



Differential Market Reactions to Revenue and Expense Surprises

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Overview

Research Questions:

Do investors react differently to revenue and expense surprises that are disclosed in the preliminary earnings announcement?

Are investors' reactions different for firms with different characteristics (e.g., value-growth)?

Methodology:

Test whether the associations of revenues and expenses with size-adjusted returns are of the same magnitude.

Examine the associations for firms with different characteristics to see if they change in a predictable manner.

Overview (continued)

Results:

Investors react more strongly to a dollar surprise in revenues than to a dollar surprise in expenses (cost savings).

Investors react more strongly to a dollar surprise in revenue of a growth firm than to a dollar surprise of a value firm.

Investors are more indifferent between the revenue and expense surprises of value firms than the surprises of growth firms.

Investors reactions to surprises change predictably according to various firm's characteristics.

Setting

Companies have been reporting both revenues and earnings in their preliminary earnings announcements.

- Some companies have been providing even more details in the preliminary earnings release.

Earnings forecasts have been available for many companies, and were extensively studied by academics. Revenue forecasts were not systematically reported until recently.

Most analyst forecasts are based on an operating model, which typically begins with forecasted revenue.

Literature

Swaminathan and Weintrop (JAR, 1991)

- Value line forecasts. Limited sample.
- Sales forecast errors are associated with stronger reactions than expense forecast errors.

Various earlier studies:

- No differences. Did not use analyst forecasts of sales.

Rees and Sivaramakrishnan (Unpublished, 2001)

- Sales forecast errors have incremental association with returns beyond earnings forecast errors, but only in Rank and not OLS regressions.

Reasons for differential reactions to sales and earnings surprises

1. Sales may be more persistent than expenses.
 - Some expenses (such as write-offs, restructuring, losses on asset sales) may not be recurring.
2. Sales are more homogeneous than expenses, with a more favorable signal-to-noise ratio.
 - Expenses contain substantially more line items with further sub-groupings into:
 - Fixed and variable.
 - Various time periods.
 - Which assets and liabilities are affected.
3. It may be easier to manipulate expenses than sales.

Value-Growth

A vast literature documenting that value and growth companies differ.

We expect that sales surprises are more important for growth than value firms.

- Growth firms need to convince investors that the market actually exists and is developing (growing).

We expect that the differential reactions between sales and expense surprises are smaller for value than for growth firms.

- Investors in value companies are interested in improving earnings; cost reduction is valuable.

Data - Sources

Compustat quarterly tapes Q1/1994-Q2/2001

- Live and research companies.
- Financial information.

Factset Information Services

- Returns data. Size-adjusted returns.

I/B/E/S

- Consensus analyst forecasts.
- Revenue and earnings forecasts.
- Revenue forecasts available from 1996.
 - Many companies have only one revenue forecast.

Initial Sample

Selection criteria:

- Preliminary announcement date.
- Market and book value of equity.
- Sales and earnings changes (previous quarter, and the same quarter in the prior year).
- Indicated annual dividend.
- Three-day return centered on the preliminary earnings announcement.

Calendar quarters:

- All firms with a fiscal quarter ending on the calendar quarter end or within one month.

Analyst Forecast Sample

Required I/B/E/S forecasts on both sales and earnings prior to the preliminary earnings announcement.

Reduced the sample considerably:

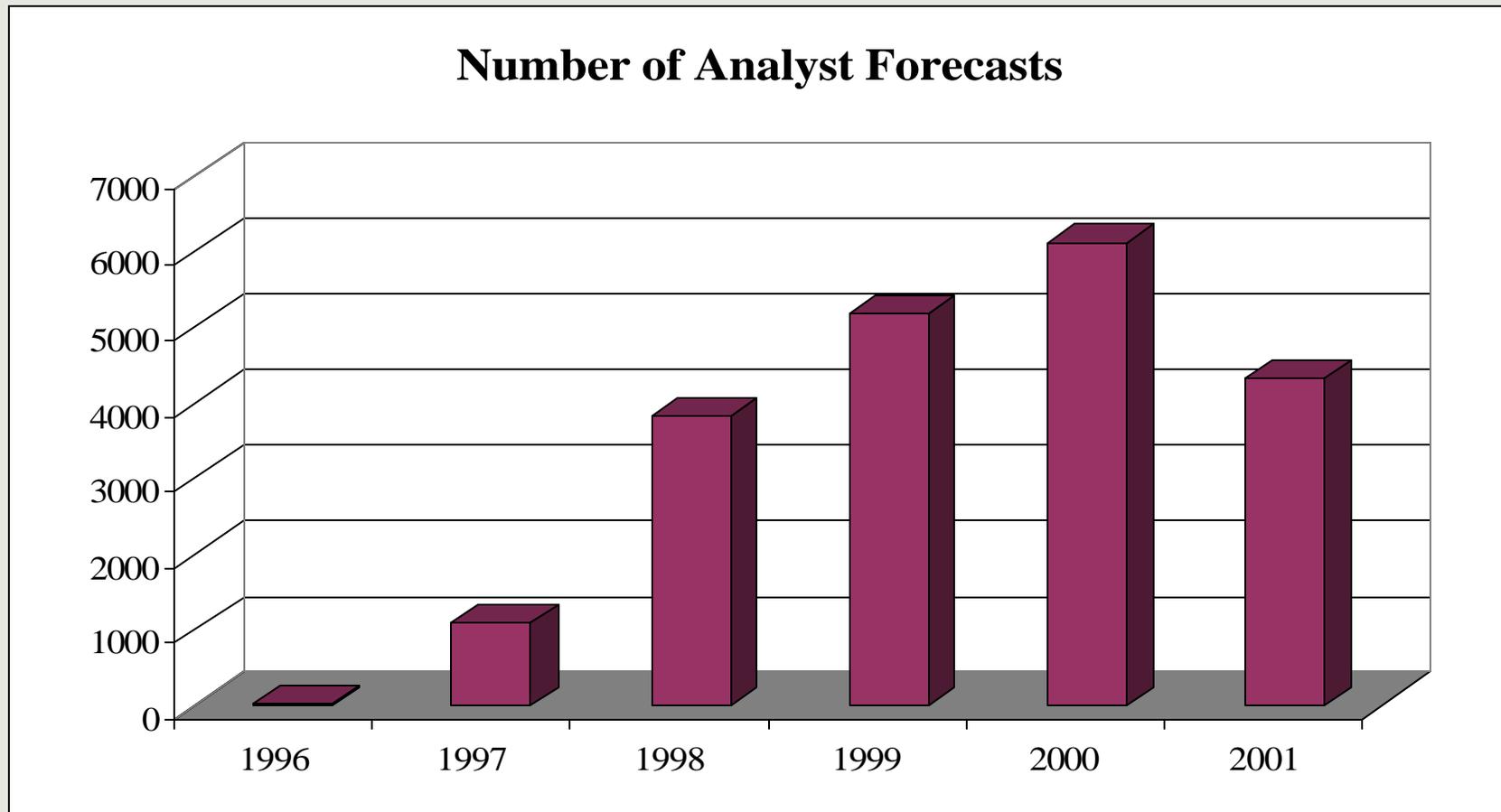
- From over 120,000 firm-quarters to about 20,000 firm-quarters spanning 1997-2001.

Eliminated top and bottom 1% to avoid extreme observations.

Eliminated observations where the price is below \$1.00/share.

3,089 Distinct Firms

(Table 1)



Analyst Forecast Sample

(Table 1)

Variable	N	Mean	10%	50%	90%
Earnings Surprise	20486	-0.003	-0.014	0.000	0.006
Sales Surprise	20487	0.003	-0.030	0.001	0.036
Expense Surprise	20486	0.006	-0.026	0.001	0.045
Size-Adjusted Return	20469	0.002	-0.106	0.004	0.112
Market Value	20487	5595	93	713	9767
Sales	20487	668	9.2	92.5	1413.9
Book/Market	20487	0.413	0.09	0.324	0.822
Number of Sales Forecasts	20487	1.8	1	1	3
Number of Earnings Forecasts	20487	7.892	2	6	17

Regression Results – Analyst Forecast Sample

(Table 2)

$$AR = d_0 + d_1 SUE \quad (1)$$

$$AR = a_0 + a_1 SUR + a_2 SUEX \quad (2)$$

Variable	Expected Sign	All Forecasts		At least 2 forecasts	
		Model 1	Model 2	Model 1	Model 2
Intercept		0.003 (0.001)	0.003 (0.001)	0.003 (0.009)	0.003 (0.024)
Earnings Surprise (d₁)	+	0.460 (0.001)		0.262 (0.001)	
Sales Surprise (a₁)	+		0.517 (0.001)		0.349 (0.001)
Expense Surprise (a₂)	-		-0.412 (0.001)		-0.231 (0.001)
Adjusted R-Square		0.006	0.009	0.002	0.003
N		20533	20533	8785	8785
F- statistic			50.990 (0.001)		12.390 (0.001)

Regression Results – Entire Sample

(Table 2)

$$AR = d_0 + d_1 SUE \quad (1)$$

$$AR = a_0 + a_1 SUR + a_2 SUEX \quad (2)$$

Variable	Expected Sign	Seasonal Random Walk		Random Walk	
		Model 1	Model 2	Model 1	Model 2
Intercept		0.001 (0.002)	(0.001) (0.023)	0.001 (0.003)	0.000 (0.109)
Earnings Surprise (d₁)	+	0.278 (0.001)		0.215 (0.001)	
Sales Surprise (a₁)	+		0.295 (0.001)		0.224 (0.001)
Expense Surprise (a₂)	-		-0.250 (0.001)		-0.178 (0.001)
Adjusted R-Square		0.012	0.014	0.007	0.008
N		118041	118041	118041	118041
F- statistic			263.1 (0.001)		183.6 (0.001)

Value-Growth

Growth firms are at the bottom 1/3 of all companies sorted on the ratio of B/M, **and** not in the top 25% of all companies sorted on the dividend yield.

- Prudential Securities uses the dividend yield.

Value firms are at the top 1/3 of all companies sorted on B/M, **or** at the top 25% of all companies sorted on the dividend yield.

Roughly the same number of value and growth firms in the entire sample. Roughly about twice as many growth as value firms in the analyst forecast sample.

- Different variations of the classification into value and growth.

Regression Results – Growth and Value

(Table 3)

$$AR = a_0 + a_1 D + a_2 SUR + a_3 SUEX + a_4 SUR * D + a_5 SUEX * D$$

D= 1 if Value, 0 if Growth

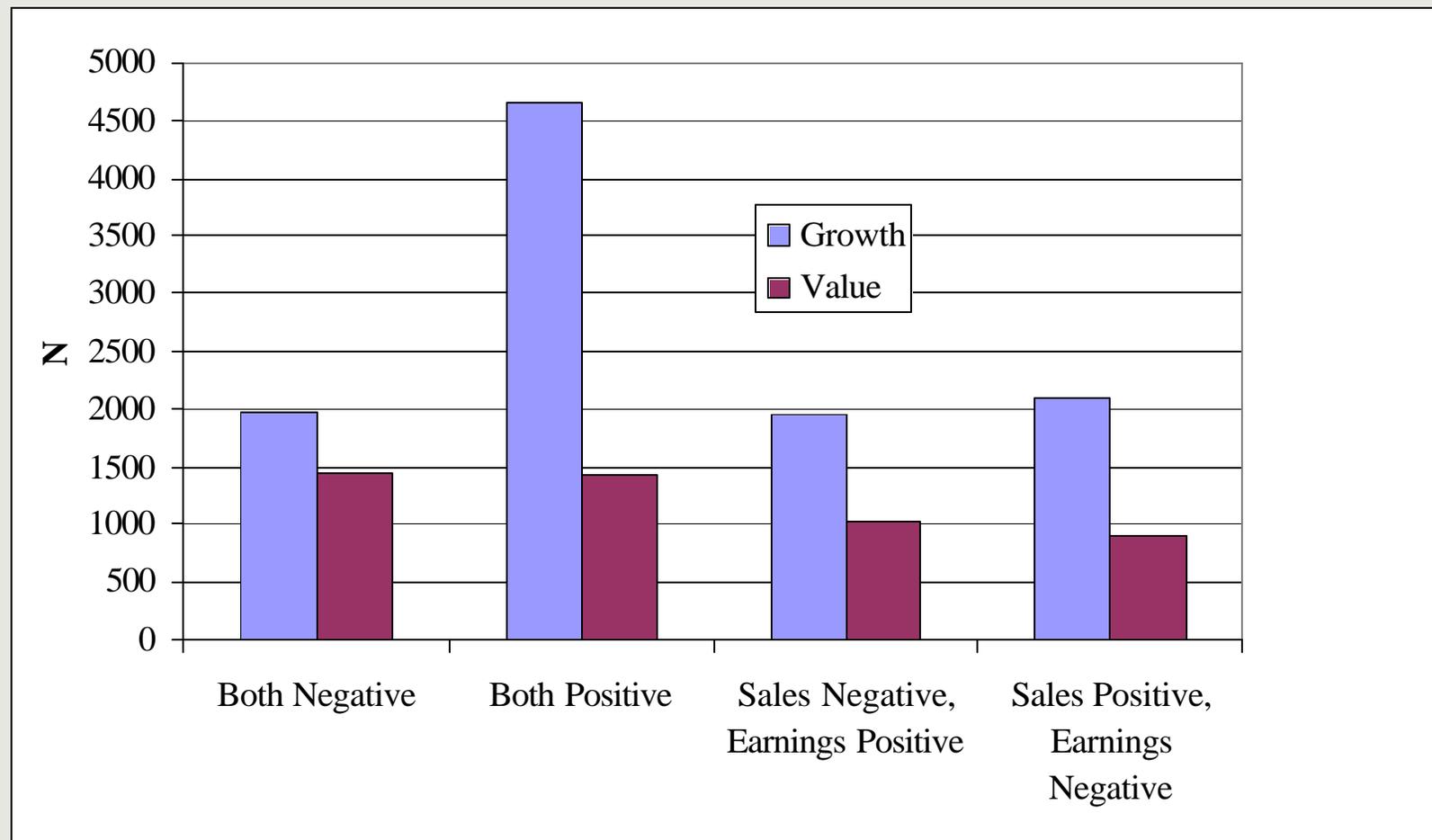
$$AR = .002 + .002 D + .714 SUR - .559 SUEX - .304 SUR * D + .224 SUEX * D$$

Additional tests show:

1. Revenue and expense surprises have statistically different reactions for both growth and value companies.
2. The incremental revenue and expense reactions for value firms over growth firms is not equal.

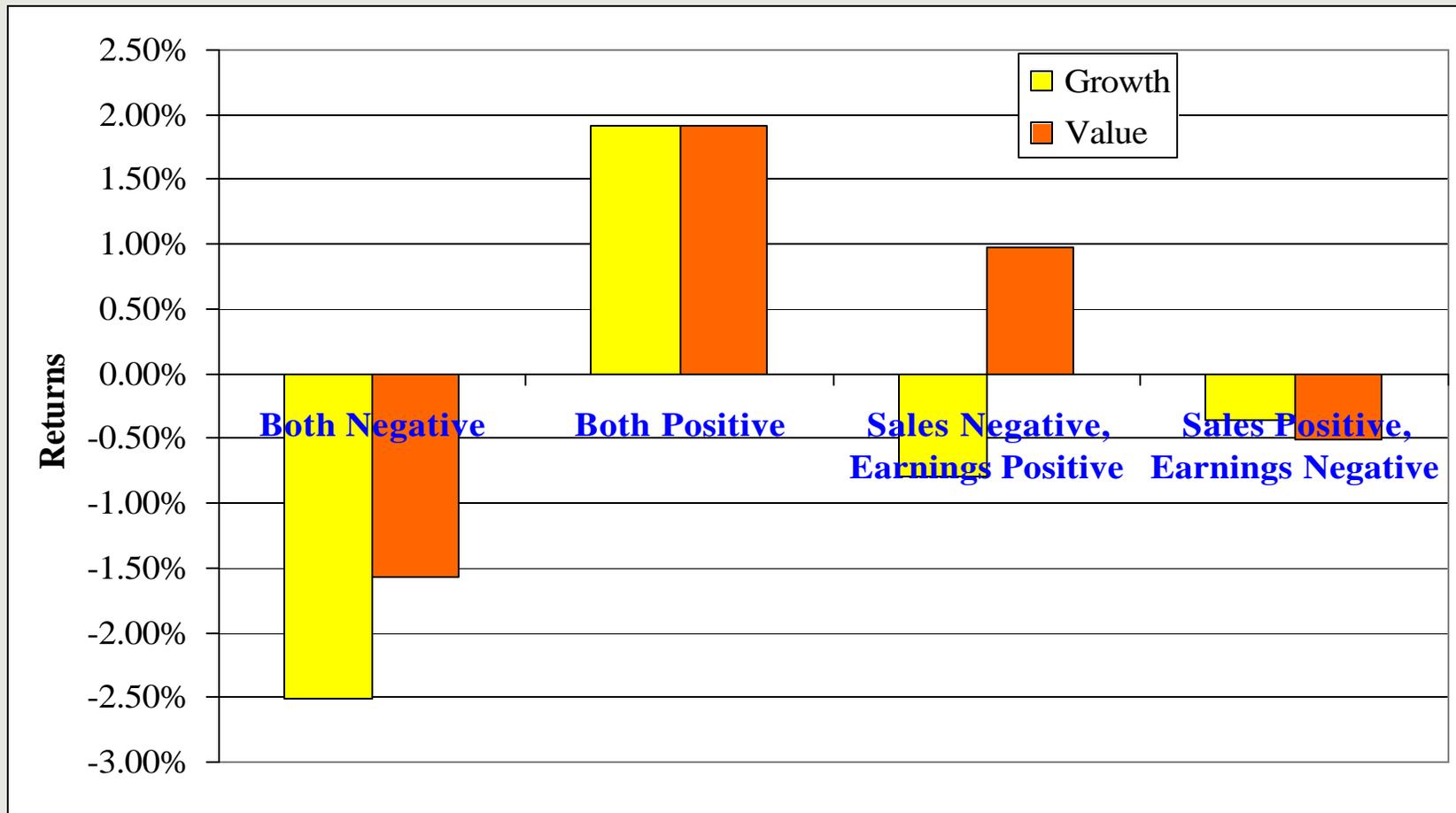
Distribution of Firms and Surprises

(Table 4)



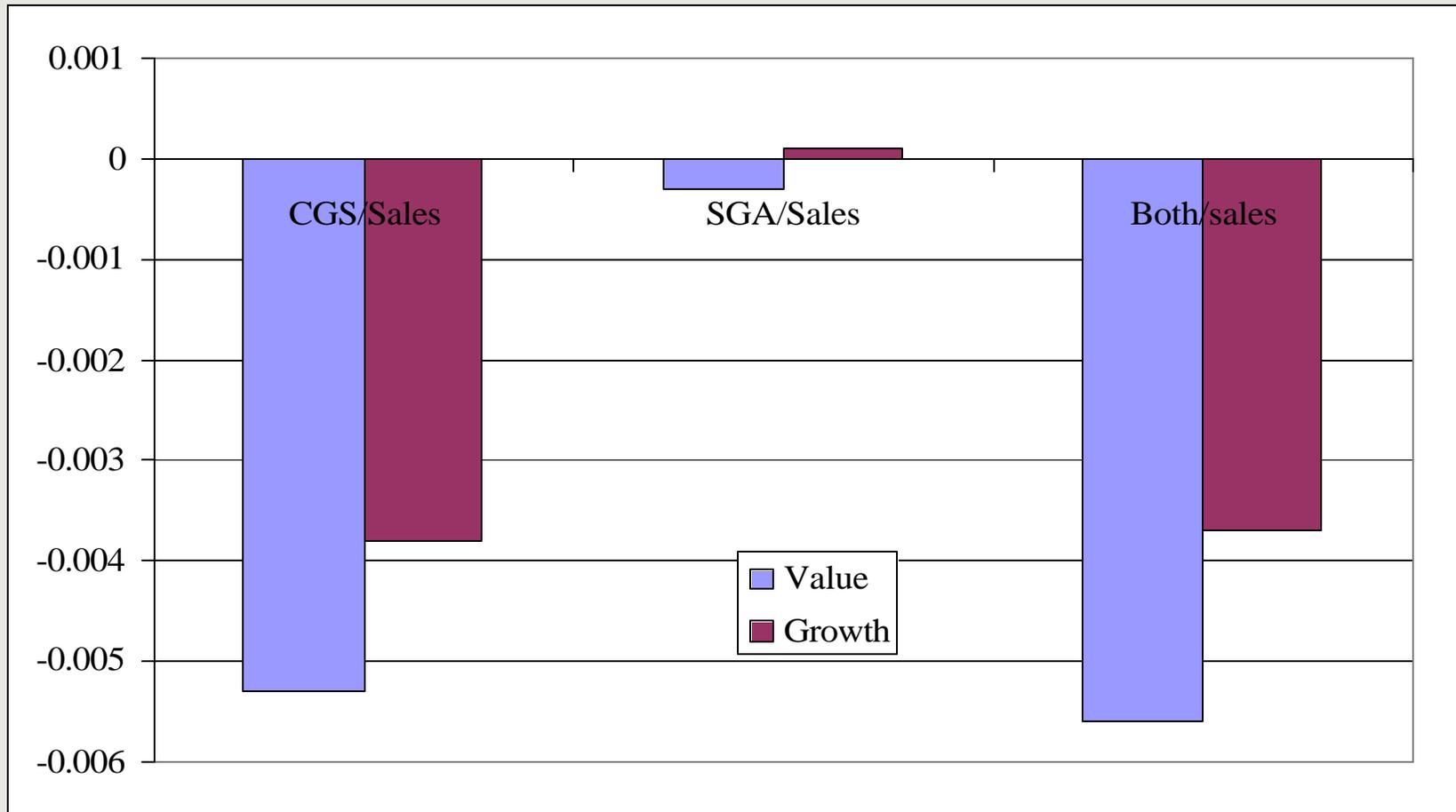
Returns and Surprises

(Table 4)



Change in ratio of expenses to sales from prior quarter – Positive earnings but negative sales surprise

(Table 5)



Regression Results – Revenue and Expense Persistence

(Table 6)

$$AR = a_0 + a_1 SUR + a_2 SUEX + a_3 SUR * P + a_4 SUEX * P$$

P = Ratio of expense to sales persistence

$$AR = .005 + .443 SUR - .254 SUEX + .394 SUR * P - .521 SUEX * P$$

Additional tests show:

1. Revenue and expense surprises have statistically different reactions in both the no-interaction and the interaction cases.
2. The expense interaction variable is negative and statistically significant; the more are expenses persistent the stronger is the market reaction.

Regression Results – Ratio of Variable Expense to Sales

(Table 6)

$$AR = a_0 + a_1 SUR + a_2 SUEX + a_3 SUR * P + a_4 SUEX * P$$

P = Ratio of Variable Expense to Sales

$$AR = .005 + 1.112 SUR - .959 SUEX - .487 SUR * P + .419 SUEX * P$$

Additional tests show:

1. Revenue and expense surprises have statistically different reactions in the interaction case.
2. The higher is the ratio of variable expense to sales the lower is the reaction to the sales surprise.

Regression Results – Ratio of Operating to Total Expenses

(Table 6)

$$AR = a_0 + a_1 SUR + a_2 SUEX + a_3 SUR * P + a_4 SUEX * P$$

P = Ratio of Operating to Total Expenses

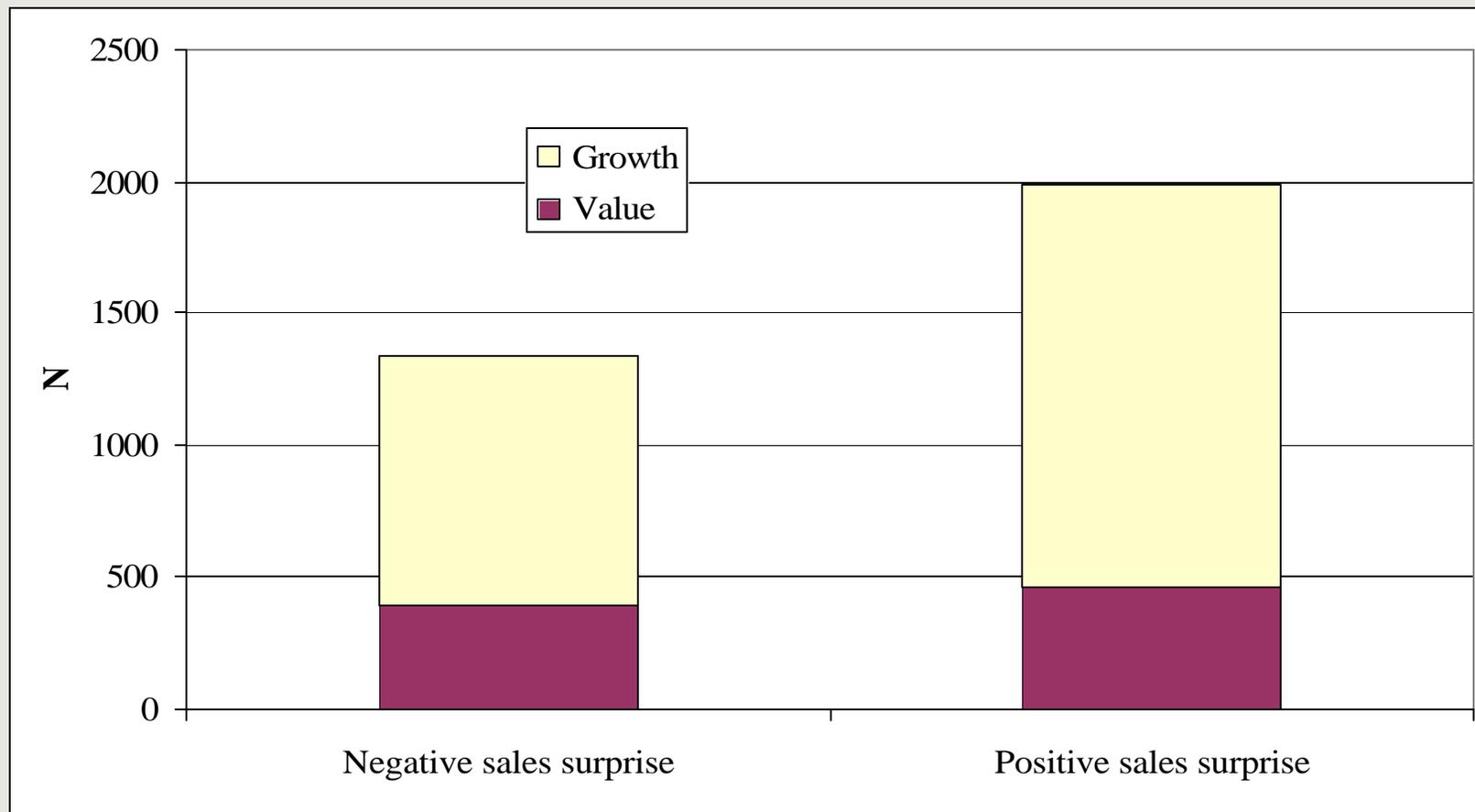
$$AR = .004 + .283 SUR - .054 SUEX + .739 SUR * P - .830 SUEX * P$$

Additional tests show:

1. Revenue and expense surprises have statistically different reactions in both the no-interaction and the interaction cases.
2. The higher is the ratio of operating to total expenses the greater is the reaction to the expense surprise.

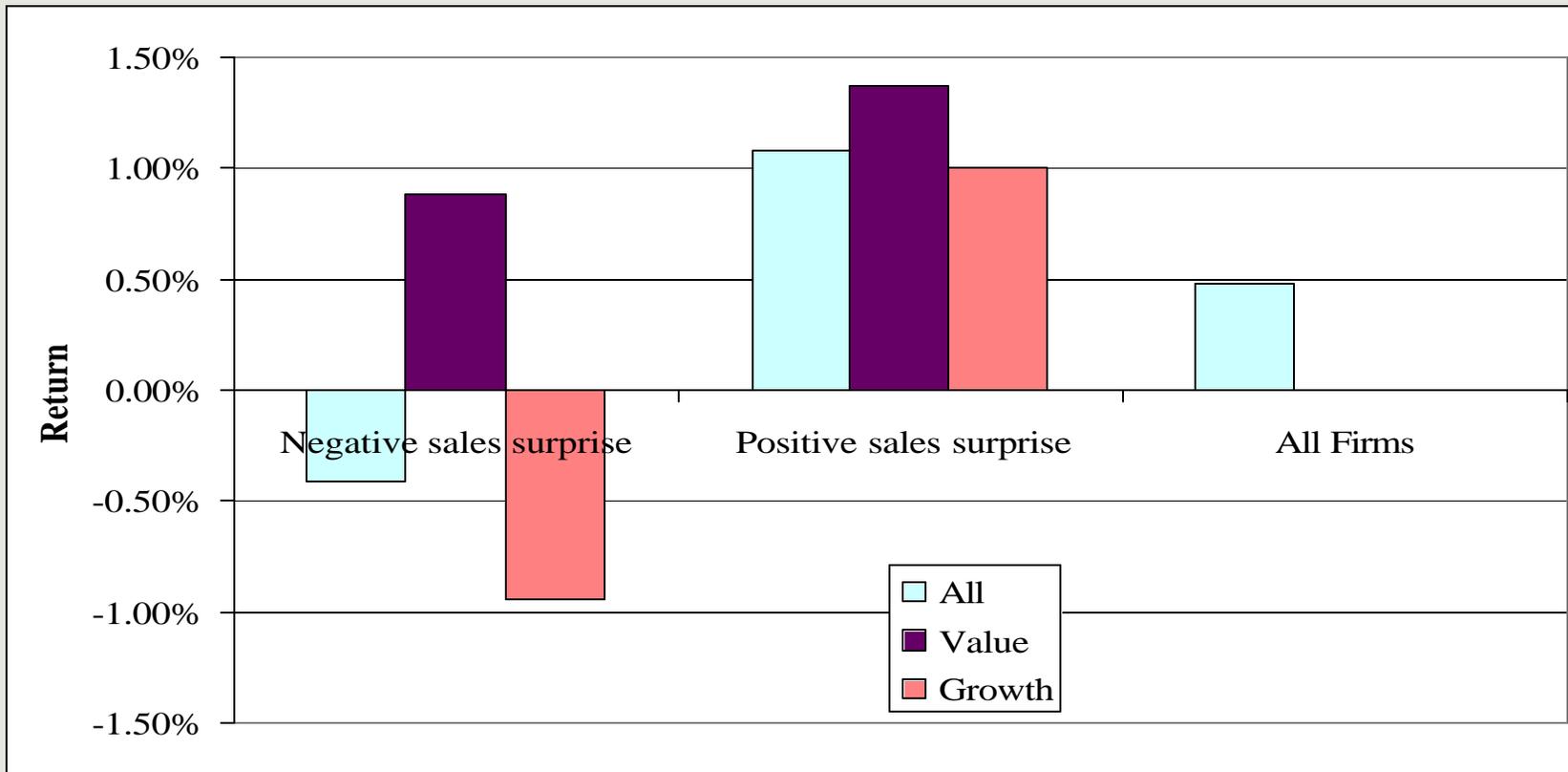
Companies that meet or beat analyst forecast of earnings by \$.01

Number of Firms – Table 7



Companies that meet or beat analyst forecast of earnings by \$.01

Size-Adjusted Returns – Table 7



Summary

Market reactions to sales and expense surprises are different.

- Market participants react more strongly to a sales surprise than to an expense surprise.

Market reactions to a sales surprise are stronger for growth firms than for value firms.

The difference between market reactions to a sales and expense surprise is more pronounced for growth firms than for value firms.

Value firms that were able to reduce expenses (below expectations) even more than the decline in sales (below expectations) have a positive return, whereas growth firms have a negative return.

Summary - Continued

The market reaction to a surprise in expenses is stronger the higher is the ratio of expense persistence to sales persistence, and the higher is the ratio of operating expenses to total expenses.

The market reaction to a surprise in sales is stronger the lower is the ratio of variable expenses to sales.

Market participants behave as if they suspect more earnings management by companies that meet analyst forecasts of earnings or beat them by \$.01 when the sales surprise is negative than when the sales surprise is positive.

Conclusions

The earnings surprise should be carefully interpreted according to the individual surprises in sales and expenses.

The breakdown to sales and expense surprises is more important for growth companies than for value companies, and for companies with a higher contribution margin ratio.

In attempts to detect earnings management, it may be useful to focus on the sales surprise.

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Abstract

This study investigates investors' reactions to surprises in revenues and expense reduction around the preliminary earnings announcements. The results of the study show that investors value more highly a dollar surprise in revenue than a dollar surprise due to a reduction of expenses, and that the breakdown into these two components adds information to market participants beyond the aggregate surprise in earnings. The study also shows that a dollar surprise in revenues is more valuable for growth firms than value firms, but that the difference between a dollar surprise in sales or expense reduction is smaller for value firms than for growth firms. Indeed, the study further documents that investors react positively when value firms announce negative sales surprises but positive surprises in expense reductions, but react negatively to such announcements by growth companies. This latter finding is shown to be related to cost cutting exercised by value firms that had negative sales surprises but positive earnings surprises.

The study also shows that investors react more strongly to a surprise in sales the higher is the contribution margin ratio. In contrast, investors react more strongly to a surprise in expense reduction the higher is the ratio of expense persistence to sales persistence, and the higher is the proportion of operating expenses to total expenses. Finally, the study shows that market reactions also vary for companies that were able to meet analysts' forecasts of earnings or beat them by one cent. Consistent with suspicions of expense management in such cases, companies with positive (negative) sales surprises are associated with positive (negative) market reactions.

The combined results of this study indicate the importance of interpreting the earnings surprise in the context of its sources – whether it is due to the surprise in revenues or the surprise in total expenses.

Differential Market Reactions to Revenue and Expense Surprises

A wide body of research documents a positive association between unexpected earnings and market reactions around the preliminary announcements of earnings (see Lev, 1989 and Kothari, 2001 for reviews of prior studies). However, substantially less research has been directed to the problem of assessing whether investors react differently to a dollar surprise in revenues than to a dollar surprise in expenses, and whether value and growth companies experience differential reactions to the sales and expense surprises.¹ Since firms announce both revenues and earnings in the preliminary earnings announcement, investors can use the disclosure of revenues to better assess and interpret the quality of the disclosed earnings signal.² The purpose of this study is to shed light on the differential market reactions to revenue and expense surprises in various contexts.

Most valuation models suggest that investors react more strongly to any surprise that is more persistent or less noisy. To the extent that the revenue surprise is more persistent and/or less noisy than the expense reduction surprise, investors are expected to react more strongly to the revenue surprise than to the expense surprise. We provide below evidence that the revenue surprise is more persistent, and surmise that the expense

¹ Throughout the paper, the term “expenses” refers to the difference between sales and earnings, where earnings is income before extraordinary items.

² In recent years, some firms have begun disclosing more income statement items in their preliminary earnings announcements, as well as pro-forma earnings, which are supposed to convey information about recurring earnings. These additional disclosures may further help investors assess the quality of earnings, beyond the disclosure of revenues and earnings alone. However, this study covers earnings announcements since 1994 for a large sample of firms, many of which did not provide detailed disclosures of expenses, or a breakdown of recurring and non-recurring items in their announcements. To the extent that more information about expenses was available in the preliminary earnings announcement beyond that of revenues, the results of this study will be biased against finding significant differential reactions to revenue and expense surprises.

surprise is noisier because the expense surprise is an aggregate of different expenses and charges. We also show that investors' reactions to dollar surprises in revenues and expenses are systematically related to the relative persistence of sales and expenses, to the ratio of operating expenses to total expenses, and to the contribution margin ratio.

Furthermore, the specific source of the earnings surprise may have differential implications for value and growth firms; investors may be more concerned with revenue growth for growth firms that are in the initial stages of their life cycle, and more indifferent between revenue surprises and surprises in expense reduction for value firms, which are at latter stages of their life cycle.

Since analyst forecasts of **both** earnings and revenues have been available to investors in recent years, a more precise measurement of the surprise in revenues is feasible for many firms, enabling a better proxy for market expectations of revenues. In this study, we use both analyst forecasts of revenues and simple time-series forecasts to measure the surprise in revenues, and to assess the differential market reactions to the revenue and expense reduction surprises.

Our results indicate that investors react significantly more strongly to a dollar of sales surprise than to a dollar of cost savings. We further show that investors react significantly more strongly to a dollar of sales surprise in the case of growth companies than in the case of value firms. Conversely, investors' are more indifferent between a dollar surprise in cost savings and a dollar surprise in sales for value companies than in the case of growth companies. We also show that market reactions to negative sales surprises combined with positive earnings surprises, i.e., where expense reductions dominate the sales shortfall, are positive for value companies but negative for growth

companies. This evidence is consistent with the relatively greater importance of controlling expenses for value companies than for growth companies. Finally, we show that the sales surprise can aid investors in identifying cases of earnings management. Companies which barely “meet their earnings forecasts” with a positive sales surprise have a positive market reaction, but those with negative sales surprise have a negative market reaction.

These differential market reactions to revenue and expense surprises indicate the different attributes investors attach to revenue and expense items in general, and the specific company context (growth or value, the proportion of variable costs to total costs, the relative persistence of sales and expenses, and the proportion of operating expenses to total expenses) in particular. These differential reactions are likely to have implications for financial statement analysis and for studies of earnings quality and earnings management.

The next section develops and describes the research design used in this study. Section III describes the data and results. The last section summarizes the study.

II. Research Design

2.1 Revenue and expense surprises:

The first stage of this study investigates whether the breakdown of an earnings surprise into revenue and expense surprises is useful for investors, as determined by their associations with security returns around the preliminary earnings announcement date. Of course, if earnings and sales surprises are perfectly correlated, there is no reason to assume that a decomposition of an earnings surprise into sales and expense surprises

would be beneficial for investors. However, intuitively, a perfect correlation between sales and earnings surprises is not expected, because firm expenses are not perfectly correlated with revenues – some expenses are tied to other variables such as fixed assets, intangibles, etc. Furthermore, investors may actually evaluate the sales surprise differently from the expense surprise, leading to potentially differential market reactions.

Empirical evidence on whether the breakdown of earnings into revenues and expenses provides additional information beyond that conveyed by earnings has been ambiguous. Swaminathan and Weintrop (1991) document incremental information content of revenues beyond earnings for a sample of companies using Value Line forecasts of revenues and expenses. Most of the earlier studies, though, including Wilson (1986), Hopwood and McKeown (1985) and Hoskin et al. (1986), do not find incremental information content of revenues and expenses beyond earnings. However, in contrast to Swaminathan and Weintrop (1991), these studies do not use analyst forecasts to measure the surprise in revenues. The ambiguous findings in the literature are even more puzzling considering the differential market effects and persistence of various income statement components reported by Lipe (1986).

With the recent availability of analyst forecasts of revenues for many companies and quarters, it is possible to reexamine and extend Swaminathan and Weintrop (1991) beyond their original sample of 218 firms, which used only Value Line forecasts for just four quarters. Indeed, Rees and Sivaramakrishnan (2001) study the incremental information content of revenue surprises beyond earnings surprises using revenue forecasts collected by I/B/E/S. They find that the revenue response coefficient is statistically significant after controlling for the earnings surprise, but only in their rank

regressions and not in their OLS regressions. They also provide evidence that the revenue forecast is more important for companies with above-median levels of historical revenue growth or forecasts of long-term growth by analysts than those companies with below-median levels, again only for their rank regressions. They also study the effects of earnings stability and the consistency of the revenue and earnings forecast error signs.

Our study is more comprehensive along several dimensions. First, we compare directly the relative magnitude of the market reactions to revenue and expense surprises, rather than testing for just differences between revenues and expenses. Second, we are able to document differential market reactions using OLS regressions, instead of relying on rank regressions. Third, we are able to document these results for companies with no revenue forecasts, where we use time series forecasts to substitute for market expectations. Fourth, we investigate differences in market reactions to revenue and expense surprises in various contexts (different contribution margin ratios, persistence of sales and expenses, and the ratio of operating expenses to total expenses), and document differential reactions in line with intuition about these contexts. Fifth, we further study the special cases of positive earnings and negative sales surprises, and compare value and growth companies. Finally, we further investigate companies with greater likelihood for earnings management.³

Bagnoli et al (2001) examine revenue forecasts of Internet firms and market reactions to both earnings and revenue forecasts before and after the Internet bubble. They find that market participants react to the revenue surprises beyond the earnings surprises for losing Internet firms, but only weakly so for profitable Internet firms during

³ We became aware of the Rees and Sivaramakrishnan (2001) unpublished study only after completing our first draft.

the bubble. They also document differential bias in analyst revenue forecasts during and after the bubble. Our study is broader and includes many growth firms that do not belong to the Internet sector. This is important distinction because Internet firms may have been very different from our larger sample in age, maturity, and their negative earnings and cash flows, which almost required the use of revenues and revenue growth for valuation.

We argue that market participants may react more strongly to an earnings surprise that is induced by a revenue surprise than by unexpected expenses because of the following reasons:

1. Sales changes are generally more persistent than changes in expenses. As we show below for our various samples, the first and second autocorrelations of revenue changes are higher than those of changes in expenses. Most valuation models expect more persistent surprises to be associated with stronger market effects.
2. Revenue surprises are likely to be more homogeneous than expense surprises, which are aggregations of various expenses and charges. If the firm discloses just revenues and income, all expenses are aggregated into a single number. Even firms that disclose some components of income in their preliminary earnings announcement typically aggregate several expenses into one reporting number with heterogeneous items. In particular, some expenses may have long-term benefits (e.g. R&D), whereas others may benefit only the current period. Some expenses may be almost perfectly related to demand while others to the operating capacity of the firm. Some expenses may be recurring and others special or non-recurring. Because of the aggregation of these dissimilar expenses and charges

into a single number, the expense signal may be perceived noisier by market participants, who, in turn, may react more weakly to surprises in expense reductions.

3. Accounting manipulations of expenses may be easier to implement and more difficult to detect than manipulations of sales. Although many earnings restatements and SEC actions against companies involve revenues, this may simply be an indication that revenue manipulations are easier to detect ex-post than expense manipulations, and not that revenue manipulations are more prevalent.

Thus, stronger market reactions are expected for revenue surprises than for expense surprises due to the latter's inferiority with respect to both persistence and noise.

Consistent with prior studies, we define the surprises as:

$$SUE = (AE - FE)/P$$

$$SUR = (AR - FR)/P$$

$$SUEX = (AEX - FEX)/P$$

Where SUE (SUR, SUEX) is the scaled surprise in earnings (revenues, expenses), AE (AR, AEX) is actual earnings (revenues, expenses) per share; FE (FR, FEX) is the mean analyst forecast of earnings (revenues, expenses) per share, and P the price per share at the end of the preceding quarter. Expenses are defined as sales minus earnings. The number of shares used to calculate per share figures is obtained from I/B/E/S to ensure consistency of the forecasts and actual data. We report below the sensitivity of the results to other variables used to scale the forecast error.

We employ size-adjusted returns (SAR) in the analyses. All firms with an available market value at the beginning of a quarter (size) are classified into 10 groups according to size. The size-adjusted return is the return on an individual company minus the equally weighted return on the portfolio of all firms in the same size decile. We use the three-day cumulative returns, centered on the date of the preliminary earnings announcement.

In the first stage of the analysis, we estimate the following regression equations (firm and time subscripts omitted, as are the error terms):

$$\text{SAR} = \delta_0 + \delta_1 \text{SUE} \quad (1)$$

$$\text{SAR} = \alpha_0 + \alpha_1 \text{SUR} + \alpha_2 \text{SUEX} \quad (2)$$

We expect a positive earnings response coefficient, i.e., $\delta_1 > 0$. Similarly, the sales response coefficient should be positive and the expense response coefficient negative, $\alpha_1 > 0$, $\alpha_2 < 0$. Due to the greater persistency and lower noise of the sales surprise than the expense surprise, we expect that the sales response coefficient will be larger (in absolute value) than the expense response coefficient, i.e., $\text{abs}(\alpha_1) > \text{abs}(\alpha_2)$. We test whether $\alpha_1 = -\alpha_2$. Rejection of the latter relation indicates that investors' reactions to revenue and expense surprises are different from each other, and shows that the breakdown of the earnings surprise into its sales and expense surprises adds incremental value to investors. This is also a test that compares the two nested regression models (1) and (2).

2.2 Differential reactions for value and growth firms:

Prior research studies document differential market returns and financial

characteristics of value and growth firms. Early studies, advocating the success of a “value” investment approach, document the superiority of investment strategies based on low Price/Earnings (P/E) ratios (Graham and Dodd, 1934, Latane et al., 1969, and Basu, 1977). Jaffe et al. (1989), Chan et al. (1991), Fama and French (1992, 1996), and Davis et al. (2000) provide recent evidence about similar strategies. Similar investment approaches based on low Market/Book ratios (the ratio of market value of equity to book value of equity, M/B) are reported in Rosenberg et al. (1984), Chan et al. (1991), Fama and French (1992, 1996), Lakonishok et al. (1994), Davis (1994), Chow and Hulburt (2000), and Daniel and Titman (1998). Value strategies based on past returns (De Bondt and Thaler 1985 and 1987), low ratios of market value to cash flow (Chan et al. 1991, Lakonishok et al. 1994, Hackel et al. 1994, 2000), and high dividend yields (Keim, 1985) also show abnormal returns. Similar findings are reported for British firms by Bagella et al. (2000), and for other non-US markets by Fama and French (1998).

Fama and French (1995) argue that value firms offer greater returns because they have an additional risk dimension – they are more likely to face earnings decline and financial distress. Fama and French (1996) show that a three-factor model of returns, which adjusts for size and Book to Market (B/M) ratio, in addition to the market return, eliminates most of the abnormal returns of a value strategy, as documented by Lakonishok et al. (1994).⁴ Daniel and Titman (1998) provide evidence that is inconsistent with non-diversifiable risk factors as explanations for the premium return to value

⁴ Note that the three-factor Fama and French (1996) model measures the additional risk of a high B/M ratio portfolio, given a specific level of systematic risk. It implies that when two firms have the same size and systematic risk, the high B/M firm has a higher risk than the low B/M firm. However, it does not imply that the average high B/M firm has a greater systematic and operating risk than the average low B/M firm, as shown by Ballester et al. (1998).

companies that have high B/M ratios. Ballester et al. (1998) find that growth companies have lower B/M ratios and higher future abnormal earnings due to unrecorded economic assets (intangibles) such as R&D and advertising expenditures. They also show that growth companies have higher systematic risks than value companies.

To explain the superiority of value strategies over growth strategies, Lakonishok et al. (1994) argue that investors predict current growth to persist for too long a period (nine years according to their estimates), whereas such growth actually continues for a much shorter period (three years in their study). Similarly, La Porta et al. (1997) argue that value strategies work because they exploit systematic errors in the way investors form expectations, as is evidenced in periods of earnings announcements. Rai (1996) finds that market reactions to negative earnings surprises are more pronounced for growth firms than for value firms, whereas market reactions to positive earnings surprises are more pronounced for value firms than for growth firms. However, Rai (1996) does not examine differential market reactions to revenue and expense surprises. Bauman and Miller (1997) show that the differences in performance between value and growth stocks are associated with their respective earnings surprises, in which analysts generally underestimate the earnings of value stocks and overestimate those of growth stocks.

Given the academic evidence about different market reactions to earnings announcements of value and growth firms, we expect market reactions to also differ across these two groups for revenue and expense surprises. In particular, we expect market reactions to revenue surprises to be stronger for growth firms than for value firms, because investors in growth firms are more concerned about the existence and growth in customers' demand for the firm's products than they are about controlling costs. In

contrast, the product market for value firms is more mature and well understood by investors, who are also concerned about management's ability to control expenses and maintain profits even in the face of slow growing or even falling demand. Thus, the differential reaction to a dollar surprise in sales or a dollar surprise in cost savings is expected to be smaller for value firms than for growth firms.

Furthermore, we expect that differences between value and growth firms also exist in cases of negative sales surprises but positive earnings surprises. Ertimur and Livnat (2002) document positive (negative) size-adjusted returns for value (growth) companies that had sales declines from the previous quarter, but an increase in the ratio of net income to sales (ROS). Such firms manage to control costs in the face of a sales decline, indicating good news for value companies, because of management's determination and ability to reduce costs. However, investors in growth companies may be wary of the deterioration in sales, in spite of the firm's ability to control costs and to increase profits, and bid down the stock prices of these growth firms. Thus, we expect that a negative sales surprise combined with a positive earnings surprise be associated with positive returns for value companies and with negative returns for growth companies.

The classification into value and growth is performed as follows: Every quarter, we rank all companies according to their Book to Market (B/M), after assigning the ratio of 0.5 to all firms with negative book values.⁵ We also rank in each quarter all companies according to their dividend yield. We classify a firm into the growth group if it falls into the bottom 33% of all companies according to B/M, and if it does not have a dividend

yield in the top 25% of all firms. The value companies are those in the top 33% B/M companies, or companies with the highest 25% dividend yield.⁶ Thus, in the analysis of differential market reactions to value and growth companies, we omit firms in the middle 33% of B/M ratios that are not in the top 25% of dividend yield. We describe below the sensitivity of the results to other classifications of value and growth firms.

To test the differential market reactions of value and growth firms to sales and expense surprises, we create a dummy variable, D , which equals one for value companies and zero for growth firms. We then examine the following regression model:

$$SAR = \alpha_0 + \alpha_1 SUR + \alpha_2 SUEX + \alpha_3 D + \alpha_4 SUR * D + \alpha_5 SUEX * D \quad (3)$$

If the sales surprise is stronger for growth firms than value firms, we expect $\alpha_4 < 0$. Similarly, if $\alpha_4 < 0$ and $\alpha_5 > 0$, but $abs(\alpha_4) > abs(\alpha_5)$ then the difference between revenue and expense surprises is less pronounced for value companies than for growth companies.

III. Data and Results

Financial data for the sample are obtained from the Compustat quarterly files, as well as the Compustat research files to mitigate the potential survival bias. Returns are obtained from the price database maintained by Factset Information Systems, Inc.⁷ Sales and earnings forecast data are obtained from I/B/E/S.

⁵ Instead of eliminating firms with negative book values, we assign them to fall in the middle B/M ratio of all firms, thus not including them in our analysis of value and growth firms. Placing them as low B/M ratios, i.e., as growth firms may contaminate the analysis in cases of firms with extended periods of losses.

⁶ The dividend yield is used by institutional investors to classify firms as value or growth (see Ballester et al., 1998). We report below that results are insensitive to classifications based on the B/M ratio alone.

⁷ Factset's price database is developed internally and is different than the CRSP database that is more frequently used in academic studies. Factset's price database is used by most of the large institutional investors, who typically do not use the CRSP database in their decisions and research.

We first obtain a large sample of firms (over 100,000 observations) for which we use time-series forecasts of expected revenues and earnings, and which we use to assign firms into growth and value groups. We then add the necessary requirements about available forecast data on quarterly sales and earnings, so that we can also perform tests using a better proxy for market expectations of revenues and earnings. This last step reduces the sample size considerably.

To be included in the initial sample during the quarters Q1/94-Q2/01, each firm had to pass the following selection criteria:

1. The preliminary earnings announcement date for the quarter is available from Compustat.
2. Market value of equity is available at the end of the prior quarter (Compustat item 61 multiplied by item 14).
3. Sales surprises can be calculated as sales in the current quarter minus sales in the same quarter of the preceding year (seasonal random walk), or minus sales in the immediately preceding quarter (random walk) (Compustat item 2).
4. The earnings surprise can be calculated as earnings in the current quarter minus earnings in the same quarter of the preceding year (seasonal random walk), or minus earnings in the immediately preceding quarter (random walk) (Compustat item 8).
5. The book value of equity (Compustat item 59) and the annual indicated dividend yield (Compustat item 20 divided by item 14) are available.
6. The three-day return centered on the preliminary earnings announcement date is

available in the price database.

The companies in the sample do not have to satisfy any requirements about a minimum size or a particular fiscal year end. All firms with a fiscal quarter ending within one month of a calendar quarter end are classified into that quarter. For example, all companies with fiscal quarters ending between May and July 1998 are classified into the second calendar quarter of 1998. Thus, we ensure comparability of economic conditions for all firms in each quarter. We report below the sensitivity of the results to a sub-sample of companies with a market value that exceeds \$500 as of the end of the preceding quarter.

We collect quarterly earnings and sales forecasts from I/B/E/S. In all cases, we select the most recent consensus forecast reported by I/B/E/S prior to the preliminary earnings announcement date. To be included in the analyst forecast sample, a firm must have **both** an earnings and a sales forecast. We delete all observations with a share price below one dollar to avoid poor scaling of the earnings surprises. In addition, we eliminate the bottom and top one percent of the earnings, revenue and expenses surprises, because examination of the data indicated substantial non-linearity due to unreasonable surprises in the tails. These unreasonable values may likely be due to poor data entries in the databases or extreme observations, and are therefore eliminated from our analysis.

Summary Statistics:

Panels A-C of Table 1 report summary statistics about the distribution of forecasts in our analyst forecast sample, which includes 20,487 forecasts over the years 1996-2001. The number of forecasts grew each year during this period, except for 2001, which did not contain a full year of data. The distribution of forecasts per calendar quarter is

essentially flat, indicating that there is no tendency to report more forecasts as the year progresses. Finally, the analyst forecast sample contains 3,089 distinct firms with an average of six forecasts per firm, although 25% of the firms have three forecasts or less. Still, this is a much larger sample spanning a longer sample period than that of Swaminathan and Weintrop (1991). Our sample is more extensive than Rees and Sivaramakrishnan (2001) who report results for 1997-1999, and who use the most recent earnings or revenue forecast instead of a consensus forecast.

(Insert Table 1 about here)

Panel D of Table 1 reports summary statistics about the variables in the study for the analyst forecast sample. The average (and median) scaled earnings, sales and expenses surprises are all close to zero, and seem to be reasonably symmetric around zero. The analyst forecast sub-sample reveals that the distribution of sales surprises seems to be more symmetric than the distribution of expense surprises. This may be due to the greater homogeneity of sales than expenses, and may partially explain stronger market reactions to sales than expense forecast errors. Note that over 50% of all firms report sales in excess of the forecast, although over 50% of all firms also report expenses in excess of the forecasts. The size-adjusted return for our analyst forecast sample is positive and close to zero on the average, with a larger median. Thus, our sample exhibits positive abnormal returns more often than not.

The size of the analyst forecast sample firms varies considerably from very small firms to very large ones in terms of both market values and sales. The book to market ratio indicates that many of our analyst forecast sample firms are in the lower range of the US population, which means that we are likely to have more growth firms than value

firms. This is probably due to the restriction on availability of analyst sales forecasts, which are more likely to exist for growth firms than value firms, possibly due to investors' interest in growth firms during the period 1997-2001. Finally, there are substantially more forecasts for earnings in our sample than sales; indeed, for more than 50% of our sales forecasts there is only one analyst forecast for the specific firm during that quarter. This may create a bias in our results, and we repeat the main results for the analyst forecast sub-sample with those firms that have more than one revenue and earnings forecast.

Panel E of Table 1 provides separate summary statistics about value and growth firms in the analyst forecast sample. As can be expected, value firms have lower earnings and sales surprises than growth firms. Value firms are also smaller than growth firms, have higher book to market ratios (by construction), and fewer analysts forecasts than growth firms. It should be noted that the analyst forecast sub-sample has twice as many growth firms than value firms. This may indicate a self-selection bias, where analysts prefer to provide revenue forecasts for growth firms, for which revenues may be a more important factor in the valuation. As can be seen in Panel G of Table 1, the entire sample has a more balanced distribution of value and growth firms. Thus, the replication of our analysis for the entire sample is important in highlighting whether the results of the analyst forecast sub-sample are due to this self-selection bias.

Panel F of Table 1 presents the summary statistics for our entire sample of 118,602 firm-quarters. The mean (median) earnings surprise is positive for both the seasonal random walk model and the random walk model, although it is very close to zero for both. A similar picture emerges for the sales and expense surprises, with the expense

surprise exhibiting a wider distribution than the sales surprise. The mean (median) size-adjusted return for the entire sample is positive (negative), albeit very close to zero. For this sample, the distribution of size in terms of both market value of equity and sales is wider than that of the analyst forecast sample, with smaller means and medians for the entire sample, indicating a selection bias for companies that are followed by analysts.

Panel G of Table 1 reports separate summary statistics for the value and growth sub-samples of the entire sample (which does not require analyst forecasts). As can be seen from the table, the number of value and growth firms is almost equal. The mean (median) earnings, sales and expense surprises are similar to those of the entire sample, and are not different across the value and growth sub-groups. The size-adjusted returns of the growth sub-group are smaller than those of the value firms, but growth firms have greater market values than value companies. Finally, by construction, value companies have higher book to market ratios than growth companies.

Differential Reactions to Revenue and Expense Surprises:

Table 2 reports the results of regression equations (1) and (2), where the dependent variable is the size-adjusted return and the independent variables are the earnings surprise in equation (1), and both the sales and expense surprise in equation (2). The table reports results for the analyst forecast sub-sample in Panel A, which also includes separate panels for all sample observations, and for those observations with at least two forecasts for both sales and earnings. Panel B provides results for the entire sample, using both the seasonal random walk and the random walk models to proxy for market expectations. Consistent with prior studies, the earnings surprise in Panel A is positively associated with adjusted returns, and the coefficient is about the same magnitude as that of Swaminathan and

Weintrop (1991). When the earnings surprise is broken down to sales and expense surprises in equation (2), we find that the sales surprise is positively associated with adjusted returns, whereas the expense surprise is negatively associated with adjusted returns. Furthermore, we can see that the sales surprise coefficient is greater in magnitude than the absolute value of the expense coefficient. An F-test at the bottom of the table shows that the absolute value of the sales and expense surprise coefficients are statistically different from each other. Finally, the same results hold for sample observations with at least two sales forecasts.

A very similar picture emerges from Panel B of the table, for both the seasonal and random walk proxies of market expectations. We find that the sales surprise is positive and has a larger coefficient (in absolute value) than the expense coefficient, and that the two (absolute values of the) coefficients are statistically different from each other. Thus, consistent with Swaminathan and Weintrop (1991), investor reactions to announcement of earnings are stronger (and statistically different) for sales surprises than for expense surprises.

(Insert Table 2 about here)

Differential Reactions to Value and Growth Firms:

Table 3 reports the results of similar regression equations, but with dummy variables for value companies, as expressed in Equation (3), for the analysts forecast sub-sample. The table reveals that, in the earnings equation, value companies have a higher intercept than those of growth companies, consistent with higher adjusted-returns of value companies, although not statistically different from zero. The table also reveals that, in the earnings regression, the earnings response coefficient of value companies is

significantly lower than that of growth companies, indicating the relatively greater importance investors attach to earnings of growth companies than those of value companies.

When splitting the earnings surprise into sales and expense surprises, we find that the sales surprise is still more strongly associated with size-adjusted returns than the expense surprise. However, we also find that the sales surprise is significantly less strongly associated with adjusted returns for value companies than for growth companies. This is consistent with our expectations that investors attach more importance to sales growth of growth companies than for value companies. We also find that the decrease in the revenue surprise coefficient for value firms (0.304) is larger in absolute value than the increase in the expense surprise coefficient (0.224). Thus, for value companies, the difference in reactions to revenue and expense surprises is smaller than the corresponding difference for growth firms. F-tests at the bottom of the table indicate that the absolute values of the revenue and expense surprise coefficients are statistically different for both the growth and value groups (except for the value group when only companies with at least two analysts are included). Furthermore, the absolute value of the change in the coefficient from growth to value companies is not the same for revenue and expense surprises (i.e., $-a_4 \neq a_5$), indicating that for value companies the revenue and expense coefficients are less different than for growth companies. Similar results are obtained (but not reported in the paper) for the entire sample where analyst forecasts are not necessarily available.

(Insert Table 3 about here)

The above results indicate that market reactions are different not only for the sales

and expense surprises, but also between value and growth firms with respect to these surprises. Market participants seem to place more importance on the sales surprise of growth companies than for value companies, and are more indifferent between the revenue and expense reduction surprises for value companies than for growth companies.

Table 4 provides information about size-adjusted returns centered on the preliminary earnings announcement date for different combinations of sales and earnings surprises, and for value and growth firms. When both surprises are negative (positive), adjusted returns are negative (positive) and statistically different from zero. However, when the sales surprise is negative but the earnings surprise is positive, i.e., when the firm is able to reduce expenses beyond analysts' estimates, there is a statistically significant difference in adjusted returns between value and growth firms; the adjusted return for growth firms is negative, whereas that of value firms is positive. The table reports that the value firms in the positive earnings and negative sales surprise group had a greater mean negative sales surprise than growth firms in that group, but also a greater mean positive earnings surprise. This is consistent with greater ability of value firms in this group to contain costs than growth companies in this group. These results further support our intuition that market participants actually reward value companies that are able to reduce expenses in the face of disappointing sales, whereas growth companies are expected to show consistent growth in both sales and earnings. Similar results to those described above are obtained (but not reported in the paper) for the entire sample where market expectation proxies are based on the seasonal random walk and the random walk models.

(Insert Table 4 about here)

Table 5 reports mean and medians of operating expense changes from the prior

quarter for firms that had a negative sales surprise but a positive earnings surprise in the analyst forecast sub-sample. Market participants may not know these data when the preliminary earnings announcement is made, unless the firm discloses sufficient information in the preliminary earnings release. The table reveals that the ratio of cost of goods sold to sales declined for these companies from the previous quarter, indicating significantly improved efficiencies in manufacturing costs. The table also reveals that there are improvements in the ratio of selling, general and administrative expenses to sales, although these improvements are not statistically different from zero. Finally, the mean improvement in the ratios of cost of goods sold and total expenses to sales are more pronounced for value companies than for growth companies, although the median improvement in the ratio of selling, general and administrative expenses to sales and therefore the ratio of total expenses to sales are greater for growth companies than for value companies. Thus, the positive market reactions to a negative sales surprise but a positive earnings surprise of value firms is justified; when the details are released to the market, investors realize that these firms are able to gain efficiencies in production that may persist in the future.

(Insert Table 5 about here)

Further Exploration for the Differential Reactions to Revenue and Expense

Surprises:

We have surmised earlier that investors react differently to revenue and expense surprises because revenue surprises are more persistent than expense surprises, and because expense surprises are noisier due to the aggregation of heterogeneous expenses.

To further investigate these assertions, we first compare the persistence of sales and expense changes by examining the first and second autocorrelations of these two series for the entire sample.

We first calculate the change in sales (expense) from the same quarter in the preceding year, and scale this change by market value at the beginning of the quarter. We then examine the autocorrelations in this series for any two consecutive quarters (first autocorrelation) and for any two quarters that are exactly one quarter apart (second autocorrelation). When all observations are pooled, the first (second) autocorrelation for sales is 0.014 (0.055), and for expense is 0.009 (0.016). We also repeat the calculation of autocorrelations for each firm separately if the firm had at least 10 quarterly observations. The average first (second) autocorrelation for sales is 0.466 (0.248), and for expense is 0.348 (0.191). The average autocorrelations for sales are statistically greater than those for expenses (using both parametric and non-parametric tests) at significance levels below 0.001, indicating that sales changes are more persistent than expense changes. We obtain similar results for the analyst forecast sub-sample.

We compute the ratio of the absolute value of persistence (first serial correlation) in expense changes to sales changes by using all available data for each firm through 1996. Since analyst forecasts of revenues begin in 1997 (except for 16 forecasts in 1996 as seen in Table 1), this estimation does not include a look-ahead bias. We winsorize each ratio to be between zero and one. We then multiply this ratio by the revenue and expense (scaled) surprise to create an interaction variable. We expect that when this ratio is high, i.e., for companies with expense surprises that are highly persistent, the reaction to an expense surprise will be stronger than for companies where the ratio of expense

surprise to sales surprise is low. Thus, we estimate the following regression model (error and subscripts suppressed):

$$\text{SAR} = \alpha_0 + \alpha_1 \text{SUR} + \alpha_2 \text{SUEX} + \alpha_3 \text{SUR*P} + \alpha_4 \text{SUEX*P} \quad (4)$$

Where SAR is the size-adjusted return, SUR (SUEX) is the scaled revenue (expense) surprise, and P is the ratio of the expense persistence to revenue persistence. We hypothesize that $\alpha_4 < 0$, which means that the expense reduction surprise is more valuable to investors in companies where expense surprises are more persistent relative to the persistence of sales surprises. We provide the results of this test in the first two columns of Table 6. As the table indicates, the sales (expense) surprise is positively (negatively) associated with size-adjusted returns, consistent with our prior results in Table 2. Consistent with our expectation, α_4 is indeed negative and significantly different from zero. The table also shows that α_3 is positive (but lower than α_4), although not significantly different from zero, possibly indicating that when the ratio of the expense persistence to sales persistence is high, market participants react more strongly to both surprises. We also find (by using the F-Tests reported at the bottom of the table) that the market reactions to the revenue and expense surprises are significantly different for both the raw and interacted variables. Thus, the relative persistence of expense and revenue surprises does play a role in the market reactions to these surprises.

(Insert Table 6 about here)

Table 6 provides similar analysis for two additional interaction variables. The first is the ratio of variable expenses to sales (one minus the contribution margin ratio), and the second is the ratio of operating expenses to total expenses. It is expected that when a company has a low ratio of variable expenses to sales, the reaction of investors to a

revenue surprise shall be stronger than when the ratio is high. The reason is that a dollar surprise in revenues contributes a larger amount to income (or covering fixed expenses) when the ratio is low than when the ratio is high. Thus, if P is the ratio of variable expense to sales in regression Equation (4) above, we expect $\alpha_3 < 0$. We estimate the ratio of variable expense to sales by regressing of total quarterly expenses on quarterly sales, using all quarterly observations separately for each firm through 1996.

Table 6 reports the results of estimating Equation (4) with the ratio of variable expenses to sales as the interaction variable in the middle two columns. As can be seen from the table, the revenue (expense) surprise is positively (negatively) associated with size-adjusted returns, as we saw in Table 2. We find that the interaction sales surprise coefficient (α_3) is indeed negative and statistically different from zero, and greater than α_4 which is positive but with lower significance levels. We also find that the differential reactions to revenue and expense surprises are statistically different for both the raw and interacted variables, as is evident from the F-tests at the bottom of the table.

Finally, to test for the relative heterogeneity of the expense surprise, we use the ratio of operating expenses before depreciation to total expenses. Operating expenses before depreciation are calculated as sales minus operating income before depreciation (Compustat item 21). If there are non-recurring charges to income, they are not expected to be included in operating income. Conversely, operating expenses are likely to be more homogeneous and recurring. Thus, if a company has a higher ratio of operating expenses to total expense, the expense surprise is more reliable, and a stronger market reaction is expected to the expense surprise than when the ratio is low. Thus, if we use the ratio of operating expenses to total expenses as the interaction variable in Equation (4), the

coefficient α_4 is expected to be negative (indicating a stronger reaction to the expense, the higher is the ratio). We estimate the ratio separately for each company for the current quarter of analysis. The results for this specification are reported in the last two columns of Table 6.⁸

As can be seen from the table, the revenue (expense) surprise is positively (negatively) associated with size-adjusted returns, as we saw in Table 2. Furthermore, the coefficient on the interaction expense variable is indeed negative and significantly different from zero. The coefficient on the sales surprise interaction variable α_3 is positive and significant, although smaller than the coefficient on the expense surprise interaction variable, possibly indicating that market participants treat both surprises as more credible. We also find that the differential reactions to revenue and expense surprises are statistically different for both the raw and interacted variables, as is evident from the F-tests at the bottom of the table.

The results reported in this sub-section seem to shed further light on the reasons for the differential market reactions to revenue and expense surprises. They indicate the importance of the persistence in these surprises, the homogeneity of the underlying data, and the contribution margin ratio of the firm.

Detection of Earnings Management:

Recent research (see e.g., Bartov, Givoly and Hayn, 2000, and Degeorge, Patel and Zechhauser, 1999) asserts that there is a greater propensity for earnings management for

⁸ The correlation between the ratio of operating expenses to total expenses and the ratio of the persistence in expenses relative to that of sales persistence is low, and statistically indistinguishable from zero. The reason is likely because the ratio of operating expenses to total expenses is based on the current quarter, whereas the ratio of the expense persistence to sales persistence is based on all available observations prior

firms that either just meet the consensus earnings forecast by analysts or beat it by one cent. The underlying assumption is that firms close to their earnings forecast select accounting methods that increase earnings sufficiently to meet the forecast or beat it by a low margin. Intuitively, if firms engage in earnings management and investors are able to detect it, market reactions to the earnings announcement should be negative, because it is the management of earnings that achieved the non-negative or slightly positive earnings news rather than real economic events. However, detection of earnings management is not an easy task, and may be even more difficult on the day preliminary earnings are announced with only partial information disclosure about expenses.

Assuming that earnings management is more difficult to detect when performed through expenses than through revenues, we can refine the detection of earnings management by focusing on the revenue and expense surprises of firms that meet the forecast or beat it slightly. Intuitively, when the firm is able to meet the earnings forecast with a positive sales surprise, the likelihood for expense management is lower, and stock reactions should be positive, because the firm is unlikely to have managed expenses to meet the analysts' earnings forecast. However, if the sales surprise is negative, the firm has met or beaten the analysts' earnings forecast through a reduction in expenses beyond the analysts' forecasted expenses. In that case, investors may perceive it more likely that expense management had been practiced, and follow with negative market reactions. Thus, we compare the size-adjusted returns of firms that report positive and negative sales surprises together with an earnings surprise of zero or one cent.

Table 7 reports size-adjusted returns centered on the preliminary earnings

to 1997. Thus, the results reported in the first and the last two columns of Table 6 are based on different characterizations of firm-quarters.

announcements of firms with an earnings surprise of zero or \$0.01. There are 3,325 such observations (firm-quarters) in our analyst forecast sub-sample, and the average return for them is 0.48%, statistically different from zero at a significance level of 0.003. However, when we break this group down into those firms that had a positive or negative sales surprise, we find differences in returns between the two groups. In particular, when the sales surprise is negative, the average adjusted-return is negative too -0.41% , with significance level of 0.106. In contrast, when the sales surprise is positive, the average adjusted-return is positive too, 1.08% , and statistically different from zero at significance levels below 0.001. Thus, the sales surprise can help investors assess whether meeting or beating analysts' earnings forecast by less than one cent is likely due to earnings management or not. If the sales surprise is positive, the firm has probably met or beaten the forecast with no expense management. In the case of a negative sales surprise, expense management may have played a role, causing the negative (or at least non-positive) market reactions. However, the table reveals that the negative reaction to a negative sales surprise is limited to growth companies; consistent with our findings in Table 4, value companies actually are not hurt by a negative sales surprise, as long as they can reduce expenses sufficiently to create a zero or even a \$0.01 earnings surprise.

(Insert Table 7 about here)

Sensitivity Analysis

To assess the robustness of our results to various research design issues, we conduct the following sensitivity analysis:

1. **Classification of firms into value and growth groups.** The classification scheme above used the book to market ratio and the dividend yield. We first

repeat the analysis with the book-to-market ratio alone; we rank firms based on their book-to-market ratio and classify the top 25% (33%) as value and the bottom 25% (33%) as growth. The results are qualitatively the same as those reported above. We also classify firms based on their dividend yield alone; we rank firms based on their dividend yield and classify the top 33% as value and the bottom 33% as growth. These results are also qualitatively the same as those reported above.

2. **Alternative definitions of the standardized unexpected earnings (revenues, expenses).** Instead of scaling the forecast error by price as reported above, we standardize unexpected earnings (revenues, expenses) by actual revenues, as well as by the absolute value of earnings, revenues and expenses, respectively. The coefficients have the same signs as before, although a few coefficients become statistically insignificant.
3. **Firms with market value greater than \$500 million.** The results are similar to those reported above, except for the regression coefficients for value firms, which have the same signs as before but are insignificantly different from those of growth firms.
4. **Earnings management for firms with an earnings surprise between 0 and \$0.03.** Instead of using an earnings surprise of 0 or \$0.01, we include all surprises between 0 and \$0.03. The results remain the same as those reported above.
5. **Extreme surprises.** We eliminate the middle one third of the sales and earnings surprise variables from the analysis, concentrating on the extreme positive and negative surprises. The results remain very similar to those reported above.

6. **Recent forecasts.** We eliminate observations where the earnings (sales) forecast is older than one month prior to the preliminary earnings announcement. The results are very similar to those reported above.
7. **Fixed effects models.** We repeat the analysis with quarter and firm dummy variables. The results are very similar to those reported above.
8. **Loss firms.** We repeat the analyses by elimination of loss firms. The results are very similar to those reported above, and in some cases become more significant.
9. **Estimation of expense homogeneity.** We use the ratio of cost of goods sold plus selling, general and administrative expenses to total expenses instead of operating expenses to total expenses. The results are very similar to those reported above.

IV. Summary and Conclusions

This study examines whether market reactions to revenue surprises differ from reactions to expense surprises, and whether such differences vary between value and growth companies. The study also investigates whether decomposition of the earnings surprise into sales and expense surprises can be used to detect potential cases of expense management.

Consistent with Swaminathan and Weintrop (1991), we show that investors react significantly more strongly to a dollar of sales surprise than to a dollar of cost savings. We also find differential market reactions for value and growth companies; investors react significantly more strongly to a dollar of sales surprise of growth firms than of value firms. For value companies, investors are more indifferent between a dollar of

revenue surprise and a dollar of cost reduction than they are in the case of growth companies. Furthermore, we document positive market reactions in cases of expense reductions beyond sales shortfalls of value firms, but negative market reactions in such cases for growth firms. We also show that in these cases of negative sales surprises but positive earnings surprises, companies indeed report declining proportions (to sales) of cost of sales and selling, general and administrative expenses from the prior quarter.

Further analysis of the possible reasons for the differential market reaction to revenue and expense surprises shows that the relatively higher persistence of revenues motivates a stronger reaction to revenue surprises. The differential reaction is also caused by the greater heterogeneity of expenses than sales, and by the differential contribution margin ratios of firms. The study also provides evidence consistent with the assertion that the decomposition of the earnings surprise into its two components (sales and expenses surprises) aids in detecting potential expense management. The results indicate that for the subset of companies that barely “met their earnings forecasts,” those with a positive sales surprise experience a positive market reaction, whereas those with a negative sales surprise experience a negative market reaction. These results are in line with the intuition that the likelihood of expense manipulation for the former group is lower than that for the latter group.

The results of this study can be used in financial statement analysis, where the earnings surprise should be split into its components, and various income statement components closely examined to interpret the earnings surprise. This analysis should also be carried out differently for value and growth firms, with different components emphasized for the two groups. The results of this study can also be used by researchers

who study the quality of earnings and earnings management to improve the research design.

Table 1
Summary Statistics

Panel A: Distribution of Forecasts by Year

<i>Year</i>	<i>No. Of Forecasts</i>
1996	16
1997	1082
1998	3820
1999	5160
2000	6100
2001	4309
Total	20487

Panel B: Distribution of Forecasts by Quarter

<i>Quarter</i>	<i>N</i>
1	5628
2	4773
3	5421
4	4665
Total	20487

Panel C: Number of Quarterly Forecasts Per Firm

Mean	6.632
Mimimum	1
10%	1
25%	3
50%	6
75%	10
90%	14
Maximum	24
No. of Distinct Firms	3089

Panel D: Summary Statistics For The Analyst Forecast Sub-Sample

Variable	N	Mean	Minimum	10%	25%	50%	75%	90%	Maximum
Earnings Surprise	20486	-0.003217	-0.161	-0.014	-0.002	0	0.002	0.006	0.041
Sales Surprise	20487	0.003	-0.298	-0.03	-0.006	0.001	0.009	0.036	0.321
Expense Surprise	20486	0.006	-0.288	-0.026	-0.005	0.001	0.013	0.045	0.384
Size-Adjusted Return	20469	0.002	-1.002	-0.106	-0.0451	0.004	0.0481	0.112	1.859
Market Value	20487	5595	3	93	230	713	2429	9767	604415
Sales	20487	668	0.001	9.2	26.5	92.5	354.1	1413.9	56556
Book/Market	20487	0.413	0	0.09	0.173	0.324	0.531	0.822	6.938
Number of Sales Forecasts	20487	1.8	1	1	1	1	2	3	16
Number of Earnings Forecasts	20487	7.892	1	2	3	6	11	17	42

Panel E: Summary Statistics By Value/Growth For The Analyst Forecast Sub-Sample

Variable	N	Mean	Minimum	10%	25%	50%	75%	90%	Maximum
Value Firms									
Earnings Surprise	4800	-0.006	-0.178	-0.025	-0.005	0.000	0.002	0.008	0.042
Sales Surprise	4800	0.000	-0.324	-0.071	-0.023	-0.001	0.019	0.075	0.320
Expense Surprise	4800	0.006	-0.315	-0.061	-0.019	0.001	0.028	0.087	0.384
Size-Adjusted Return	4795	0.002	-1.002	-0.081	-0.034	0.000	0.035	0.085	0.622
Market Value	4800	4931	2.91	50.29	114.98	433.84	1982.7	10742	253896
Book/Market	4800	0.805	0.004	0.261	0.455	0.749	1.024	1.376	6.938
Number of Sales Forecasts	4800	1.364	1.000	1.000	1.000	1.000	1.000	2.000	11
Number of Earnings Forecasts	4800	6.886	1.000	1.000	3.000	5.000	9.000	16.000	39
Growth Firms									
Earnings Surprise	10681	-0.002	-0.171	-0.009	-0.001	0.000	0.002	0.004	0.043
Sales Surprise	10682	0.004	-0.312	-0.011	-0.002	0.001	0.006	0.020	0.320
Expense Surprise	10681	0.006	-0.314	-0.010	-0.002	0.001	0.008	0.025	0.335
Size-Adjusted Return	10671	0.002	-0.784	-0.119	-0.053	0.000	0.056	0.125	1.859
Market Value	10682	7720	6.21	168.7	400	1050	3622	13980	604415
Book/Market	10682	0.193	0.000	0.063	0.111	0.186	0.270	0.331	0.468
Number of Sales Forecasts	10682	2.163	1.000	1.000	1.000	2.000	3.000	4.000	16
Number of Earnings Forecasts	10682	8.787	1.000	2.000	4.000	7.000	12.000	19.000	42

Panel F: Summary Statistics For The Entire Sample

Variable	N	Mean	Minimum	10%	25%	50%	75%	90%	Maximum
Earnings Surprise - SRW	118602	0.000389	-0.239	-0.025	0.006	0.0017	0.007	0.022	0.255
Sales Surprise - SRW	118602	0.003	-0.498	-0.031	0.001	0.018	0.051	0.407	0.664
Expense Surprise - SRW	118602	0.032	-0.566	-0.031	0.001	0.017	0.051	0.119	0.689
Earnings Surprise - RW	118602	0.0006	-0.229	-0.043	-0.005	0.001	0.006	0.022	0.265
Sales Surprise - RW	118602	0.009	-0.5	-0.045	-0.007	0.004	0.022	0.07	0.308
Expense Surprise - RW	118602	0.008	-0.581	-0.046	-0.007	0.004	0.022	0.069	0.558
Size-Adjusted Return	118079	0.001	-4.775	-0.077	-0.031	-0.001	0.031	0.081	2.978
Market Value	118602	2325	0.24	19	54	205	890	3470	604415
Sales	118602	409	2.63	3.26	10.27	39.89	180	709	56646
Book/Market	118602	0.595	0	0.15	0.283	0.5	0.767	1.137	16.306

Panel G: Summary Statistics By Value/Growth For The Entire Sample

Variable	N	Mean	Minimum	10%	25%	50%	75%	90%	Maximum
Value Firms									
Earnings Surprise - SRW	41200	-0.002	-0.239	-0.042	-0.012	0.001	0.010	0.032	0.255
Sales Surprise - SRW	41200	0.033	-0.498	-0.080	-0.008	0.020	0.069	0.165	0.664
Expense Surprise - SRW	41200	0.035	-0.566	-0.073	-0.007	0.020	0.071	0.166	0.689
Earnings Surprise - RW	41200	0.000	-0.229	-0.036	-0.010	0.001	0.010	0.036	0.264
Sales Surprise - RW	41200	0.009	-0.499	-0.088	-0.018	0.005	0.035	0.111	0.535
Expense Surprise - RW	41200	0.008	-0.581	-0.084	-0.017	0.005	0.035	0.107	0.558
Size-Adjusted Return	37218	0.002	-4.675	-0.068	-0.027	-0.001	0.028	0.074	2.978
Market Value	41200	473	0.6	10.75	25	70	245	928	172573
Book/Market	41200	1.090	0.500	0.670	0.780	0.950	1.240	1.650	16.300
Growth Firms									
Earnings Surprise - SRW	41184	0.002	-0.238	-0.014	-0.003	0.002	0.006	0.016	0.255
Sales Surprise - SRW	41184	0.027	-0.491	-0.008	0.003	0.015	0.036	0.076	0.662
Expense Surprise - SRW	41184	0.025	-0.549	-0.009	0.003	0.014	0.035	0.076	0.686
Earnings Surprise - RW	41184	0.001	-0.228	-0.013	-0.003	0.001	0.004	0.013	0.265
Sales Surprise - RW	41184	0.007	-0.491	-0.019	-0.003	0.003	0.014	0.038	0.535
Expense Surprise - RW	41184	0.007	-0.509	-0.020	-0.003	0.003	0.014	0.038	0.558
Size-Adjusted Return	40979	0.000	-1.829	-0.093	-0.039	-0.002	0.037	0.094	2.795
Market Value	41184	4667	0.89	40	123	480	1860	7865	604415
Book/Market	41184	0.210	0.000	0.080	0.140	0.220	0.290	0.340	0.48

Notes:

1. Panels A – C provide summary statistics for the 20,487 forecasts in the analyst forecast sub-sample. Panels D-G provide summary statistics for the variables used in the study.
2. The (scaled) earnings (sales) surprise is the actual earnings (revenues) per share less the mean analysts forecast of earnings (sales) per share scaled by the price per share at the end of the preceding quarter. Expenses are defined as sales minus earnings, and the expense surprise is defined in a similar manner to the sales and earnings surprise. For the entire sample, the surprise is defined as the actual variable minus the actual variable in the same quarter of the preceding

- year, denoted SRW (Seasonal Random Walk), or minus the actual variable in the preceding quarter, denoted RW (Random Walk), all scaled by the market value of equity as of the beginning of the quarter.
3. The size-adjusted return is the three-day return on the stock, centered on the day of the preliminary earnings announcement, minus the equally-weighted return on all firms in the same size decile for the same period.
 4. Market value is the market value of equity as of the beginning of the quarter.
 5. The Book/Market ratio is the ratio of the book value of equity to market value of equity as of the beginning of the quarter. For companies with negative book values of equity, the book/market ratio was set to 0.5, so that these observations will not affect the value-growth assignment.
 6. Growth companies are companies which fall into the bottom 33% of all companies according to their book-to-market ratio and which do not have a dividend yield in the top 25% of all firms. Value companies are those in the top 33% with respect to book-to-market ratio or in the top 25% with respect to dividend yield.

Table 2
Regression Results

$$\text{SAR} = d_0 + d_1 \text{SUE} \quad (1) \quad \text{SAR} = a_0 + a_1 \text{SUR} + a_2 \text{SUEX} \quad (2)$$

Panel A: The Analyst Forecast Sub-Sample

Variable	Expected Sign	All Forecasts		At least 2 forecasts	
		Model 1	Model 2	Model 1	Model 2
Intercept		0.003 (0.001)	0.003 (0.001)	0.003 (0.009)	0.003 (0.024)
Earnings Surprise (d_1)	+	0.460 (0.001)		0.262 (0.001)	
Sales Surprise (a_1)	+		0.517 (0.001)		0.349 (0.001)
Expense Surprise (a_2)	-		-0.412 (0.001)		-0.231 (0.001)
Adjusted R-Square		0.006	0.009	0.002	0.003
N		20533	20533	8785	8785
F- statistic			50.99 (0.001)		12.39 (0.001)

Panel B: The Entire Sample

Variable	Expected Sign	Seasonal Random Walk		Random Walk	
		Model 1	Model 2	Model 1	Model 2
Intercept		0.001 (0.002)	-0.001 (0.023)	0.001 (0.003)	0.000 (0.109)
Earnings Surprise (d_1)	+	0.278 (0.001)		0.215 (0.001)	
Sales Surprise (a_1)	+		0.295 (0.001)		0.224 (0.001)
Expense Surprise (a_2)	-		-0.250 (0.001)		-0.178 (0.001)
Adjusted R-Square		0.012	0.014	0.007	0.008
N		118041	118041	118041	118041
F- statistic			263.12 (0.001)		183.57 (0.001)

Notes:

SAR is the size-adjusted return. SUE (SUR) is the earnings (revenues) surprise defined as the actual earnings (revenues) per share less the mean analysts forecast of earnings (revenues) per share in Panel A and the actual earnings (revenues) in the same quarter of the preceding year (Seasonal Random Walk) or the preceding quarter (Random Walk) in Panel B, scaled by the price per share at the end of the preceding quarter. Expenses are defined as sales less earnings and SUEX is defined in a similar manner to SUE and SUR. Models 1 and 2 refer to equations (1) and (2), respectively. The probabilities associated with the t-test are in parentheses. The F-statistic (significance reported in parenthesis) compares Model 1 versus Model 2, by testing whether the absolute values of the coefficients on sales and expenses are identical in Model 2.

Table 3
Regression Results – Value and Growth Differences
The Analyst Forecast Sub-Sample

$$\text{SAR} = d_0 + d_1 \text{SUE} + d_2 \text{SUE} * \text{D} + d_3 \text{D} \quad (1)$$

$$\text{SAR} = a_0 + a_1 \text{D} + a_2 \text{SUR} + a_3 \text{SUEX} + a_4 \text{SUR} * \text{D} + a_5 \text{SUEX} * \text{D} \quad (2)$$

Variable	Expected Sign	All Forecasts		At least 2 forecasts	
		Model 1	Model 2	Model 1	Model 2
Intercept		0.003 (0.015)	0.002 (0.082)	0.003 (0.083)	0.002 (0.1649)
Value Dummy Variable (d_3 or a_1)	+	0.002 (0.372)	0.002 (0.255)	0.000 (0.979)	0.000 (0.942)
Earnings Surprise (d_1)	+	0.617 (0.001)		0.538 (0.001)	
Sales Surprise (a_2)	+		0.714 (0.001)		0.646 (0.001)
Expense Surprise (a_3)	-		-0.559 (0.001)		-0.507 (0.001)
Earnings Surprise * Value Dummy (d_2)	-	-0.242 (0.023)		-0.477 (0.010)	
Sales Surprise * Value Dummy (a_4)	-		-0.304 (0.005)		-0.532 (0.067)
Expense Surprise * Value Dummy (a_5)	?		0.224 (0.037)		0.472 (0.012)
Adjusted R-Square		0.006	0.008	0.002	0.003
N		15464	15464	6909	6909
F- statistic to test $a_2 = -a_3$ (Test of equality of revenue and expense for growth companies)			19.82 (0.001)		5.07 (0.024)
F- statistic to test $a_2 + a_4 = -a_3 - a_5$ (Test of equality of revenue and expense for value companies)			12.59 (0.001)		2.29 (0.131)
F- statistic to test $-a_4 = a_5$ (Test of equality of incremental revenue and expense for value companies)			6.05 (0.014)		5.28 (0.022)

Notes:

SAR is the size-adjusted return. SUE (SUR) is the scaled earnings (revenues) surprise defined as the actual earnings (revenues) per share less the mean analysts forecast of earnings (revenues) per share, scaled by the price per share at the end of the preceding quarter. Expenses are defined as sales less earnings and SUEX is defined in a similar manner to SUE and SUR. Growth companies are companies that fall into the bottom 33% of all companies according to their book-to-market ratio and that do not have a dividend yield in the top 25% of all firms. Value companies are those in the top 33% with respect to book-to-market ratio or in the top 25% with respect to dividend yield. D is a dummy variable that equals 1 for value companies and zero otherwise. Models 1 and 2 refer to equations (1) and (2), respectively. The probabilities associated with the t-test are in parentheses. The F-statistic (significance reported in parenthesis) tests various restrictions on the coefficients.

Table 4
Size-Adjusted Returns by Surprise Groups
The Analyst Forecast Sub-Sample

CONFIRMING SIGNALS	Growth	Value	Test of Value > Growth	
			t-test Significance	Wilcoxon Significance
1. Negative Sales Surprise and Negative Earnings Surprise				
Number of observations	1967	1444		
Mean adjusted-return	-2.52%	-1.58%	0.018	
	(0.001)	(0.001)		
Median adjusted-return	-1.83%	-1.25%		0.014
	(0.001)	(0.001)		
Mean sales surprise	-.015	-.048	.999	.999
Mean earnings surprise	-.010	-.018	.999	.999
2. Positive Sales Surprise and Positive Earnings Surprise				
Number of observations	4652	1429		
Mean adjusted-return	1.91%	1.90%	0.977	
	(0.001)	(0.001)		
Median adjusted-return	1.27%	0.80%		0.878
	(0.001)	(0.001)		
Mean sales surprise	.015	.048	.001	.001
Mean earnings surprise	.003	.005	.001	.001
CONFLICTING SIGNALS	Growth	Value	t-test Significance	Wilcoxon Significance
1. Negative Sales Surprise and Positive Earnings Surprise				
Number of observations	1964	1020		
Mean adjusted-return	-0.79%	0.96%	0.001	
	(0.002)	(0.001)		
Median adjusted-return	-0.52%	0.49%		0.001
	(0.002)	(0.001)		
Mean sales surprise	-.009	-.035	.999	.999
Mean earnings surprise	.002	.005	.999	.999
2. Positive Sales Surprise and Negative Earnings Surprise				
Number of observations	2088	902		
Mean adjusted-return	-0.36%	-0.51%	0.735	
	(0.197)	(0.057)		
Median adjusted-return	-0.68%	-0.47%		0.806
	(0.197)	(0.057)		
Mean sales surprise	.011	.045	.999	.999
Mean earnings surprise	-.008	-.015	.999	.999

Notes:

1. Growth firms are those at the bottom 33% of all firms ranked according to the ratio of book to market (B/M) value of equity. Value firms are those firms in the top 33% according to B/M, or in the top 25% of the firms when ranked according to the dividend yield.
2. Earnings (sales) surprise is defined as the actual earnings (sales) per share less the mean analysts forecast of earnings (revenues) per share scaled by the price per share at the end of the preceding quarter.
3. The size-adjusted return is equal to the return on the stock minus the equally-weighted return on the same size (market value of equity at the end of the prior quarter) decile portfolio for the three-day window centered on the preliminary earnings announcement date.
4. Significance levels (reported in parentheses) below the mean size-adjusted returns are for a t-test that the mean size-adjusted return is equal to zero.
5. Significance levels (reported in parentheses) below the median size-adjusted returns are for a Wilcoxon signed-rank test that the median size-adjusted return is equal to zero.
6. In the two rightmost columns, the table reports significance levels for parametric (non-parametric) tests that value companies have a higher mean (median) than growth companies.

Table 5
Change in Operating Expenses of Firms with Negative Sales Surprises and Positive Earnings Surprises
Analyst Forecast Sub-Sample

		t-test		Wilcoxon	
		Mean	Significance	Median	Significance
CGS/SALES - CGS (t-1)/ SALES (t-1)	All	-0.0043	0.0001	-0.0029	0.0001
	Value	-0.0053	0.0001	-0.0030	0.0001
	Growth	-0.0038	0.0001	-0.0027	0.0001
SGA / SALES - SGA(t-1)/ SALES (t-1)	All	-0.0001	0.9486	-0.0008	0.1060
	Value	-0.0003	0.8537	-0.0003	0.7096
	Growth	0.0001	0.9577	-0.0012	0.0967
TOTAL/ SALES - TOTAL(t-1)/ SALES (t-1)	All	-0.0044	0.0009	-0.0042	0.0001
	Value	-0.0056	0.0129	-0.0040	0.0001
	Growth	-0.0037	0.0237	-0.0042	0.0001

Notes:

CGS and SGA denote cost of goods sold and selling, general & administrative expenses, respectively. TOTAL is the sum of CGS and SGA. (t-1) refers to the previous quarter. The changes in the various ratios are reported for the sub-sample of companies with analyst forecast data that experienced a negative sales surprise but a positive earnings surprise. The table also includes data about subsets of growth and value companies. For the classification of value and growth firms see notes to Table 4.

Table 6
Differences Between Revenue and Expense Surprises:
Effects of Persistence, Contribution Margin Ratio, and The
Ratio of Operating Expenses to Total Expenses
The Analyst Forecast Sub-Sample

$$SAR = a_0 + a_1 SUR + a_2 SUEX + a_3 SUR * P + a_4 SUEX * P \quad (4)$$

Variable	Ratio of Expense to Revenue Persistence		Ratio of Variable Expense to Sales		Ratio of Operating to Total Expenses	
	Expected Sign		Expected Sign		Expected Sign	
Intercept	?	0.005 (0.001)	?	0.005 (0.001)	?	0.004 (0.001)
Sales Surprise (a_1)	+	0.443 (0.015)	+	1.112 (0.001)	+	0.283 (0.105)
Expense Surprise (a_2)	-	-0.254 (0.171)	-	-0.959 (0.001)	-	-0.054 (0.750)
Sales Surprise * Ratio (a_3)	?	0.394 (0.102)	-	-0.487 (0.037)	?	0.739 (0.001)
Expense Surprise * Ratio (a_4)	-	-0.521 (0.033)	?	0.419 (0.082)	-	-0.830 (0.001)
Adjusted R-Square		0.009		0.009		0.010
N		11684		12759		14852
F- statistic to test $a_2 = -a_3$ (Test of equality of revenue and expense – No interaction)		10.11 (0.002)		3.51 (0.061)		5.07 (0.024)
F- statistic to test $a_2+a_4 = -a_3 -a_5$ (Test of equality of revenue and expense – With interaction)		4.17 (0.041)		10.20 (0.001)		8.16 (0.004)

Notes:

SAR is the size-adjusted return. SUE (SUR) is the scaled earnings (revenues) surprise defined as the actual earnings (revenues) per share less the mean analysts forecast of earnings (revenues) per share, scaled by the price per share at the end of the preceding quarter. Expenses are defined as sales less earnings and SUEX is defined in a similar manner to SUE and SUR. P is a ratio between zero and one. The expense (revenue) persistence is estimated, for all quarters through the end of 1996, as the first serial correlation of the change in expense (revenue) from the same quarter in the prior year, scaled by the market value at the beginning of the quarter. The ratio of variable expense to sales is estimated from regression of total expense on sales using all quarters through the end of 1996. The ratio of operating expenses (before depreciation) to all expenses is estimated for the quarter, using sales minus operating income before depreciation (Compustat item 21), and total expenses as sales minus earnings. The probabilities associated with the t-test are in parentheses. The F-statistic (significance reported in parentheses) tests various restrictions on the coefficients.

Table 7
Size-Adjusted Returns For Firms with an Earnings surprise of
Zero or \$0.01
Analyst Forecast Sub-Sample

	N	Mean Size- Adjusted Return	Significance
Negative Sales Surprise	1339	-0.41%	0.106
Positive Sales Surprise	1986	1.08%	0.001
Total	3325	0.48%	0.003
Negative Sales Surprise			
Growth Firms	947	-0.94%	0.003
Value Firms	392	0.88%	0.030
Positive Sales Surprise			
Growth Firms	1527	1.00%	0.001
Value Firms	459	1.37%	0.001

Notes:

The table reports size-adjusted returns centered on the preliminary earnings announcements of firms with an earnings surprise of zero or \$0.01. For variable definitions see the notes to Table 4.

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