated with investment-price sensitivity. First, I decompose earnings smoothness into an innate component that captures a firm's underlying business process and a discretionary component that reflects managerial choice. I find that both components of earnings smoothness are negatively associated with investment-price sensitivity. Second, exploring cross-sectional variation in the effect of earnings smoothness, I show that the negative impact of earnings smoothness on investment-price sensitivity is greater when firms operate in more volatile and uncertain business environments (proxied by cash flow volatility, stock return volatility, and bid-ask spread). Third, I examine the relation between earnings smoothness and equity financing and show that earnings smoothness is negatively associated with equity financing sensitivity

⁴ Using future stock returns as a proxy for stock prices follows the idea that underpriced (overpriced) stocks tend to earn higher (lower) returns when mispricing is corrected in the future. The use of future stock returns mitigates the concern that variation in Q contains not only mispricing but also information about investment opportunities. I discuss competing interpretations of investment-Q sensitivity in detail in Chapter 6.

to stock prices. Because equity financing is a channel through which stock prices affect investment (e.g., Bosworth 1975; Morck, Shleifer, and Vishny 1990), this evidence corroborates the findings I obtain from the tests of investment.

The above findings collectively suggest that earnings smoothness is negatively associated with firms' tendency to respond to stock prices in their investment decisions. To provide evidence on whether the negative association between earnings smoothness and investment sensitivity to stock prices translates into more efficient investment, I examine the relation between earnings smoothness and investment efficiency. I measure investment efficiency as the firm's deviation from expected investment and future operating performance. I show that one decile increase in earnings smoothness is associated with a reduction of over-investment (under-investment) measured by asset growth by 0.45% (0.35%). Further, one decile in earnings smoothness is positively associated with future operating performance measured as return on assets, operating cash flows, and sales growth by 0.41%, 0.29%, and 0.12%, respectively.⁵

The results of my paper contribute to several streams of literature. My findings add to the earnings smoothness literature by showing that earnings smoothness has a positive impact on firms' resource allocation. My evidence is consistent with the view that earnings smoothness provides information rather than garbles it; and it provides economic explanations for why firms that smooth earnings receive higher valuations (Ghosh, Gu, and Jain 2005; Allayannis and Simko 2009), and why managers who smooth earnings receive higher compensation (Das, Hong, and Kim 2009).

⁵ The mean (median) values of investment, return on assets, operating cash flows, and sales growth in my sample are 13.83% (6.87%), 2.39% (4.03%), 8.08% (8.6%), and 11.24% (8.05%), respectively.

My findings complement the recent literature that studies the relation between accounting quality and investment efficiency (e.g., Biddle and Hilary 2006; Biddle, Hilary and Verdi 2009; McNichols and Stubben 2008; Francis and Martin 2010). Biddle, Hilary and Verdi (2009) document that firms with superior financial reporting quality have lower over- (under)-investment. I show that the effect of accounting information on investment-price sensitivity may be a mechanism that explains the positive relation between accounting quality and investment efficiency. In addition, McNichols and Stubben (2008) document that firms over-invest when managers inflate earnings and conclude that earnings management leads to inefficient investment. Francis and Martin (2010) conclude that timely loss recognition leads to more profitable mergers and acquisitions as it prevents managers from investing in value destroying projects. While these studies emphasize the governance role of earnings in affecting corporate investment, I provide evidence that earnings may impact corporate investment through its impact on firm valuation.

My paper extends the literature examining the relations between market valuations and corporate financing and investing activities (e.g., Baker and Wurgler 2002; Baker, Stein, and Wurgler 2003; Chang, Dasgupta, Hilary 2006, 2009). These studies do not address whether market misvaluations have efficiency implications for firm productivity. Using earnings smoothness as a common link, my study suggests that market misvaluations may lead to suboptimal investment and that earnings smoothness improves investment efficiency by reducing the impact of market valuations on firm investment.

My paper proceeds as follows. Chapter 2 reviews related literature and develops testable hypotheses. Chapter 3 describes sample selection and research design. Chapter 4 presents main empirical results. I analyze the relation between earnings smoothness and investment efficiency in Chapter 5. Chapter 6 conducts additional tests and analyses and Chapter 7 concludes.

CHAPTER 2

RELATED LITERATURE AND HYPOTHESES DEVELOPMENT

2.1 Corporate investment and stock prices

Numerous studies have documented a positive relation between corporate investment and stock prices. In the framework of market efficiency and symmetric information, this positive relation simply reflects firms' rational responses to the information about investment opportunities embedded in stock prices. However, there is much evidence that stock markets are not completely efficient and information does not flow freely among managers and investors (e.g., Shiller 1981). In the presence of investor irrationality and/or information asymmetry, nonfundamental movements in stock prices impact corporate investment, often leading to suboptimal investment.

Mispricing influences firm investment in two ways.⁶ First, mispricing affects corporate investment through equity financing. This idea originates from Bosworth (1975) and Merton and Fischer (1984), who argue that managers time their equity issuance (repurchase) when their prices are too high (low) relative to firm fundamentals. Cash flows associated with equity financing in turn impact corporate investment (e.g., Morck, Shleifer, and Vishny 1990; Blanchard, Rhee, and Summers 1993; Stein 1996). In addition, firms can undertake stock-for-stock mergers and acquisitions to take advantage of cheap financing when their stock prices are overvalued. Second, mispricing has a direct impact on corporate investment. When the market misprices firms according to their level of investment, firms use investment to cater to investor sentiment to maximize

⁶ Figure 2 illustrates the mechanisms through which stock prices affect corporate investment and the consequences of mispricing on corporate investment.

short-run stock prices, that is, they invest in projects that are overpriced and cut down on projects that are underpriced (Shleifer and Vishny 2003; Polk and Sapienza 2009).⁷

Several studies have directly tested the implications of these two mechanisms through which stock prices influence corporate investment. Motivated by the model in Stein (1996), Baker, Stein, and Wurgler (2003) test the equity financing channel by examining the cross-sectional variation of investment-price sensitivity associated with the degree of equity dependence of a firm. The model predicts that relative to firms with no debt and ample cash, equity dependent firms are more likely to forgo investment if they have to issue undervalued stocks to fund investment projects. Baker, Stein, and Wurgler (2003) confirm this prediction by documenting that equity-dependent firms display a higher investment sensitivity to stock prices. They conclude that nonfundamental components of stock prices play an important role in affecting the investment of firms that depend on external equity capital to fund investment projects.

Polk and Sapienza (2009) emphasize the alternative “catering” channel through which mispricing affects corporate investment. In their model, firms invest optimally when there is no mispricing. Managers overinvest when firms are overpriced because the market’s tendency to overvalue investment projects drives managers to forgo long-run value to sustain short-run overvaluations. Similarly, managers invest too little when the market is pessimistic about the value of the firm. Polk and Sapienza (2009) provide empirical support for these predictions by documenting a positive relation between abnormal investment and discretionary accruals (their proxy for mispricing) after controlling for equity financing. They further show that abnormal investment is more

⁷ For example, in the booming market, investors may view investment as a signal of growth and overprice firms that undertake more investment.

sensitive to mispricing for firms with higher R&D intensity or share turnover, suggesting that opaque firms and firms with shorter shareholder horizons are more likely to cater to investor demand with investment.

While many studies do not address the efficiency implications of the impact of mispricing on investment, some theoretical and empirical evidence suggests that firms' responses to market misvaluations lead to suboptimal investment. For example, over-investment arises when managers subsidize failing projects with the excess cash received from selling overpriced securities (Chang, Dasgupta, and Hilary 2006). Under-investment arises when long-horizon managers refuse to issue underpriced securities to fund profitable investment projects because issuing underpriced securities transfers wealth from existing investors to new ones (Stein 1996). Misvaluations also lead firms to undertake investments of poor quality. Rhodes-Kropf and Viswanathan (2004) link merger waves and market misvaluations, proposing that market misvaluations lead firms to overlook the synergies between acquirers and targets and miscalibrate the quality of mergers and acquisitions. Bowuman, Fuller, and Nain (2009) obtain empirical support for this theoretical prediction by showing that acquisitions undertaken in booming markets have lower long-run stock and operating performance than those undertaken in depressed markets. Hoberg and Phillips (2010) also document that some firms experience sharp declines in cash flows and stock returns after high industry-level market valuations, financing, and investment.

The above discussion illustrates how misvaluations affect corporate investment and lead to suboptimal investment. In the next section, I discuss how earnings

smoothness may reduce the impact of stock valuations on investment and therefore improve investment efficiency.

2.2 Earnings smoothness

Earnings smoothness is an important attribute of earnings that has received much attention in the accounting literature. In many studies smoothness is characterized as a managerial choice, that is, managers move earnings from peak years to depressed years so that the reported income stream appears less variable (Copeland 1968). Extant literature provides two primary explanations for such income smoothing. On the one hand, some regulators and researchers argue that earnings smoothing conceals information (e.g., Levitt 1998; Bhattacharya, Daouk and Welker 2003). According to this garbling view, insiders smooth earnings to hide their actions and avoid interventions by outsiders in order to facilitate private benefit extraction. For example, managers may smooth reported income to meet the bonus target (Healy 1985) and protect their jobs (Fudenberg and Tirole 1995; Arya et al. 1998). Using a cross-country design, Leuz, Nanda, and Wysocki (2003) document that managers in countries with weak investor protection smooth earnings to mask firms' true performance in an attempt to shield their private control benefits.

On the other hand, some researchers suggest that earnings smoothing provides information by revealing the permanent component of earnings and communicating managers' private information (e.g., Barnea, Ronen and Sadan 1975; Ronen and Sadan 1981; Sankar and Subramanyam 2001; Tucker and Zarowin 2006). Hunt, Moyer and Shevlin (2000) provides evidence in a U.S. setting that income smoothing enhances the contemporaneous relation between prices and earnings. Tucker and Zarowin (2006) find

that the change in the current stock price of higher-smoothing firms contains more information about their future earnings than does the change in the stock price of lower-smoothing firms, indicating earnings smoothing conveys managers' private information.

Studies that attempt to reconcile the two opposing views point out that earnings smoothing is generally informative in the U.S. because strong law and enforcement mechanisms in the U.S. limit the ability of insiders to mask information and extract private benefits. Specifically, Amiram and Owens (2010) document that discretionary smoothness is negatively associated with cost of debt within the U.S. while it is positively associated with cost of debt within countries that have a high threat of private benefit extraction by insiders. This evidence is consistent with the argument that lenders interpret earnings smoothing in the U.S. as informative and view earnings smoothing in countries with weaker investor protection as garbling. Leuz, Nanda, and Wysocki (2003) acknowledge in their paper that "the evidence for the U.S. suggests that, on average, managers use their discretion in a way that increases the informativeness of earnings".

2.3 Hypotheses Development

I derive my predictions based on the evidence that earnings smoothness on average provides information in the U.S. I posit that earnings smoothness reduces investment sensitivity to stock prices through a reduction of mispricing. As mentioned above, firms time equity issuance and cater to investor demand with investment when stock prices deviate from fundamentals. Therefore, firms have greater incentives and opportunities to respond to stock prices in their investing decisions when their stock prices contain a greater degree of mispricing. If a given movement in stock prices of firms with smooth earnings contains a smaller proportion of mispricing than the same-

sized movement in stock prices of firms with volatile earnings, then investment of firms with smooth earnings would respond less sensitively to stock prices than investment of firms with volatile earnings.

Earnings smoothness reduces mispricing by removing transient earnings components and revealing permanent earnings components. Actual income of the firm varies from year to year as a result of transient shocks as well as accounting effects. Because managers possess more information, they can better isolate transient changes from permanent changes than can outside investors. When less well-informed investors are uncertain about the permanence of firm earnings, they may mistakenly capitalize transient earnings or interpret permanent earnings as transient (Arya, Glover, and Sunder 2003). Earnings smoothness conveys managers' private information and enhances investors' confidence in the permanence of earnings (Kirschenheiter and Melumad 2002). Consequently, it reduces valuation errors arising from investors' uncertainty about earnings persistence caused by the temporal variation of earnings.

Based on the discussion above, I hypothesize that earnings smoothness reduces the impact of stock prices on corporate investment. Specifically, my first hypothesis is:

H1: *Earnings smoothness is negatively associated with investment sensitivity to stock prices.*

Having established the baseline relation between earnings smoothness and investment sensitivity to stock prices, I now investigate innate earnings smoothness through neutral application of accounting standards and discretionary smoothness through intentional managerial intervention. The purpose of this investigation is two-fold. Prior research provides mixed evidence on the informativeness of innate versus

discretionary earnings smoothness (e.g., Tucker and Zarowin 2006; Jayaraman 2008).⁸ Therefore, it is important to document the effect of discretionary earnings smoothness because we are interested in what actions firms can take to affect earnings quality and in turn improve investment efficiency. In addition, as detailed in Chapter 6, the evidence on the effect of innate smoothness on investment-price sensitivity helps to address the concern that managerial attributes rather than earnings smoothness per se explain the results documented in this study. Based on the argument that both innate and discretionary components of earnings smoothness remove the transient component of earnings and drive prices closer to firm fundamentals, I predict that both components reduce investment sensitivity to stock prices. My second set of hypotheses is:

H2a: *Innate earnings smoothness is negatively associated with investment sensitivity to stock prices.*

H2b: *Discretionary earnings smoothness is negatively associated with investment sensitivity to stock prices.*

The impact of earnings smoothness on investment-price sensitivity is likely to vary with firms' business environments. When firms operate in volatile and uncertain business environments, valuation uncertainty is also likely to be high. The marginal benefit of earnings smoothness should be higher for these firms. Consistent with this argument, Jayaraman (2008) documents that earnings smoothing is more informative when firms experience extreme performance. Therefore, I expect that the effect of earnings smoothness in reducing the impact of stock prices on investment is greater for firms operating in more volatile business environments. My third hypothesis is:

⁸ For example, Tucker and Zarowin (2006) find that discretionary earnings smoothness provides information. In contrast, Jayaraman (2008) and LaFond, Lang, and Skaife (2007) conclude that while innate earnings smoothness provides information, discretionary earnings smoothness garbles information.

H3: *The negative effect of earnings smoothness on investment sensitivity to stock prices is greater for firms that operate in more volatile business environments.*

Finally, I examine the relation between earnings smoothness and equity financing sensitivity to stock prices. Because equity financing is a channel through which stock valuations affect investment (e.g., Morck, Shleifer, and Vishny 1990; Stein 1996), the test of the impact of earnings smoothness on equity financing is a complement to the hypotheses that I develop for investment. Firms are less likely to time the market in their equity issuance when their stock prices tend to reflect firm fundamentals. Because earnings smoothness facilitates stock prices to converge on fundamentals, it reduces equity financing sensitivity to stock prices. My fourth hypothesis is:

H4: *Earnings smoothness is negatively associated with equity financing sensitivity to stock prices.*

CHAPTER 3

SAMPLE SELECTION AND RESEARCH DESIGN

3.1 Data selection

My main sample consists of firms listed on the Compustat Annual Fundamental Files during 1993-2006. I start my sample in 1993 because I need cash flow statement data to reliably estimate earnings smoothness over the five years $t-1$ to $t-5$ and cash flow statements are not widely available until 1988.⁹ I stop at 2006 because I require future three-year stock return and operating performance data for my tests. I obtain stock return data from CRSP. Following common practice in prior research, I exclude the financial and real estate industries (SIC codes in the 6000 to 6999 range) and the regulated utilities industry (SIC code 4200) because the investment and financing policies of firms in these industries are likely to be significantly different from firms in other industries. I exclude firm-year observations with less than \$10 million book value of equity to ensure that my results are not driven by extremely small companies. I winsorize all continuous variables at the 1% and 99% levels by year to mitigate the influence of extreme outliers. My final main sample consists of 32,234 firm-year observations.

3.2 Measure of earnings smoothness

I use the ratio of cash flow volatility to earnings volatility to measure earnings smoothness (*SMTH*). This measure captures the extent to which accrual accounting has smoothed out the underlying volatility of the firm's operations, which is consistent with prior research on earnings smoothness (e.g., Leuz, Nanda, and Wysocki 2003; Francis, LaFond, Ohlson, and Schipper 2004; Bowen, Rajgopal, and Venkatachalam 2008;

⁹ Collins and Hribar (2002) suggest that accruals estimated from the balance sheet as opposed to the cash flow statement contain measurement error and may lead to biased inferences.

McInnis 2010). Cash flow (earnings) volatility is the standard deviation of cash flows from operations (earnings before extraordinary items) scaled by the average total assets estimated at the annual level over the five years $t-5$ to $t-1$ with a minimum of four year data. Detailed definitions of all the variables used in this study are provided in the Appendix. Large values of *SMTH* indicate greater earnings smoothness. I report the raw values of *SMTH* in descriptive statistics. I use the decile ranking of *SMTH* by year in the regression analyses to address the concern of non-normality and to simplify the economic interpretation of regression coefficients.

3.3 Empirical models for hypotheses testing

To test whether earnings smoothness affects the impact of stock prices on investment, I focus on the cross-sectional variation in the partial correlations between investment and stock prices associated with earnings smoothness. Consistent with prior research (e.g., Baker, Stein and Wurgler 2003, Lamont and Stein 2006), I use both Tobin's Q (market-to-book ratio) and future realized stock returns to proxy for stock prices. High Q indicates a greater likelihood of current overpricing while high future returns indicate a greater likelihood of current underpricing as firms earn higher returns when current underpricing is corrected in the future. As I discuss in detail in Chapter 6, Q embodies the information about future investment opportunities and therefore results on Q are subject to the alternative interpretation given by the traditional view on the relation between stock prices and investment. The use of future stock returns addresses this concern as future stock returns should not reflect the information about firm future profitability.

3.3.1 Test of basic effect of earnings smoothness (H1)

I test the effect of earnings smoothness on investment sensitivity to stock prices in two ways. First, I estimate the following equations separately for the three subsamples formed by terciles of earnings smoothness:

$$INVEST_{i,t} = \alpha + \beta_1 Q_{i,t-1} + \beta_2 CF_{i,t} + \beta_3 \text{LogAsset}_{i,t-1} + \sum \text{YearDum} + \sum \text{IndDum} + \varepsilon_{i,t} \quad (1)$$

$$INVEST_{i,t} = \alpha + \beta_1 RET_{i,t+3} + \beta_2 CF_{i,t} + \beta_3 \text{LogAsset}_{i,t-1} + \sum \text{YearDum} + \sum \text{IndDum} + \varepsilon_{i,t} \quad (2)$$

where *INVEST* is firm *i*'s investment, measured as the percentage change in book value of assets from year *t-1* to *t*. I use change in assets (asset growth) because Cooper, Gulen, and Schill (2008) argue that it is a more comprehensive measure of firm-level real investment and disinvestment than other investment measures used in prior research.¹⁰ *Q* is measured as the market value of assets (the market value of equity plus the book value of liabilities) divided by the book value of assets at the beginning of year *t*. *RET* is measured as the cumulative raw returns over the three years *t+1*, *t+2*, and *t+3*. The choice of three years is based on the evidence that mispricing associated with external financing is likely to unravel over this horizon (Loughran and Ritter 1999; Baker and Wurgler 2000).¹¹

Other variables are included as controls. Cash flow (*CF*) is included to control for the effect of internal financing on investment (Fazzari, Hubbard, and Petersen 1988). I measure *CF* as the sum of net income before extraordinary items, depreciation and

¹⁰ Using asset growth to measure investment is consistent with Baker, Stein, and Wurgler (2003) and Chen, Goldstein and Wei (2007). I discuss the robustness of the results to alternative measures of investment in Chapter 6.

¹¹ I obtain similar results when I use market-adjusted returns.

amortization expense, and R&D expense scaled by lagged assets.¹² *LogAsset* is included to control for firm size and to mitigate the concern of spurious correlation as *INVEST* is scaled by lagged assets. I include year and two-digit SIC industry dummy variables to control for year and industry effects on firm investment.

Consistent with the market mispricing argument that firms invest more (less) when their stocks are overpriced (underpriced), I expect *INVEST* to be positively associated with *Q* and negatively associated with *RET*. According to H1, which predicts that earnings smoothness reduces investment sensitivity to stock prices, I expect the positive coefficients on *Q* to decrease across *SMTH* terciles and the negative coefficients on *RET* to increase across *SMTH* terciles.

Second, I expand the above basic framework by including both *Q* and *RET* and the interaction terms between *SMTH* and these two proxies for stock prices in the same regression below. This is a more rigorous test because *RET* will only attract a significant coefficient when it contains incremental information over *Q*.

$$INVEST_{i,t} = \alpha + \beta_1 Q_{i,t-1} + \beta_2 SMTH_{i,t-1} * Q_{i,t-1} + \beta_3 RET_{i,t+3} + \beta_4 SMTH_{i,t-1} * RET_{i,t+3} + \beta_5 CF_{i,t} + \beta_6 LogAsset_{i,t-1} + \beta_7 SMTH_{i,t-1} + \sum YearDum + \sum IndDum + \varepsilon_{i,t} \quad (3)$$

The interaction between *SMTH* and *Q* (*RET*) captures the effect of earnings smoothness on investment sensitivity to stock prices. *SMTH* is included separately to control for its direct effect on investment. I expect a significant negative coefficient on *SMTH*Q* ($\beta_2 < 0$) and a significant positive coefficient on *SMTH*RET* ($\beta_4 > 0$).

¹² I use this *CF* measure to be consistent with Chen, Goldstein, and Wei (2007). The inferences remain unchanged when I use cash flows from operations to proxy for internal financing.

3.3.2 Test of effect of innate and discretionary earnings smoothness (H2)

I first decompose earnings smoothness into its innate and discretionary components by regressing total earnings smoothness on innate determinants of earnings quality as described in Dechow and Dichev (2002). I estimate the following equation by year and two-digit SIC industry:

$$SMTH_{i,t-1} = \alpha + \beta_1 LogAsset_{i,t-1} + \beta_2 STDCFO_{i,t-1} + \beta_3 STDSALES_{i,t-1} + \beta_4 OperatingCycles_{i,t-1} + \beta_5 Loss_{i,t-1} + \varepsilon_{i,t-1} \quad (4)$$

where *STDCFO* (*STDSALES*) is the standard deviation of cash flows (sales) measured over the five years t-5 to t-1, *OperatingCycles* is the log of the firm's operating cycles, and *Loss* is the number of years in which the firm reported negative earnings over the five years t-5 to t-1. I use the predicted values from the equation above to proxy for innate earnings smoothness (*ISMTH*) and the residuals to proxy for discretionary earnings smoothness (*DSMTH*).¹³

I estimate the effect of innate and discretionary earnings smoothness on investment sensitivity to stock prices using the following regression:

$$INVEST_{i,t} = \alpha + \beta_1 Q_{i,t-1} + \beta_2 ISMTH_{i,t-1} * Q_{i,t-1} + \beta_3 DSMTH_{i,t-1} * Q_{i,t-1} + \beta_4 RET_{i,t+3} + \beta_5 ISMTH_{i,t-1} * RET_{i,t+3} + \beta_6 DSMTH_{i,t-1} * RET_{i,t+3} + \beta_7 CF_{i,t} + \beta_8 LogAsset_{i,t-1} + \beta_9 ISMTH_{i,t-1} + \beta_{10} DSMTH_{i,t-1} + \sum YearDum + \sum IndDum + \varepsilon_{i,t} \quad (5)$$

Consistent with H2, which predicts that both innate and discretionary earnings smoothness reduce investment sensitivity to stock prices, I expect significant negative coefficients on *ISMTH*Q* ($\beta_2 < 0$) and *DSMTH*Q* ($\beta_3 < 0$) and significant positive coefficients on *ISMTH*RET* ($\beta_5 > 0$) and *DSMTH*RET* ($\beta_6 > 0$).

3.3.3 Test of cross-sectional variation in the effect of earnings smoothness (H3)

I use Equation (6) to test whether the effect of earnings smoothness on investment

¹³ *DSMTH* and *ISMTH* are ranked into deciles by year before they enter Equation (5).

sensitivity to stock prices is more pronounced when firms operate in more volatile business environments.

$$\begin{aligned}
INVEST_{i,t} = & \alpha + \beta_1 Q_{i,t-1} + \beta_2 HIGH_{i,t-1} * Q_{i,t-1} + \beta_3 SMTH_{i,t-1} * Q_{i,t-1} + \beta_4 SMTH_{i,t-1} \\
& * HIGH_{i,t-1} * Q_{i,t-1} + \beta_5 RET_{i,t+3} + \beta_6 HIGH_{i,t-1} * RET_{i,t+3} + \beta_7 SMTH * RET_{i,t+3} + \\
& \beta_8 SMTH_{i,t-1} * HIGH_{i,t-1} * RET_{i,t+3} + \beta_9 CF_{i,t} + \beta_{10} LogAsset_{i,t-1} + \beta_{11} SMTH_{i,t-1} + \\
& \beta_{12} HIGH_{i,t-1} + \beta_{13} SMTH_{i,t-1} * HIGH_{i,t-1} + \sum YearDum + \sum IndDum + \varepsilon_{i,t} \quad (6)
\end{aligned}$$

where *HIGH* is an indicator variable coded as one if the corresponding proxy for the uncertainty/volatility of business environments is above the median in year t-1, and zero otherwise. Consistent with Francis and Martin (2010), I alternatively use cash flow volatility (*STDCFO*), stock return volatility (*STDRET*), and bid-ask spread (*SPREAD*) to proxy for the uncertainty of a firm's operating environment. *STDCFO* is defined in equation (4). *STDRET* is the standard deviation of daily stock returns in year t-1. *SPREAD* is the average daily bid-ask spread in year t-1, measured as the difference between ask and bid prices divided by the average of bid and ask prices.

The coefficients on *SMTH*HIGH*Q* and *SMTH*HIGH*RET* indicate the incremental effect of earnings smoothness in mitigating investment-price sensitivity when firms' business environments are more volatile. I expect a significant negative coefficient on *SMTH*HIGH*Q* ($\beta_4 < 0$) and a significant positive coefficient on *SMTH*HIGH*RET* ($\beta_8 > 0$).

3.3.4 Test of earnings smoothness and equity financing sensitivity to stock prices (H4)

I examine whether earnings smoothness affects equity financing sensitivity to stock prices by replacing the dependent variable in equation (3) with proxies for financing.

$$\begin{aligned}
ISU_{i,t} = & \alpha + \beta_1 Q_{i,t-1} + \beta_2 SMTH_{i,t-1} * Q_{i,t-1} + \beta_3 RET_{i,t+3} + \beta_4 SMTH_{i,t-1} * RET_{i,t+3} + \\
& \beta_5 CF_{i,t} + \beta_6 LogAsset_{i,t-1} + \beta_7 SMTH_{i,t-1} + \sum YearDum + \sum IndDum + \varepsilon_{i,t} \quad (7)
\end{aligned}$$

where *ISU* is capital raised from external financing by firm *i* in year *t*. Although my primary focus is equity financing, I present both equity financing (*EISU*) and debt financing (*DISU*). A comparison of differential equity and debt financing sensitivity to stock prices helps to shed a light on the argument that firms respond to *stock market* misvaluations. I provide detailed discussions regarding this comparison in Chapters 4.2.4 and 6. Following Bradshaw, Richardson, and Sloan (2006), I measure external financing using cash flow statement data. *EISU* is the net cash proceeds from the issuance and/or purchase of common and preferred stock less cash dividends paid. *DISU* is the net cash proceeds from the issuance and/or repayment of debt. I scale *EISU* and *DISU* by lagged assets to measure the amount of capital raised relative to the existing asset base.

Consistent with H4 that earnings smoothness reduces equity financing sensitivity to stock prices, I expect a significant negative coefficient on $SMTH*Q$ ($\beta_2 < 0$) and a significant positive coefficient on $SMTH*RET$ ($\beta_4 > 0$).

CHAPTER 4

EMPIRICAL RESULTS

4.1 Descriptive statistics

Panel A of Table 1 reports descriptive statistics for the sample used for testing hypotheses H1 - H4. *INVEST* has a mean of 13.83% and a median of 6.87%, suggesting that firms invest and grow on average. Mean values for *EISU* and *DISU* are 0.87% and 2.06% respectively, indicating an overall tendency for firms to raise additional external capital. However, the medians of external financing proxies are all close to zero. *SMTH* has a mean of 1.9 and a median of 1.26, revealing that on average a firm's cash flow volatility exceeds its earnings volatility, consistent with the role of accruals to smooth out transitory components of earnings (Dechow 1994). The mean (median) value of *Q* is 1.86 (1.4) and the mean (median) of *RET* is 0.44 (0.41). These descriptive statistics are consistent with those reported in prior research (Francis, LaFond, Ohlson, and Schipper 2004; Baker, Stein, and Wurgler 2003; Bradshaw, Richardson, and Sloan 2006).

Panel B of Table 1 reports the Pearson and Spearman correlations among these variables. *INVEST* and proxies for external financing (*EISU* and *DISU*) are positively correlated, suggesting that firms raise external capital to finance investment projects. As expected, *INVEST* is positively correlated with *Q* and negatively correlated with *RET*. Moreover, *INVEST* is positively correlated with *CF* and negatively correlated with *LogAsset*. *SMTH* is positively correlated with *STDCFO*, consistent with the innate smoothness role of accruals documented in Dechow and Dichev (2002). Finally, *SMTH* is negatively correlated with *STDRET* and *SPREAD*.

4.2 Regression results

4.2.1 Results for H1

Figure 3 presents the investment sensitivity to stock prices across earnings smoothness terciles from low to high. Panel A reports the coefficient estimates of investment sensitivity to Q from Equation (1) and Panel B reports the coefficient estimates of investment sensitivity to RET from Equation (2). Specifically, moving from low to high $SMTH$, the coefficient estimates on Q decrease from 6.463 to 2.236 (with a coefficient of 5.215 for the medium group) while the coefficient estimates on RET increase from -5.231 to -2.295 (with a coefficient of -4.238 for the medium group). This pattern of results suggests that earnings smoothness reduces investment sensitivity to stock prices.

Table 2 reports the results for H1 when both $SMTH$ and RET are included in the same regression. Column 1 estimates the baseline regression without the interaction terms between $SMTH$ and Q (RET). It shows that $INVEST$ is positively (negatively) related to Q (RET) with the coefficient of 4.892 (-3.430), significant at less than 1% level. Table 1 Panel A indicates that the standard deviation of Q (RET) is 1.41 (0.81). Thus one standard deviation in Q changes $INVEST$ by 6.89% ($1.41 * 4.892 = 6.90$) while one standard deviation in RET changes $INVEST$ by 2.78% ($0.81 * 3.430 = 2.78$).

Column 2 reports the results of Equation (3). The coefficient on $SMTH * Q$ is significantly negative ($\beta_2 = -0.429$, $t = 4.67$) and the coefficient on $SMTH * RET$ is significantly positive ($\beta_4 = 0.292$, $t = 3.44$). Given that unconditional investment sensitivity to Q from Column 1 is 4.892, the coefficient on $SMTH * Q$ shows that one

decile increase in *SMTH* results in about an 8.8% (0.429/4.892) decrease of positive investment sensitivity to *Q*. Similarly, one decile increase in *SMTH* is associated with about an 8.5% (0.292/3.430) decrease of negative investment sensitivity to *RET*.

Turning to control variables, both Columns 1 and 2 show a positive significant coefficient on *CF*, confirming the evidence in the prior literature that investment is positively related to internal financing (Fazzari, Hubbard, and Petersen 1988). The coefficients on *LogAsset* are significantly negative, suggesting that large firms have less growth potential and invest less. The overall evidence in Figure 2 and Table 2 is consistent with H1 that earnings smoothness reduces investment sensitivity to stock prices.

4.2.2 Results for H2

Table 3 reports the regression results for H2. Column 1 presents the baseline regression results. It indicates a positive coefficient on *Q* (4.904) and a negative coefficient on *RET* (-3.435). It also shows that *ISMTH* is not significantly related to *INVEST* while *DSMTH* is significantly positively related to *INVEST*. Column 2 reports the results of Equation (5). The coefficients on *DSMTH*Q* ($\beta_2 = -0.684$, $t = -6.49$) and *ISMTH*Q* ($\beta_3 = -0.124$, $t = -1.35$) are both negative although the latter is not statistically significant. The coefficients on *ISMTH*RET* ($\beta_5 = 0.166$, $t = 1.92$) and *DSMTH*RET* ($\beta_6 = 0.278$, $t = 3.23$) are both significantly positive.¹⁴ These results are generally consistent

¹⁴ Given that my primary interest is whether each component of earnings smoothness drives the results and I do not have a prior to predict which component prevails, I do not compare the magnitudes of the effects associated with innate and discretionary smoothness.

with H2, which predicts that both innate and discretionary components of earnings smoothness reduces investment sensitivity to stock prices.¹⁵

4.2.3 Results for H3

Table 4 reports the regression results of Equation (6). Columns 1, 2, and 3 report the results when the proxy for the uncertainty of the business environment is *STDCFO*, *STDRET*, and *SPREAD*, respectively. The coefficients on *HIGH*Q* (*HIGH*RET*) are significantly positive (negative) across all three columns, indicating that firms are more likely to respond to stock prices when they operate in more uncertain business environments. None of the coefficients on *SMTH*Q* and *SMTH*RET* are significant, indicating that earnings smoothness does not significantly reduce investment sensitivity to stock prices when the uncertainty of business environments is low. The coefficients on *SMTH*HIGH*Q* (*SMTH*HIGH*RET*) are negative (positive) in all three columns and significant in Columns 1 and 3. These results are generally consistent with H3, which predicts that the negative effect of earnings smoothness on investment-price sensitivity is stronger when firms' business environments are more volatile.

4.2.4 Results for H4

Table 5 reports the results for H4. Columns 1 and 3 estimate the baseline regressions with *EISU* and *DISU* as the independent variable, respectively. Columns 1 and 3 show that the magnitudes of the coefficients on *Q* and *RET* are greater for *EISU* than for *DISU* (2.085 versus 0.685; -0.907 versus -0.637), although the distributions of *DISU* and *EISU* (as shown in Panel A of Table 1) indicate that on average firms issue

¹⁵ When the coefficients on the interactions between earnings smoothness and *RET* are statistically significant, I conclude that the results are generally consistent with my hypotheses even though the coefficients on the interactions between earnings smoothness and *Q* are not statistically significant. I use the same criterion to interpret the results for H3. This is because unlike Tobin's *Q*, *RET* is not subject to the concern that it contains information about investment opportunities.

more debt than equity. This combined evidence suggests that equity financing is more sensitive to stock prices than debt financing, consistent with the view that stock market misvaluations affect equity issuance and repurchases.

Columns 2 and 4 report the results of Equation (7) with *EISU* and *DISU* as the independent variable, respectively. Column 2 shows a negative coefficient on *SMTH*Q* ($\beta_2 = -0.251$, $t = -4.54$) and a positive coefficient on *SMTH*RET* ($\beta_4 = 0.087$, $t = 2.54$), which is consistent with H4 that earnings smoothness reduces equity financing sensitivity to stock prices. More specifically, one decile increase in *SMTH* reduces the average equity financing sensitivity to *Q* (2.085 from Column 1) by 12% ($0.251/2.085$) and reduces the average equity financing sensitivity to *RET* (-0.907 from Column 1) by 9.6% ($0.087/0.907$). Column 4 shows a negative coefficient on *SMTH*Q* ($\beta_2 = -0.049$, $t = -2.11$) and a positive but insignificant coefficient on *SMTH*RET* ($\beta_4 = 0.019$, $t = 0.65$). In particular, one decile increase in *SMTH* reduces the average debt financing sensitivity to *Q* (0.685 from Column 3) by 7.2% ($0.049/0.685$) and reduces the average debt financing sensitivity to *RET* (-0.637 from Column 3) by 3.0% ($0.019/0.637$). These results suggest that earnings smoothness has a stronger negative effect on equity financing sensitivity to stock prices than on debt financing sensitivity to stock prices.

CHAPTER 5

INVESTMENT EFFICIENCY ANALYSIS

To validate my prediction that earnings smoothness reduces the impact of market misvaluations on corporate investment, which in turn leads to more efficient investment, in this section I examine the relation between earnings smoothness and investment efficiency. I focus on a firm's likelihood to deviate from expected investment predicted by its sales growth and its average operating performance in the three years subsequent to the year in which I measure investment. These two tests complement each other for the following reasons. Examining a firm's deviation from expected investment provides a direct test of the prediction that managers over-invest (under-invest) when market valuations are high (low). However, this test critically depends on the assumption that sales growth is a good proxy for investment opportunities. Examining future operating performance mitigates the model specification concern. However, any observed relation between earnings smoothness and operating performance may be caused by unknown factors that are related to earnings smoothness but unrelated to firm investment decisions.

5.1 Over- and under-investment

To measure over- and under-investment, I estimate the following piece-wise linear model of investment as a function of sales growth for two-digit SIC industry in each year and use the residuals as proxies for deviations from expected investment.¹⁶

$$INVEST_{i,t} = \alpha_0 + \beta_1 SG_{i,t-1} + \beta_2 NEG_{i,t-1} + \beta_3 SG * NEG_{i,t-1} + \varepsilon_{i,t} \quad (8)$$

¹⁶ Using sales growth to proxy for investment opportunities is consistent with Biddle, Hilary, and Verdi (2009). I estimate a piece-wise linear regression because the relation between investment and sales growth could differ between sales contractions and sales expansions (e.g., McNichols and Stubben 2008; Chen, Hope, Li, and Wang 2010).

where SG is the annual sales growth for firm i in year $t-1$. NEG is an indicator variable taking the value of one for sales decreases, and zero otherwise.

I then examine the relation between earnings smoothness and over- and under-investment by estimating the following equation.¹⁷

$$OINVEST (UINVEST)_{i,t} = \alpha + \beta_1 SMTH_{i,t-1} + \beta_2 LogAsset_{i,t-1} + \beta_3 Slack_{i,t-1} + \beta_4 Leverage_{i,t-1} + \beta_5 Tangibility_{i,t-1} + \beta_6 K-structure_{i,t-1} + \beta_7 Dividend_{i,t-1} + \beta_8 Age_{i,t-1} + \sum YearDum + \sum IndDum + \varepsilon_{i,t} \quad (9)$$

where $OINVEST$ is the positive residuals from equation (9) and $UINVEST$ is the negative residuals multiplied by minus one for ease of interpretation. To mitigate the concern of endogeneity, I measure all independent variables at the beginning of year t . Following Biddle, Hilary, and Verdi (2009), I control for a set of firm characteristics that may affect corporate investment. $LogAsset$ is the log value of book assets. $Slack$ is the ratio of cash balance to property, plant, and equipment. $Leverage$ is the ratio of total debt to total assets. $Tangibility$ is the ratio of property, plant, and equipment to total assets. $K-Structure$ is the ratio of long-term debt to the sum of the long-term debt and the market value of equity. $Dividend$ is an indicator variable taking the value of one if the firm pays a dividend, and zero otherwise. Age is the number of years since the firm first appeared on CRSP.¹⁸ These variables control for firm size, internal financing capability, financial constraints, asset pledgeability, debt overhang problem, and firm maturity, respectively.

¹⁷ In this model all firms in my sample are classified as either over-investing or under-investing. To relax the restriction that all firms deviate from optimal investment, I apply a multi-nominal logistic regression used in Biddle, Hilary, and Verdi (2009). I sort firms into quartiles each year based on the residuals from equation (8). Firm-year observations in the top (bottom) quartile are classified as the over-investing (under-investing) group and those in the middle quartiles as the normal investing group. Thus the multinomial logistic regression tests how earnings smoothness affects the probability of a firm falling into the suboptimal investing groups versus the normal investing group. Untabulated results indicate that using the logistic model does not affect my inferences.

¹⁸ I do not include Q and CF as control variables because they are used to test investment sensitivity to stock prices. Untabulated results indicate that including these variables does not affect my conclusion.

Table 6 reports the regression results for tests of over-investment (Columns 1 and 2) and under-investment (Columns 3 and 4). Columns 1 and 3 present the univariate results while Columns 2 and 4 present the multivariate results with the control variables included. The coefficient estimates on *SMTH* in Columns 1 and 2 are -0.613 (t = -6.24) and -0.450 (t = -4.64), respectively. The coefficient estimates on *SMTH* in Columns 3 and 4 are -0.439 (t = -14.79) and -0.350 (t = -12.19), respectively. These coefficients indicate the percentage change of *OINVEST* and *UINVEST* associated with one decile increase of *SMTH*. When compared with the mean and median values of *INVEST* (13.83% and 6.87%, respectively) in Table 1 Panel A, these effects appear economically significant.

5.2 Subsequent operating performance

I test the relation between earnings smoothness and firm future operating performance by estimating the following equation.

$$Performance_{i,t+3} = \alpha + \beta_1 SMTH_{i,t-1} + \beta_2 Sales_{i,t-1} + \beta_3 Q_{i,t-1} + \beta_4 LogAsset_{i,t-1} + \beta_5 Age_{i,t-1} + \beta_6 Leverage_{i,t-1} + \beta_7 Hindex_{i,t-1} + \sum YearDum + \sum IndDum + \varepsilon_{i,t+3} \quad (10)$$

where Performance is the average firm operating performance over the three years t+1, t+2, and t+3. I consider performance measures based on earnings, cash flows, and sales. Specifically, I use return on assets (*ROA*), return on equity (*ROE*), cash flows from operations (*CFO*), asset turnover (*ATO*) and sales growth (*SG*). Control variables are mainly adopted from Chen, Goldstein, and Wei (2007). *Sales* and *LogAsset* are included to proxy for firm size because Core, Holthausen, and Larcker (1999) find that larger firms have higher future operating performance. *Age* is included to control for firm maturity.

Hindex is the Herfindahl index based on sales and is included to control for the effect of product market competition on firm profitability.

I use these three sets of performance metrics to complement each other because they each have their unique strengths and weaknesses. The positive relation between *SMTH* and *ROA* could be mechanical, simply reflecting inter-temporal shifting of accruals as opposed to the economic consequences of more efficient investment. *CFO* is less likely subject to the same concern. However, *CFO* is not a timely performance metric and does not match well with underlying economic activities (Dechow 1994).¹⁹ Sales-based measures are reliable in the sense that revenues are less likely to be manipulated than expenses (Ertimur, Livnat, and Martikainen 2003; Jegadeesh and Livnat 2006).

Table 7 reports the regression results for the test of operating performance. When future performance is measured as *ROA*, *ROE*, *CFO*, *ATO*, and *SG*, the coefficient on *SMTH* is 0.405, 0.945, 0.292, 0.362, and 0.116, respectively, which represent the percentage increases of corresponding operating performance associated with one decile increase of *SMTH*. Untabulated results show that the mean (median) values of these performance measures in my sample are 2.39% (4.03%), 2% (8.8%), 8.08% (8.6%), 120.29% (104.63%) and 11.24% (8.05%), respectively. Therefore, the effect of earnings smoothness on future operating performance appears economically significant.

¹⁹ For example, negative *CFO* can result from investment in positive net present value projects if disproportionately large amounts of cash flows are received at the later stages of the investment. This is especially true for relatively young firms.

CHAPTER 6

ADDITIONAL TESTS AND ANALYSES

6.1 Alternative measures of corporate investment

In the above main analyses, I use asset growth as a proxy for corporate investment as it captures comprehensive firm investment and disinvestment (Cooper, Gulen, and Schill 2008). To perform a robustness check, I use three alternative measures of corporate investment - *INVESTALT*, *CAPXRND*, and *CAPEX*. *INVESTALT* is the sum of capital expenditure, research and development cost, and acquisition expenditure less cash receipts from sale of property, plant, and equipment as in Biddle, Hilary, and Verdi (2009). Unlike asset growth that includes stock acquisition, this measure of investment includes only cash acquisitions as reported in the statement of cash flows. *CAPXRND* is the sum of capital expenditure and research and development cost and *CAPX* is capital expenditure only. Results in Table 8 indicate that, when using *INVESTALT* or *CAPXRND* as the dependent variable, the coefficients on *SMTH*Q* remain significant and positive and the coefficients on *SMTH*RET* are not significant. Further, as reported in the last column of Table 8, earnings smoothness does not affect the relation between stock prices and capital expenditure (*CAPX*). These results suggest that the effect of earnings smoothness on investment-price sensitivity is stronger when asset growth is used as investment proxy or when stock acquisitions and research and development expenses are included in the calculation of corporate investment. The findings are consistent with the prior studies documenting that stock acquisition and hard-to-value investment, such as R&D, are the key elements in the relation between stock valuations and corporate investment because firms tend to undertake stock acquisitions rather than

cash acquisitions when firms are overvalued and use hard-to-value investment to cater to investor sentiment and maximize short-run stock prices.

6.2 Abnormal investment sensitivity to stock prices

Prior research suggests that firms overinvest when stocks are overvalued and underinvest when stocks are undervalued (Polk and Sapienza 2009). In the main analyses, I perform two sets of tests – the relation between earnings smoothness and investment-price sensitivity and the relation between earnings smoothness and investment efficiency. My combined evidence from these two sets of analyses suggests that earnings smoothness reduces over-investment when stock prices are high and under-investment when prices are low. To test this hypothesis more directly, I replace the dependent variable in Equation (3) with measures of over-investment (*OINVEST*) and under-investment (*UINVEST*). As reported in Table 9, when *OINVEST* is used as the dependent variable, the coefficient on *SMTH*Q* is significant and negative (-0.312, $t = -3.56$), indicating earnings smoothness reduces over-investment when stock prices are high. The coefficient on *SMTH*RET* is significant and positive (0.275, $t = 1.78$), indicating earnings smoothness increases over-investment when stock prices are low. When *UINVEST* is used as the dependent variable, the coefficient on *SMTH*Q* is not significant (0.005, $t = 0.13$) and the coefficient on *SMTH*RET* is significant and negative (-0.100, $t = 2.18$), suggesting that earnings smoothness does not affect under-investment when stock prices are high and reduces under-investment when stock prices are low. These results

generally are consistent with the argument that earnings smoothness reduces over-investment when stock prices are high and under-investment when they are low.²⁰

6.3 Alternative interpretations of investment sensitivity to Q

Variation in Q comes from three sources – mispricing, information about investment profitability, and measurement error (Baker, Stein, and Wurgler 2003). My theory emphasizes that earnings smoothness reduces the impact of mispricing on firm investment. Therefore the other two components in Q can create alternative interpretations for my results.

I address the concern that firms with smoother earnings have a lower investment sensitivity to Q because there is less information about investment opportunities in Q for these firms.²¹ First, as pointed out by Baker, Stein and Wurgler (2003), using future stock returns, which reflect managers' views about over- and under-valuations, helps to mitigate this concern. In the framework of market efficiency, future stock returns should not contain the information about investment opportunities embedded in Q .²² Second, the analyses related to H4 show that equity financing is more sensitive to stock prices than debt financing and earnings smoothness has a stronger negative effect on equity than on debt financing sensitivity to stock prices. These results are consistent with the conjecture that firms react to *stock market* misvaluations by exploiting time-varying cost of *equity*. Finally, if the negative association between earnings smoothness and

²⁰ I do not use *OINVEST* and *UINVEST* as dependent variables in my main analysis as the validity of these abnormal investment measures depend critically on the assumption that sales growth is a good measure of investment opportunities.

²¹ The information hypothesis states that firms react less strongly to stock prices when prices contain less information about firm fundamentals that managers do not have. Consistent with this conjecture, Chen, Goldstein, and Jiang (2007) document a positive relation between price informativeness (proxied by price nonsynchronicity and PIN) and investment sensitivity to stock prices.

²² Using future stock return also helps to discriminate between the interpretations given by the mispricing hypothesis and those given by the adverse-selection models set in an efficient market (Myers and Majluf 1984).

investment sensitivity to stock prices reflects less information in stock prices about firm fundamentals for firms with smoother earnings, I should observe a negative rather than a positive relation between earnings smoothness and firm future operating performance.

Measurement error may also drive the negative relation between earnings smoothness and investment sensitivity to Q if earnings smoothness is positively related to measurement error in Q . Prior research shows that measurement error in Q is greater for young, growing, and low-dividend firms (e.g., Fazzari, Hubbard, and Petersen 1988; Erickson and Whited 2000). However, in my sample, firms with smoother earnings tend to be mature, large, and dividend-paying firms.²³ Therefore, measurement error is unlikely to drive my results. Another possible threat is that the relation between investment and Q is concave. That is, investment sensitivity to Q is higher when Q is low than when Q is high. The negative correlation between $SMTH$ and Q (shown in Table 1 Panel B) suggests that the possible concave relation between Q and investment would bias my results away from showing a negative relation between earnings smoothness and investment sensitivity to Q .

6.4 Control for capital constraints

I document that earnings smoothness has a negative effect on investment sensitivity to stock prices. Baker, Wurgler and Stein (2003) show that capital constraints have a positive effect on investment sensitivity to stock prices. To assess the sensitivity of my results to firms' capital constraints, I include the Kaplan-Zingales index (measured as a function of cash flow, cash dividends, cash balance, and leverage) in my

²³ Untabulated results show that earnings smoothness is significantly positively correlated with *Age*, *LogAsset*, and *Dividend* (Pearson correlations of 0.13, 0.10, and 0.08, respectively).

regressions.²⁴ Consistent with Baker, Stein and Wurgler (2003), I find a positive relation between the Kaplan-Zingales index and investment sensitivity to Q . However, the negative relation between earnings smoothness and investment sensitivity to stock prices is unchanged.

6.5 Managerial attributes

Arguably, managers who smooth earnings have greater propensities to smooth investment, resulting in a less prompt response to stock prices and less volatile investment. Similarly, managers who smooth earnings have higher ability because only capable managers have superior knowledge about firm future performance and are able to smooth earnings (Spence 1973). Therefore, the observed negative relation between earnings smoothness and investment sensitivity to stock prices may simply be driven by managers' preferences or ability rather than by earnings smoothness per se. The evidence that innate earnings smoothness reduces investment sensitivity to stock prices helps rule out managerial preferences as the sole driver for my findings.

²⁴ The Pearson and Spearman correlations between *SMTH* and *KZ* index are -0.01 and -0.05, respectively.

CHAPTER 7

CONCLUSIONS

This paper examines the effect of earnings smoothness on corporate investment sensitivity to stock prices. I find that earnings smoothness is negatively associated with investment sensitivity to stock prices. That is, relative to firms with volatile earnings, firms with smoother earnings are less likely to invest more(less) when stock prices are high (low). In addition, I document that both innate and discretionary components of earnings smoothness are negatively associated with investment sensitivity to stock prices. Exploring cross-sectional variation in the effect of earnings smoothness, I show that the negative impact of earnings smoothness on investment-price sensitivity is greater when firms operate in more volatile or more uncertain business environments. Finally, I demonstrate that earnings smoothness has a negative effect on equity financing sensitivity to stock prices.

To determine whether the effect of earnings smoothness on investment-price sensitivity translates into more efficient investment, I examine the relation between earnings smoothness and investment efficiency. The results reveal that earnings smoothness reduces a firm's over- (under)-investment and increases its future operating performance. Collectively, these results suggest that earnings smoothness reduces the volatility of investment introduced by non-fundamental movements in stock prices, leading to more efficient corporate investment.

The main interpretation of the results is consistent with Lamont and Stein's (2006) prediction that corporate investment and issuance should respond less strongly to stock prices that contain a smaller proportion of nonfundamentals. An alternative interpretation is that the lower investment-price sensitivity associated with smoothing firms reflects less

information about investment opportunities embedded in stock prices for these firms. However, this alternative interpretation is inconsistent with the previous findings suggesting that earnings smoothing provides information in the U.S. setting (e.g., Tucker and Zarowin). Regardless, my results provide an empirical regularity that associates firms' earnings properties with the relation between corporate investment and stock prices.

My paper focuses on the average effect of earnings smoothness on investment-price sensitivity. Future research could examine the effect of earnings smoothing in settings where managers smooth earnings to convey private information versus settings where managers smooth earnings to mask underlying operations. My study uses asset growth as a general measure of firm investment. Future research could study the effect of earnings smoothness in more specific contexts, such as firms' decisions to undertake mergers and acquisitions. Finally, future research could examine how other earnings attribute measures, such as timely loss recognition, impact the relation between stock prices and corporate investment.

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APPENDIX

Variable Definitions

Investment measures:

- INVEST*: Change in assets (data6) scaled by lagged assets (%).
- INVESTALT*: The sum of capital expenditure (data128), research and development expenditure (data46), and acquisition expenditure (data129) less cash receipts from sale of property, plant, and equipment (data107) scaled by lagged total assets (data6) (%).
- CPAXRND*: The sum of capital expenditure (data128) and research and development expenditure (item 46) multiplied by 100 and scaled by lagged total assets (item 6).
- CAPX*: Capital expenditure (item 128) multiplied by 100 and scaled by lagged total assets (item 6).

External financing measures:

- EISU*: Equity issuance, measured as the net cash proceeds from the issuance and/or purchase of common and preferred stock less cash dividends paid (data108-data115-data127) scaled by lagged assets (data6).
- DISU*: Debt issuance, measured as the net cash proceeds from the issuance and/or repayment of debt (data111-data114+data301) scaled by lagged assets (data6).

Earnings smoothness measures:

- SMTH*: The standard deviation of cash flows (data308) scaled by total assets (data6) divided by standard deviation of earnings (data18) scaled by total assets (data6) over the five years t-5 to t-1.
- ISMTH*: Innate component of earnings smoothness measured as the predicted value from the regression below.
- DSMTH*: Discretionary component of earning smoothness measured as the residuals from the following regression.

$$SMTH_{i,t} = \alpha_0 + \beta_1 \text{LogAsset}_{i,t} + \beta_2 \text{STDCFO}_{i,t} + \beta_3 \text{STDSALES}_{i,t-1} + \beta_4 \text{OperatingCyle}_{i,t} + \beta_5 \text{Loss}_{i,t} + \varepsilon_{i,t}$$

The above equation is estimated on all firms in the same industry (two-digit SIC) each year. Independent variables are defined in the “firm innate attributes” section listed below.

Firm innate attributes:

- LogAsset:* The log of total assets (data6).
- STDSALES:* The standard deviation of sales (data12) deflated by total assets (data6) over the five years t-5 to t-1.
- STDCFO:* The standard deviation of cash flows (data308) scaled by total assets (data6) over the five years t-5 to t-1.
- OperatingCycle:* The log of receivables to sales (data2/data12) plus inventory to cost of goods sold (data3/data41) multiplied by 360.
- Loss:* The number of years over the five years t-5 to t-1 in which the firm's net income before extraordinary item (data18) is negative.

Inherent information asymmetry proxies:

- STDCFO:* The same as STDCFO described above.
- STDRET:* The standard deviation of daily stock returns.
- SPREAD:* The average daily bid-ask spread, measured as the difference between ask and bid prices scaled by the average of bid and ask prices.

Investment efficiency measures:

- OINVEST:* The positive residuals from the investment model in the following equation.
- UINVEST:* The absolute value of negative residuals from the investment model in the following equation:

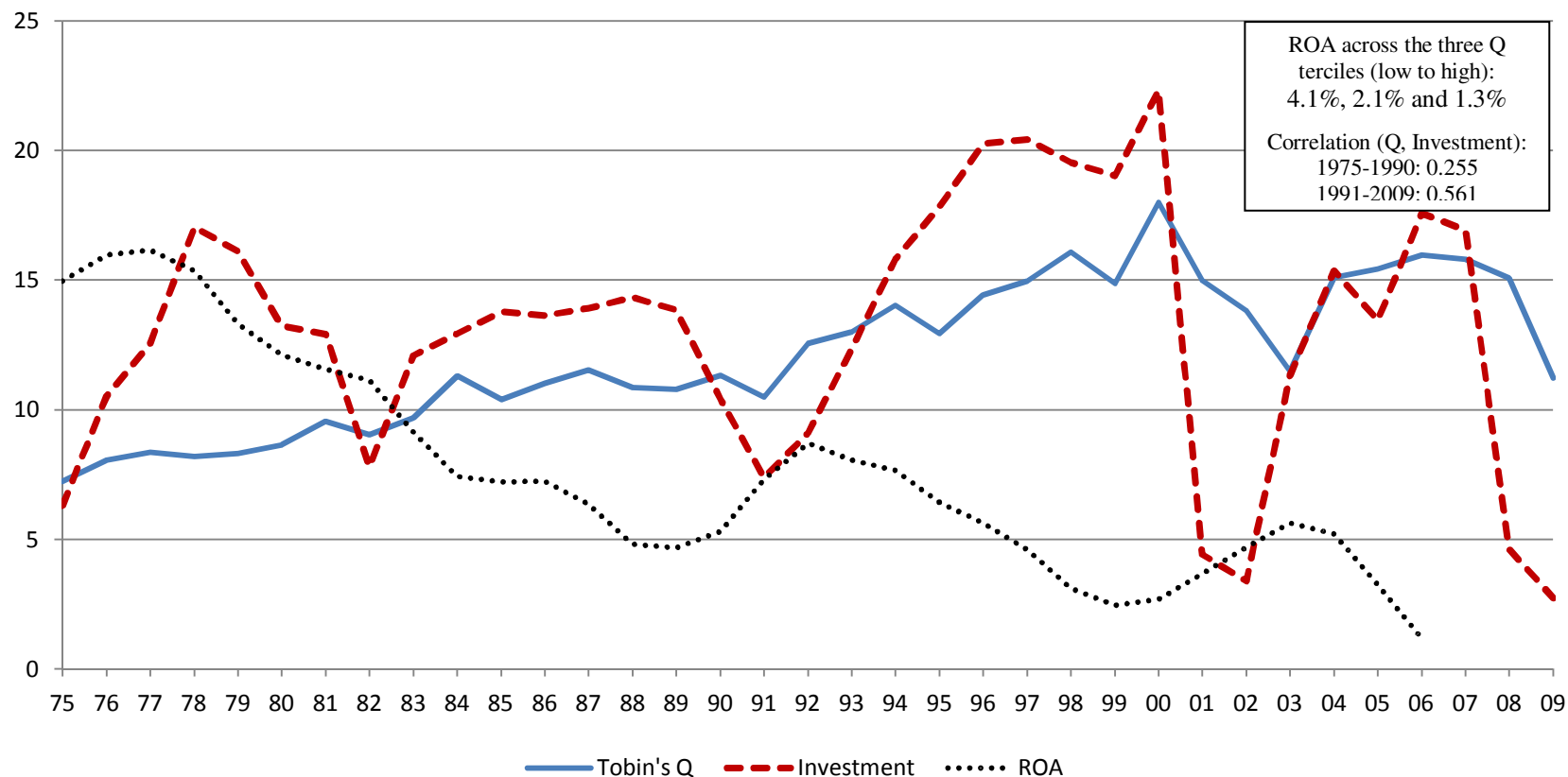
$$INVEST_{i,t} = \alpha_0 + \beta_1 SG_{i,t-1} + \beta_2 NEG_{i,t-1} + \beta_3 SG * NEG_{i,t-1} + \varepsilon_{i,t}$$

where SG is net sales growth (data12) in year t-1, NEG is an indicator variable taking the value of 1 if SG is negative, and 0 otherwise. Equation (2) is estimated by two-digit SIC code and fiscal year.

- ROA:* Earnings before extraordinary items (data18) scaled by lagged assets (data6) (in %).
- ROE:* Earnings before extraordinary items (data18) scaled by lagged book value of equity (data60) (in %).
- CFO:* Cash flow from operations (data308) scaled by lagged assets (data6) (in %).

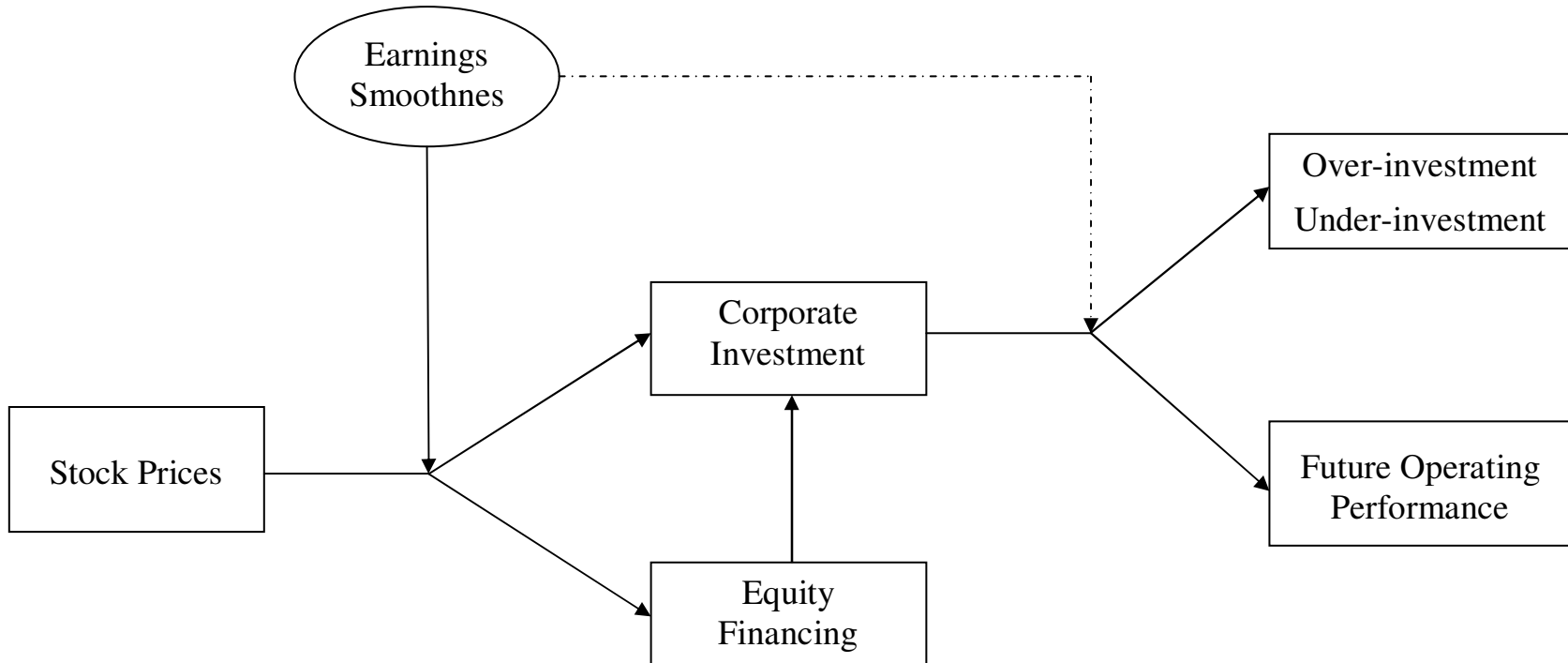
<i>ATO:</i>	Asset turnover measured as sales revenue divided by total assets (data6) (in %).
<i>SG:</i>	Net sales growth (data12) (in %).
<u>Other variables:</u>	
<i>Q:</i>	The ratio of the market value of total assets (data6 - (data 25*data 199) - data60 - data 74) to book value of total assets (data 6).
<i>RET:</i>	Cumulative raw returns over the three years t+1, t+2, and t+3.
<i>CF:</i>	The sum of net income before extraordinary items (data18), depreciation and amortization expense (data14) and R&D expense (data46), scaled by lagged assets(data6).
<i>Slack:</i>	The ratio of cash (data1) to PPE (data8).
<i>Leverage:</i>	The ratio of the sum of short-term debt (data34) and long-term debt (data9) to total assets (data6).
<i>Tangibility:</i>	The ratio of PPE (data8) to total assets (data6).
<i>K-Structure:</i>	The ratio of long-term debt (data9) to the sum of long-term debt and the market value of equity (data9+data 25*data199).
<i>Dividend:</i>	An indicator variable taking the value of 1 if the firm pays a dividend (data21 or data127), and 0 otherwise.
<i>Age:</i>	The number of years since the firm first appeared on CRSP.
<i>Sales:</i>	Total sales revenues (data12) scaled by lagged assets (data6) (in %).
<i>Hindex:</i>	The Herfindahl index of sales (data12), based on firm segment reports. Industries are defined at the three-digit SIC code level.
<i>KZ:</i>	The Kaplan-Zingales index, measured as $-1.002\text{Cashflow} - 39.368\text{Dividends} - 1.315\text{Cash} + 3.139\text{Leverage}$.

FIGURE 1
Tobin's Q, Corporate Investment, and Future ROA by Year



This figure plots the average values of Tobin's Q (solid line), corporate investment (square dotted line) and the median values of future ROA (round dotted line) over the years 1975 through 2009. The sample is based on all firms in Compustat with a book value of equity greater than \$10 million. *Tobin's Q* is measured as the ratio of the market value of total assets to the book value of total assets at the beginning of year *t*. Investment is the change in book value of assets (in %) in year *t*. *ROA* is the average return on assets (in %) over the three years *t*+1 to *t*+3. *Q (ROA)* is multiplied by 8(3) for scaling in the figure. Detailed definitions of all the variables used in this paper are provided in the Appendix.

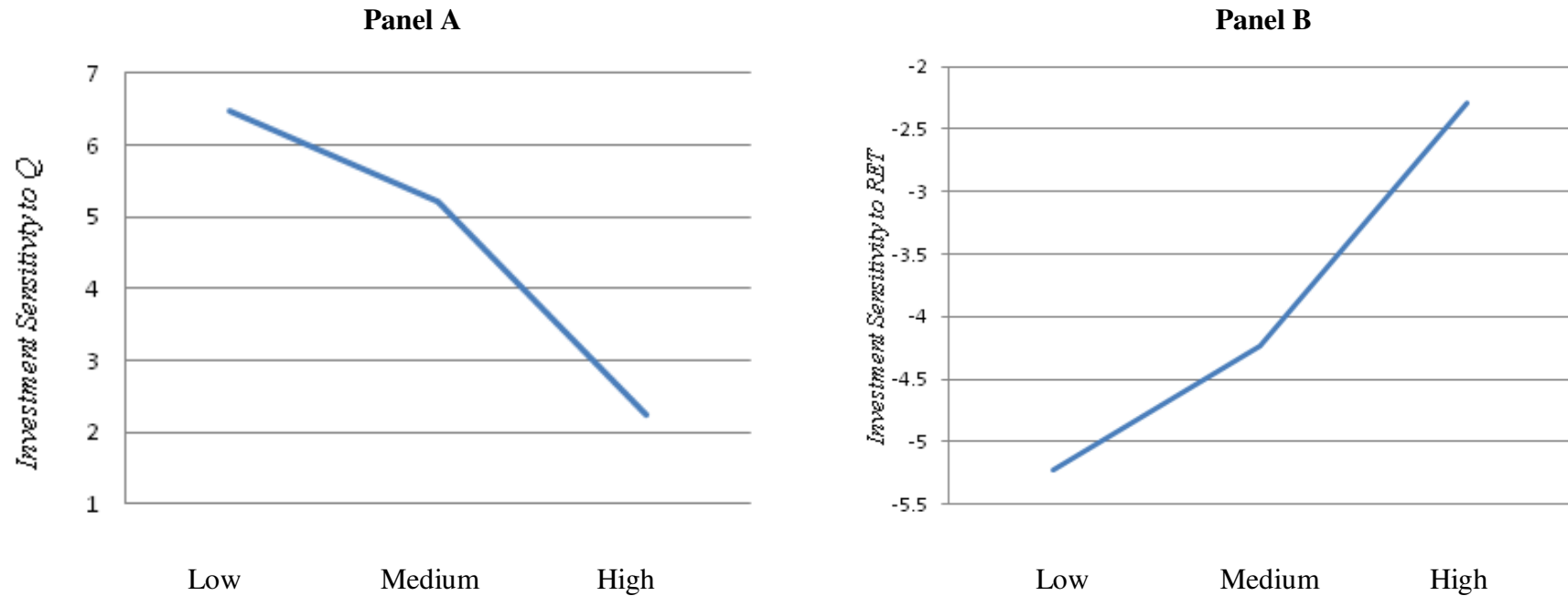
FIGURE 2
Relations among Earnings smoothness, Stock Prices, and Corporate Investment



This figure presents the relations among earnings smoothness, corporate investment, and stock prices. Stock prices affect corporate investment directly through the “catering” channel and indirectly through the equity financing channel. Earnings smoothness reduces the impact of stock prices on corporate investment and equity financing. This effect in turn enhances investment efficiency measured by over- (under-) investment and future operating performance.

FIGURE 3

Investment Sensitivity to Stock Prices across Earnings Smoothness Groups



This figure presents investment sensitivity to Q in Panel A and investment sensitivity to RET in Panel B across the three earnings smoothness groups. Investment sensitivity to Q (RET) is the coefficient β_1 (β_2) from the following equations estimated separately for the three earnings smoothness groups.

$$INVEST_{i,t} = \alpha + \beta_1 Q_{i,t-1} + \beta_2 CF_{i,t} + \beta_3 LogAsset_{i,t-1} + \sum YearDum + \sum IndDum + \varepsilon_{i,t}$$

$$INVEST_{i,t} = \alpha + \beta_2 RET_{i,t+3} + \beta_2 CF_{i,t} + \beta_3 LogAsset_{i,t-1} + \sum YearDum + \sum IndDum + \varepsilon_{i,t}$$

where $INVEST$ is the percent change in book assets scaled by lagged book assets in year t . $SMTH$ is earnings smoothness, measured as the ratio of the standard deviation of cash flows to the standard deviation of earnings over the five years $t-5$ to $t-1$. Q is measured as the ratio of the market value of total assets to the book value of total assets at the beginning of year t . CF is the cash flow in year t , measured as the sum of net income before extraordinary item, depreciation and amortization expense, and R&D expense scaled by lagged assets. RET is the cumulative raw returns over the three years $t+1$, $t+2$, and $t+3$. $LogAsset$ is the log value of book assets at the beginning of year t .

TABLE 1
Summary Statistics for Variables Used for Hypotheses Testing

Panel A: Descriptive Statistics

Variables	n	Mean	S.D.	P5	P25	P50	P75	P95
<i>INVEST (%)</i>	32,234	13.83	33.37	-19.58	-1.53	6.87	19.21	69.87
<i>EISU (%)</i>	32,234	0.87	13.45	-10.92	-2.66	-0.28	0.72	16.31
<i>DISU (%)</i>	32,234	2.06	11.57	-10.33	-2.30	0.00	3.28	21.61
<i>SMTH</i>	32,234	1.90	1.96	0.34	0.77	1.26	2.22	5.73
<i>ISMTH</i>	32,234	2.94	17.86	-13.71	-4.81	-0.49	4.36	34.50
<i>DSMTH</i>	32,234	0.87	13.45	-10.91	-2.65	-0.28	0.71	16.31
<i>Q</i>	32,234	1.86	1.41	0.79	1.07	1.40	2.08	4.55
<i>RET</i>	32,234	0.44	0.81	-0.85	-0.01	0.41	0.86	1.88
<i>CF</i>	32,234	0.13	0.12	-0.05	0.06	0.11	0.18	0.34
<i>LogAsset</i>	32,234	6.14	1.92	3.38	4.65	5.92	7.43	9.66
<i>STDCFO</i>	32,234	0.06	0.05	0.01	0.03	0.05	0.08	0.17
<i>STDRET</i>	32,048	0.03	0.02	0.01	0.02	0.03	0.04	0.07
<i>SPREAD</i>	32,048	0.02	0.01	0.01	0.01	0.02	0.03	0.04

Panel B: Pearson (Spearman) Correlations Above (Below) the Diagonal

	1	2	3	4	5	6	7	8	9	10	11	12	13
1 <i>INVEST</i>		0.46	0.51	0.02	0.03	-0.01	0.31	-0.10	0.38	-0.07	0.08	0.00	0.00
2 <i>EISU</i>	0.20		0.01	-0.09	-0.13	0.02	0.20	-0.03	-0.03	-0.22	0.22	0.25	0.26
3 <i>DISU</i>	0.41	-0.08		0.03	0.03	0.00	0.08	-0.06	0.05	-0.01	0.01	-0.06	-0.05
4 <i>SMTH</i>	0.09	-0.13	0.06		0.55	0.54	-0.06	-0.03	0.01	0.06	0.07	-0.22	-0.23
5 <i>ISMTH</i>	0.10	-0.17	0.06	0.55		-0.26	-0.01	-0.03	0.06	0.11	0.04	-0.24	-0.24
6 <i>DSMTH</i>	0.01	0.03	0.01	0.54	-0.26		-0.05	0.00	-0.05	-0.04	0.03	-0.02	-0.02
7 <i>Q</i>	0.33	0.01	0.11	-0.06	-0.01	-0.06		-0.07	0.39	-0.05	0.22	0.09	0.12
8 <i>RET</i>	-0.09	0.02	-0.06	-0.02	-0.02	0.00	-0.11		-0.02	-0.08	0.04	0.18	0.15
9 <i>CF</i>	0.47	-0.09	0.04	0.00	0.04	-0.04	0.50	-0.02		-0.01	0.01	-0.10	-0.09
10 <i>LogAsset</i>	-0.03	-0.31	0.03	0.07	0.12	-0.03	0.03	-0.07	-0.02		-0.39	-0.49	-0.48
11 <i>STDCFO</i>	0.03	0.31	-0.04	0.13	0.04	0.09	0.14	0.05	0.06	-0.47		0.44	0.45
12 <i>STDRET</i>	-0.07	0.45	-0.10	-0.22	-0.24	-0.02	-0.03	0.15	-0.07	-0.54	0.52		0.92
13 <i>SPREAD</i>	-0.05	0.45	-0.09	-0.22	-0.23	-0.03	0.04	0.12	-0.05	-0.51	0.51	0.93	

Panel A presents descriptive statistics for the variables used for hypothesis testing and Panel B presents correlations among these variables. *INVEST* is the percentage change in book assets scaled by lagged book assets. *EISU* is the net cash proceeds from the issuance and/or purchase of common and preferred stock less cash dividends paid. *DISU* is the net cash proceeds from the issuance and/or repayment of debt. *SMTH* is earnings smoothness, measured as the ratio of the standard deviation of cash flows to the standard deviation of earnings over the five years t-5 to t-1. *ISMTH* is the innate component of earnings smoothness. *DSMTH* is the discretionary component of earnings smoothness. *SMTH*, *DSMTH*, and *ISMTH* are ranked into deciles by year in Panel B. *Q* is measured as the ratio of the market value of total assets to the book value of total assets. *CF* is cash flows, measured as the sum of net income before extraordinary items, depreciation and amortization expense, and R&D expense scaled by lagged assets. *RET* is the cumulative raw returns over the three years t+1, t+2, and t+3. *LogAsset* is the log value of total assets. *STDCFO* is the standard deviation of cash flows over the five years t-5 to t-1. *STDRET* is the standard deviation of daily stock returns. *SPREAD* is the average daily bid-ask spread, measured as the difference between ask and bid price scaled by the average of bid and ask price.

TABLE 2
Earnings Smoothness and Investment Sensitivity to Stock Prices

$$INVEST_{i,t} = \alpha + \beta_1 Q_{i,t-1} + \beta_2 SMTH_{i,t-1} * Q_{i,t-1} + \beta_3 RET_{i,t+3} + \beta_4 SMTH_{i,t-1} * RET_{i,t+3} + \beta_5 CF_{i,t} + \beta_6 LogAsset_{i,t-1} + \beta_7 SMTH_{i,t-1} + \sum YearDum + \sum IndDum + \varepsilon_{i,t}$$

	Expected Sign	INVEST	
		Column 1	Column 2
<i>Q</i>	(+)	4.892* (14.98)	6.601* (12.19)
<i>SMTH*Q</i>	(-)		-0.429* (-4.67)
<i>RET</i>	(-)	-3.430* (-12.31)	-4.641* (-9.64)
<i>SMTH*RET</i>	(+)		0.292* (3.44)
<i>CF</i>	(+)	88.482* (31.40)	89.498* (31.91)
<i>LogAsset</i>	(-)	-1.686* (-13.20)	-1.643* (-12.90)
<i>SMTH</i>	(?)	0.198* (2.81)	0.843* (5.07)
Observations		32,234	32,234
R ²		21.31%	21.59%

This table reports regression results of the effect of earnings smoothness on investment sensitivity to stock prices. All variables are defined in Table 1. t-statistics are in parentheses and are calculated based on standard errors clustered by firm. Year and industry fixed effects are included. *, **, and *** denote significance at the 1%, 5%, and 10% levels, respectively (two-tailed test).

TABLE 3
Innate and Discretionary Earnings Smoothness and Investment Sensitivity to Stock Prices

$$INVEST_{i,t} = \alpha + \beta_1 Q_{i,t-1} + \beta_2 ISMTH_{i,t-1} * Q_{i,t-1} + \beta_3 DSMTH_{i,t-1} * Q_{i,t-1} + \beta_4 RET_{i,t+3} + \beta_5 ISMTH_{i,t-1} * RET_{i,t+3} + \beta_6 DSMTH_{i,t-1} * RET_{i,t+3} + \beta_7 CF_{i,t} + \beta_8 LogAsset_{i,t-1} + \beta_9 ISMTH_{i,t-1} + \beta_{10} DSMTH_{i,t-1} + \sum YearDum + \sum IndDum + \varepsilon_{i,t}$$

	Expected Sign	INVEST	
		Column 1	Column 2
<i>Q</i>	(+)	4.904* (15.02)	8.377* (10.78)
<i>ISMTH*Q</i>	(-)		-0.684* (-6.49)
<i>DSMTH*Q</i>	(-)		-0.124 (-1.35)
<i>RET</i>	(-)	-3.435* (-12.34)	-5.33* (-7.65)
<i>ISMTH*RET</i>	(+)		0.166** (1.92)
<i>DSMTH*RET</i>	(+)		0.278* (3.23)
<i>CF</i>	(+)	88.984* (31.45)	91.418* (32.46)
<i>LogAsset</i>	(-)	-1.670* (-13.18)	-1.570* (-12.47)
<i>ISMTH</i>	(?)	0.034 (0.42)	1.176* (6.32)
<i>DSMTH</i>	(?)	0.238* (3.71)	0.334** (2.02)
Observations		32,234	32,234
R ²		21.32%	21.89%

This table reports regression results of the effect of innate and discretionary earnings smoothness on investment sensitivity to stock prices. All variables are defined in Table 1. t-statistics are in parentheses and are calculated based on standard errors clustered by firm. Year and industry fixed effects are included. *, **, and *** denote significance at the 1%, 5%, and 10% levels, respectively (two-tailed test).

TABLE 4

Firm Operating Environments and Relation between Earnings Smoothness and Investment Sensitivity to Stock Prices

$$INVEST_{i,t} = \alpha + \beta_1 Q_{i,t-1} + \beta_2 HIGH_{i,t-1} * Q_{i,t-1} + \beta_3 SMTH_{i,t-1} * Q_{i,t-1} + \beta_4 SMTH_{i,t-1} * HIGH * Q_{i,t-1} + \beta_5 RET_{i,t+3} + \beta_6 HIGH_{i,t-1} * RET_{i,t+3} + \beta_7 SMTH_{i,t-1} * RET_{i,t+3} + \beta_8 SMTH_{i,t-1} * HIGH_{i,t-1} * RET_{i,t+3} + \beta_9 CF_{i,t} + \beta_{10} LogAsset_{i,t-1} + \beta_{11} SMTH_{i,t-1} + \beta_{12} HIGH_{i,t-1} + \beta_{13} SMTH_{i,t-1} * HIGH_{i,t-1} + \sum YearDum + \sum IndDum + \varepsilon_{i,t}$$

	Exp. Sign	STDCFO	HIGH = STDRET	SPREAD
		Column 1	Column 2	Column 3
<i>Q</i>	(+)	2.543* (4.11)	1.729** (2.39)	1.401** (2.13)
<i>HIGH*Q</i>	(+)	6.330* (6.98)	5.779* (6.14)	6.223* (6.96)
<i>SMTH*Q</i>	(-)	-0.011 (-0.11)	-0.102 (-0.97)	-0.029 (-0.29)
<i>SMTH*HIGH*Q</i>	(-)	-0.728* (-4.50)	-0.255 (-1.56)	-0.412* (-2.65)
<i>RET</i>	(-)	-3.252* (-5.73)	-2.333* (-3.00)	-2.053** (-2.65)
<i>HIGH*RET</i>	(-)	-2.525* (-2.82)	-2.692* (-2.83)	-3.189* (-3.36)
<i>SMTH*RET</i>	(+)	0.123 (1.03)	0.024 (0.18)	-0.041 (-0.32)
<i>SMTH*HIGH*RET</i>	(+)	0.305*** (1.81)	0.259 (1.52)	0.365** (2.13)
<i>CF</i>	(+)	91.399* (33.1)	93.173* (33.45)	93.155* (33.02)
<i>LogAsset</i>	(-)	-1.523* (-11.79)	-1.397* (-10.56)	-1.307* (-9.79)
<i>SMTH</i>	(?)	0.126 (0.67)	0.300 (1.60)	0.242 (1.37)
<i>HIGH</i>	(?)	-11.300* (-6.33)	-9.056* (-5.29)	-8.734* (-5.37)
<i>SMTH*HIGH</i>	(?)	1.436* (4.62)	0.601** (2.01)	0.797* (2.76)
Observations		32,155	32,048	32,048
R ²		22.30%	22.50%	22.46%

This table reports regression results of cross-sectional variation in the effect of earnings smoothness on investment sensitivity to stock prices. *HIGH* is an indicator variables coded as 1 if the corresponding proxy (i.e., *STDCFO*, *STDRET*, and *SPREAD*) for operating environment volatility/uncertainty is above the median in year t-1, and 0 otherwise. All other variables are defined in Table 1. t-statistics are in parentheses and are calculated based on standard errors clustered by firm. Year and industry fixed effects are included. *, **, and *** denote significance at the 1%, 5%, and 10% levels, respectively (two-tailed test).

TABLE 5
Earnings Smoothness and External Financing Sensitivity to Stock Prices

$$ISU_{i,t} = \alpha + \beta_1 Q_{i,t-1} + \beta_2 SMTH_{i,t-1} * Q_{i,t-1} + \beta_3 RET_{i,t+3} + \beta_4 SMTH_{i,t-1} * RET_{i,t+3} + \beta_5 CF_{i,t} + \beta_6 LogAsset_{i,t-1} + \beta_7 SMTH_{i,t-1} + \sum YearDum + \sum IndDum + \varepsilon_{i,t}$$

	Exp. Sign	<i>EISU</i>		<i>DISU</i>	
		Column 1	Column 2	Column 3	Column 4
<i>Q</i>	(+)	2.085* (11.99)	3.087* (10.20)	0.685* (8.73)	0.880* 6.58
<i>SMTH*Q</i>	(-)		-0.251* (-4.54)		-0.049** (-2.11)
<i>RET</i>	(-)	-0.907* (-7.64)	-1.270* (-6.30)	-0.637* (-6.44)	-0.717* (-4.31)
<i>SMTH*RET</i>	(+)		0.087* (2.54)		0.019 (0.61)
<i>CF</i>	(-)	-13.682* (-8.67)	-13.091* (-8.33)	1.671** (2.09)	1.786** (2.25)
<i>LogAsset</i>	(-)	-1.584* (-22.93)	-1.559* (-22.70)	-0.159* (-4.73)	-0.155* (-4.58)
<i>SMTH</i>	(?)	-0.238* (-7.87)	0.178*** (1.88)	0.140* (5.95)	0.220* (4.47)
Observations		32,234	32,234	32,234	32,234
R ²		12.64%	13.17%	3.50%	3.52%

This table reports regression results of the effect of earnings smoothness on external financing sensitivity to stock prices. All variables are defined in Table 1. t-statistics are in parentheses and are calculated based on standard errors clustered by firm. Year and industry fixed effects are included. *, **, and *** denote significance at the 1%, 5%, and 10% levels, respectively (two-tailed test).

TABLE 6
Earnings Smoothness and Deviations from Expected Investment

$$OINVEST (UINVEST)_{i,t} = \alpha + \beta_1 SMTH_{i,t-1} + \beta_2 LogAsset_{i,t-1} + \beta_3 Slack_{i,t-1} + \beta_4 Leverage_{i,t-1} + \beta_5 Tangibility_{i,t-1} + \beta_6 K-structure_{i,t-1} + \beta_7 Dividend_{i,t-1} + \beta_8 Age_{i,t-1} + \sum YearDum + \sum IndDum + \varepsilon_{i,t}$$

	Expected Sign	OINVEST		UINVEST	
		Column 1	Column 2	Column 3	Column 4
<i>SMTH</i>	(-/-)	-0.613* (-6.24)	-0.450* (-4.64)	-0.439* (-14.79)	-0.350* (-12.19)
<i>LogAsset</i>	(-/-)		-1.247* (-6.29)		-0.339* (-6.14)
<i>Slack</i>	(+/-)		0.115** (2.08)		0.100* (5.49)
<i>Leverage</i>	(-/+)		10.709* (3.36)		-0.365 (-0.37)
<i>Tangibility</i>	(-/-)		-5.829* (-3.11)		-5.688* (-9.72)
<i>K-Structure</i>	(-/+)		-13.585* (-5.37)		3.234* (4.26)
<i>Dividend</i>	(-/-)		-3.009* (-4.20)		-1.584* (-7.87)
<i>Age</i>	(-/-)		-0.144* (-7.59)		-0.039* (-7.31)
Observations		18,046	18,046	28,447	28,447
R ²		6.91%	8.90%	9.61%	12.31%

This table reports regression results of the effect of earnings smoothness on over- and under-investment. Dependent variable is over-investment (*OINVEST*) in columns 1 and 2 and under-investment (*UINVEST*) in columns 3 and 4. *OINVEST* and *UINVEST* are unexpected investment estimated from a model of investment as a function of sales growth. *SMTH* and *LogAsset* are defined in Table 1. *Slack* is the ratio of cash to PPE. *Leverage* is the ratio of the sum of short-term and long-term debt to total assets. *Tangibility* is the ratio of PPE to total assets. *K-structure* is the ratio of long-term debt to the sum of long-term debt and the market value of equity. *Dividend* is an indicator variables taking value of 1 if firm pays dividend, and 0 otherwise. *Age* is the number of years since the firm first appears on CRSP. t-statistics are in parentheses and are calculated based on standard errors clustered by firm. Year and industry fixed effects are included. *, **, and *** denote significance at the 1%, 5%, and 10% levels respectively (two-tailed test).

TABLE 7
Earnings Smoothness and Future Operating Performance

$$Performance_{i,t+3} = \alpha + \beta_1 SMTH_{i,t-1} + \beta_2 Sales_{i,t-1} + \beta_3 Q_{i,t-1} + \beta_4 LogAsset_{i,t-1} + \beta_5 Age_{i,t-1} + \beta_6 Leverage_{i,t-1} + \beta_7 Hindex_{i,t-1} + \sum YearDum + \sum IndDum + \varepsilon_{i,t+3}$$

	Exp. Sign	ROA	ROE	CFO	ATO	SG
SMTH	(+)	0.405* (11.85)	0.945* (6.88)	0.292* (9.75)	0.362* (3.71)	0.116* (2.03)
<i>Sales</i>	(+)	3.738* (15.58)	7.002* (9.07)	3.163* (13.73)	90.375* (101.02)	-4.390* (-13.89)
<i>Q</i>	(?)	0.299* (2.79)	0.237 (0.63)	0.445* (4.89)	-0.940* (-6.34)	1.093* (6.97)
<i>LogAsset</i>	(?)	1.469* (16.86)	3.959* (13.75)	1.418* (18.29)	-0.700* (-3.68)	-0.712* (-6.19)
<i>Age</i>	(?)	0.030* (4.11)	0.128* (4.20)	0.003 (0.49)	-0.106* (-5.64)	-0.095* (-8.72)
<i>Leverage</i>	(?)	-1.802* (-2.64)	7.652* (2.55)	-0.547 (-0.87)	2.881 (1.53)	-1.630 (-1.36)
<i>Hindex</i>	(?)	1.042 (1.17)	2.603 (0.79)	-0.409 (-0.50)	1.417 (0.51)	-5.686* (-4.30)
Observation		31,254	31,252	31,235	31,254	31,244
R ²		15.10%	5.58%	19.07%	83.66%	9.77%

This table reports regression results of the effect of earnings smoothness on future operating performance. *ROA* is return on asset, measured as earnings divided by lagged assets. *ROE* is return on equity, measured as earnings divided by owner's equity. *CFO* is cash flows from operations, measured as cash flows scaled by lagged assets. *ATO* is asset turnover, measured as sales divided by assets. *SG* is sales growth. All performance measures are the average performance over the three years t+1, t+2, and t+3. *Sales* is net sales. *Age* is the number of years since the firm first appeared on CRSP. *Leverage* is the debt to asset ratio. *Hindex* is the Herfindahl index of sales based on firms' segment reports where industries are defined at the three-digit SIC code level. *SMTH*, *Q*, and *LogAsset* are defined in Table 1. t-statistics are in parentheses and are calculated based on standard errors clustered by firm. Year and industry fixed effects are included. *, **, and *** denote significance at the 1%, 5%, and 10% levels respectively (two-tailed test).

TABLE 8
Earnings Smoothing and Investment Sensitivity to Stock Prices –
Alternative Measures of Investment

$$INVEST_{i,t} = \alpha + \beta_1 Q_{i,t-1} + \beta_2 SMTH_{i,t-1} * Q_{i,t-1} + \beta_3 RET_{i,t+3} + \beta_4 SMTH_{i,t-1} * RET_{i,t+3} + \beta_5 CF_{i,t} + \beta_6 LogAsset_{i,t-1} + \beta_7 SMTH_{i,t-1} + \sum YearDum + \sum IndDum + \varepsilon_{i,t}$$

	Expected Sign	<i>INVESTALT</i>	<i>CAPXRND</i>	<i>CAPX</i>
<i>Q</i>	+	2.322* (11.80)	1.803* (8.77)	0.357* (3.71)
<i>SMTH*Q</i>	-	-0.094* (-2.84)	-0.295* (-3.28)	-0.030 (1.06)
<i>RET</i>	-	-0.136 (-0.68)	0.294 (1.50)	-0.374* (-2.76)
<i>SMTH*RET</i>	+	0.029 (1.57)	0.036 (1.63)	0.001 (0.05)
<i>CF</i>	+	30.038* (23.90)	18.822* (8.56)	11.443* (6.97)
<i>LogAsset</i>	-	-0.915* (-14.42)	-0.768* (-11.19)	-0.233* (-3.38)
<i>SMTH</i>	?	0.023 (0.36)	0.034 (0.57)	0.103* (2.61)
Observations		32,234	32,234	32,234
R ²		22.59%	39.52%	36.07%

This table reports regression results of the effect of earnings smoothness on investment sensitivity to stock prices. All variables are defined in Table 1. t-statistics are in parentheses and are calculated based on standard errors clustered by firm. Year and industry fixed effects are included. *, **, and *** denote significance at the 1%, 5%, and 10% levels, respectively (two-tailed test).

TABLE 9
Earnings Smoothing and Investment Sensitivity to Stock Prices –
Abnormal Investment

$$OINVEST(UINVEST)_{i,t} = \alpha + \beta_1 Q_{i,t-1} + \beta_2 SMTH_{i,t-1} * Q_{i,t-1} + \beta_3 RET_{i,t+3} + \beta_4 SMTH_{i,t-1} * RET_{i,t+3} + \beta_5 CF_{i,t} + \beta_6 LogAsset_{i,t-1} + \beta_7 SMTH_{i,t-1} + \sum YearDum + \sum IndDum + \varepsilon_{i,t}$$

	Expected Sign	<i>OINVEST</i>	<i>UINVEST</i>
<i>Q</i>	(+/?)	3.333* (5.59)	0.872* (5.43)
<i>SMTH*Q</i>	(-/?)	-0.312* (-3.56)	0.005 (0.13)
<i>RET</i>	(?/+)	-5.873* (-4.46)	0.975* (4.22)
<i>SMTH*RET</i>	(?/-)	0.275*** (1.78)	-0.100** (-2.18)
<i>CF</i>	+	33.976* (3.02)	-35.913* (-14.62)
<i>LogAsset</i>	-	-3.149* (-4.30)	-0.335* (-5.18)
<i>SMTH</i>	?	-0.009 (-0.03)	-0.163 (-2.01)
Observations		32,234	32,234
R ²		18.66%	24.30%

This table reports regression results of the effect of earnings smoothness on investment sensitivity to stock prices. All variables are defined in Table 1. t-statistics are in parentheses and are calculated based on standard errors clustered by firm. Year and industry fixed effects are included. *, **, and *** denote significance at the 1%, 5%, and 10% levels, respectively (two-tailed test).

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Education

Ph.D. Accounting, Georgia State University, 2006 - 2011 (Expected in May)

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Research Interests

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Working Papers

“Earnings Smoothing and Investment Sensitivity to Stock Prices”

“Forecast-Recommendation Consistency and Earnings Forecast Quality” with Lawrence Brown

“The Dark Side of Trading” with Ilia Dichev and Dexin Zhou

Conference Presentations and Participation

AAA Annual Meeting, San Francisco, 2010 (Presented “Forecast-Recommendation Consistency and Earnings Forecast Quality” with L. Brown)

20th Annual Conference on Financial Economics and Accounting, Newark, 2009 (Presented “Stock Recommendation-Earnings Forecast Consistency” with L. Brown)

AAA FARS Midyear Meeting, Tampa, 2011

AAA FARS Midyear Meeting, New Orleans, 2009

17th Annual Conference on Financial Economics and Accounting, Atlanta, 2006

Southeast Summer Accounting Research Colloquium, Atlanta, 2006 – 2009

Awards and Honors

AAA/Deloitte/J. Michael Cook Doctoral Consortium Fellow, 2008
Catherine E. Miles Doctoral Fellowship, Georgia State University, 2007
University of Hawaii General Scholarship, 2004
Freeman Foundation Leadership Fellowship (full fellowship for pursuing graduate study at University of Hawaii), 2002 - 2003

Academic Service

Conference Reviewer: AAA Annual Meeting 2009, 2010, 2011
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Teaching

Instructor, Georgia State University, Spring 2011
Intermediate Accounting III
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Principles of Accounting II
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Certified Public Accountant, State of Hawaii, 2006
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