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A catering theory of revenue benchmark beating behavior

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A CATERING THEORY OF REVENUE BENCHMARK BEATING BEHAVIOR

by

Rong Zhao

An Abstract

Of a thesis submitted in partial fulfillment of the requirements
for the Doctor of Philosophy degree in Business Administration
in the Graduate College of
The University of Iowa

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Thesis Supervisors: Professor Daniel W. Collins
Professor W. Bruce Johnson

ABSTRACT

This paper tests a revenue catering theory under which investors have time-varying demand for revenue growth and managers will cater to this demand by delivering higher revenue when investors place a higher premium on revenue. I document the time-series variation in the "revenue surprise premium" – a proxy for investor demand for revenue growth, where the "revenue surprise premium" is measured as the earnings announcement period stock return response to good news in revenue after controlling for news in earnings. I investigate whether managers cater to the time-varying "revenue surprise premium" by meeting or beating market expectations of revenue. I find evidence consistent with revenue catering behavior. Firms are more likely to meet or beat analyst forecasts of revenue when the previous quarter's revenue surprise premium is high. I also find evidence that firms use aggressive revenue recognition practices when catering to investors. The results are most pronounced among firms in high-tech and health sectors whose revenue surprise premiums are higher relative to other sectors.

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CERTIFICATE OF APPROVAL

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PH.D. THESIS

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% POSITIVE ES	Number of firms with positive and zero ES divided by the total number of firms in a given calendar quarter
% POSITIVE RS	Number of firms with positive and zero RS divided by the total number of firms in a given calendar quarter
% REVENUE MISSTATEMENTS	The number of firms that misstated their financial statements for revenue recognition reasons, divided by the total number of firms that misstated for various accounting failure or fraud reasons
ABNORMAL_ΔAR	Residual from quarterly cross-sectional regressions of ΔAR on ΔSales, multiplied by 100; ΔAR is the change in accounts receivable over the previous quarter, scaled by beginning assets; ΔSales is the change in sales over the previous quarter, scaled by beginning assets
AGE	Number of months since the firm's first return record appeared on CRSP
BHAR	Size-adjusted buy-and-hold abnormal return, computed as the buy-and-hold return of the firm minus the buy-and-hold return for a value-weighted portfolio of firms in the same NYSE/AMEX/NASDAQ size decile. Returns are accumulated over a three-day window (day -1 to +1) to obtain buy-and-hold returns, where trading days 0 is the Compustat quarterly earnings announcement date
EPSCHG	Current quarter earnings per share (EPS) divided by earnings per share from the same quarter of the prior year
ERC	Coefficient on ES_DECILE from quarterly cross-sectional regressions of BHAR on ES_DECILE and RS_DECILE
ES	Unadjusted actual quarterly EPS from I/B/E/S minus the most recent unadjusted I/B/E/S consensus quarterly EPS forecast issued between prior-quarter's earnings announcement date and current quarter's earnings announcement date
ES_DECILE	Decile assignment of scaled ES, where ES is scaled by the closing share price 3 days prior to the earnings announcement date and sorted into deciles every calendar quarter

GDPCHG	Percent change in real gross domestic product (GDP), calculated as current quarter GDP divided by GDP from the same quarter of the prior year, then minus 1
HIGHERC	An indicator variable that equals one if ERC is above median; zero otherwise
HIGHPREMIUM	An indicator variable that equals one if RS PREMIUM is above median; zero otherwise
I_ROA	An indicator variable that equals one if a firm's current quarter ROA is greater than or equal to the previous quarter's ROA
LOSS	An indicator variable that equals one if a firm's income before extraordinary items and discontinued operations is negative; zero otherwise
MARGIN	Operating income after depreciation divided by sales
MBE	An indicator variable that equals one if a firm's ES is non-negative; zero otherwise
MBR	An indicator variable that equals one if a firm's RS is non-negative; zero otherwise
MTB	Market value of equity to book value of equity at the beginning of each quarter
MV	Market value of equity, computed as common shares outstanding multiplied by closing price at the end of the fiscal quarter
Q4	An indicator variable that equals one for fiscal quarter four; zero otherwise
ROA	Income before extraordinary items and discontinued operations divided by total assets
RS	Actual quarterly sales minus the most recent I/B/E/S consensus quarterly sales forecast issued between prior-quarter's earnings announcement date and current quarter's earnings announcement date; for fiscal quarter four, it is calculated as actual annual sales minus the most recent consensus forecast of annual sales if the consensus annual forecast is more timely than the quarterly forecast

RS_DECILE	Decile assignment of scaled RS per share, where RS is divided by the number of shares outstanding, then scaled by the closing share price 3 days prior to the earnings announcement date and sorted into deciles every calendar quarter
RS_MV	RS as a percentage of the beginning market value of equity
RS PREMIUM	Coefficient on RS_DECILE from quarterly cross-sectional regressions of BHAR on ES_DECILE and RS_DECILE
SENTIMENT	Average monthly investor sentiment index for the three months in a calendar quarter; the investor sentiment index is developed in Baker and Wurgler (2006) and is orthogonal to business cycle variation
SIZE	Natural log of market value of equity at the beginning of each quarter
TREND	A linear time trend variable ranging from 0 for the second quarter of 1997 to 41 for the third quarter of 2007

CHAPTER 1 INTRODUCTION

Lynn Turner, while serving as the Chief Accountant of U.S. Securities and Exchange Commission, said during a speech in 2001:

> Revenue is typically the single largest item reported in a company's financial statements. As with the all important bottom line and cash flows, companies' reported revenues are not only significant to these companies' financial statements in dollar terms, but also in the weight and importance that investors place on them in making investment decisions. Trends and growth in the top line of a company's income statement are barometers investors use when assessing the company's past performance and future prospects.

The key message Mr. Turner conveys in these remarks is that investors place a significant weight on revenue information when valuing a firm. Firm managers appear to be in agreement with Mr. Turner. In a comprehensive survey of more than 400 financial executives, Graham, Harvey and Rajgopal (2005) find that executives consider revenue as one of the three most important performance measures for external constituents, next to earnings and operating cash flows. Eighty percent of the executives acknowledge that at times they make decisions that sacrifice firms' long-term values in order to meet short-term financial market expectations.

Academic literature and the financial press use the term "catering" to describe the behavior of firm managers to package the firm in a way that maximizes its appeal to investors whose preferences for certain firm characteristics change over time. In a theoretical model, Aghion and Stein (2008) propose that investors have time-varying demand for revenue growth. According to Aghion and Stein (2008), if firm managers care about current stock prices, they will devote more effort to increasing sales when investors place a greater emphasis on revenue.

In this paper, I address the following three questions: (1) Is there time-varying investor demand for revenue growth? (2) Do managers cater to time-varying investor demand for revenue growth by meeting or beating market expectations of revenue? (3) Do managers resort to aggressive revenue recognition practices when catering to investors?

Prior accounting studies provide evidence that managers respond to time-varying investor demand or investor sentiment when making financial reporting and disclosure decisions. These studies find that managers strategically alter the disclosure of management earnings forecasts or pro forma earnings information in response to time-varying investor sentiment (Bergman and Roychowdhury 2008; Brown et al. 2008). Managers also manipulate accruals to cater to time-varying investor optimism related to earnings news (Rajgopal, Shivakumar and Simpson 2007). Earnings benchmark beating behavior is another manifestation of catering behavior, i.e., managers meet or beat market expectations of earnings to obtain the stock price premium that investors attach to firms that meet or beat earnings benchmarks.

The focus of this paper is on managerial discretion with respect to revenue reporting, which differs from prior studies' emphases on earnings and capital market incentives related to earnings. Unlike prior research that considers revenue manipulation simply as a means to achieve an earnings objective (Plummer and Mest 2001; Stubben 2008; Caylor 2009), this study explores the importance of achieving a revenue objective itself. Given managers' belief that investors view revenue as another important performance metric (Graham et al. 2005), managers likely care about how they perform on the revenue dimension relative to market expectations. Thus, it is important to verify

the significance of the revenue benchmark and understand how managers apply discretion to meet or beat revenue benchmarks.

Another key element of this study is the time-series aspect of managerial discretion on revenue reporting. The extant literature is largely concerned with cross-sectional evidence that managers manipulate revenue for stock market related reasons. This study documents the aggregate time-series variation in how investors price revenue and whether the temporal trend in revenue benchmark beating behavior is linked to this pricing variation. Exploring the time-series aspect of incentives to manipulate revenues helps enrich our understanding of why and when managers are more likely to be aggressive in revenue reporting. It also broadens the scope of the existing literature which focuses on firm-specific or event-specific earnings management incentives, and in doing so enhances our understanding of macro-level incentives.

Investor demand for revenue growth can be inferred from the weight that investors place on revenue while determining stock prices. Empirically, this pricing weight is measured as the quarterly earnings announcement period stock return response to good news in revenue after controlling for news in earnings (referred to as the "revenue surprise premium" or *RS PREMIUM*). The weight on earnings news in the pricing equation is referred to as the earnings response coefficient (*ERC*). I use I/B/E/S consensus analyst forecasts of quarterly earnings per share (EPS) and revenue as proxies for the market expectations of EPS and revenue. My sample starts in the second quarter of 1997 when revenue forecasts become more widely available and ends in the third quarter of 2007. The quarterly *RS PREMIUM* and *ERC* are first estimated across all sectors (pooled) and then estimated at the sector-level within each of the five Fama-

French sectors (consumer, manufacturing, high-technology, health and a sector consisting of miscellaneous industries).

I find significant time-series and cross-sectional variations in the *ERC* and the *RS PREMIUM*. At the sector-level, the *ERC* exceeds the *RS PREMIUM* over the entire sample period for the consumer sector, the manufacturing sector and the sector consisting of miscellaneous industries. In contrast, *RS PREMIUM* often surpasses *ERC* in the high-tech and health sectors. A cross-sectional comparison reveals that the *RS PREMIUM* is much higher for the high-tech and health sectors relative to other sectors, consistent with the conventional wisdom that investors place a greater emphasis on revenue growth in these sectors. I also find that the trend in *RS PREMIUM* for the high-tech and health sectors coincides with the peak and burst of the tech-bubble.

Similar to the distribution of revenue surprises shown in Plummer and Mest (2001), scaled revenue surprises slightly greater than zero occur more frequently than expected. More importantly, the percentage of small positive scaled revenue surprises is higher when the previous quarter's *RS PREMIUM* is high (above median) than when the previous quarter's *RS PREMIUM* is low (below median).

To test whether and how managers cater to time-varying *RS PREMIUM*, I conduct multivariate regression analyses and find the following results. First, I find evidence consistent with managers catering to investor demand for revenue growth. Aggregate-level time-series tests show a weakly positive association between the percentage of positive revenue surprises and the previous quarter's *RS PREMIUM*. Controlling for firm characteristics found to be associated with benchmark beating behavior, firm-level logistic regressions confirm the findings from the aggregate-level

tests. The tendency of firms to meet or beat market expectations of revenue is higher when the previous quarter's *RS PREMIUM* is high. Additional analyses reveal that both young and old firms exhibit revenue catering behavior; that the effect of investor demand for revenue growth is more robust among high-tech and health care firms, and among firms that are less likely to focus on meeting or beating market expectations of earnings.

Second, to provide some insight into whether managers resort to aggressive revenue recognition practices to cater to investor demand for revenue growth, I analyze the link between abnormal growth in accounts receivable and revenue benchmark beating behavior. The results show that firms report higher abnormal growth in accounts receivable when the previous quarter's *RS PREMIUM* is high, when firms meet or beat revenue benchmarks, or when the magnitude of revenue surprises is high. In addition, the association between abnormal growth in accounts receivable and the magnitude of revenue surprises is more positive when the previous quarter's *RS PREMIUM* is high than when it is low. Additional analysis of a sample of restatement firms reveals that the percentage of high-tech and health care firms that misstate financial statements for revenue recognition issues is higher when the previous quarter's *RS PREMIUM* is high. These findings suggest that managers at high-tech and health care firms turn to aggressive revenue recognition practices to inflate revenue in response to high investor demand for revenue growth.

Third, I provide preliminary evidence that sheds some light on the sources of investor demand for revenue growth. I find that *RS PREMIUM* is positively associated with contemporaneous investor sentiment and one-quarter-ahead GDP growth. These results are consistent with the notion that investor demand for revenue growth stems from

investors' expectation of future state of the macroeconomy, as well as from investors' belief about future cash flows and investment risks that is not rationally justified.

Finally, an examination of the earnings announcement period stock price performance indicates that after controlling for meeting or beating market expectations of earnings, firms that meet or beat market expectations of revenue during periods of high investor demand for revenue growth are rewarded with high earnings announcement returns. Thus, managers seem to benefit from stock price appreciation as a result of their revenue catering behavior.

This paper contributes to the accounting literature in several ways. First, it documents time-series and cross-sectional variations in the pricing implications of revenue for firms' revenue benchmark beating behavior. It also provides evidence on the link between accounts receivable accruals and achieving revenue benchmarks. Thus, this study not only confirms that managers view market expectations of revenue as another important benchmark, but also gives an indication of when revenue manipulation is most likely to occur and among which industries. Finally, this study explores the aggregate-level capital market incentive directly related to revenue and how managers tilt their reporting of revenue in response to this aggregate-level market indicator. The findings in this study contribute to the earnings management literature by showing that in addition to firm-specific incentives, macro-level stock price based incentives also lead to earnings management behavior.

CHAPTER 2 LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

In this section, I review the earnings management literature and behavioral finance literature on catering theory and develop the link between the two. There are two key building blocks. First, there exists time-varying investor demand for certain accounting outcomes. Second, firm managers recognize this demand and tilt their decisions accordingly.

2.1 Time-varying investor demand and managers' financial reporting discretion

Theoretical studies in behavioral finance literature provide models that describe how market psychology such as shifts in consumer confidence or fads affect asset prices in financial markets, which in turn influences firms' investment, financing, and other corporate decisions (Shiller 1984; Morck, Shleifer and Vishny 1990; Stein 1989; to name a few). As pointed out in a review paper by Baker, Ruback and Wurgler (2007), firm managers make investment and financing decisions not only to increase fundamental value but also to cater to investor demand. "Catering" refers to the behavior of firm managers to package the firm in a way that maximizes its appeal to investors. Investor demand is time-varying, reflecting investors' interest in a particular new technology, their preference for dividend-paying stocks, and so on.

Empirical studies in finance provide evidence of catering behavior. These studies capture investor demand as manifested in time-varying stock price premium on certain firm characteristics and have demonstrated a link between time-varying investor demand and changes in firms' investment, financing and other corporate policies, including dividend policy (Baker and Wurgler 2004a; Baker and Wurgler 2004b; Li and Lie 2006),

capital expenditure investment (Polk and Sapienza 2008), stock splits (Baker, Greenwood and Wurgler 2008), and corporate name changes (Cooper, Dimitrov and Rau 2001).

The accounting literature, for the most part, has not utilized catering theory to frame its investigation of managerial behavior motivated by stock market incentives or investor preferences; however, several streams of accounting literature have in fact documented catering behavior. For instance, studies on earnings benchmark beating behavior document that investors reward firms that meet or beat market expectations of earnings with a stock price premium and punish firms that miss the earnings targets (Kasznik and McNichols 2002; Bartov, Givoly and Hayn 2002; Skinner and Sloan 2002). Managers acknowledge that the dominant reasons to meet or beat earnings benchmarks are related to stock prices (Graham et al. 2005). As a result, managers avoid reporting earnings decreases, negative earnings surprises or losses (Burgstahler and Dichev 1997; Degeorge et al. 1999) and this kind of benchmark beating behavior has increased in recent years (Brown 2001; Matsumoto 2002). These studies, however, do not examine the time-series variation in stock price premium or whether this variation is linked to the temporal trend in the benchmark beating behavior.

Rajgopal et al. (2007) and Cohen and Zarowin (2007) are among the first to examine the link between temporal changes in earnings management behavior and aggregate-level stock price based incentives. Rajgopal et al. (2007) argue that for rational or irrational reasons, investors' reaction to good earnings news relative to bad earnings news (i.e., earnings optimism) is time-varying. They show that at the aggregate-level, managers cater to investor demand by inflating earnings through abnormal accruals when investors are optimistic about earnings news and by reporting more conservatively when

investors are pessimistic. Cohen and Zarowin (2007) identify earnings management by firms' tendency to meet or just beat earnings benchmarks. They find that the temporal trend in the percentage of firms that meet or just beat earnings benchmarks is correlated with the trend in the aggregate market P/E ratio, evidence that upward earnings management is more prevalent when the aggregate market is more optimistic about future prospects.

2.2 Time-varying investor demand for revenue growth

This study is closely related to Rajgopal et al. (2007) and Cohen and Zarowin (2007), but it differs in crucial ways. First, instead of earnings, this study focuses on the revenue component of earnings and examines the temporal trend in firms' tendency to meet or beat market expectations of revenue. Revenue is the single largest item on many firms' financial statements and is considered one of the three most important performance metrics (Graham et al. 2005). Yet, the literature has provided limited evidence on the importance of revenue benchmarks. Second, the sources of investor demand or aggregate-level stock price based incentives in Rajgopal et al. (2007) and Cohen and Zarowin (2007) are captured by the stock market's reaction to earnings. This study focuses on how the stock market reacts to revenue information. The investor demand for revenue growth is captured by stock return response to the news in revenue after controlling for the news in earnings.

Aghion and Stein (2008) propose that investors pay attention to performance measures such as revenue and profit margin rather than just earnings. As a result, investors shift the emphasis that they place on top line revenue and bottom line profitability over time. Their model predicts that managers who care about current stock

prices will cater to this time-varying investor preference for revenue growth by devoting more effort to increasing revenue when investors place a higher premium on revenue.

To understand the basics of Aghion and Stein's (2008) catering theory, consider the following simple two-period model. In the first period, the firm's manager decides how to allocate her effort between two business strategies – (1) a "growth" strategy of pursuing revenue growth; and (2) a "margins" strategy of improving profitability by cutting costs. Because the market cannot directly observe the manager's ability and the allocation of her effort, it updates the forecast of second-period earnings based on the first-period revenue and profit margin as well as its conjecture of which business strategy the manager is pursuing. Stock price at the end of period one is the discounted expectation of second-period earnings. This pricing rule reveals that when the market thinks that the manager allocates more effort to pursuing revenue growth, it believes that the realization of the sales component is more informative about the manager's ability and firm's future performance; thus the market puts more weight on revenue than on profitability.

The manager, on the other hand, wants to maximize her utility which is a linear combination of period one earnings and the firm's stock price at the end of period one. If the manager cares about current stock price, she is better off devoting her effort to increasing sales when the market puts a premium on revenue. In contrast, the manager is better off allocating her effort to cost reduction when the market puts more weight on profitability. In equilibrium, the manager caters to time-varying stock market's preference between firms that pursue revenue growth and firms that focus on cost cutting.

Anecdotal evidence is consistent with Aghion and Stein's (2008) theory that investors shift the valuation weights placed on top line revenue and bottom line profitability over time. As Gregory Zuckerman wrote in an article published in the *Wall Street Journal* on September 25, 2000, "The top line is the bottom line for investors lately." He pointed out that "revenue figures always have been seen as the lifeblood of a company" but "lately there has been a single-minded focus on revenue growth rather than a company's profits, especially in critical industries such as technology." He continued to explain that a big reason for this single-minded focus is "a growing view that earnings in recent years have been boosted by cost-cutting and productivity gains that may no longer be sustainable. Furthmore, "many Internet and other companies with little in the way of earnings have tirelessly pushed Wall Street to focus on revenue, rather than profits, when analyzing their companies. Now that many Wall Street bulls have embraced this approach, it is coming back to haunt many tech companies that boast growing earnings but have suspect sales."

A similar sentiment is expressed years later by an Associated Press reporter Tim Paradis in a July 11, 2009 article. Mr. Paradis wrote that "the stock market is looking for signs that business improved in the second quarter or at least will in the coming months. And investors will measure that by the revenue figures companies put up as they issue earnings reports during the next four weeks". He later wrote in an October 10, 2009 article that "as earnings reports start to flow in for the July-September quarter, investors are likely to be more exacting than they were a few months ago, when they were pleased by companies' better-than-expected profits for the second quarter. Those results largely

came from heavy cost-cutting. This time, investors want signs that companies are finding ways to bring in more money."

Consistent with this anecdotal evidence, Glushkov (2007) provides large sample evidence that managers pursue a growth strategy when investors favor revenue growth. Using the stock price premium that investors place on unexpected revenue ("revenue surprise premium") as the proxy of investor demand for revenue growth, Glushkov (2007) finds that periods with high revenue surprise premium are followed by higher than expected revenue growth. However, his findings do not necessarily indicate catering behavior. A positive association between the revenue surprise premium and revenue growth in the subsequent period could arise because higher revenue surprise premium reflects higher persistence in revenue growth.

In contrast to Glushkov (2007), I examine firms' catering behavior by their tendency to meet or beat market expectations of revenue. Revenue benchmark beating behavior has been documented by Plummer and Mest (2001) for a sample of firms that meet or just beat *Value Line* analyst forecasts of earnings. Plummer and Mest (2001) find that for firms with small positive earnings surprises, scaled revenue surprises slightly greater than zero occur more frequently than would be expected, suggesting that firms inflate sales to avoid missing earnings benchmarks.[1] The importance of revenue on the financial statements and its relevance for firm value warrants further examination of revenue benchmark beating behavior for a broader set of firms.

The accounting literature to date provides only limited evidence on the time-series aspect of the pricing implications of revenue. For a sample of Internet firms during 1998-2000, Davis (2002) shows that the pricing multiple on revenue for firms with grossed-up

[1] Both earnings surprises and revenue surprises are scaled by the market value of equity.

or barter revenue declined in the periods after the crash of Internet stocks in April 2000. For a sample of firms with earnings and revenue forecasts during 1998-2002, Rees and Sivaramakrishnan (2007) find that the market premiums to meeting or beating earnings and revenue forecasts are significantly more positive in the bull period of 1998-1999 than in the later period. My study extends prior research that documents the pricing implications of revenue within a specific industry and for a limited time period.

I investigate whether the temporal trend in revenue benchmark beating behavior is associated with the time-series variation in the pricing implications of revenue. Accordingly, my first hypothesis is (stated in alternative form):

H1: Firms are more likely to meet or beat market expectations of revenue when investor demand for revenue growth is high.

2.3 How do managers cater to investor demand for revenue growth?

Prior research finds that managers motivated by the pricing implications of revenue manipulate revenue in various ways. Managers could engage in real earnings management activities such as offering price discounts or more lenient credit terms to attract customers and increase sales volume (Roychowdhury 2006). Alternatively, they could increase advertising spending to increase consumer awareness and boost sales. These forms of activities are often difficult to distinguish from a reasonable exercise of business judgment because these activities do not violate GAAP. Managers could also resort to aggressive revenue recognition practices that are in the grey areas of GAAP or even in direct violation of GAAP. As an example, Internet firms have sometimes reported grossed-up revenue instead of net revenue and have aggressively recognized revenue from advertising barter transactions (Davis 2002; Bowen, Davis and Rajgopal 2002).

Other methods that managers use to artificially inflate revenue include channel stuffing, bill and hold sales, and even recognition of fictitious sales.

When managers exercise accounting discretion over revenue, their discretion usually involves the accounts receivable or deferred revenue accounts. Receivables rising more quickly than revenues could be a sign that revenues are inflated. Through an investigation of firms' abnormal accounts receivable, Marquardt and Wiedman (2004) find that managers manipulate revenue upward before equity issuance and downward before management buyouts. Stubben (2006) shows that firms in general and especially growth firms use abnormal accounts receivable to meet not only earnings forecasts but also revenue forecasts. In addition, managers accelerate the recognition of revenue that should have been deferred by altering the estimates of services provided. Rountree (2006) finds that a majority of firms affected by SAB 101 were recognizing cash revenue that should have been deferred. Caylor (2009) finds evidence that short-term deferred revenue is managed in an attempt to avoid negative earnings surprises. I focus on the analysis of accounts receivable because deferred revenue data coverage in COMPUSTAT begins in fiscal year 2000 and is only available on an annual basis (Caylor 2009). My second set of hypotheses is (stated in alternative form):

H2a: The abnormal growth in accounts receivable is higher when investor demand for revenue growth is high.

H2b: The abnormal growth in accounts receivable is higher when firms meet or beat market expectations of revenue.

H2c: The abnormal growth in accounts receivable is higher when firms meet or beat market expectations of revenue during periods of high investor demand for revenue growth.

CHAPTER 3 THE EXISTENCE OF TIME-VARYING INVESTOR DEMAND FOR REVENUE GROWTH

3.1 Sample selection

My sample is comprised of firms that have quarterly earnings announcement dates on the COMPUSTAT Industrial Quarterly data files, sufficient CRSP data to compute abnormal stock returns over the three-day window centered on the earnings announcement dates, and sufficient I/B/E/S data to compute earnings surprises and revenue surprises. Following Fama and French (2001), financial firms (SIC code 6000-6999) and utilities (SIC code 4900-4949**)** are excluded from the sample because they are subject to unique regulatory requirements. These data requirements yield a preliminary sample of 90,337 firm-quarter observations for 6,114 individual firms from the second quarter of 1997 to the third quarter of 2007.[2] The number of firms ranges from a minimum of 201 in the second quarter of 1997 to a maximum of 2,846 in the second quarter of 2007. The final samples used for specific analyses vary due to additional data requirements.

3.2 Measure of time-varying investor demand for revenue growth

Both Glushkov (2007) and Rees and Sivaramakrishnan (2007) estimate the stock price premium on revenue by regressing returns on revenue surprises after controlling for earnings surprises.[3] Building on Glushkov (2007) and Rees and Sivaramakrishnan

[2] Revenue forecasts in I/B/E/S are mostly available from 1995 onwards. The I/B/E/S data file contains very few quarterly revenue forecasts in 1995, and an unusually low number of revenue forecasts in the first quarter of 1997. To maintain a continuous time series of revenue forecasts for meaningful statistical analyses, my sample starts in the second quarter of 1997.

[3] Glushkov (2007) also controls for seasonal change in net profit margin which serves as a proxy for a firm's cost-cutting effectiveness. However, the inclusion of revenue surprise in a return model is equivalent

(2007), I run cross-sectional regressions each calendar quarter to estimate the time-varying investor demand for revenue growth. Following Ertimur and Livnat (2002), all firms with a fiscal quarter ending within one month of a calendar quarter end are classified into that calendar quarter to ensure the comparability of economic conditions for all firms in each calendar quarter. [4] For example, firms with fiscal quarters ending in February, March and April are included in the regression for calendar quarter one. The regression is specified in equation (1).

$$BHAR_{it} = \alpha + \beta_1 ES\_DECILE_{it} + \beta_2 RS\_DECILE_{it} + \varepsilon_{it} \qquad (1)$$

Abnormal return (*BHAR)* is the size-adjusted buy-and-hold abnormal return, computed as the buy-and-hold return of a firm minus the buy-and-hold return of a value-weighted portfolio of firms in the same NYSE/AMEX/NASDAQ size decile. Returns are accumulated over a three-day window (day -1 to +1) to obtain buy-and-hold returns, where trading days 0 is the COMPUSTAT quarterly earnings announcement date. Earnings surprise (*ES*) for quarter t is defined as unadjusted actual EPS reported by I/B/E/S minus the most recent unadjusted I/B/E/S consensus forecast of EPS issued prior to the earnings announcement date for quarter t. Revenue surprise (*RS*) for quarter t is defined as actual sales for quarter t minus the most recent I/B/E/S consensus forecast of sales prior to the earnings announcement date for quarter t.

Following Rees and Sivaramakrishnan (2007), earnings surprises and revenue surprises are converted to the same scale for the purpose of this regression only. That is, *ES* is scaled by the stock price 3 days prior to the earnings announcement date, while *RS*

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to partitioning earnings surprise into its revenue and expense components (Ertimur et al. 2003, Rees and Sivaramakrishnan 2007). It is unclear why the inclusion of the change in net profit margin is necessary in the regression.

[4] This is the same as how COMPUSTAT defines its variable "calendar quarter".

is converted to a per-share basis then deflated also by the stock price 3 days prior to the earnings announcement date. To mitigate measurement errors in earnings surprises and revenue surprises, I sort scaled *ES* and scaled *RS* for a given calendar quarter into deciles.[5] Each observation is assigned a decile rank that is rescaled to range from 0 for the bottom decile to 1 for the top decile (*ES_DECILE* and *RS_DECILE*). Coefficient β_1 measures the earnings response coefficient (*ERC*); and β_2 measures the "revenue surprise premium" (*RS PREMIUM*) or investor demand for revenue growth.

Glushkov (2007) ignores the variation across sectors in how investors price revenue information. Results in prior studies suggest that the revenue surprise premium can differ across sectors. Specifically, the market reaction to revenue surprises is stronger for high-growth firms (Ertimur et al. 2003; Rees and Sivaramakrishnan 2007). Assuming that certain firm characteristics such as growth opportunity result in revenue forecasts being of greater value and these characteristics are common within industries, analysts will issue more revenue forecasts for certain industries. As documented in Rees and Sivaramakrishnan (2007) for their sample of I/B/E/S firms, analysts issue revenue forecasts for a higher proportion of firms in the computer industry and the pharmaceuticals industry. This evidence is consistent with conventional wisdom that high-technology industries or industries with high R&D are considered high-growth industries. Thus, I measure the revenue surprise premium both at the pooled level across all sectors and at the sector level. I expect the revenue surprise premium to be higher for high-growth sectors including high-tech and health sectors.

[5] Sorting *ES* and *RS* into deciles creates a trading strategy "look-ahead" bias because at the time of the portfolio formation, some firms have not announced their earnings. But this bias is of no importance to my study because I am not evaluating the profitability of trading on earnings and revenue information.

3.3 Descriptive statistics

Table A1 presents descriptive statistics for the sample. Panel A describes the characteristics of the sample firms. Three-day earnings announcement period abnormal return (*BHAR*) has mean and median of zero and inter-quartile range of 10% (with first quartile of -5% and third quartile of +5%). Mean earnings surprise (*ES*) is zero and the median is 1 cent. Firms report EPS that meet or beat analyst forecasts about 70% of the time. In contrast, firms report sales that meet or beat analyst forecasts only 57% of the time.[6] The "average" firm reports sales of $686 million, $6.62 million higher than that forecasted by analysts. The mean (median) revenue surprise as a percentage of the market value of equity is -0.24% (0.07%). Relative to the COMPUSTAT universe, firms in my sample are larger in terms of total assets (mean of $3,169 million) and market capitalization (mean of $3,338 million), and comparable in terms of market-to-book ratio (mean of 4.03).

Table A1 panel B presents a correlation matrix with Pearson correlation displayed above the diagonal and Spearman correlation displayed below the diagonal. All correlations are significant at 10% level or better, except the italicized ones. Notice that the Spearman correlation between earnings announcement abnormal return and earnings surprise is 0.28, higher than that between abnormal return and revenue surprise (0.16). The Spearman correlation between revenue surprise and earnings surprise is 0.29.

[6] Consensus earnings forecast and consensus revenue forecast are not necessarily based on the same group of analysts. The number of analysts providing earnings forecasts is usually higher than the number of analysts providing revenue forecasts, thus the accuracy of the consensus revenue forecast does not compare to that of the consensus earnings forecast.

3.4 Results - Time-varying Investor demand for revenue growth

Table A2 reports mean and median coefficient estimates from 42 quarterly cross-sectional regressions in equation (1). Standard errors are calculated from the time-series variation in these estimates. I estimate the quarterly regressions for the full sample across all sectors and for each of the Fama-French five sectors separately. Dividing industries into five sectors allows for the estimation of differential revenue surprise premium for industry groups while retaining enough observations for each sector-quarter. Sector 1 contains consumer-related industries, including consumer durable, nondurables, wholesale, retail and some services such as laundries and repair shops. Sector 2 includes manufacturing and energy industries. Sector 3 includes high-technology industries such as business equipment, computer-related services, R&D labs, telephone, and television transmission. Sector 4 comprises industries involved in health care, medical equipment and drugs. All other industries are grouped into sector 5. The number of firms in each sector for each quarter ranges from 22 to 871.

A few patterns emerge from Table A2. First, the *ERC* (β_1) and the *RS PREMIUM* (β_2) are positive on average.[7] In the full sample, the mean coefficient estimate of 0.068 for β_1 implies that abnormal returns increase by 6.8% when earnings surprises move from the bottom decile to the top decile; the mean coefficient estimate of 0.027 for β_2 implies that holding earnings surprises constant, firms with revenue surprises in the top decile earn 2.7% more abnormal returns than those with revenue surprises in the bottom decile. A comparison of β_1 and β_2 across the five sectors reveals that the health sector has the lowest *ERC* (β_1= 0.046) while the consumer sector has the highest *ERC* (β_1= 0.085). As

[7] For all five sectors, the quarterly Spearman correlations between ES and RS are below 0.5 over the sample period and the correlations appear to be fairly stable over time (see Figure B3).

expected, the *RS PREMIUM* (β_2) for high-tech and health sectors is higher than those for the remaining sectors.

Figure B1 plots the percentage of positive revenue surprises (*% POSITIVE RS*), the previous quarter's *ERC* and *RS PREMIUM* over time for the full sample (panel A), the consumer, manufacturing and miscellaneous other sectors (panel B), as well as the high-tech and health sectors (panel C). The left vertical axis is for the *ERC* and the *RS PREMIUM* while the right vertical axis is for *% POSITIVE RS*. Panel A and panel B show a great degree of similarity. In both panels, the *ERC* exceeds the *RS PREMIUM* over the entire sample period. The time-series patterns of *% POSITIVE RS* and *RS PREMIUM* in panel B for the consumer, manufacturing and miscellaneous other sectors closely resemble those in panel A for the full sample. In both panels, two peaks of the *% POSITIVE RS* occur in the first quarter of 2000 (about 66%) and the first quarter of 2004 (about 75%). In addition, the trends in the *RS PREMIUM* and *% POSITIVE RS* appear to go hand in hand in the first half of the sample period.

Panel C shows a quite different picture for high-tech and health sectors. The *ERC* does not trend upwards and neither does it dominate the *RS PREMIUM*. During most of the sample period, the *RS PREMIUM* is above 0.04 for high-tech and health sectors while it is generally below 0.04 for the remaining sectors in panel B. The *RS PREMIUM* peaks in the first quarter of 2000 and quickly drops in the following few quarters until after 2001 when it starts to climb up again, a pattern that coincides with the peak and burst of the tech-bubble. Untabulated results show that for the high-tech and health sectors, the values of *RS PREMIUM* when they are above the median are on average about 0.05 higher than those of *RS PREMIUM* when below the median.

Perhaps the most significant message from Table A2 and Figure B1 is that there are significant time-series as well as cross-sectional variations in the *RS PREMIUM*. The trend in the *RS PREMIUM* reflects investors' time-varying demand on revenue growth. The variation in the *RS PREMIUM* across sectors reflects the higher importance of revenue for firms in high-growth sectors.

CHAPTER 4 REVENUE BENCHMARK BEATING AND TIME-VARYING INVESTOR DEMAND FOR REVENUE GROWTH

4.1 Tendency to meet or beat market expectations of revenue

Empirical studies on catering behaviors usually examine time-series variation in behaviors that catering incentives are supposed to induce and investigate whether this variation is associated with the proxies for catering incentives (Baker and Wurgler 2004a, 2004b; Li and Lie 2006; Rajgopal et al. 2007, etc.). The catering incentives are lagged by one period to mitigate the endogeneity problem and are intended to capture the managers' perception of investor demand. In this study, I investigate whether the tendency of firms to meet or beat market expectations of revenue is associated with the previous quarter's *RS PREMIUM.* Analyses are conducted both at the aggregate-level and at the firm-level. In addition, because analysts issue revenue forecasts for a higher proportion of firms in high-tech and health industries (Rees and Sivaramakrishnan 2007) and the *RS PREMIUM* is higher for these two sectors (section 3 of current study), I conduct analyses separately for firms in high-tech and health sectors.

4.1.1 Tendency to meet or beat market expectations of revenue - aggregate level test

At the aggregate-level, the following regression tests whether managers cater to investor demand for revenue growth by meeting or beating market expectations of revenue.

$$\%POSITIVE\ RS_t = \beta_0 + \beta_1 RS\ PREMIUM_{t-1} + \beta_2 ERC_{t-1} + \beta_3 RS\ PREMIUM_{t-1} * ERC_{t-1} + \beta_4 TREND_t + \varepsilon \quad (2)$$

Percentage of positive revenue surprises (*% POSITIVE RS*) is the number of firms with positive or zero revenue surprises divided by the total number of firms with revenue forecasts in a given calendar quarter. Aghion and Stein's (2008) catering theory suggests that a higher *RS PREMIUM* leads to a higher incidence of revenue benchmark beating behavior as reflected in higher *% POSITIVE RS* in the subsequent quarter. Thus, I expect β_1 to be positive.

Evidence in prior research suggests that managers inflate revenue with the earnings targets in mind. Company CFOs surveyed by Graham et al. (2005) acknowledge that they are likely to book revenues in the current quarter rather than in the next quarter, or to provide incentives for customers to buy more products this quarter in order to achieve the desired earnings targets. However, in an attempt to meet earnings targets, managers take actions such as cutting advertising or research and development (Roychowdhury 2006). These actions could have an adverse impact on current or future revenue. It is unclear which one of the above two competing forces will dominate. As a result, it is an empirical question whether managers' revenue catering behavior depends on the demand of investors for revenue growth relative to their demand for earnings growth. Therefore, I include *ERC* (lagged by one quarter) as a proxy for investor demand for earnings growth to control for the link between revenue benchmark beating and capital market incentives related to earnings. I do not have predictions for β_2 and β_3. I also include a linear time trend variable (*TREND*) to control for the possibility that the relation between revenue benchmark beating and the *RS PREMIUM* represents a common trend caused by forces outside the catering theory.

4.1.2 Tendency to meet or beat market expectations of revenue – firm level test

To fully control for effects related to variations over time in the cross-sectional dispersion of firm characteristics, I conduct the following firm-level logistic regressions to test whether firms are more likely to meet or beat market expectations of revenue when the previous quarter's *RS PREMIUM* is high.

$$\ln\left(\frac{Pr(MBR_{it}=1)}{1-Pr(MBR_{it}=1)}\right) = \alpha + \beta_1 HIGHPREMIUM_{t-1} + \beta_2 HIGHERC_{t-1} + \beta_3 HIGH\_HIGH_{t-1} + \sum_{j=4}^{J} \beta_j Z_{it}^{j} + \varepsilon_{it} \quad (3)$$

Where *Pr*(*MBR*=1) is the probability of meeting or beating analyst forecast of revenue; *HIGHPREMIUM* (*HIGHERC*) is an indicator variable that equals one if *RS PREMIUM* (*ERC*) is above the sample median. *HIGH_HIGH* is the interaction of *HIGHPREMIUM* and *HIGHERC*. *HIGHPREMIUM*, *HIGHERC* and *HIGH_HIGH* are all lagged by one quarter.

I use dichotomous variables (*HIGHPREMIUM* and *HIGHERC*) rather than continuous variables (*RS PREMIUM* and *ERC*) because the interpretation of the interaction between two dichotomous variables in a logit model is less confusing. Holding control variables constant, β_0 represents the base line case of low *RS PREMIUM* and low *ERC*. β_1 (the coefficient on *HIGHPREMIUM*) measures the incremental effect of high *RS PREMIUM*, β_2 (the coefficient on *HIGHERC*) measures the incremental effect of high *ERC*. A positive β_1 (β_1 + β_3) indicates that, conditional on low (high) *ERC*, an

increase in the *RS PREMIUM* leads to an increase in the log-odds ratio of firms meeting or beating market expectations of revenue.[8]

Z^j are control variables including a linear time trend (*TREND*) and firm characteristics. Prior research has shown that market value of equity (*SIZE*) is positively related to meeting earnings targets (Barton and Simko 2002). Firms with high growth opportunities (high market-to-book ratio (*MTB*)) face greater pressure to meet earnings targets (Skinner and Sloan 2002). Two variables that indicate whether a firm incurs a loss (*LOSS*) and whether there is an improvement in a firm's return on assets (*I_ROA*) are included as two performance measures that help explain why firms meet their earnings targets (Phillips et al. 2003; McInnis and Collins 2009). Firms with high margins (*MARGIN*) benefit more from managing earnings using revenues rather than expenses (Stubben 2006). Given that the properties of the fourth quarter earnings are different from those of the first three quarters, both in terms of the accuracy of earnings forecasts and the stock market reactions (Kothari 2001), I include a fiscal quarter four indicator variable (*Q4*) to control for these differences. To control for the possibility that firms meet or beat revenue benchmarks as a result of meeting or beating earnings targets, an indicator variable for meeting or beating analyst forecast of earnings (*MBE*) is included.[9]

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[8] The odds ratio for *HIGHPREMIUM* (holding all other variables constant) is the odds for *HIGHPREMIUM* = 1 divided by the odds for *HIGHPREMIUM* = 0, i.e., $\exp(\beta_1)$. Similarly, the odds ratio for *HIGHERC* is equal to $\exp(\beta_2)$. When the interaction of *HIGHPREMIUM* and *HIGHERC* are included in the regression, the interpretation is as follows: the odds ratio for *HIGHPREMIUM* given *HIGHERC* = 1 is $\exp(\beta_1 + \beta_2 + \beta_3 + \sum\beta_j Z_j)/\exp(\beta_2 + \sum\beta_j Z_j) = \exp(\beta_1 + \beta_3)$; the odds ratio for *HIGHPREMIUM* given *HIGHERC* = 0 is $\exp(\beta_1 + \sum\beta_j Z_j)/\exp(\sum\beta_j Z_j) = \exp(\beta_1)$. In comparison, the interpretation of the continuous by continuous interaction will require calculations of the cross derivative of the logit cumulative distribution function over the whole range of the continuous variables. As a result, it is possible that the interaction effect is positive over one range and negative over another.

[9] Prior research also finds that if firms meet or beat prior period's earnings benchmarks, they are more likely to meet or beat earnings benchmarks in current period (Barton and Simko 2002). Because *HIGHPREMIUM* and *HIGHERC* are estimated based on prior quarter's benchmark beating behavior, I do not include lagged revenue benchmark beating indicator.

Finally, *AGE* is the number of months since the firm's first return record appeared on CRSP.

4.2 Meet or beat market expectations of revenue through accounts receivable

To test whether firms meet or beat market expectations of revenue through accounts receivable when investor demand for revenue growth is high, I use the following specifications.

$$ABNORMAL\_\Delta AR_{it} = \beta_0 + \beta_1 HIGHPREMIUM_{t-1} + \beta_2 MBR_{it} + \beta_3 RS\_MV_{it} + \beta_4 MBR_{it} * HIGHPREMIUM_{t-1} + \beta_5 RS\_MV_{it} * HIGHPREMIUM_{t-1} + \beta_6 MBR_{it} * RS\_MV_{it} + \beta_7 MBR_{it} * RS\_MV_{it} * HIGHPREMIUM_{t-1} + \beta_8 LAG\ ABNORMAL\_\Delta AR_{it} + \beta_9 MBE_{it} + \varepsilon_{it} \quad (4)$$

*ABNORMAL_*Δ*AR* is the abnormal growth in accounts receivable, measured as 100 times the regression residual of a model adapted from Gong, Louis and Sun (2008). For each industry (defined by 2-digit SIC code) and calendar quarter, I estimate the following model using all firms that have necessary data on COMPUSTAT:

$$\Delta AR_{it} = \sum_{q=1}^{4} \alpha_q QTR_q + \beta_1 \Delta SALES_{it} + \varepsilon_{it} \quad (5)$$

Δ*AR* is the change in receivables over the previous quarter, scaled by beginning assets. Δ*SALES* is the change in sales over the previous quarter, scaled by beginning assets. QTR_q is an indicator variable that takes the value of one in fiscal quarter q and zero otherwise. I require at least 20 observations for each industry-quarter to estimate this regression.

HIGHPREMIUM, *MBR* and *MBE* are as previously defined. *RS_MV* is the revenue surprise scaled by the market value of equity. Both *MBR* and *RS_MV* are

included to allow different intercepts and slopes for “revenue beaters” (firms that meet or beat analyst forecasts of revenue) and “revenue missers” (firms that miss analyst forecasts of revenue). *LAG ABNORMAL_ΔAR* is included in equation (4) because prior research has found that abnormal accruals reverse in the subsequent period. *MBE* is included to control for the possibility that abnormal growth in accounts receivable is higher as a result of meeting or beating earnings targets.

CHAPTER 5 EMPIRICAL RESULTS – MEETING OR BEATING MAREKT EXPECTATIONS OF REVENUE

5.1 Cross-sectional distributions of earnings surprises and revenue surprises

Figure B2 presents the relative frequency distributions of earnings surprises (panel A) and scaled revenue surprises (panel B). Relative frequency is measured as the number of surprise observations that fall into a specific bin, divided by the total number of surprise observations in the sample. In either panel, the left (right) figure includes earnings or revenue surprises in periods when the *RS PREMIUM* is above (below) median. Panel A graphs earnings surprises with an interval width of 1 cent over the range of -20 cents to +20 cents. Bin 0 includes surprises that equal zero; bin 1 includes surprises that equal 1 cent, and so on. As documented in prior research, earnings surprises exhibit the familiar single-peaked, bell-shaped distribution with a discontinuity around zero, i.e., earnings surprises in the -1 cent bin occur less frequently than expected, while earnings surprises in zero and 1 cent bins occur more frequently than expected.[10]

Panel B of Figure B2 presents the frequency distributions of revenue surprises scaled by the market value of equity. Because it is unclear whether investors view revenue surprises on a per share basis (same as earnings) or on any other basis, the choice of the scalar follows prior research by Plummer and Mest (2001). Scaled revenue surprises are then sorted into 42 bins with an increment of 0.0025, where bin 0 includes surprises in the range [0, 0.0025), bin 1 includes surprises in the range [0.0025, 0.005),

[10] When *RS PREMIUM* is above (below) median, the standardized difference in -1 cent bin is -13.27 (-15.50), and the standardized difference in zero and 1 cent bins are 15.55 (17.50) and 5.03 (4.83), respectively. See Burgstahler and Dichev (1997) for details on how to construct this standardized difference.

and so on. This ad hoc choice of interval width results in a distribution of revenue surprises that resembles a normal distribution.

Similar to the distribution of earnings surprises, scaled revenue surprises occur more frequently than expected in bin 0. However, the frequency of scaled revenue surprises in bin 1 is lower rather than higher than expected and the frequency in bin -1 is not significantly lower than expected.[11] The percentage of scaled revenue surprises in bin 0 is approximately 20% when the *RS PREMIUM* is above median, almost 3% higher than that in periods when the *RS PREMIUM* is below median. Untabulated results show that across the whole sample period, the percentage of scaled revenue surprises in bin 0 is about 25% for high-tech and health sectors, almost 7% higher than that for the full sample.

In summary, Figure B2 conveys the following messages. The distributions of scaled revenue surprises do not exhibit the same kind of discontinuity as seen in earnings surprises. However, as reflected in the unusually high frequency of small positive revenue surprises, there is evidence that firms report sales that are slightly higher than forecasted by analysts. Furthermore, this frequency is higher in high-tech and health sectors and in periods when the *RS PREMIUM* is high.[12]

[11] When *RS PREMIUM* is above (below) median, the standardized difference in -1 cent bin is 1.57 (0.33), and the standardized difference in zero and 1 cent bins are 26.27 (22.08) and -12.88 (-10.05), respectively.
[12] Results in Figure B2 should be viewed with a caveat in mind because Durtschi and Easton (2005) find that firms reporting a small profit tend to have a higher beginning-of-year price than firms reporting a small loss. Durtschi and Easton conclude that deflating earnings by market capitalization is one of the reasons that earnings distribution exhibits discontinuity around zero. Thus, Figure B2 alone does not provide sufficient evidence of revenue benchmark beating behavior.

5.2 Aggregate-level results on the tendency to meet or beat market expectations of revenue

Table A3 reports the results of aggregate-level tests on revenue benchmark beating behavior. Panel A presents the percentage of positive revenue surprises (*% POSITIVE RS*) and the number of quarters by the level of previous quarter's *ERC* and *RS PREMIUM*. The *ERC* or the *RS PREMIUM* is low (high) if its value is below (above) its respective sample median. Panel A.1 shows that, in the full sample, *% POSITIVE RS* is higher in periods when the *RS PREMIUM* is high regardless of whether the *ERC* is high or low. On the other hand, periods of low *ERC* are often accompanied by high *RS PREMIUM* or vice versa, suggesting that investors alternate their preferences for revenue growth and for earnings growth. The patterns in panel A.1 are also evident in panel A.2 when *% POSITIVE RS* is tabulated for high-tech and health sectors with the sector-level *ERC* and *RS PREMIUM*. Finally, Pearson Chi-square tests reject the null hypothesis that the row and the column variables (*RS PREMIUM* and *ERC*) are independent.

Panel B reports the results of estimating equation (2) for the full sample with pooled *ERC* and *RS PREMIUM* (panel B.1) and for the subsample of high-tech and health sectors with sector-level *ERC* and *RS PREMIUM* (panel B.2). Panel B.1 shows that, in the full sample, the coefficient on *RS PREMIUM* is positive and marginally significant with or without *ERC* in the regression. The coefficients on *ERC* and the interaction term are insignificant, evidence that higher *% POSITIVE RS* is associated with higher *RS PREMIUM* but not with higher *ERC*. The coefficient on the linear time trend (*TREND*) is positive and significant, consistent with the increasing propensity of firms to meet or beat analysts' forecasts (Brown and Caylor 2005). The results for high-tech and health sectors in panel B.2 are generally consistent with those for the full sample with one

exception - the coefficient on the interaction term is now negative and significant. The negative coefficient on *RS PREMIUM*ERC* indicates that the effect of *RS PREMIUM* decreases as the *ERC* increases, possibly because managers sacrifice sales target as the investor demand for earnings growth pressures them to devote more effort to cutting costs.

In sum, the findings in Table A3 provide weakly significant results consistent with managers catering to time-varying investor demand for revenue growth. Across all sectors, high *RS PREMIUM* leads to higher percentage of firms meeting or beating revenue forecasts in the subsequent quarter.

5.3 Firm-level results on the tendency to meet or beat market expectations of revenue

Table A4 reports the results from firm-level logistic regressions for the full sample (Panel A) and for high-tech and health sectors (Panel B). Firm-level results in Panel A are generally consistent with the aggregate-level results for the full sample. The coefficient on *HIGHPREMIUM* (β_1) is positive and significant. The coefficient on *HIGHERC* (β_2) is negative and significant without *HIGHPREMIUM* in the regression; however, it becomes insignificant once *HIGHPREMIUM* is included in the regression. The coefficient on *HIGH_HIGH* is negative and significant.

The coefficients on control variables are positive and significant with the exception of *LOSS* and *AGE* whose coefficients are negative and significant. As in the aggregate, there is an increasing trend (*TREND*) in the propensity of firms to meet or beat revenue targets at the firm-level. In addition, larger firms (*SIZE*), firms with higher growth opportunities (*MTB*), firms with improved performance (*I_ROA*), and firms with higher operating profit margin (*MARGIN*) are more likely to outperform market

expectations on the revenue dimension, while firms that report losses (*LOSS*) are more likely to disappoint the market. Firms are more likely to meet or beat revenue benchmarks in the fourth quarter (*Q4*) as compared to the first three quarters of the year. Finally, firms that meet or beat earnings forecasts (*MBE*) and younger firms (*AGE*) are more likely to meet or beat revenue forecasts as well.

Results in panel B for high-tech and health sectors exhibit patterns slightly different from panel A. Similar to panel A, the coefficient on *HIGHPREMIUM* is positive and the coefficient on *HIGH_HIGH* is negative. Different from panel A, the coefficient on *HIGHERC* is positive and significant with or without *HIGHPREMIUM* in the regression. These results suggest that firms in high-tech and health sectors are more likely to meet or beat revenue benchmarks when either the previous quarter's *RS PREMIUM* or *ERC* is high, but the effect of *RS PREMIUM* decreases as *ERC* increases.

To draw some practical inferences from the estimated coefficients in Table A4, I calculate the odds ratio for my main variable of interest *HIGHPREMIUM*. I start with the specification without *HIGHERC* and *HIGH_HIGH*. In the full sample, the odds ratio for *HIGHPREMIUM* is 1.03, implying that the predicted odds of firms meeting or beating revenue benchmarks is 3% higher when the *RS PREMIUM* is high. In comparison, the predicted odds of high-tech and health care firms meeting or beating revenue benchmarks is 12% higher when the *RS PREMIUM* is high (odds ratio of 1.12). When *HIGHERC* and *HIGH_HIGH* are added to the logit model, I calculate the odds ratio conditional on *HIGHERC*. That is, when *HIGHERC* is equal to 1, the odds ratio for *HIGHPREMIUM* is 0.97 in the full sample and 1.05 in high tech and health sectors; when *HIGHERC* is equal

to zero, the odds ratio for *HIGHPREMIUM* is 1.10 in the full sample and 1.17 in high tech and health sectors.[13]

To further investigate the possibility that firms meet or beat revenue benchmarks as a result of trying to meet or beat earnings targets, I re-estimate the logit model in equation (3) for two subsamples of firms. Firms with earnings surprises close to zero (defined as earnings surprises between negative two cents and positive one cent) are more likely to focus on meeting or beating earnings targets and therefore are separated into one subsample, and the remaining firms are included in the other subsample.[14]

Untabulated results show that all of the findings in Table A4 hold for firms whose earnings surprises are away from zero, evidence that revenue benchmark beating behavior is not simply a result of firms trying to meet or beat earnings targets. A subset of the findings holds for firms with earnings surprises close to zero. Without controlling for *HIGHERC*, the coefficient on *HIGHPREMIUM* is positive and significant for high-tech and health sectors but it is insignificant for the full sample. After controlling for *HIGHERC*, the coefficient on *HIGHPREMIUM* is positive and significant for high-tech and health sectors as well as for the full sample. In general, the explanatory power or pseudo R-square is much higher for the subsample of firms with earnings surprises away from zero and for high-tech and health care firms. These results suggest that revenue benchmarks are perhaps secondary targets when meeting or beating earnings targets is a primary concern.

As another robustness test, I re-estimate the logit model for subsamples of young (*AGE* below median) and old (*AGE* above median) firms with and without *AGE* variable

[13] See footnote 12 for the calculation of odds ratio.
[14] I choose the range of negative two cents and positive one cent [-2¢, 1¢] so that I have equal number of bins from the left and right of zero earnings surprise.

in the model. Strategy literature suggests that a firm maximizes revenue growth in early stage of its life cycle, but in its mature stage market growth slows (Porter 1980). Estimating the logit model in subsamples of young and old firms provides additional evidence on whether revenue catering behavior is solely a phenomenon among young firms. Untabulated results show that both young and old firms in high-tech and health sectors respond to investor demand for revenue growth. In the full sample, young firms respond to investor demand for revenue growth, while there is evidence of revenue catering behavior among old firms only when I control for investor demand for earnings growth.

Overall, Table A4 provides evidence of revenue catering behavior at the firm-level. Firms are more likely to meet or beat analyst forecasts of revenue when investors favor revenue growth. The effect of investor demand for revenue growth on revenue benchmark beating behavior is attenuated when investor demand for earnings growth is high; and this effect is more robust among high-tech and health care firms, as well as among firms that are less likely to focus on meeting or beating market expectations of earnings.

5.4 Firm-level results on abnormal growth in accounts receivable

Table A5 reports regression results on whether firms use aggressive revenue recognition practices or aggressive pricing policies (proxied by *ABNORMAL_ΔAR*) to meet or beat revenue benchmarks when time-varying investor demand for revenue growth is high.

Results are mostly consistent for the full sample and for high-tech and health sectors, thus I focus on the full sample and discuss high-tech and health sectors only

when the results are different. The positive and significant coefficients on *HIGHPREMIUM* (β_1), *MBR* (β_2), *RS_MV* (β_3) and *RS_MV*HIGHPREMIUM* (β_5) indicate the following: *ABNORMAL_ΔAR* is higher when the *RS PREMIUM* is high, when firms meet or beat revenue benchmarks, or when revenue surprises are higher; the association between abnormal growth in accounts receivable and the magnitude of revenue surprises is more positive when the previous quarter's *RS PREMIUM* is high than when it is low.

The following sums of coefficients are also positive and significant: $\beta_2 + \beta_4 = 0.133$, $\beta_1 + \beta_2 + \beta_4 = 0.227$. A positive $\beta_2 + \beta_4$ indicates that in periods of high *RS PREMIUM*, "revenue beaters" report higher *ABNORMAL_ΔAR* than "revenue missers". A positive $\beta_1 + \beta_2 + \beta_4$ indicates that firms that meet or beat revenue benchmarks in periods of higher *RS PREMIUM* report higher *ABNORMAL_ΔAR* than firms that miss revenue benchmarks in periods of low *RS PREMIUM*. In high-tech and health sectors, $\beta_5 + \beta_7$ as well as the sum of β_5, β_6 and β_7 are also positive and significant. A positive $\beta_5 + \beta_7$ indicates that conditional on meeting or beating revenue benchmarks, firms with similar magnitude of revenue surprises report higher *ABNORMAL_ΔAR* in periods of high *RS PREMIUM*. A positive $\beta_5 + \beta_6 + \beta_7$ indicates that revenue surprises are associated with higher *ABNORMAL_ΔAR* for firms that meet or beat revenue benchmarks in periods of high *RS PREMIUM* than for firms that miss revenue benchmarks in periods of low *RS PREMIUM*.

The interpretation of the negative coefficient on *MBR*HIGHPREMIUM* and negative $\beta_6 + \beta_7$ is counterintuitive since it would suggest that "revenue beaters" have lower rather than higher abnormal accounts receivable growth when facing high *RS*

PREMIUM. One plausible explanation is that managers of "revenue beaters" engage in activities that increase accounts receivable, but the increased receivables outstanding are more aggressively factored away (Roychowdhury 2006).

Taken together, Table A5 provides evidence that firms report higher abnormal growth in accounts receivable to pump up revenue in response to high investor demand for revenue growth. The high abnormal growth in accounts receivable could result from aggressive revenue recognition practices or from sales-boosting incentives such as offering price discounts or more lenient credit terms.

CHAPER 6 ADDITIONAL ANALYSES

6.1 Revenue misstatements

The evidence thus far suggests that firms are more likely to meet or beat revenue benchmarks when investors favor revenue growth. Although firms can use aggressive revenue recognition practices to achieve the benchmarks, benchmark beating behavior alone does not necessarily imply that firms are making choices that fall outside the boundaries of GAAP. To shed some light on whether firms violate GAAP in order to cater to investor demand for revenue growth, I analyze incidences of revenue-related restatements. Based on a 2002 report by U.S. General Accounting Office (GAO), revenue recognition is the most frequently identified cause of financial statement restatements during the period 1997-2002. Despite the drop in revenue recognition related restatements in more recent periods, revenue recognition remained the second most identified reason for restatements during the period 2002-2005 (GAO 2006).[15]

I obtain data from Audit Analytics for a sample of firms that restated their financial statements for reasons of accounting failure or financial fraud. Restatements that are identified as clerical errors are excluded from the analysis. Following the aggregate-level specification in equation (2), I test whether the percentage of revenue-related misstatements is higher when the previous quarter's *RS PREMIUM* is high. The percentage of revenue-related misstatements of a given quarter is the number of firms

[15] Scholz (2008) suggests that the reduction in the relative number of revenue restatements is likely a result of tech bubble burst and the issuance of SAB 101.

that misstated financial statements for revenue recognition issues, divided by the total number of firms that misstated for various reasons.[16]

Table A6 presents results for the full sample in panel A and for high-tech and health sectors in panel B. *RS PREMIUM* is not associated with the percentage of revenue-related misstatements in the full sample. However, in the high-tech and health sectors, the coefficient on *RS PREMIUM* (β_1) is positive and significant with or without *ERC* in the regression, indicating that periods of high *RS PREMIUM* are followed by periods of high frequency of revenue-related misstatements. These results complement the ones from the previous section on abnormal growth in accounts receivable. Taken together, the findings show that high-tech and health care firms resort to aggressive revenue recognition practices to cater to investor demand for revenue growth.

6.2 Sources of investor demand for revenue growth

The analyses so far in the paper treat the investor demand for revenue or earnings growth as exogenous and investigate its empirical effects. In this subsection, I explore the possible sources of investor demand for revenue or earnings growth. Prior research on catering theory has documented links between catering incentives and investor sentiment. Baker and Wurgler (2004a, 2004b) find that investor demand for dividends (the dividend premium) is associated with the closed-end fund discount - a common proxy for investor sentiment. Rajgopal et al. (2007) find a strong association between earnings optimism (i.e., investor demand for good news in earnings) and closed-end fund discount, while they do not observe a consistent relation between earnings optimism and macroeconomic

[16] Audit Analytics provides information on the periods misstated for each restatement filing. I classify a quarter as misstated as long as it is within the misstated period. If a firm has multiple restatement filings that involve the same misstated quarter, the firm is only counted once for that given quarter.

activities. On the other hand, Aghion and Stein (2008) suggest that investors are likely to prefer a "growth" strategy during the expansion phase and a "margins" strategy during the recession phase of the business cycle.

To provide a preliminary test on the sources of investor demand for revenue or earnings growth, I regress *RS PREMIUM* or *ERC* on one-quarter-ahead real GDP growth (*GDPCHG*) and the contemporaneous investor sentiment index (*SENTIMENT*) developed in Baker and Wurgler (2006).[17] The following equations present the results of these regressions (sector fixed effects omitted).

$$RS\ PREMIUM_t = \underset{(t = 4.19)}{0.008} * SENTIMENT_t + \underset{(t = 7.76)}{0.433} * GDPCHG_{t+1} + \underset{(t = 4.36)}{0.002} * TREND$$

$$ERC_t = \underset{(t = 0.18)}{0.0003} * SENTIMENT_t + \underset{(t = 1.71)}{0.217} * GDPCHG_{t+1} + \underset{(t = 1.21)}{0.0003} * TREND$$

Results show that *RS PREMIUM* is positively associated with investor sentiment and GDP growth after controlling for the time trend. In comparison, *ERC* is positively associated with GDP growth but not with investor sentiment. These results are consistent with investor demand for revenue growth stemming not only from investors' expectation of future macroeconomic growth, but also from investors' belief about future cash flows and investment risks that is not rationally justified.

Finally, to rule out the explanation that *RS PREMIUM* simply captures the investors' expectation of future earnings growth, I regress *RS PREMIUM* or *ERC* on one-quarter-ahead earnings growth (*EPSCHG*) and the contemporaneous investor sentiment index (*SENTIMENT*), where *EPSCHG* is measured as the sector-level average growth in

[17] Real GDP growth is available at the website of St. Louis Federal Reserve Bank and is measured over the same quarter of the prior year. The investor sentiment index is available at Jeffrey Wurgler's website. I use the index from Baker and Wurgler (2006) equation (3), which is orthogonal to business cycle variation. Because Baker and Wurgler provide the investor sentiment index on a monthly basis, I average the index across the three months in a calendar quarter for comparison with the *RS PREMIUM* and the *ERC.*

earnings per share (*EPS*) over the same quarter of the prior year. The following equations present the results of these regressions (sector fixed effects omitted).

$$RS\ PREMIUM_t = \underset{(t = 2.05)}{0.005} * SENTIMENT_t + \underset{(t = 0.52)}{0.003} * EPSCHG_{t+1} + \underset{(t = 4.23)}{0.001} * TREND$$

$$ERC_t = \underset{(t = -0.32)}{-0.0005} * SENTIMENT_t + \underset{(t = 2.02)}{0.005} * EPSCHG_{t+1} + \underset{(t = 0.32)}{0.00008} * TREND$$

Results show that *RS PREMIUM* is not significantly associated with earnings growth after controlling for investor sentiment and the time trend. In comparison, *ERC* is positively associated with earnings growth but not with investor sentiment.

6.3 Do managers benefit from their catering behavior?

One question that remains unanswered is whether managers benefit from their revenue catering behavior. In practice, managerial compensation is often directly linked to revenue through firms' use of revenue numbers in performance-based incentive plans. A recent compensation survey conducted by Mercer, a leading human resource consulting firm, documents that out of 350 large and midsize public companies in the United States, 11% use revenue in their performance-based compensation incentive plans. Managerial compensation could also be indirectly linked to revenue through the effect of revenue on stock prices. As the catering theory predicts, catering behavior is more pronounced among firms whose managers care more about current stock prices. This suggests that managers derive benefits from increases in stock prices.

To provide a preliminary answer as to whether managers benefit from revenue catering behavior, I compare earnings announcement returns of firms that meet or beat revenue benchmarks to firms that miss revenue benchmarks conditional on the level of

the previous quarter's *RS PREMIUM*. The following equation presents the result of the regression (sector fixed effects omitted).[18]

$$BHAR_t = \underset{(t = 10.40)}{0.015 * MBR_t} - \underset{(t = -5.82)}{0.202 * RS\ PREMIUM_{t-1}}$$

$$+\underset{(t = 5.26)}{0.169 * MBR_t * RS\ PREMIUM_{t-1}} + \underset{(t = 32.72)}{0.039 * MBE_t}$$

Consistent with prior research, the coefficients on *MBR* and *MBE* are significantly positive. The significant and positive coefficient on *MBR*RS PREMIUM* suggests that during periods of high investor demand for revenue growth, investors reward firms that meet or beat market expectations of revenue with higher earnings announcement returns, evidence that managers benefit from increases in stock prices as a result of their revenue catering behavior.

[18] Standard errors are clustered by firm and time period to account for multiple dimensions at the same time.

CHAPTER 7 CONCLUSION

In this paper, I document the time-series variation in the "revenue surprise premium" - a proxy for time-varying investor demand for revenue growth, where the revenue surprise premium is measured as the stock price premium that investors place on good news in revenue after controlling for the news in earnings. I develop an empirical test of the revenue catering theory relying on Aghion and Stein (2008) that if firm managers care about current stock prices, they will devote more effort to increasing sales when investor demand for revenue growth is high. I examine whether managers cater to time-varying revenue surprise premium by meeting or beating market expectations of revenue and whether they resort to aggressive revenue recognition practices in order to do so.

I find evidence consistent with revenue catering behavior. The tendency of firms to meet or beat analyst forecasts of revenue is higher when the previous quarter's revenue surprise premium is high. This kind of catering behavior exists among both young and old firms. The effect of revenue surprise premium on revenue benchmark beating behavior is more pronounced among high-tech and health care firms, and among firms that are less likely to focus on meeting or beating market expectations of earnings. My analyses on the abnormal growth in accounts receivable and on a sample of restatement firms suggest that managers of high-tech and health care firms resort to aggressive revenue recognition practices to inflate revenue in response to high investor demand for revenue growth. An investigation of earnings announcement period stock price performance indicates that managers benefit from stock price appreciation as a result of revenue catering behavior.

This study provides evidence that managers view market expectations of revenue as another important benchmark and links managerial discretion with respect to revenue reporting to time-varying investor demand for revenue growth. It advances the understanding of macro-level earnings management incentives and provides an indication of why and when revenue manipulation is most likely to occur, and thus makes a contribution to the research stream on earnings management.

I offer several suggestions for future research. First, future research could investigate the alternative mechanisms that managers use to boost revenue. For example, managers could offer price discounts or spend more on advertising to increase short-term revenue. Prior research offers ways to test whether firms engage in real earnings management to meet or beat earnings benchmarks. Following Roychowdhury (2006), one could test whether firms that meet or beat revenue benchmarks in periods of higher revenue surprise premium have higher abnormal advertising expenses or lower abnormal operating cash flows.[19] Second, McInnis and Collins (2009) find evidence that the provision of cash flow forecasts induces changes in firms' earnings management behavior. They do not examine when and why analysts started providing more cash flow forecasts. Future research could explore the time variation in the importance that investors place on firms' cash flows as opposed to earnings, and whether the time-varying investor demand for cash flows is linked to the temporal trend in the provision of cash flow forecasts by analysts. Finally, it would also be interesting to further examine

[19] In untabulated tests, I do not find evidence that revenue benchmark beating or high revenue surprise premium is associated with abnormally low operating cash flows. Given that operating cash flows are affected by many factors other than price discounts, researchers could design a model that captures price discounts more directly.

sources of investor demand for earnings or revenue growth using a systematic content analysis of financial press articles.

APPENDIX A. TABLES

Table A1. Descriptive Statistics

Panel A: Sample characteristics

	Mean	1st Quartile	Median	3rd Quartile	Std	N
Abnormal return (BHAR)	0.00	-0.05	0.00	0.05	0.09	90,337
Earnings surprise (ES)	0.00	-0.01	0.01	0.03	0.10	90,337
- % Positive ES	70%					
Revenue surprise (RS)	6.62	-2.39	0.36	5.52	99.72	90,337
- % Positive RS	57%					
- RS/MV	-0.24%	-0.49%	0.07%	0.69%	5.99%	
Quarterly sales (SALES)	686	24	97	365	2,848	90,262
Total Assets (ASSETS)	3,169	131	429	1,559	17,250	90,289
Market value of equity (MV)	3,338	199	580	1,859	9,667	89,895
Market-to-book ratio (MTB)	4.03	1.63	2.62	4.38	4.74	87,752
LOSS	32%	-	-	-		90,275
Operating profit margin (MARGIN)	-0.36	-0.01	0.07	0.14	2.02	89,069
Change in return on assets (I_ROA)	50%	-	-	-		90,226
Fiscal quarter four (Q4)	29%	-	-	-		90,337
AGE	160.82	42	99	202	183.80	90,312
ΔAR/ΔSales	0.63	-0.10	0.35	1.01	8.02	79,944
Abnormal change in accounts receivable (Abnormal_ΔAR)	0.01%	-1.10%	-0.10%	0.99%	2.82%	82,924

Panel B: Pearson (above diagonal) and Spearman (below diagonal) Correlation Matrix

Variable	RET	ES	RS	SALES	ASSETS	MV	MTB	LOSS	MARGIN	I_ROA	Q4	AGE	Abnormal_ΔAR
RET		**0.20**	**0.03**	**0.01**	*0.00*	*0.00*	**-0.01**	**-0.11**	**0.05**	**0.13**	*0.00*	**0.01**	*0.00*
ES	**0.28**		**0.09**	**0.04**	**0.02**	**0.04**	**0.04**	**-0.22**	**0.05**	**0.21**	**-0.04**	**0.04**	**0.03**
RS	**0.16**	**0.29**		**0.21**	**0.18**	**0.12**	*0.00*	**-0.06**	**0.02**	**0.02**	*0.01*	**0.08**	**0.02**
SALES	**0.07**	**0.12**	**0.18**		**0.74**	**0.60**	*0.00*	**-0.11**	**0.06**	**0.01**	*0.00*	**0.35**	*0.00*
ASSETS	**0.05**	**0.11**	**0.16**	**0.91**		**0.86**	**-0.07**	**-0.06**	**0.04**	*0.00*	*0.00*	**0.29**	*0.00*
MV	**0.05**	**0.14**	**0.18**	**0.77**	**0.53**		**0.14**	**-0.15**	**0.08**	**0.01**	**-0.02**	**0.39**	*0.00*
MTB	*0.00*	**0.07**	**0.08**	**-0.04**	**-0.01**	**0.33**		**0.03**	**-0.09**	**0.03**	**-0.02**	**-0.06**	**0.05**
LOSS	**-0.12**	**-0.20**	**-0.15**	**-0.43**	**-0.31**	**-0.32**	**-0.09**		**-0.36**	**-0.20**	**0.03**	**-0.21**	**-0.04**
MARGIN	**0.12**	**0.19**	**0.15**	**0.40**	**0.36**	**0.41**	**0.20**	**-0.70**		**0.08**	*0.00*	**0.12**	**0.02**
I_ROA	**0.13**	**0.25**	**0.09**	**0.04**	**0.02**	**0.02**	**0.02**	**-0.20**	**0.14**		**-0.03**	**0.01**	**0.01**
Q4	*0.00*	**-0.02**	**-0.01**	**-0.01**	**-0.02**	**-0.06**	**-0.05**	**0.03**	*-0.01*	**-0.03**		*0.00*	**0.03**
AGE	**0.02**	**0.02**	**0.03**	**0.46**	**0.42**	**0.33**	**-0.08**	**-0.25**	**0.22**	**0.02**	**-0.01**		**-0.02**
Abnormal_ΔAR	*0.00*	**0.02**	**0.05**	**-0.01**	**-0.01**	**0.01**	**0.05**	**-0.04**	**0.04**	**0.01**	**0.04**	**-0.02**	

Continuous variables are winsorized at the 1% and 99% levels. Abnormal return (*BHAR*) is size-adjusted buy-and-hold abnormal return over the three-day earnings announcement window. *ES* is earnings surprise. *RS* is revenue surprise. *SALES* and *ASSETS* are net sales and total assets reported on the quarterly balance sheet. *MV* is the market value of equity. *MTB* is a firm's market-to-book ratio. *LOSS* is an indicator variable that equals one if a firm reports a loss. *MARGIN* is operating profit margin. *I_ROA* is an indicator variable that equals one if a firm's return on assets has improved since the previous quarter. *Q4* is an indicator

Table A1. Continued

variable that equals one for fiscal quarter four. *AGE* is the number of months since the firm's first return record appeared on CRSP. Δ*AR*/Δ*Sales* is quarterly change in accounts receivable divided by quarterly change in sales. *ABNORMAL_*Δ*AR* is the abnormal change in accounts receivable as a percentage of total assets. See "List of Abbreviations" for details on variable measurement. All correlations are significant at 10% level or better except the ones that are italicized.

Table A2. Quarterly Cross-sectional Regressions of Earnings Announcement Period Abnormal Returns on Earnings Surprise and Revenue Surprise Deciles

$$BHAR = \alpha + \beta_1 ES\_DECILE + \beta_2 RS\_DECILE + \varepsilon$$

	α	β_1		β_2		
	Mean	Mean	Median	Mean	Median	Adj-Rsq
Full Sample	-0.046 ***	0.068 ***	0.067	0.027 ***	0.030	8.5%
	(-22.70)	(39.07)		(10.76)		
Sector 1 - Consumer	-0.045 ***	0.085 ***	0.083	0.014 ***	0.016	11.3%
	(-19.88)	(23.27)		(6.14)		
Sector 2 - Manufacturing	-0.039 ***	0.065 ***	0.064	0.018 ***	0.018	10.3%
	(-15.78)	(19.75)		(7.90)		
Sector 3 - High-tech	-0.059 ***	0.071 ***	0.070	0.045 ***	0.048	9.0%
	(-19.76)	(23.94)		(9.84)		
Sector 4 - Health	-0.045 ***	0.046 ***	0.046	0.045 ***	0.044	6.3%
	(-19.85)	(16.98)		(10.30)		
Sector 5 - Other	-0.037 ***	0.064 ***	0.066	0.015 ***	0.014	8.2%
	(-9.48)	(18.98)		(3.01)		

α, β_1, β_2 are the coefficient estimates from 42 quarterly regressions in equation (1). Standard errors for mean α, β_1 and β_2 are calculated from the time-series variation in these estimates. T-stats are in parenthesis and calculated from the standard errors of the quarterly averages. Sector 1 includes consumer-related industries - consumer durable, nondurables, wholesale, retail and some services such as laundries and repair shops. Sector 2 refers to manufacturing and energy. Sector 3 refers to high-tech industries such as business equipment, computer-related services, R&D labs, telephone, and television transmission. Sector 4 includes industries involved in health care, medical equipment and drugs. All other industries are grouped into Sector 5. *BHAR* is size-adjusted buy-and-hold abnormal return over the three-day earnings announcement window. *ES_DECILE* is the decile assignment of scaled earnings surprise. *RS_DECILE* is the decile assignment of scaled revenue surprise. See "List of Abbreviations" for details on variable measurement. *, **, and *** denote the significance level of 10%, 5% and 1% (two-sided), respectively.

Table A3. Revenue Benchmark Beating – Aggregate Level

Panel A: Percentage of positive *RS* and the number of quarters (in parenthesis) by one-quarter lagged *ERC* and *RS PREMIUM*

Panel A.1 Full sample and pooled *ERC* and *RS PREMIUM*

% positive RS (# of Quarters)				
	RS Premium		Average	Difference by RS Premium
ERC	Low	High	(Total)	High - Low
Low	53%	59%	56%	6%
	(13)	(8)	(21)	(t-stat = 1.51)
High	55%	58%	57%	3%
	(8)	(12)	(20)	(t-stat = 1.65)
Average	54%	59%	56%	5%**
(Total)	(21)	(20)	(41)	(t-stat = 2.28)
	χ2 stat = 479.82***			

Panel A.2 High-tech and health sectors by one-quarter lagged sector-level *ERC* and *RS PREMIUM*

	High-tech (sector 3)				Health (sector 4)			
	RS Premium		Average	Difference by RS Premium	RS Premium		Average	Difference by RS Premium
ERC	Low	High	(Total)	High - Low	Low	High	(Total)	High - Low
Low	53%	61%	57%	8%**	53%	54%	53%	1%
	(12)	(9)	(21)	(t-stat = 2.23)	(10)	(11)	(21)	(t-stat = 0.25)
High	56%	62%	59%	6%*	52%	55%	54%	4%
	(9)	(11)	(20)	(t-stat = 2.08)	(10)	(10)	(20)	(t-stat = 1.11)
Average	54%	61%	58%	7%***	52%	55%	54%	2%
(Total)	(21)	(20)	(41)	(t-stat = 3.21)	(20)	(21)	(41)	(t-stat = 1.03)
	χ2 stat = 613.65***				χ2 stat = 19.87***			

Table A3. Continued

Panel B: Regression results

Panel B.1 Full sample and pooled *ERC* and *RS PREMIUM*

		Y = *% POSITIVE RS*					
	Pred.	(1)		(2)		(3)	
Variable	Sign	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
Intercept		0.498	19.34 ***	0.529	7.21 ***	0.439	4.27 ***
RS PREMIUM	(β1) +	1.088	1.83 **			4.723	1.36 *
ERC	(β2)			-0.299	-0.31	0.757	0.63
*RS PREMIUM * ERC*	(β3)					-52.353	-1.18
TREND		0.002	2.13 **	0.003	2.98 ***	0.002	1.96 *
N		41		41		41	
Adjusted Rsq		21.2%		17.4%		19.0%	

Panel B.2 High-tech and health sectors and sector-level *ERC* and *RS PREMIUM*

		Y = *% POSITIVE RS*					
	Pred.	(1)		(2)		(3)	
Variable	Sign	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
Intercept		0.453	45.37 ***	0.462	36.90 ***	0.427	13.65 ***
RS PREMIUM	(β1) +	0.604	1.56 *			0.839	1.35 *
ERC	(β2)			0.106	0.36	0.436	0.87
*RS PREMIUM * ERC*	(β3)					-2.690	-1.67 *
TREND		0.003	2.92 ***	0.003	10.73 ***	0.003	3.03 ***
Sector fixed effects		Yes		Yes		Yes	
N		82		82		82	
Adjusted Rsq		37.56%		33.78%		38.31%	

Standard errors are corrected using heteroscedasticity-consistent Newey-West procedure. *% POSITIVE RS* is the number of firms with positive or zero revenue surprises divided by the total number of firms in a given calendar quarter. *ERC* is the coefficient on *ES_DECILE* from quarterly cross-sectional regressions of earnings announcement period abnormal returns (*BHAR*) on decile assignments of earnings surprises (*ES_DECILE*) and decile assignments of revenue surprises (*RS_DECILE*). *RS PREMIUM* is the coefficient on *RS_DECILE* from quarterly cross-sectional regressions of earnings announcement period abnormal returns (*BHAR*) on decile assignments of earnings surprises (*ES_DECILE*) and decile assignments of revenue surprises (*RS_DECILE*). Both the *ERC* and the *RS PREMIUM* are lagged by one quarter. *TREND* is a linear time trend variable. See "List of Abbreviations" for details on variable measurement. *, **, and *** denote the significance level of 10%, 5% and 1%, respectively (one-tailed when the sign of the coefficient is predicted, two-tailed otherwise).

Table A4. Revenue Benchmark Beating – Firm Level Logistic Regressions

Panel A: Full sample (All sectors)

		Y = MBR					
		(1)		(2)		(3)	
Variable		Coefficient	StdErr	Coefficient	StdErr	Coefficient	StdErr
Intercept		-1.202	0.051 ***	-1.188	0.052 ***	-1.227	0.052 ***
HIGHPREMIUM	(β1)	0.029	0.015 *			0.094	0.021 ***
HIGHERC	(β2)			-0.030	0.015 **	0.034	0.021
HIGH_HIGH	(β3)					-0.126	0.028 ***
TREND		0.012	0.001 ***	0.013	0.001 ***	0.013	0.001 ***
SIZE		0.073	0.007 ***	0.074	0.008 ***	0.074	0.008 ***
MTB		0.022	0.002 ***	0.022	0.002 ***	0.022	0.002 ***
LOSS		-0.152	0.022 ***	-0.153	0.022 ***	-0.151	0.022 ***
I_ROA		0.151	0.015 ***	0.152	0.015 ***	0.152	0.015 ***
MARGIN		0.074	0.006 ***	0.074	0.006 ***	0.074	0.006 ***
Q4		0.028	0.015 *	0.031	0.015 **	0.023	0.016
MBE		1.030	0.019 ***	1.030	0.019 ***	1.030	0.019 ***
AGE		-0.001	0.000 ***	-0.001	0.000 ***	-0.001	0.000 ***
Sector Fixed Effects		Yes		Yes		Yes	
N		86,200		86,200		86,200	
%MBR = 1		56.9%		56.9%		56.9%	
Pseudo Rsq		11.22%		11.22%		11.25%	
Likelihood Ratio ChiSq		7525.6 ***		7526.2 ***		7548.5 ***	

	Odds Ratios		
	Estimate	95% Wald Confidence Interval	
(1) *HIGHPREMIUM* (1 vs 0)	1.03	1.00	1.06
(2) *HIGHERC* (1 vs 0)	0.97	0.94	1.00
(3) *HIGHPREMIUM* (1 vs 0) at *HIGHERC* = 0	1.10	1.05	1.15
HIGHPREMIUM (1 vs 0) at *HIGHERC* = 1	0.97	0.93	1.01

Table A4. Continued

Panel B: High-tech and health sectors (sectors 3 & 4)

		Y = MBR					
		(1)		(2)		(3)	
Variable		Coefficient	StdErr	Coefficient	StdErr	Coefficient	StdErr
Intercept		-1.587	0.076 ***	-1.623	0.078 ***	-1.656	0.078 ***
HIGHPREMIUM	(β1)	0.115	0.024 ***			0.161	0.031 ***
HIGHERC	(β2)			0.074	0.021 ***	0.121	0.030 ***
HIGH_HIGH	(β3)					-0.114	0.042 ***
TREND		0.015	0.001 ***	0.017	0.001 ***	0.016	0.001 ***
SIZE		0.103	0.011 ***	0.104	0.011 ***	0.103	0.011 ***
MTB		0.026	0.003 ***	0.027	0.003 ***	0.026	0.003 ***
LOSS		-0.122	0.030 ***	-0.120	0.030 ***	-0.116	0.030 ***
I_ROA		0.233	0.021 ***	0.230	0.021 ***	0.232	0.021 ***
MARGIN		0.075	0.006 ***	0.075	0.006 ***	0.075	0.006 ***
Q4		0.048	0.023 **	0.057	0.023 **	0.033	0.024
MBE		1.152	0.028 ***	1.154	0.028 ***	1.153	0.028 ***
AGE		-0.001	0.000 ***	-0.001	0.000 ***	-0.001	0.000 ***
Sector Fixed Effects			Yes		Yes		Yes
N			41,578		41,578		41,578
%MBR = 1			56.9%		56.9%		56.9%
Pseudo Rsq			15.10%		15.06%		15.14%
Likelihood Ratio ChiSq			4963.4 ***		4949.8 ***		4978.0 ***

Odds Ratios

	Estimate	95% Wald Confidence Interval	
(1) *HIGHPREMIUM* (1 vs 0)	1.12	1.07	1.18
(2) *HIGHERC* (1 vs 0)	1.08	1.03	1.12
(3) *HIGHPREMIUM* (1 vs 0) at *HIGHERC* = 0	1.18	1.11	1.25
HIGHPREMIUM (1 vs 0) at *HIGHERC* = 1	1.05	0.98	1.12

Standard errors are clustered at the firm-level. Continuous variables are winsorized at the 1% and 99% levels. *MBR* is an indicator variable that equals one if a firm meets or beats revenue forecast in the current quarter. *HIGHPREMIUM* is an indicator variable that equals one if the *RS PREMIUM* is above the sample median. *HIGHERC* is an indicator variable that equals one if the *ERC* is above the sample median. *HIGH_HIGH* is the interaction between *HIGHPREMIUM* and *HIGHERC*. *HIGHPREMIUM*, *HIGHERC* and *HIGH_HIGH* are all lagged by one quarter. *TREND* is a linear time trend variable. *MTB* is a firm's market-to-book ratio. *SIZE* is the natural log of market value of equity. *LOSS* is an indicator variable that equals one if a firm reports a loss. *I_ROA* is an indicator variable that equals one if a firm's ROA improves over the previous quarter. *MARGIN* is the operating profit margin. *Q4* is an indicator variable that equals one for fiscal quarter four. *MBE* is an indicator variable that equals one if a firm meets or beats earnings forecast in the current quarter. *AGE* is the number of months since the firm's first return record appeared on CRSP. See "List of Abbreviations" for details on variable measurement. *, **, and *** denote the significance level of 10%, 5% and 1% (two-sided), respectively.

Table A5. Revenue Management through Accounts Receivable

		Y = ABNORMAL_ ΔAR			
		Full Sample		High-tech and Health Sectors	
		Coefficient	t-stat	Coefficient	t-stat
Intercept		-0.200	-4.52 ***	-0.325	-7.33 ***
HIGHPREMIUM	(β1)	0.095	2.77 ***	0.176	3.76 ***
MBR	(β2)	0.233	6.77 ***	0.324	6.55 ***
RS_MV	(β3)	2.725	4.89 ***	3.315	3.58 ***
*MBR * HIGHPREMIUM*	(β4)	-0.101	-2.25 **	-0.240	-3.81 ***
*RS_MV * HIGHPREMIUM*	(β5)	1.784	2.05 **	5.348	3.63 ***
*MBR * RS_MV*	(β6)	-1.335	-1.43	-0.005	0.00
*MBR * RS_MV * HIGHPREMIUM*	(β7)	-1.887	-1.43	-0.096	-0.03
LAG ABNORMAL_ΔAR		-0.207	-26.24 ***	-0.198	-20.52 ***
MBE		0.120	4.93 ***	0.191	5.48 ***
		Coefficient	F-test	Coefficient	F-test
Test: β1 + β4 = 0		-0.006	0.04	-0.064	2.39
Test: β2 + β4 = 0		0.133	19.84 ***	0.084	4.28 **
Test: β1 + β2 + β4 = 0		0.227	49.49 ***	0.260	33.72 ***
Test: β5 + β7 = 0		-0.102	0.01	5.252	3.38 *
Test: β6 + β7 = 0		-3.222	10.16 ***	-0.100	0.00
Test: β5 + β6 + β7 = 0		-1.437	1.97	5.248	4.88 **
Sector fixed effects		Yes		Yes	
N		69,664		35,423	
Adjusted Rsq		4.94%		5.17%	

Standard errors are robust standard errors clustered at the firm-level. Continuous variables are winsorized at the 1% and 99% levels. *ABNORMAL_ΔAR* is abnormal change in accounts receivables as a percentage of beginning assets, multiplied by 100. *HIGHPREMIUM* is an indicator variable that equals one if the *RS PREMIUM* is above the sample median. *HIGHPREMIUM* is lagged by one quarter. *LAG ABNORMAL_ ΔAR* is the one-quarter lagged *ABNORMAL_ΔAR*. *MBR* is an indicator variable that equals one if a firm meets or beats revenue forecast in the current quarter. *RS_MV* is *RS* scaled by market value of equity at the beginning of the quarter. *MBE* is an indicator variable that equals one if a firm meets or beats earnings forecast in the current quarter. See "List of Abbreviations" for details on variable measurement. *, **, and *** denote the significance level of 10%, 5% and 1% (two-sided), respectively.

Table A6. Revenue Recognition Related Misstatements

Panel A: Full sample and pooled *ERC* and *RS PREMIUM*

		Y = *% REVENUE MISSTATEMENTS*					
	Pred.	(1)		(2)		(3)	
Variable	Sign	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
Intercept		0.263	16.71 ***	0.319	13.32 ***	0.335	7.95 ***
RS PREMIUM	(β1) +	0.451	1.19			-0.857	-0.63
ERC	(β2)			-0.822	-2.68	-1.063	-2.30 *
*RS PREMIUM * ERC*	(β3)					17.484	1.08
TREND		-0.004	-7.75 ***	-0.003	-6.50 ***	-0.004	-6.50 ***
N		41		41		41	
Adjusted Rsq		76.12%		78.40%		78.75%	

Panel B: High-tech and health sectors by sector-level *ERC* and *RS PREMIUM*

		Y = *% REVENUE MISSTATEMENTS*					
	Pred.	(1)		(2)		(3)	
Variable	Sign	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
Intercept		0.227	15.25 ***	0.256	8.40 ***	0.223	3.93 ***
RS PREMIUM	(β1) +	0.547	3.45 ***			0.808	1.31 *
ERC	(β2)			-0.322	-0.72	-0.0004	0.00
*RS PREMIUM * ERC*	(β3)					-4.711	-0.68
TREND		-0.003	-10.82 ***	-0.002	-5.14 ***	-0.003	-7.52 ***
Sector fixed effects		Yes		Yes		Yes	
N		82		82		82	
Adjusted Rsq		39.92%		36.55%		40.35%	

Standard errors are corrected using heteroscedasticity-consistent Newey-West procedure. *% REVENUE MISSTATEMENTS* is the number of firms that misstated for revenue recognition reasons, divided by the total number of firms that misstated for various accounting failure or fraud reasons. *ERC* is the coefficient on *ES_DECILE* from quarterly cross-sectional regressions of earnings announcement period abnormal returns (*BHAR*) on decile assignments of earnings surprises (*ES_DECILE*) and decile assignments of revenue surprises (*RS_DECILE*). *RS PREMIUM* is the coefficient on *RS_DECILE* from quarterly cross-sectional regressions of earnings announcement period abnormal returns (*BHAR*) on decile assignments of earnings surprises (*ES_DECILE*) and decile assignments of revenue surprises (*RS_DECILE*). Both the *ERC* and the *RS PREMIUM* are lagged by one quarter. *TREND* is a linear time trend variable. See "List of Abbreviations" for details on variable measurement. *, **, and *** denote the significance level of 10%, 5% and 1%, respectively (one-tailed when the sign of the coefficient is predicted, two-tailed otherwise).

APPENDIX B. FIGURES

Figure B1. Percentage of Positive Revenue Surprises (*% POSITIVE RS*), One-quarter Lagged Earnings Response Coefficient (*ERC*), and One-quarter Lagged Revenue Surprise Premium (*RS PREMIUM*) over Time

Panel A: Full Sample - pooled *ERC* and pooled *RS PREMIUM*

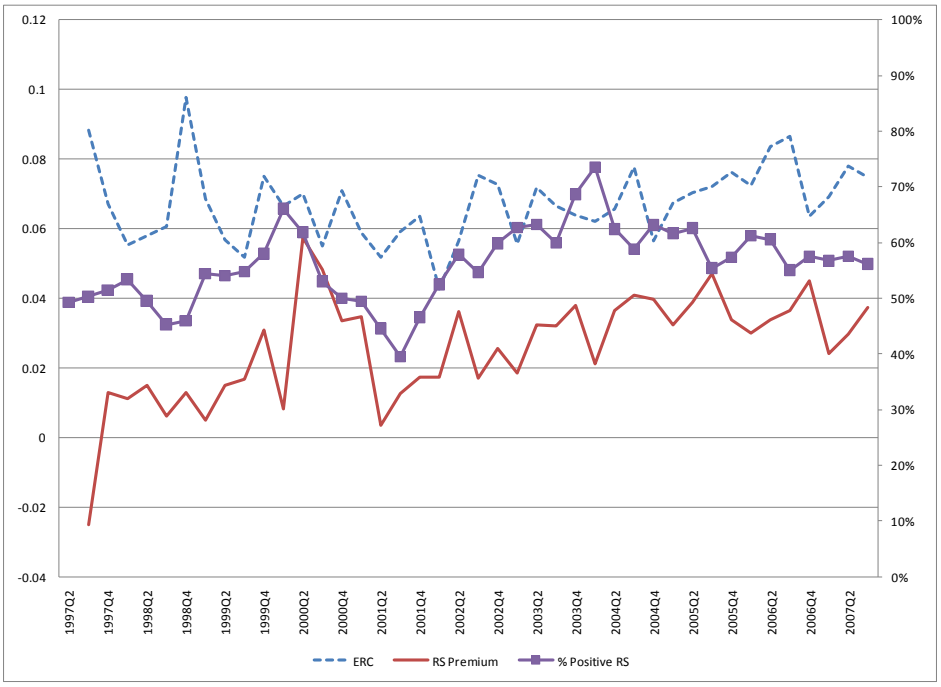
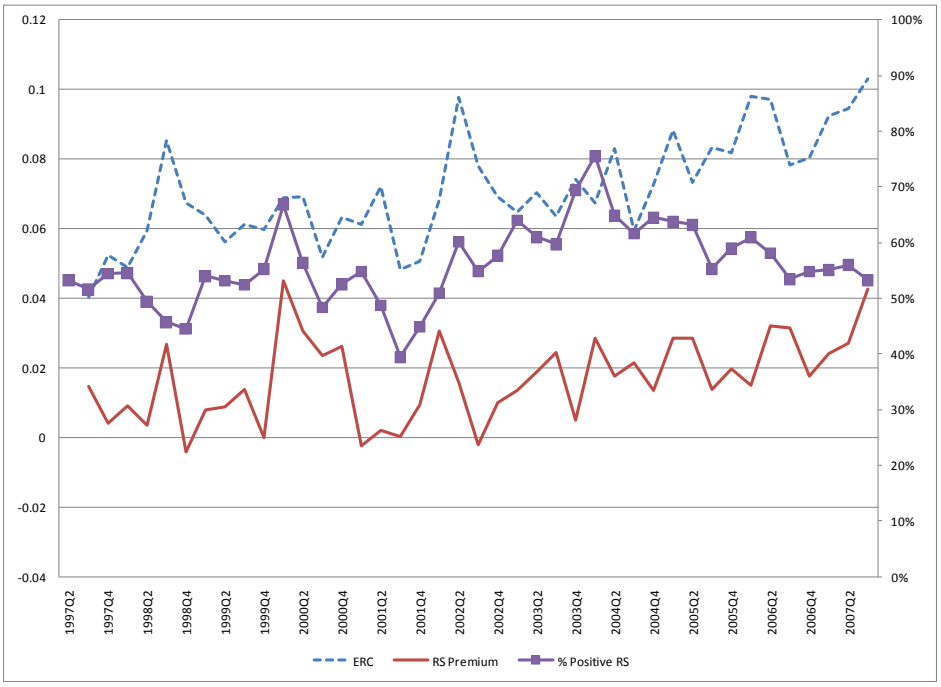


Figure B1. Continued

Panel B: Average of sector 1 (consumer), sector 2 (manufacturing) and sector 5 (other) – sector level *ERC* and *RS PREMIUM*



Panel C: Average of sector 3 (high-tech) and sector 4 (health) – sector level *ERC* and *RS PREMIUM*

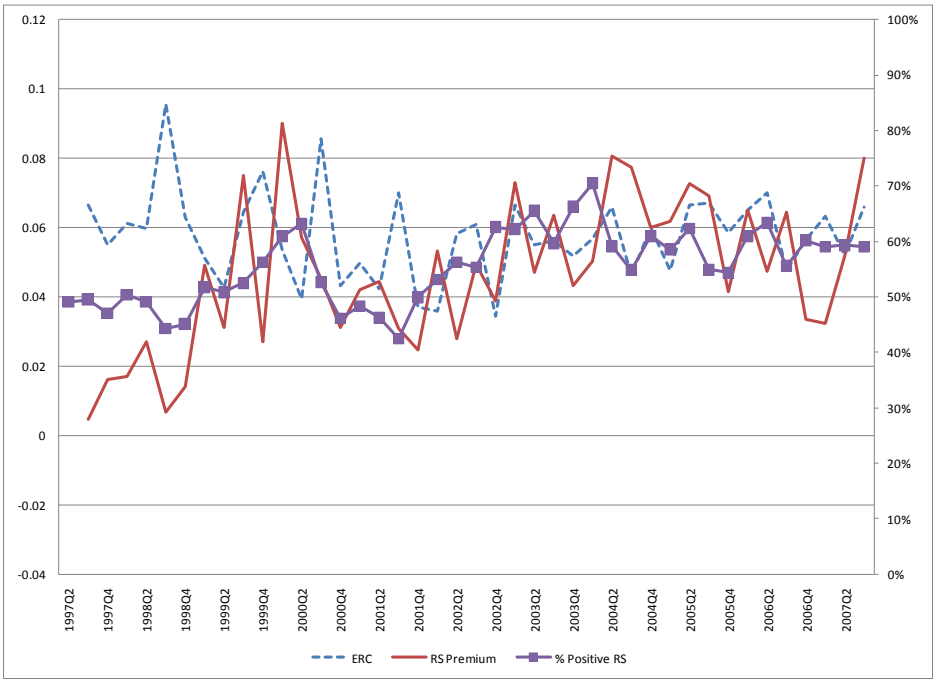


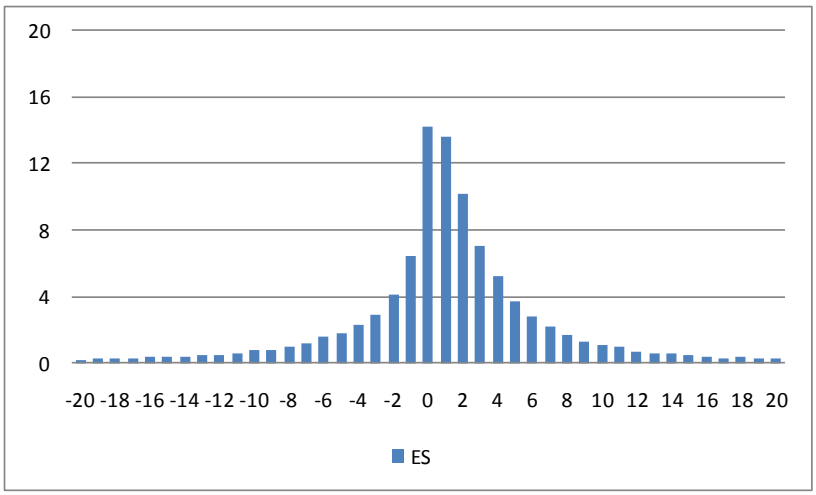
Figure B1. Continued

ERC is the coefficient on *ES_DECILE* from quarterly cross-sectional regressions of earnings announcement period abnormal returns (*BHAR*) on decile assignments of earnings surprises (*ES_DECILE*) and decile assignments of revenue surprises (*RS_DECILE*). *RS PREMIUM* is the coefficient on *RS_DECILE* from quarterly cross-sectional regressions of earnings announcement period abnormal returns (*BHAR*) on decile assignments of earnings surprises (*ES_DECILE*) and decile assignments of revenue surprises (*RS_DECILE*). Both the *ERC* and the *RS PREMIUM* are lagged by one quarter. *% POSITIVE RS* is the number of firms with positive or zero revenue surprises divided by the total number of firms in a given calendar quarter. The scale on the left side of the panel is for the *ERC* and the *RS PREMIUM* while the scale on the right side of the panel is for *% POSITIVE RS*. See "List of Abbreviations" for details on variable measurement.

Figure B2. Distributions of Earnings Surprises and Revenue Surprises

Panel A: Earnings surprises

RS PREMIUM above median



RS PREMIUM below median

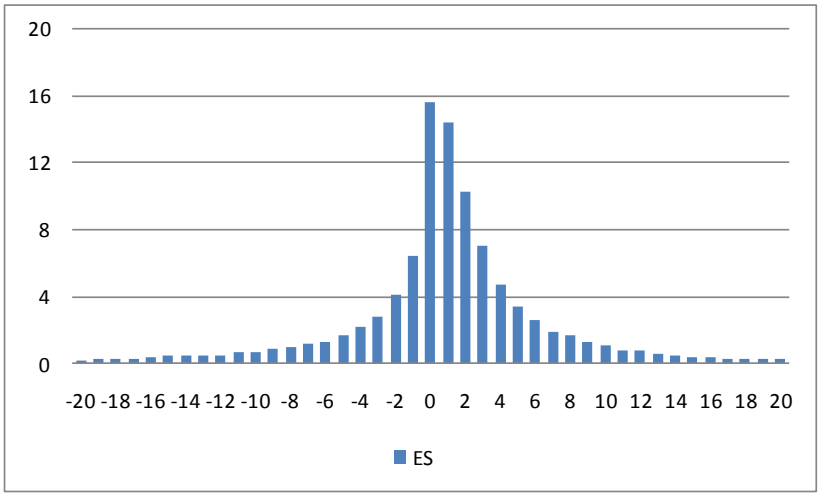
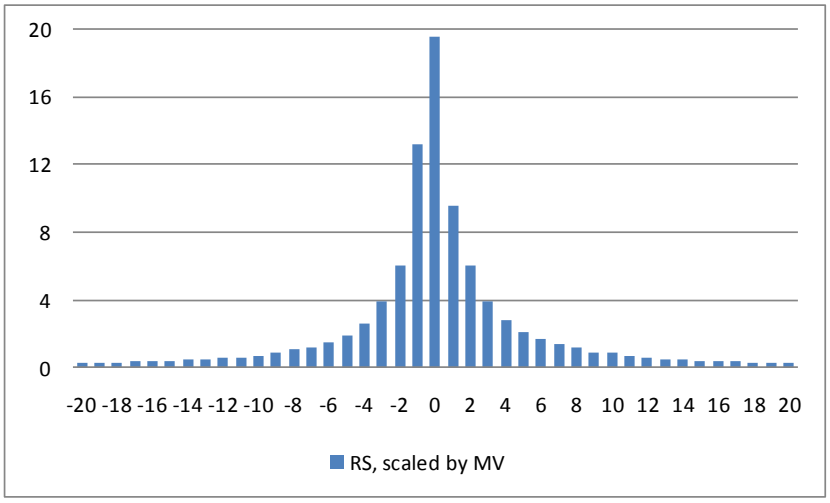


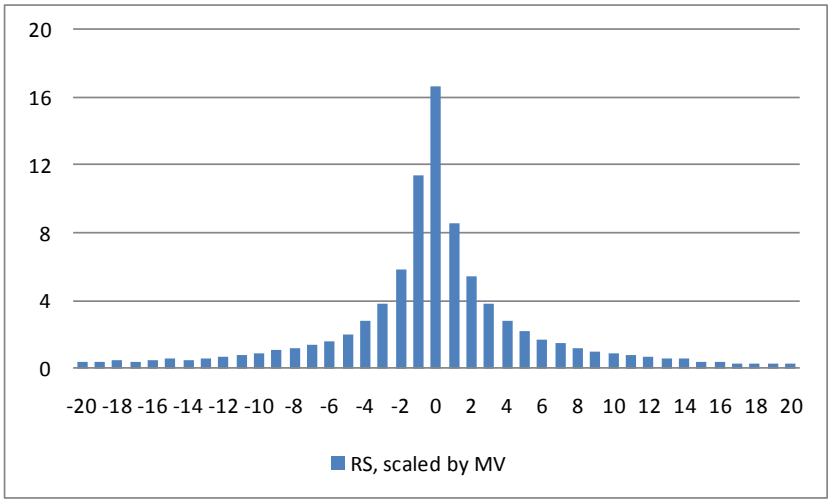
Figure B2. Continued

Panel B: Revenue surprises, scaled by the market value of equity

RS PREMIUM above median

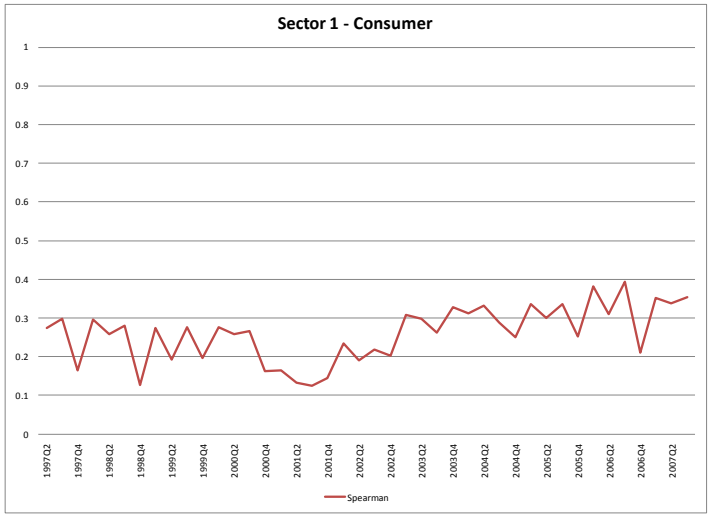


RS PREMIUM below median



Y-axis indicates the relative frequency, measured as the number of surprise observations that fall into a specific bin, divided by the total number of surprise observations in the sample or subsample. In panel A, the distribution interval width is 1 cent. Bin 0 includes surprises that equal zero cent, bin 1 includes surprises that equal 1 cent, and so on. The figures are truncated at -20 cents and +20 cents because the distributions beyond bin -20 and bin +20 are indistinguishable from the X-axis. In panel B, revenue surprises scaled by market value of equity are sorted into 42 bins with an increment of 0.0025, where bin 0 includes surprises in the range [0, 0.0025), bin 1 includes surprises in the range [0.0025, 0.005), and so on. Figures in panel B are also truncated at bin -20 and bin +20.

Figure B3. Spearman Correlation between Earnings Surprises and Revenue Surprises over Time



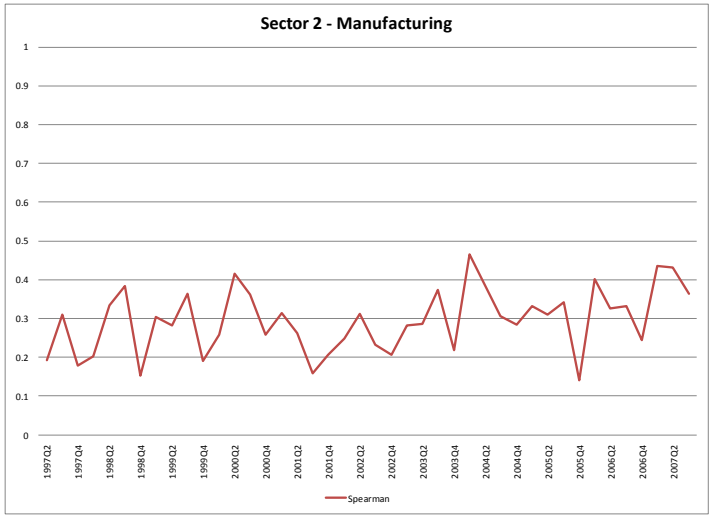
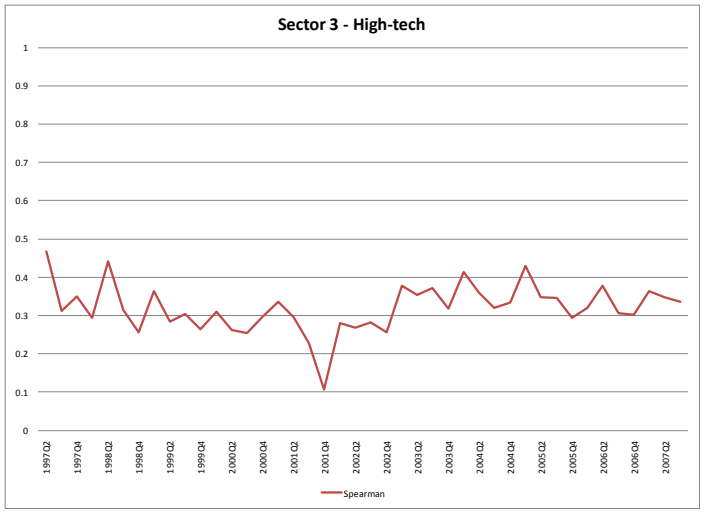
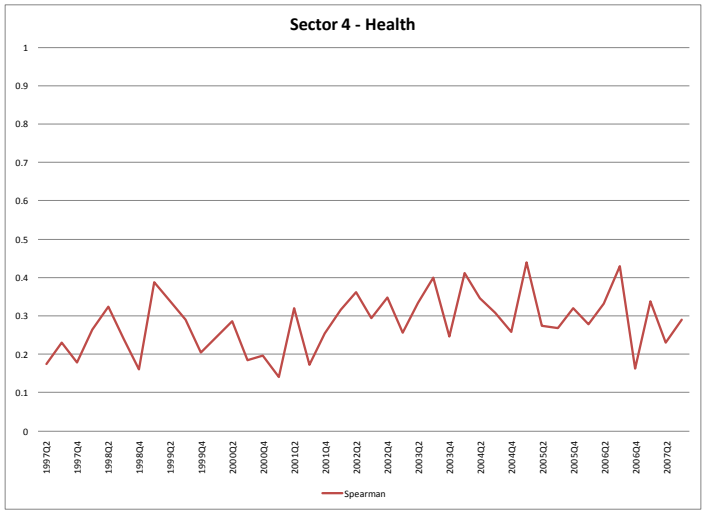
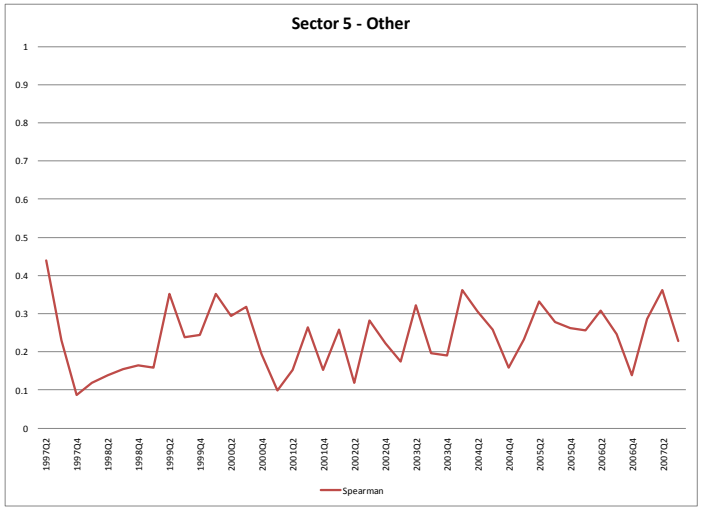


Figure B3: Continued







APPENDIX C. STATIONARITY TEST

Most economic variables that exhibit strong trends, such as GDP and consumption, are not stationary. Regressions that involve strongly trended nonstationary series often produce spurious relationships (Greene 2002, Kennedy 2003). This appendix conducts a stationarity test for the *ERC* and *RS PREMIUM* using Dickey-Fuller test for unit roots (Dickey and Fuller 1979, 1981). A stochastic process is stationary if the roots of the characteristic equation have a modulus greater than one, or "lie outside the unit circle". Take a first-order autoregressive (AR) process as an example. Suppose a stochastic process y_t follows AR(1) process.

$$y_t = \mu + \gamma y_{t-1} + \varepsilon_t$$

One can re-write this equation as $C(L)y_t = \mu + \varepsilon_t$, where C($L$) is the polynomial in the lag operator. Then the characteristic equation is $C(z) = 1 - \gamma z = 0$ and it has single root $1/\gamma$. This root lies outside the unit circle if $|\gamma| < 1$. If γ is equal to 1, then y_t is characterized by a unit root and thus nonstationary.

Dickey and Fuller (1979, 1981) derive an appropriate set of critical values for testing the hypothesis that $\gamma = 1$ (series is nonstationary) against the one-sided alternative hypothesis that $\gamma < 1$ (series is stationary). Augmented Dickey-Fuller test is employed if time series is autoregressive of higher order than one. In this case, the auxiliary regression with a time trend is as follows

$$\Delta y_t = \mu + \beta t + (\theta - 1)y_{t-1} + \sum_{i=1}^{p} \gamma_i \Delta y_{t-i} + \varepsilon_t$$

where θ is the sum of all the coefficients on the lagged dependent variables, t is time. An appropriate number of lagged Δys are added. Augmented Dickey-Fuller test conducts the test of whether $\theta\text{-}1 = 0$.

Augmented Dickey-Fuller tests are conducted separately for the *ERC* and *RS PREMIUM* with the optimal lag length determined by Schwert Criterion. Untabulated results show that the first-order autocorrelations for *RS PREMIUM* are 0.095, -0.211, 0.392, 0.042 and 0.054 respectively for sectors 1 through 5 (with only 0.392 significant at the 1% level), and the first-order autocorrelations for *ERC* are 0.201, 0.386, 0.185, -0.401 and 0.241 respectively for sectors 1 through 5 (with 0.386 and -0.401 significant at the 1% level). Untabulated results also show that for the full sample and for each of the Fama-French five sectors, the null hypothesis of a unit root is rejected at the significance level of 5% or better, evidence that the *ERC* and *RS PREMIUM* are likely stationary.

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