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The Unappreciated Value of Marketing: The Moderating Role of Changes in Marketing and R&D Spending on Valuation of Earnings Reports

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Abstract

Because current earnings predict future financial performance, the stock market reacts strongly to earnings announcements. How rapidly and in what manner information about marketing actions and strategies is accounted for in the stock valuation is less clear. We examine the financial market's ability to fully and timely value marketing-related information released along with quarterly earnings announcements. We find evidence consistent with the market initially under-appreciating marketing and R&D effort. Specifically, we find differences in the immediate market response to earnings announcements for firms expanding versus reducing their marketing and R&D effort. However, we also observe a significantly greater positive stock price drift (i.e., systematic stock price adjustment) in the months following an earnings announcement for firms increasing marketing and/or R&D expenditures. We examine the dynamics and the mechanism underlying this differential drift. Firms increasing their marketing and/or R&D spending report significantly greater future operating performance than firms decreasing their marketing and R&D spending and the stock price adjustment (drift) accelerates around the time of the subsequent earnings announcement. Our findings suggest that the stock market takes time to fully incorporate implications of strategic marketing decisions. They also suggest the stock market tends to update firm valuation when the outcomes of marketing strategies are realized in future financial performance and new performance signals are sent to the market.

Key Words: Marketing Strategy, R&D, Marketing Metrics, Event Study, Post-Earnings-Announcement Drift

Growing evidence demonstrates positive long-term benefits of marketing activities such as advertising (Erickson and Jacobson 1992; Ho, Keh and Ong 2005; Hirschey 1982; Joshi and Hanssens 2008), branding (Barth et al. 1998, Mizik and Jacobson 2008), new product introductions (Chaney, Devinney, and Winer 1991; Pauwels et al. 2004), expansion of distribution channels (Geyskens, Gielens, and Dekimpe 2002, Gielens et al. 2008), and customer service changes (Nayyar 1995). Several recent studies, however, argue that the value associated with marketing investments may take an extended period of time to be realized and that the stock market may undervalue investments in marketing assets (e.g., Lehmann 2004, Mizik and Jacobson 2007, Pauwels et al. 2004, Rust et al. 2004). This stream of research suggests the stock market does not always immediately and fully appreciate the contribution of marketing to the firm's long-term financial performance but does not explore the underlying mechanism and dynamics of this phenomenon (Srinivasan and Hanssens 2009).

This study examines the financial market's ability to fully and timely value marketing-related information in the context of quarterly earnings announcements utilizing high-frequency (daily) trading data. We chose the earnings announcements setting because it allows us to pinpoint the timing of performance and marketing spending information flow. First, we use traditional event study methodology to examine the differences in the *immediate* market reaction to earnings announcements conditional on firm marketing strategy changes (i.e., increasing or decreasing marketing and research and development intensity). Next, we examine the post-announcement stock price behavior (i.e., the *delayed* stock market reaction) of firms undertaking different marketing and research and development (R&D) strategy changes. In order to better understand the mechanisms underlying the differential delayed market reaction, we examine the future operating performance of firms changing their marketing and R&D effort and the dynamic patterns of the post-earnings-announcement drift (PEAD).

We find differences in the immediate market response to earnings announcements for firms expanding versus reducing their marketing and R&D efforts. Specifically, well-performing firms (i.e., firms exceeding expected earnings) reporting a simultaneous cut to marketing and R&D spending realize lower abnormal returns than firms increasing marketing and R&D spending. In addition, firms increasing

marketing and cutting R&D realize greater abnormal returns than firms cutting marketing and increasing R&D. However, we also find evidence of a significant PEAD (i.e., a systematic trend in the stock price) depending on the change in marketing and R&D spending patterns. The direction of the drift is consistent with the initial under-appreciation of marketing and R&D effort and a subsequent correction. Specifically, firms reporting an increase in marketing and/or R&D expenditures have a significantly more positive stock price drift following an earnings announcement and significantly outperform firms that decreased both expenditures.

Our findings are consistent with the earnings fixation hypothesis (Bernard and Thomas 1990, Sloan 1996). That is, financial analysts may be paying insufficient attention to or not fully appreciating the future performance consequences of non-earnings information (i.e., marketing and R&D spending changes). We show that firms increasing their marketing and R&D spending report significantly greater future operating performance than firms decreasing their marketing and R&D spending. We examine the dynamic pattern of stock price adjustment and find that much of the future-term adjustment occurs around the time of the subsequent earnings reports. These findings suggest that stock market participants wait to observe subsequent earnings before fully adjusting their expectations and firm valuation. In other words, the stock market does not immediately and fully appreciate the link between marketing-related investments and future financial performance (future earnings).

This study contributes to the marketing literature by documenting new evidence of the dynamic patterns in the stock market response to marketing-related information. The substantive findings highlight the need for greater study and dissemination of knowledge about marketing's contribution to the financial bottom line and its impact on *future* financial performance. In addition, to the best of our knowledge, our study is the first to employ drift analysis to investigate long-term implications of marketing strategies. The findings highlight the importance of assessing not only the immediate but also delayed market response. The study also contributes to accounting research by identifying a significant new factor (i.e., marketing and R&D spending pattern) that affects the PEAD phenomenon and by adding to the debate on the mechanisms underlying the PEAD and financial markets efficiency.

We organize the rest of the paper as follows. We first describe the study setting of quarterly earnings announcements and relevant past research. Next, we discuss applicable theory and present our hypotheses. The methods section presents the key methodologies we use, event study analysis, average drift analysis, and calendar-portfolio analysis, and the specific tests for assessing our hypotheses. We then discuss data sources and the study sample and present results. We conclude with discussion and directions for future research.

Study Setting: Quarterly Earnings Announcements

Public firms are required to file quarterly earnings reports with the Securities and Exchange Commission (SEC). The process is structured and highly regulated. The stock market uses earnings reports as an important source of firm-specific performance information. Earnings announcements are also a focal point for managers, whose evaluations and compensation are often based on reported performance metrics.

Immediate Market Reaction to Earnings Announcements

Analysts follow publicly traded firms by researching their actions and operating conditions to predict their future performance. The efficient market hypothesis (EMH) postulates that a firm's stock price incorporates all public information and rational expectations of future performance. That is, only deviations of actual earnings from the stock market equilibrium expectations of earnings (i.e., earnings surprises) influence stock price. Firms reporting earnings greater than expected typically see an immediate increase in stock price, whereas firms that fail to meet their expected earnings benchmark experience an immediate decrease in stock price (Collins and Kothari 1989).

The immediate stock price adjustment following earnings announcement occurs because stock market participants use new performance information to adjust their expectations of firm future performance. Due to positive persistence in operating performance (i.e., current earnings being positively correlated with future earnings), improved (decreased) current earnings signal better (inferior) financial performance in the future. The magnitude of the change in the market valuation of a firm following an earnings announcement reflects the market’s estimate of the total expected change in the value of the

firm's discounted future cash flows. Research shows the stock market quickly incorporates new information in earnings announcements. Patell and Wolfson (1984), for example, report that the bulk of the stock price adjustment following an earnings announcement occurs in approximately five to fifteen minutes.

Delayed Market Reaction to Earnings Announcements: Post-Earnings-Announcement Drift

In an apparent contradiction to the efficient market hypothesis, evidence suggests that positive (negative) earnings surprises elicit not only an immediate positive (negative) stock price response but also a positive (negative) stock price drift lasting a few months following the earnings announcement date. According to EMH, no drift should exist because new information alone determines the price movements and historical information cannot be used to create an investment strategy earning excess returns.

The PEAD phenomenon was first reported by Ball and Brown (1968). They examined annual earnings announcements and observed that firms exceeding (failing to meet) expected annual earnings have stock prices that drift in a positive (negative) direction for the three to six months following the announcement. Many research studies in finance and accounting replicate this basic result. The PEAD is recognized as the oldest and most robust financial market anomaly (Fama 1998).

Figure 1 presents a depiction of the basic PEAD phenomenon using 127,056 earnings announcements conducted between January 1, 1995 and July 1, 2005 and recorded in the Thomson IBES database. We sort announcements into ten decile portfolios based on the magnitude of the earnings surprise and align data by the date of the earnings announcement. For each day for each portfolio beginning three days after the earnings announcement, we compute cumulative buy-and-hold abnormal returns. Portfolios with the most extreme positive (negative) earnings surprises exhibit the greatest positive (negative) drift, and the three-months (63 trading days) differential return between the top and bottom earnings surprise portfolios in this sample is over 5 percent. Past research reports similar magnitudes of the PEAD drift.

[Figure 1 about here]

Foster, Olsen, and Shevlin (1984), for example, report that a long-short portfolio (i.e., buying firms in the top decile of positive earnings surprises and short selling those in the lowest decile with greatest negative earnings surprises) earns 5.95 percent in abnormal returns in the 60 trading days following the earnings announcement. Abarbanell and Bernard (1992) find a one-quarter abnormal return of 4.98 percent for a long-short hedge of top versus bottom quintiles of unexpected earnings, and Liang (2003) documents a 6.3 percent abnormal return for a long-short hedge of the top versus bottom deciles over a 60-day period following earnings announcement.

Accounting research explores several factors affecting PEAD. One PEAD research stream focuses on the role of alternative earnings surprise measures. For example, Foster, Olsen, and Shevlin (1984) assess the robustness of the PEAD anomaly across different definitions of earnings surprises. They develop autoregressive forecast models to predict quarterly earnings and use the forecast residuals as their measure of earnings surprise. A number of studies also use financial analysts' forecasts, rather than predictions from time series models, as the measure of expected earnings (Livnat and Mendenhall 2006).

Another set of PEAD studies focuses on firm characteristics affecting the magnitude of the drift. These studies report that drift is generally weaker for firms that are larger, more liquid, and have lower risk (Bernard and Thomas 1990, Mendenhall 2004, Chordia et al. 2007). For example, Chordia and colleagues (2007) find that PEAD-based trading strategy profits decrease with liquidity. Mendenhall (2004) finds that firms with higher risk exhibit significantly greater levels of PEAD, although the magnitude of the risk effect on drift is very small. In sum, the firm-specific moderators of drift appear related to the amount of public information available about a firm: the less publicly available information, the greater the magnitude of the post-earnings-announcement drift.

Much research effort in finance and accounting focuses on understanding the mechanisms underlying the PEAD phenomenon and discriminating among its alternative explanations. The evidence is mixed and the opinions on PEAD differ. Some researchers view PEAD as a financial market anomaly and cite it as evidence against efficient markets, arguing that the market simply fails to fully assimilate available information. However, Sloan (1996, p. 314) notes that PEAD returns "do not necessarily imply

investor irrationality or the existence of unexploited profit opportunities." The literature advances two main explanations for the existence of PEAD phenomenon within the efficient markets framework. Specifically, trading costs and risk mismeasurement may explain the existence of the PEAD returns without contradicting market efficiency (Kothari et al. 2005).

One explanation suggests that a portion of the market response to new earnings information is delayed and market participants fail to act on new information due to high transaction costs (i.e., the basic assumption of zero transaction costs in EMH does not hold in practice). That is, the costs of implementing and monitoring a PEAD-based trading strategy are greater than the potential returns from immediate exploitation of new information contained in the earnings announcement. In support of this view, Chordia and colleagues (2007) report that the post-earnings-announcement drift occurs primarily in highly illiquid stocks. They find that a trading strategy of buying high earnings surprise stocks and shorting low earnings surprise stocks provides an average value-weighted return of 0.14 percent per month in the most liquid stocks and 1.60 percent in the most illiquid stocks. However, because illiquid stocks have higher trading costs, transaction costs account for 63 to 100 percent of the paper profits from the PEAD-based trading strategy. In other words, traders are not irrational but are rather deterred from exploiting a PEAD anomaly by high trading and portfolio management costs.

The second explanation suggests that PEAD is simply an artifact of the asset pricing models used to estimate abnormal returns. Specifically, because all capital asset pricing models used to calculate abnormal returns are approximations, they fail to fully adjust for all types of risk. As such, the PEAD abnormal returns may be just fair compensation for a risk factor the asset pricing model researchers use does not capture.

Researchers have also examined the dynamics of the PEAD phenomenon. Bernard and Thomas (1989, 1990), for example document that much (though not all) of the drift occurs in the first two quarters following the earnings announcement of interest. Furthermore, they report average positive abnormal returns of 1.32 and 0.70 percent for a long/short of top versus bottom decile portfolios in the short time periods around future earnings announcements in the first and second subsequent earnings announcement

seasons, respectively. These findings suggest the stock market participants do not initially appreciate the full future value implications of earnings surprises (i.e., they systematically mis-value reported earnings data) and further adjust their expectations after they have had a chance to observe future profitability signals.

Marketing-Related Information and Earnings Announcements

At the time of earnings announcements, in addition to basic earnings data, firms are also required to release additional information about their operating performance. Some of this information pertains to investments in long-term assets and ongoing projects: R&D, advertising, and other marketing-related spending are often reported along with the earnings information. Past research does not examine the impact of this information on the immediate and longer-term market reaction to earnings announcements. The main focus of this study is to examine how and how soon the financial markets incorporate information about the marketing-related investments accompanying quarterly earnings announcements. We chose the context of quarterly earnings announcements because it allows us to clearly pinpoint the timing of earnings and marketing spending information flow.

The Role of Marketing and R&D Spending and Market Valuation: Hypotheses

Past research documents positive long-term effects of marketing, innovation, and R&D spending (e.g., Dekimpe and Hanssens 1995, 1999; Erickson and Jacobson 1992, Sood and Tellis 2009) and examines the long-term performance implications of shifts in strategic emphasis on marketing versus R&D (i.e., value appropriation vs. value creation, Mizik and Jacobson 2003). Managers expand, contract, and rebalance their focus, effort, and resources to pursue strategic goals and to respond to changing environmental conditions.

However, managers may undertake some resource reallocations not only in a legitimate pursuit of a long-term market strategy but rather to satisfy immediate performance goals. Because managers are aware of the earnings-return relationship and their jobs and compensation often depend on the stock market valuation of their firm, they may try to influence market valuation by sending distorted performance signals to the market. An artificial inflation of earnings, if undetected by the market, may

temporarily increase firm valuation. One way to inflate earnings is to cut immediate costs, for example, marketing and R&D spending. Because for many marketing strategies (e.g., new product development, brand building, customer service improvements, and retention programs) the realization of successful marketing investments in cash flows occurs in the future, some managers view marketing investments as discretionary funding reserves and use them to manage current earnings. In other words, they may engage in myopic management.[1]

It is unclear when the market recognizes spending cuts as a tool for earnings inflation and how it incorporates information about the changes in spending reported concurrently with earnings announcements. Whether the market recognizes differential performance implications of shifting strategic emphasis between marketing (appropriation focus) and R&D (value creation focus) immediately or with a delay is also unclear. Based on this discussion, we propose the following hypotheses:

1. Immediate Market Reaction

If the market appreciates the long-term consequences of marketing and R&D spending, the market will respond more positively (less negatively) to firms reporting positive (negative) earnings surprises alongside an increase in marketing and R&D spending versus firms reporting a simultaneous cut to marketing and R&D spending. In addition, because spending cuts at the time of increased earnings (i.e., positive earnings surprises) may be used for earnings inflation, firms cutting their marketing and R&D spending will realize a greater negative performance differential compared to other firms when the earnings surprise is positive rather than negative:

> **Hypothesis 1a:** *The stock market's immediate response to firms reporting positive (negative) earnings surprise accompanied by an increase in marketing and R&D spending will be more positive (less negative) than for firms reporting a simultaneous decrease in marketing and R&D spending, and the return differential will be greater for firms reporting a positive rather than a negative earnings surprise.*

[1] Bushe (1998), for example, shows that firms facing the possibility of a small downfall in earnings, compared to the previous year's level of earnings, tend to cut R&D spending in order to reverse earnings decline. Roychowdhury (2006) reports similar evidence. Mizik and Jacobson (2007) find that firms tend to cut marketing spending to inflate earnings at the time of seasoned equity offerings (SEOs) to inflate earnings and firm valuation.

Past research examines performance implications of shifts between value creation (innovation and R&D) and value appropriation (marketing) in the firm's marketing strategy in the context of stock return response modeling using annual data (Mizik and Jacobson 2003). This research reports that, under general conditions, a greater emphasis on value appropriation leads to better future performance and that the positive effect of emphasis on marketing is further amplified when companies increase their marketing focus at the time of improved financial performance. If the market recognizes these differential performance implications immediately, we would see an immediate differential market response at the time of the announcement. As such, we make the following predictions for firms with mixed investment strategies:

> **Hypothesis 1b:** *The immediate stock market response to firms reporting an increase in marketing and a decrease in R&D spending will be more positive than to firms reporting a decrease in marketing and an increase in R&D spending and this return differential will be greater for firms reporting positive rather than negative earnings surprises.*

2. Differential Post-Earnings-Announcement Drift

Whether the market is able to *immediately* and *fully* appreciate investments in marketing and R&D is unclear. Past research documents a positive long-term performance impact of marketing and R&D activities. If the market does not fully recognize their performance implications, changes in marketing and R&D spending might attenuate basic PEAD pattern in the direction consistent with their future performance impact and we would observe the following:

> **Hypothesis 2a:** *The post-earnings-announcement drift for firms reporting earnings, accompanied by an increase in marketing and R&D spending, will be more positive than for firms reporting a simultaneous decrease in marketing and R&D spending, and the PEAD return differential will be greater for firms reporting a positive rather than negative earnings surprise.*

If the market does not immediately and fully appreciate the differential impact of marketing versus R&D spending increases (i.e., shift of resources between marketing and R&D) but does so after their implication have been reflected in future performance, we might also observe a differential drift for firms shifting their strategic focus. However, it is difficult to predict a priori whether the market is better able to anticipate long-term performance outcomes of R&D or long-term performance outcomes of marketing investments. Both activities are associated with high outcome uncertainty. While we do not

know whether the market tends to under- or overreact to the news of firms shifting their strategic focus, some research has suggested that the market might systematically under-react to information concerning firm strategy (e.g., Daniel and Titman 2006). If the market simply fails to see full benefits of marketing emphasis or discounts its returns at a higher rate than R&D returns, the market's initial reaction will not correctly reflect full performance implications of shifting resources between marketing and R&D. As a result, we might observe a future-term adjustment in valuation and this adjustment (drift) will be more positive for firms shifting their strategic focus to value appropriation (i.e., increasing marketing and decreasing R&D spending) versus value creation (i.e., decreasing marketing and increasing R&D spending). As such, we hypothesize the following:

> **Hypothesis 2b:** *The post-earnings-announcement drift for firms reporting an increase in marketing and a decrease in R&D spending will be more positive than for firms reporting a decrease in marketing and an increase in R&D spending.*

3. Future Operating Performance of Firms Increasing versus Cutting Marketing and R&D Spending

Past research suggests that the market's inability to correctly anticipate future operating performance may drive PEAD. Similarly, the differential drift induced by changes in marketing and R&D spending may also be related to the market's inability to correctly anticipate changes in future operating performance stemming from differing marketing resource allocation strategies. We examine the pattern of future operating performance and hypothesize that it would parallel the pattern of observed drift. That is, first, we postulate that increases in marketing and R&D investments lead more positive changes in the future operating performance:

> **Hypothesis 3a:** *The future operating performance of firms reporting an increase in marketing and R&D spending will be more positive than future operating performance of firms reporting a simultaneous decrease in marketing and R&D spending, and the performance differential will be greater for firms reporting a positive rather than negative earnings surprise.*

With respect to future operating performance stemming from mixed strategies, if managers efficiently rebalance their focus to respond to market threats and opportunities, in the long-run, we would expect equivalent performance. However, in the short-run, we might see significant differences in

operating performance of firms shifting their strategic focus. Past research generally suggests that R&D investments tend to take longer to germinate positive results, whereas most marketing spending produces faster returns. As such, we also hypothesize the following:

> **Hypothesis 3b:** *The future operating performance of firms reporting an increase in marketing and a decrease in R&D spending will be more positive than the future operating performance of firms reporting a decrease in marketing and an increase in R&D spending in the short term. In the long term, no significant performance differences will exist between mixed strategies.*

4. The Dynamics of the Post-Earnings-Announcement Drift

Hypothesis 3a suggests increases (decreases) in marketing and R&D spending are associated with the future-term improvement (deterioration) in firm operating performance. If stock market participants do not fully appreciate this relationship or do not fully update their expectation of firm future performance until increased (decreased) future earnings have been realized, the bulk of the PEAD adjustment will occur at the time of the next-period earnings announcements. That is, we will observe acceleration in the market valuation adjustment during the subsequent earnings announcement seasons. Further, if the market fails to fully appreciate the benefits of marketing and R&D, it will be relatively more positively "surprised" at the time of the future earnings announcements by performance information of firms increasing their marketing and/or R&D intensity:

> **Hypothesis 4:** *The drift accelerates around the time of the future-period earnings announcement seasons and the pace of the valuation adjustment is greater for firms increasing marketing and/or R&D spending.*

Methodology

Testing Hypothesis 1: Event Study

To test the immediate change in firm valuation following an earnings announcement, we undertake an event study for firms grouped by the sign of earnings surprise and changes in marketing and R&D spending. We divide each (i.e., positive and negative) earnings surprise condition into four groups: Group 1 firms have a decrease in both marketing and R&D expenditures (ΔMktg-/ΔR&D-); Group 2 firms decrease marketing expenditures but increase R&D spending (ΔMktg-/ΔR&D+); Group 3 firms increase marketing expenditures but decrease R&D (ΔMktg+/ΔR&D-); and Group 4 firms increase both

marketing and R&D expenditures (ΔMktg+/ΔR&D+). A differential market reaction across groups 1 through 4 would constitute evidence that, conditional on the sign of earnings surprise, the market expects different future long-term performance for firms increasing versus decreasing their marketing and/or R&D spending.

To test Hypothesis 1, we use standard event study methodology as outlined by MacKinlay (1997) and Srinivasan and Bharadwaj (2004). Event studies have long been used to study the immediate market reaction to marketing actions such as firm name changes (Horsky and Swyngedouw 1987), new product preannouncements and introductions (Elisashberg and Robertson 1988, Chaney, Devinney, and Winer 1991), product recalls (Mitchell 1989), celebrity endorsements (Agrawal and Kamakura 1995), brand extensions (Lane and Jacobson 1995), and strategic market entry (Gielens, Van de Gucht, Steenkamp, and Dekimpe 2008).

To undertake the event study, we first select a set of relevant events, then compute expected and abnormal stock returns for our event window around the event date, and assess differences in cumulative abnormal stock returns across the groups. Our events of interest are quarterly earnings announcements. Figure 2 presents a schematic representation of our study timeline.

[Figure 2 about here]

We compute abnormal stock return (AR) for firm i, day t as

$$AR_{it} = Ret_{it} - E[Ret_{it}], \text{ where} \qquad (1)$$

Ret_{it} is the raw return for firm i on day t and $E[Ret_{it}]$ is the expected return. We use the classic Fama and French (1992, 1993) multi-factor asset pricing model with momentum (Carhart 1997) to compute expected returns. Specifically, we use a pre-event period beginning twelve months (252 trading days) before and ending one month (21 trading days) before the earnings announcement date and estimate the following model for each firm i and each quarterly earnings announcement q individually:

$$Ret_{it}\text{-}RiskFree_t = \alpha_{qi} + \beta_{mkt,qi}(RetMkt_t - RiskFree_t) + \beta_{SMB,qi}SMB_t + \beta_{HML,qt}HML_t + \beta_{UMD,qt}UMD_t + \varepsilon_{it}, \qquad (2)$$

where $RiskFree_t$ is the risk-free rate, $RetMkt_t$ is the market return, SMB_t is the difference in returns beween small and large firms, HML is the difference in returns between high and low value firms, and UMD is the returns due to momentum on day t. We use the estimates of market ($\hat{\beta}_{mkt,qi}$), SMB ($\hat{\beta}_{SMB,qi}$), HML ($\hat{\beta}_{HML,qt}$), and UMD ($\hat{\beta}_{UMD,qi}$) risk factor loadings to compute abnormal returns for each day t, firm i, and earnings announcement q as follows:

$$AR_{it} = Ret_{it} - [RiskFree_t + \hat{\beta}_{mkt,qi}(RetMkt_t - RiskFree_t) + \hat{\beta}_{SMB,qi}SMB_t + \hat{\beta}_{HML,qt}HML_t + \hat{\beta}_{UMD,qt}UMD_t]. \qquad (3)$$

We compute cumulative abnormal returns (CAR) for each firm i and event window $[t_1; t_2]$ as $CAR_{iq}(t_1, t_2) = \sum_{\tau=t_1}^{t_2} AR_{i\tau}$ and use the Corrado (1989) non-parametric event study rank test to assess the significance of abnormal returns. [2] We present results for the [-1; 2] event window.[3] That is, our event study window begins a day before the earnings announcement date (to accommodate any potential information leakage) and ends two days after the announcement.

Testing Hypothesis 2: Post-Earnings-Announcement Drift

We use two methodologies to test Hypotheses 2a and 2b: a firm-level analysis to assess the differences in average magnitude of drift in different groupings and a calendar-time portfolio analysis.[4] First, we examine the patterns of abnormal returns following earnings announcements and test for differences in average buy-and-hold abnormal returns across our groups. The drift study period begins three days after the earnings announcement and continues for 252 trading days (12 months). We do not include the first two days following the announcement in order to exclude the effects of the immediate

[2] That is, we compute the θ statistic, which is distributed standard normal, and has the following form: $\theta = \frac{1}{N}\sum_{i=1}^{N} \frac{K_{i0} - \frac{t_2 - t_1 + 1}{2}}{s(K)}$, where $s(K) = \sqrt{\frac{1}{t_2 - t_1}\sum_{\tau=t_1+1}^{t_2}\left(\frac{1}{N}\sum_{t=1}^{N}\left(K_{i\tau} - \frac{t_2 - t_1 + 1}{2}\right)\right)^2}$ and K_{it} is the rank of the abnormal return of security i at the event time period t, and N is the number of securities in the group.

[3] We have examined some alternative event windows and found results in close correspondence to those we report. These results are available from the authors upon request.

[4] Jacobson and Mizik (2008) provide discussion of both methods, their assumptions, and benefits and disadvantages.

market reaction. We compute buy-and-hold abnormal portfolio returns (BHAR) as follows: [5]

$$BHAR_{it} = \prod_{\tau=3}^{t}\left(1+\mathrm{Ret}_{i\tau}\right) - \prod_{\tau=3}^{t}\left(1+E[\mathrm{Ret}_{i\tau}]\right), \text{ where} \qquad (4)$$

Ret_{it} and $E[Ret_{it}]$ are defined as previously.

If the market does not fully appreciate the differential performance implications of changing spending patterns, we will observe differences in the average long-term abnormal returns (i.e., drift) consistent with Hypotheses 2a and 2b. Under the null, we will see no differences in drift associated with marketing and R&D spending patterns across our groups.

We also undertake standard calendar-time portfolio analysis tests. Following Sorescu, Shankar, and Kushwaha (2007), we create portfolios of securities, "purchasing" stocks three days after the firms announce earnings and allocating them to one of our portfolios depending on earnings surprise and changes in marketing and R&D spending. Each batch of added stock is held for 180 calendar days (six months) after purchase. As in Sorescu, Shankar, and Kushwaha (2007), each portfolio is equally weighted within period and then value weighted by the number of firms in a given time period. Thus, for each day of our study period, we have a single return measure for each portfolio. We again assess the presence of abnormal returns in each portfolio by estimating the four-factor model with momentum (Carhart 1997). We then test for the significance of α_p:

$$Ret_{pt}\text{-}RiskFree_t = \alpha_p + \beta_{mkt,p}(RetMkt_t - RiskFree_t) + \beta_{SMB,p}SMB_t + \beta_{HML,p}HML_t + \beta_{UMD,p}UMD_t + \varepsilon_{pt}. \qquad (5)$$

Although the two methods differ, we expect the results to be consistent. Under Hypotheses 2a, we expect the intercept for group 4 to be greater than for group 1 ($\alpha_4 > \alpha_1$) and the difference between these intercepts to be greater for firms reporting positive rather than negative earnings surprises. Under Hypothesis 2b, we expect the intercept for group 3 to be greater than the intercept for group 2 ($\alpha_3 > \alpha_2$).

[5] We have undertaken sensitivity tests using some alternative measures of long-term abnormal return (e.g., CAR) and found results similar to those we report.

Under the null hypothesis of no differential drift, the intercepts will not be significantly different across any of our portfolios.

Testing Hypothesis 3: Future Operating Performance

To assess differences in the future operating performance across groups, we examine changes in sales (a top-line performance metric) and net income (a bottom-line performance metric) in the four quarters following the initial earnings announcement. For each of the future four quarters following the earnings announcement, we compute a size-adjusted change in operating performance as $\Delta Performance_q = (Performance_q - Performance_0)/Assets_0$, with the earnings announcement occurring in quarter q=0.

Findings of better future operating performance for firms reporting an increase in marketing and R&D spending than for firms reporting a simultaneous decrease in marketing and R&D spending would support Hypothesis 3a. Findings of better future operating performance in the short term for firms reporting an increase in marketing and a decrease in R&D spending compared to firms with a decrease in marketing and an increase R&D spending would support Hypothesis 3b.

Testing Hypothesis 4: The Dynamics of PEAD

To test Hypothesis 4, we examine the dynamic patterns of returns for our portfolios over one year following the initial earnings announcement. Each year a firm makes four quarterly earnings announcements. We have a total of eight periods: four earnings announcement seasons alternating with four no-earnings announcement periods. We compute portfolio buy-and-hold abnormal returns for each of our groups and test whether the rate of adjustment in firm valuation (i.e., the slope of the drift trend) differs during the future earnings announcement seasons as compared to the rate of adjustment in the periods outside of the earnings announcement season. We estimate the following model for each portfolio separately:

$$BHAR_{pt} = \sum_{season=1}^{8} \alpha_{season} + \beta_0 * noEarningsSeason_t * t + \beta_1 * EarningsSeason_t * t + \varepsilon_{pt}, \qquad (6)$$

where t is the time index, $noEarningsSeason_t$ is an indicator variable equal to 1 during the no-earnings season and 0 during the earnings announcement period, $EarningsSeason_t$ is an indicator variable equal to

1 during the earnings announcement period and 0 otherwise, and α_{season} is an intercept for each season. Under Hypothesis 4, we expect $|\beta_1| > |\beta_0|$ and β_1 for groups 2, 3, and 4 greater than β_1 for group 1.

Data

We use three sources to compile our dataset. Financial analysts' estimates of expected future earnings per share, actual reported earnings per share, and the date of earnings announcement are drawn from the Thompson Financial I/B/E/S database for the period beginning January 1, 1995 through July 1, 2005. We collect daily stock return data from the CRSP database starting one year before and ending one year after the announcement. We use return data before the announcement to estimate our asset pricing model (2).[6] For the drift study, we use the return data in the year after the announcement. Merging the databases creates a sample of 8,013 unique securities and 127,056 quarterly earnings announcements.[7] Figure 3a depicts the PEAD for this sample of 127,056 quarterly earnings announcements for two portfolios: firms reporting a positive and firms reporting a negative earnings surprise.

We obtain quarterly R&D spending and other necessary accounting data for the period covering January 1, 1995 through July 1, 2005 from the Compustat database. Many firms in the 127,056 announcements sample do not have R&D data available. The R&D data are typically missing in Compustat when the data are not available or when R&D spending constitutes less than 5 percent of the operating budget. Restricting our study sample to firms reporting their R&D and having all other data (e.g., sales, earnings) necessary to undertake our tests available reduces the sample to 3,090 unique firms and 31,348 quarterly earnings announcements. We use this sample to test our hypotheses. Table 1 presents descriptive statistics for the sample. This sample represents a wide cross-section of firms that

[6] To allow for the estimation of model 2, we require the firm to stock trade consecutively for six months before the earnings announcement.

[7] Of the sample created, approximately 52 percent of the firms were delisted from the CRSP database during our study period. Typical causes for delisting include mergers, bankruptcy, or switching indices. For most firms, CRSP database records the reason for delisting, as well as provides a delisting return. A small percentage of delisted firms in our sample (3.3 percent of the delisted firms) do not have a delisting value reported. Because past research documents some biases resulting from improper inclusion or exclusion of delisted firms, we address this issue by implementing the correction procedure following Shumway (1997).

differ widely in size, profitability, and R&D intensity. Firms in our sample typically dedicate at least 5 percent of their spending to R&D.

[Table 1 and Figure 3 (3a and 3b) about here]

Figure 3b depicts the PEAD pattern. The greater magnitude of drift for firms reporting positive earnings surprise and a lower but still positive drift for firms reporting negative earnings surprise is consistent with prior findings reporting an overall market under-reaction to R&D spending (Chan, Lakonishok, and Sougiannis 2001; Chambers, Jennings, and Thompson 2002; Eberhart, Maxwell, and Siddique 2004). That is, the initial under-reaction to R&D explains the general positive adjustment trend in our data sample: the positive adjustment (drift) for R&D-intensive firms dominates the negative PEAD associated with the negative earnings surprise and exaggerates the positive PEAD associated with the positive earnings surprise. Although these PEAD pattern differences in the R&D-intensive sample are interesting,[8] they play no role in tests of our hypotheses as our focus is on establishing *relative* differences in drift conditional on changes in R&D and marketing spending patterns.

Variable Definitions

Earnings Surprise: We compute earnings surprise as the difference between the actual and the analysts' mean consensus forecast of expected earnings.

Change in R&D spending: We compute the change in quarterly R&D spending intensity as the difference between current and same-quarter of the prior year R&D intensity (i.e., $R\&D_{iq}/Assets_{iq}$-$R\&D_{iq-4}/Assets_{iq-4}$). Using the four-quarter change, rather than last-quarter change, allows us to remove potential seasonality.

Change in marketing spending: Following past research (Dutta et al. 1999, Mizik and Jacobson 2007), we use the difference between selling, general, and administrative (SGA) expenses and R&D as a proxy for marketing spending. While capturing some additional non-marketing items, this measure is the best data available to ascertain quarterly marketing spending. We compute the change in the marketing intensity as

[8] We were not able to identify research examining PEAD differences depending on R&D intensity or other strategic factors.

the difference between current and same-quarter of the prior year marketing intensity ((SGA_{iq}-$R\&D_{iq}$)/$Assets_{iq}$)-(SGA_{iq-4}-$R\&D_{iq-4}$)/ $Assets_{iq-4}$)).[9]

Group membership: Based on changes in marketing and R&D intensity, we classify each quarterly earnings announcement event into one of the following four groups:

Group 1 has a simultaneous decrease in marketing and R&D spending ($\Delta Mkt_{iq} \leq 0$, $\Delta R\&D_{iq} \leq 0$);

Group 2 has a decrease in marketing and an increase in R&D spending ($\Delta Mkt_{iq} \leq 0$, $\Delta R\&D_{iq} > 0$);

Group 3 has an increase in marketing and a decrease in R&D spending ($\Delta Mkt_{iq} > 0$, $\Delta R\&D_{iq} \leq 0$);

Group 4 has a simultaneous increase in marketing and R&D spending ($\Delta Mkt_{iq} > 0$, $\Delta R\&D_{iq} > 0$).

Earnings and No-Earnings Season Indicators: We use two dummy variables to identify future earnings and non-earnings seasons. We align all our earnings announcements by the date of the initial announcement and track the abnormal returns relative to the initial announcement date. Future earnings announcements occur approximately every three months and can be expected at 63, 126, 189, and 252 trading days following the initial announcement, but some variation exists in terms of exact timing of future earnings releases. Some firms might announce next-quarter earnings a bit sooner or later than 63 trading days following the prior announcement. To accommodate for this variation, we allow for a wide definition of future earnings season. We define our $EarningsSeason_{iqt}$ variable as equal to 1 in the 15 trading days before and 15 trading days after an expected future earnings announcement date and zero otherwise. Thus, each earnings announcement season covers a 31-day "earnings season" period centered around days 63, 126, 189, and 252 past the initial earnings announcement. We define variable $noEarningsSeason_{iqt}$ as equal to zero during our designated earnings season and 1 otherwise.

[9] We have also used alternative proxies for a measure of change in marketing and R&D intensity. For example, we formed forecasts and used the unanticipated change in marketing and R&D as a measure of change in spending. We found results in close correspondence to those we report and these results are available from the authors upon requests. We chose to present our findings based on simple change rather than unanticipated change for parsimony.

Results

The Event Study

Table 2 reports the results of the event study tests. Firms exceeding (failing to meet) analysts' expectations realize positive (negative) four-day cumulative abnormal returns of 2.36 percent, 2.21 percent, 3.08 percent, and 2.84 percent (-2.56 percent, -2.55 percent, -2.34 percent, and -2.51 percent) for groups 1, 2, 3, and 4, respectively. We also observe some notable and significant differences in CARs across the four groups reporting positive earnings surprises. Specifically, consistent with Hypothesis 1a, firms cutting marketing and R&D spending realize significantly lower abnormal returns compared to firms increasing their marketing and R&D spending. The difference in CAR between Group 4 and Group 1 for firms reporting positive earnings surprises (.48 percent) is significantly different from zero (p=.02). However, the difference between groups 4 and 1 for firms reporting negative earnings surprises is small (.05 percent), not significant, and not significantly different than for firms reporting positive earnings surprises (p=.21). As such, we have strong support for only the first part of Hypothesis 1a.

[Table 2 about here]

We also find strong support for the first part of Hypothesis 1b. That is, cumulative abnormal returns for well-performing firms (i.e., firms reporting positive earnings surprises) with increased marketing spending and decreased R&D spending are significantly greater than for firms cutting marketing and increasing R&D. The differential between groups 3 and 2 is .87 percent and is highly significant. However, we find no significant differences between groups 2 and 3 for under-performing firms (i.e., firms reporting negative earnings surprises), and the difference in differences between groups 2 and 3 for firms with positive versus negative earnings surprises, although directionally consistent with Hypothesis 1b, is not significant (p=.15).

Examining the Drift

Figures 4a and 4b depict the PEAD for firms reporting positive and negative earnings surprises, respectively. We align all the data by the earnings announcement date at day t=0, group firms based on earnings surprise and spending pattern, and track the average buy-and-hold abnormal return for each

grouping starting from day t=3. Table 3 reports results of formal statistical tests. We report the magnitude and the statistical significance of three-months (63 trading days) and 12-months (252 trading days) average BHARs for each group in Table 3, Panel A.

[Figure 4 and Table 3 about here]

Three months following the earnings announcement, we observe significant positive average drifts of 1.79 percent, 3.01 percent, and 3.02 percent for firms in groups 2, 3, and 4, respectively. The drift for group 1 is small (.38 percent) and not significantly different from zero. The difference between groups 4 and 1 (2.64 percent) is consistent with the prediction of Hypothesis 2a and is highly significant ($p<.01$). We observe no significant drift and no significant differences across the groups of firms reporting negative earnings surprises. The difference in differences between groups 4 and 1 across the positive versus negative earnings surprise conditions, however, is significant ($p=.02$) and consistent with Hypothesis 2a.

Twelve months following the earnings announcement, the magnitude of drift is clearly increased and some of the differences across groups become more pronounced. For firms reporting positive earnings surprises, we observe significant positive average buy-and-hold abnormal returns of 7.78 percent, 7.79 percent, and 9.56 percent for groups 2, 3, and 4, respectively, and a significant negative average BHAR of -3.03 percent for group 1. For firms reporting negative earnings surprises, the drift is 1.71 percent, 5.37 percent, 4.05 percent, and 4.90 percent for groups 1, 2, 3, and 4, respectively, and is insignificant only for group 1. The differences in group 4 versus group 1 performance are significantly greater when firms report positive rather than negative earnings surprises ($p<.01$). As such, we find full support for Hypothesis 2a.

We do not find support for Hypothesis 2b at either three or twelve months following earnings announcement. Although for well-performing firms at three months post announcement we observe differences across groups 2 and 3 consistent with Hypothesis 2b, these differences are not significant ($p=.12$) and dissipate completely at twelve months following earnings announcement. In other words, we find no systematic relative misvaluation of marketing versus R&D effort.

Table 3 Panel B reports tests of Hypothesis 2a and 2b using calendar-portfolio methodology. The pattern of results is similar to that reported in Panel A. We observe significantly better portfolio performance for firms reporting positive earnings surprises and increasing (.064) rather than cutting (.029) their marketing and R&D spending. Although the results are directionally consistent with the hypotheses for firms reporting negative earnings surprises, we see no significant differences in portfolio performance. We also find no significant difference in differences across well- and poorly performing firm portfolios 4 and 1 (p=.43). Further, consistent with the findings reported in Panel A, we find no significant support for Hypothesis 2b; mixed strategies (portfolios 2 and 3) produce similar calendar portfolio performance outcomes.

Future Operating Performance

Changes in the average operating performance for each group appear in Table 4. Panel A presents change in revenue (i.e., total sales) as a percentage of assets for each of the subsequent four quarters following the earnings announcement. The overall pattern parallels the patterns of PEAD for our groups. We see significantly greater growth in revenue for firms increasing rather than cutting their marketing and R&D spending for firms reporting positive and negative earnings surprises. For example, at four quarters out, we see a 7.26 versus 3.32 percent and a 3.57 versus 2.74 percent average revenue increase for groups 4 and 1 with positive compared to negative earnings surprises, respectively. The difference in group 4 versus group 1 performance is significantly greater ($p<.01$) for firms reporting positive earnings surprises. As such, we have full support for Hypothesis 3a for the top-line performance metric (revenues).

Interestingly, we also observe some significant differences in revenue changes between groups 2 and 3. For firms reporting positive earnings surprises, consistent with Hypothesis 3b, we observe significantly greater growth in sales for firms increasing marketing and cutting R&D in quarters two and three. After one year, however, these differences even out and the growth in revenue is similar (3.73 percent for group 2 and 3.76 percent for group 3). For under-performing firms (i.e., firms reporting negative earnings surprises), however, we see no significant differences between groups 2 and 3 in the first three quarters following the initial period. However, by the fourth quarter, group 3 realizes

significantly greater revenue growth. Thus, we have support for Hypothesis 3b but at different time horizons for firms reporting positive versus negative earnings surprises.

[Table 4 about here]

Table 4 Panel B reports changes in net income as a percentage of firm assets. For well-performing firms, we observe a pattern consistent with the results Panel A depicts for revenue growth and with Hypothesis 3a. Firms reporting positive earnings surprises and increasing their marketing and R&D spending report a significant average increase in net income of .93 percent, whereas firms cutting spending report a significant average decrease of -1.23 percent in net income four quarters later. For underperforming firms in group 4, the average net income increase is 2.47 percent and is highly significant, whereas the net income decrease for group 1 firms is only -.20 percent and is not significant. Thus, consistent with Hypothesis 3a, we observe significant differences in net income changes for firms in groups 4 and 1, but these differences do not differ significantly across overperforming and underperforming firms (p=.28).

Further, for well-performing firms, we see some evidence in quarters one and three that firms increasing R&D rather than marketing tend to have greater growth in net income (.59 vs. -.09 and .41 vs. .01, respectively). But we observe no significant systematic differences between groups 2 and 3 one year after the initial earnings announcement. For firms reporting negative earnings surprises, net income growth is consistently significantly greater for firms increasing R&D rather than marketing spending. Four quarters after the initial earnings announcement when the groupings were formed, firms in group 2 report an average 1.16 percent increase whereas group 3 firms report an average increase of only .33 percent in net income. As such, we do not find support for Hypothesis 3b for the net income measure in the four quarters we examine. Contrary to Hypothesis 3b and to the results for revenue growth, the firms that increase their R&D and cut marketing realize greater improvement in profitability, particularly for poorly performing firms.

The Dynamics of Drift

The shaded areas in Figures 4a and 4b highlight our designated future earnings season periods. We note the acceleration in drift during future earnings seasons and undertake formal tests whether the slope of the trend in drift is steeper during the future earnings seasons. Table 5 Equation 1 columns report estimates of the overall trend for each of the groups. The results further confirm our prior findings and tests of Hypotheses 2a and 2b. Consistent with the findings reported in Table 3, the greatest overall trend is for firms reporting increases rather than simultaneous cuts to marketing and R&D spending.

Table 5 Equation 2 columns report trend conditional on earnings season or no-earnings season for each of our groups. For all groups, we find a significant improvement in fit when the trend is allowed to differ across earnings and no-earnings announcement seasons. A more interesting finding is the acceleration of the PEAD trend during the subsequent earnings seasons. For each group, with the exception of well-performing firms in group 1, the slope of the trend is positive and significantly greater in magnitude during the future earnings seasons as compared to the trend in no-earnings seasons. Further, for well-performing firms, the magnitude of the trend during future earnings announcement seasons is significantly greater ($p<.01$) in groups 2 (.051), 3 (.074), and 4 (.061) as compared to the .020 trend in group 1. These findings suggest that the market receives more unexpected positive news for firms in groups 2, 3, and 4 at the time of the future earnings announcements. We also find that, for the underperforming firms, the drift at the time of the future earnings announcements is significantly greater ($p=.04$) for group 4 compared to group1 firms. As such, we find support for Hypothesis 4.

[Table 5 about here]

Sensitivity Analysis

Several sensitivity analyses further validate our findings and rule out some alternative explanations. For example, we replicated all tests using the classic Fama and French three-factor model (1992, 1993) and found that the inclusion or exclusion of the momentum factor does not affect our results. We estimated unanticipated changes in marketing and R&D and used our estimates of unanticipated changes to classify firms into four groups. Use of unanticipated rather than actual changes produced

results similar to those we report, and did not alter any of our conclusions. We also examined alternative event windows and found results in close correspondence to those we report. We tested alternative abnormal return metrics to compute cumulative abnormal returns (e.g., CAR, Fama 1998) and found that our findings are stable across different definitions of cumulative abnormal return measures. We also undertook tests to rule out alternative explanations for our findings related to PEAD differences across our groupings. We examined the factors highlighted in the previous research as the drivers of differential PEAD (e.g., transaction costs and liquidity) and found no significant differences on those factors across our groupings. As such, our PEAD findings can not be attributed to differences on these factors and are indeed driven by differences in marketing and R&D spending patterns. Finally, we examined the stability of our findings across different economic environments (i.e., recession vs. growth) and found that our key findings are stable and largely independent of general economic conditions.

Discussion

Key Findings

Table 6 summarizes our key findings. Our results indicate that although the financial markets recognize differential performance implications of changing marketing and R&D spending patterns and appear to appreciate the possibility that managers might be inflating current earnings through simultaneous cuts to marketing and R&D at the time they receive this information, they do not immediately incorporate the full implications of these strategies into the valuation of the firm. Although we observe differential immediate market response to firms expanding versus shrinking their marketing and R&D intensity, we also document significant differences in future-term valuation adjustments. The differences we observe are consistent with the market initially undervaluing the contribution of marketing and R&D spending to the future operating performance of the firm. Over time, once the stock market observes future operating performance outcomes, the valuation of the firm is adjusted. In other words, the stock market participants take time to fully impound the implications of marketing and R&D activities into firm valuation.

Interestingly, although we see significant differences in the market reaction and future-term adjustment for firms simultaneously cutting versus expanding their marketing and/or R&D effort, we find no differential future-term adjustments for firms using mixed strategies. This finding suggests that no systematic stock market mispricing is associated with shifting of resources between marketing and R&D activities.

Importantly, the future-term operating performance of firms differs following marketing and R&D spending changes. Our results highlight the fact that positive increases in intangible investments lead real shifts in future income and sales. Further, the relative differential pattern of the future-term valuation adjustment (i.e., drift) is generally consistent with the differential pattern of future operating performance changes across our groups. Firms simultaneously increasing their marketing and R&D spending report the greatest growth in revenues and in net income and the greatest stock price drift, whereas firms cutting their spending in these areas report the lowest growth and the lowest drift.

Finally, the adjustment in firm valuation accelerates significantly around the time of the future earnings announcements. This finding suggests the market receives relatively more positive "surprising" performance information for firms that increase their marketing and/or R&D spending.

[Table 6 about here]

Implications

This study establishes several key results and generates implications that both marketing managers and academics might find important. First, the results demonstrate that, in the short term, investors may not fully understand the benefits (i.e., future term-performance implications) of investments in intangible assets. Specifically, some degree of earnings fixation and some disregard of intangibles investment strategy apparently exist. Indeed, our findings of differential drift for firms cutting rather than increasing their marketing and/or R&D can not be explained by differences in trading cost across our groups (our sensitivity analyses uncovered no significant differences in firm characteristics that would support this alternative explanation). Further, the second alternative explanation (i.e., risk mis-

measurement) is also unlikely to explain our results as all our drift tests are relative (i.e., undertaken within-sample) and show that differential drift is related to changes in spending pattern.

Interestingly, our findings also show that the initial misvaluation is corrected over time. Although there might be a short-term earnings fixation, in the long-run, the consequences of a strategy will be reflected in operating performance and managers who increase intangible investments will eventually see greater profitability and higher stock market valuation of their firm. That is, while firms can fool investors for a short time, the deception can't be sustained for a long time period.

The findings also provide credence to the value of increasing investments in intangible assets. We observe greater improvement in future revenue and net income for both well-performing and underperforming firms increasing rather than cutting their marketing and R&D spending. This finding supplements past research showing positive average returns for investments in intangible assets (Dekimpe and Hanssens 1995, 1999; Aaker and Jacobson 1994).

Finally, the study's evidence strongly suggests that short-term stock market reactions should be interpreted with caution. Even when the market has complete information, it may not always fully and immediately value the implications of marketing strategies. This finding suggests that all event studies examining marketing phenomena or strategies be supplemented with drift studies examining potential long-term adjustment to the initial valuation. We were only able to identify one marketing study in which researchers undertook drift analysis in conjunction with an event study to ensure the initial market reaction captured the full consequences of a marketing event (Gielens, Van de Gucht, Steenkamp, and Dekimpe 2008).

Directions for Further Research

Several interesting directions exist for future research. We focus on examining the timing and the mechanism of how the stock market incorporates information about marketing and R&D investments into firm valuation. An exploration/reexamination of the magnitude and timing of market reaction to other marketing-related phenomena (e.g., brand extensions, company name changes, major branding initiatives, etc.) would be interesting. Another possible avenue of research would be an examination of potential

differences in the communication strategies the firms use (e.g., cheap talk) to explain/justify changes in marketing and R&D spending. We do not find support for Hypothesis 3b for net income. As such, further examination of the dynamics of the longer-term changes in the various operating performance measures might be worthwhile. Finally, the question of firm risk has recently become an important research topic in marketing. Researchers might be interested in exploring not only the changes in future operating performance, which we explore in this study, but also examining possible changes in riskiness of the firm as a result of changes in its marketing and R&D strategies.

Conclusion

The inability of the financial markets to fully and immediately incorporate future-term performance implications of different intangibles investment strategies allows some managers to engage in myopic management of marketing and R&D effort. Although firms often release information about changes in their intangible investments along with earnings announcements, it may take several months for the implications of the change in a firm's investments to be fully reflected in its valuation. Specifically, firms that cut (increase) marketing and R&D investments are not fully penalized (rewarded) at the time of the announcement. Rather, their firm's valuation slowly adjusts over an extended period. Moreover, the operating performance reported at the future earnings announcements is what appears to trigger/accelerate valuation adjustments. This research adds support to the notion that investors appear to fixate on current earnings and tend to underweight the future-term performance impact of important investments in marketing and R&D.

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Table 1: Sample Statistics (N=31,348)

This table presents descriptive statistics for all NYSE, AMEX, and NASDAQ firms that issued earnings announcements between 1/1/1995 and 6/30/2005, had at least one analyst estimating quarterly earnings, as reported in the I/B/E/S database, and had information for selling, general, and administrative expenses and R&D expenses available in Compustat.

	Mean	Std. Err.	10th Prct.	Median	90th Prct.	Data Source	Data Items
Net income ($MM)	27.16	1.37	-10.88	1.93	54.70	Compustat	data8
Sales ($MM)	430.22	9.21	7.91	48.84	739.98	Compustat	data2
Assets ($MM)	2033.20	41.53	40.86	243.46	3551.50	Compustat	data44
Market cap ($MM)	4599.57	116.60	62.90	444.72	6736.81	CRSP	shares, price
Book-to-Market	0.43	0.02	0.11	0.35	1.56	Compustat, CRSP	data59, shares, price
Expected earnings per share ($)	0.09	0.03	-0.17	0.10	0.42	IBES	mean consensus EPS estimate
Actual earnings per share ($)	-0.03	0.04	-0.20	0.10	0.43	IBES	actual EPS
SG&A intensity	0.0952	0.0004	0.0315	0.0803	0.1735	Compustat	data1, data44
R&D intensity	0.0286	0.0002	0.0053	0.0228	0.0556	Compustat	data4, data44
Marketing intensity	0.0666	0.0003	0.0189	0.0554	0.1281	Compustat	data1, data4, data44

Table 2: Immediate Market Reaction to Reported Earnings for Firms Changing Their Marketing and R&D Spending Patterns: [-1, 2] Event Window

This table presents abnormal returns for a 4-day event window surrounding quarterly earnings announcements for firms reporting positive and negative earnings surprises and falling into one of four groups.

	Group 1 $\Delta Mkt_{it} \leq 0$, $\Delta R\&D_{it} \leq 0$	Group 2 $\Delta Mkt_{it} \leq 0$, $\Delta R\&D_{it} > 0$	Group 3 $\Delta Mkt_{it} > 0$, $\Delta R\&D_{it} \leq 0$	Group 4 $\Delta Mkt_{it} > 0$, $\Delta R\&D_{it} > 0$	Group comparison test p-value 1 vs. 4	1 vs. 2,3,4	2 vs. 3
Well-performing firms (i.e., firms reporting a positive earnings surprise):							
CAR	**2.36**	**2.21**	**3.08**	**2.84**	.02	.05	<.01
Standard Error	(.152)	(.209)	(.222)	(.166)			
Corrado Statistic	[21.64]	[16.65]	[26.06]	[22.32]			
p-value	<.01	<.01	<.01	<.01			
N	6,078	3,034	2,950	5,221			
Underperforming firms (i.e., firms reporting a negative earnings surprise):							
CAR	**-2.56**	**-2.55**	**-2.34**	**-2.51**	.69	.69	.51
Standard Error	(.177)	(.218)	(.232)	(.186)			
Corrado Statistic	[-14.37]	[-18.84]	[-20.92]	[-19.21]			
p-value	<.01	<.01	<.01	<.01			
N	4,399	2,697	2,379	4,621			

Table 3: Post-Earnings-Announcement Drift

Table 3 Panel A reports the average buy-and-hold abnormal returns, and Table 3 Panel B reports estimates of daily abnormal returns in the calendar portfolio for firms reporting positive and negative earnings surprises and falling into one of four groups.

Table 3 Panel A: Average Buy-and-Hold Abnormal Returns

The stock is "purchased" 3 days after the earnings announcement and held for 63 and 252 trading days (12 month).

	Group 1 $\Delta Mkt_{it} \leq 0$, $\Delta R\&D_{it} \leq 0$	Group 2 $\Delta Mkt_{it} \leq 0$, $\Delta R\&D_{it} > 0$	Group 3 $\Delta Mkt_{it} > 0$, $\Delta R\&D_{it} \leq 0$	Group 4 $\Delta Mkt_{it} > 0$, $\Delta R\&D_{it} > 0$	Group comparison test p-value		
					1 vs. 4	1 vs. 2,3,4	2 vs. 3
3-month-average BHAR							
Well-performing firms (i.e., firms reporting a positive earnings surprise):							
BHAR (%)	0.38	1.79	3.01	3.02	<.01	<.01	.12
Standard Error	(.394)	(.522)	(.567)	(.477)			
T-Statistic	[0.96]	[3.43]	[5.31]	[6.33]			
N	6,078	3,034	2,950	5,221			
Underperforming firms (i.e., firms reporting a negative earnings surprise):							
BHAR (%)	-0.26	0.90	0.52	0.34	.32	.15	.66
Standard Error	(.452)	(.611)	(.637)	(.508)			
T-Statistic	[-0.58]	[1.47]	[0.82]	[0.67]			
N	4,399	2,697	2,379	4,621			
12-month-averageBHAR							
Well-performing firms (i.e., firms reporting a positive earnings surprise):							
BHAR (%)	-3.03	7.78	7.79	9.56	<.01	<.01	.98
Standard Error	(0.98)	(1.77)	(1.71)	(1.45)			
T-Statistic	[-3.09]	[4.40]	[4.56]	[6.59]			
N	6,078	3,034	2,950	5,221			
Underperforming firms (i.e., firms reporting a negative earnings surprise):							
BHAR (%)	1.71	5.37	4.05	4.90	.07	.05	.57
Standard Error	(1.28)	(1.81)	(1.81)	(1.46)			
T-Statistic	[1.34]	[2.97]	[2.24]	[3.36]			
N	4,399	2,697	2,379	4,621			

Table 3 Panel B: Calendar-Time Portfolio Value-Weighted Abnormal Daily Returns

The stock is added to the portfolio 3 days after the earnings announcement and held for 180 calendar days. We estimate the following model for each portfolio return:

$Ret_{pt}\text{-}RiskFree_t = \alpha_p + \beta_{mkt,p}(RetMkt_t - RiskFree_t) + \beta_{SMB,p}SMB_t + \beta_{HML,p}HML_t + \varepsilon_{pt}$,

	Group 1 $\Delta Mkt_{it} \leq 0$, $\Delta R\&D_{it} \leq 0$	Group 2 $\Delta Mkt_{it} \leq 0$, $\Delta R\&D_{it} > 0$	Group 3 $\Delta Mkt_{it} > 0$, $\Delta R\&D_{it} \leq 0$	Group 4 $\Delta Mkt_{it} > 0$, $\Delta R\&D_{it} > 0$	Group comparison test p-value		
					1 vs. 4	1 vs. 2,3,4	2 vs. 3
Well-performing firms (i.e., firms reporting a positive earnings surprise):							
α_p	0.029	0.048	0.058	0.064	.03	.04	.53
Standard Error	(0.011)	(0.012)	(0.011)	(0.011)			
T-Statistic	2.54	4.02	5.42	5.98			
N	6,078	3,034	2,950	5,221			
Underperforming firms (i.e., firms reporting a negative earnings surprise):							
α_p	0.040	0.046	0.039	0.057	.24	.45	.70
Standard Error	(0.010)	(0.012)	(0.012)	(0.012)			
T-Statistic	4.08	3.96	3.39	4.99			
N	4,399	2,697	2,379	4,621			

Table 4: Operating Performance

These tables present changes in firm operating performance as a percentage of assets in the four quarters following the initial earnings announcement by group.

Table 4 Panel A: Change in Sales

	Group 1 $\Delta Mkt_{it} \leq 0$, $\Delta R\&D_{it} \leq 0$	Group 2 $\Delta Mkt_{it} \leq 0$, $\Delta R\&D_{it} > 0$	Group 3 $\Delta Mkt_{it} > 0$, $\Delta R\&D_{it} \leq 0$	Group 4 $\Delta Mkt_{it} > 0$, $\Delta R\&D_{it} > 0$	Group comparison test p-value		
					1 vs. 4	1 vs. 2,3,4	2 vs. 3
Well-performing firms (i.e., firms reporting a positive earnings surprise):							
Quarter 1	0.91	0.70	0.93	1.57	<.01	.07	.15
	(0.08)	(0.10)	(0.13)	(0.17)			
	[11.38]	[7.00]	[7.15]	[9.24]			
	5,916	2,956	2,876	5,186			
Quarter 2	1.78	1.64	2.38	2.96	<.01	<.01	<.01
	(0.11)	(0.14)	(0.23)	(0.20)			
	[16.18]	[11.71]	[10.35]	[14.80]			
	5,724	2,863	2,773	5,014			
Quarter 3	2.46	2.61	3.26	5.16	<.01	<.01	.03
	(0.12)	(0.18)	(0.23)	(0.27)			
	[20.50]	[14.50]	[14.17]	[19.11]			
	5,543	2,750	2,701	4,810			
Quarter 4	3.32	3.73	3.76	7.26	<.01	<.01	.93
	(0.13)	(0.20)	(0.20)	(0.36)			
	[25.54]	[18.65]	[18.80]	[20.17]			
	5,375	2,661	2,589	4,620			
Underperforming firms (i.e., firms reporting a negative earnings surprise):							
Quarter 1	0.63	0.71	0.65	0.57	.58	.98	.73
	(0.08)	(0.10)	(0.12)	(0.08)			
	[7.88]	[7.10]	[5.42]	[7.13]			
	4,245	2,595	2,238	4,416			
Quarter 2	1.40	1.38	1.34	1.85	.02	.22	.85
	(0.11)	(0.15)	(0.16)	(0.15)			
	[12.73]	[9.20]	[8.38]	[12.33]			
	4,041	2,493	2,119	4,162			
Quarter 3	2.15	2.21	2.28	2.66	.03	.12	.77
	(0.13)	(0.17)	(0.19)	(0.18)			
	[16.54]	[13.00]	[12.00]	[14.78]			
	3,894	2,394	2,010	3,974			
Quarter 4	2.74	2.56	3.10	3.57	.01	.03	.05
	(0.14)	(0.19)	(0.20)	(0.21)			
	[19.57]	[13.47]	[15.50]	[17.00]			
	3,770	2,292	1,926	3,782			

Table 4 Panel B: Change in Net Income

	Group 1 $\Delta Mkt_{it} \leq 0$, $\Delta R\&D_{it} \leq 0$	Group 2 $\Delta Mkt_{it} \leq 0$, $\Delta R\&D_{it} > 0$	Group 3 $\Delta Mkt_{it} > 0$, $\Delta R\&D_{it} \leq 0$	Group 4 $\Delta Mkt_{it} > 0$, $\Delta R\&D_{it} > 0$	Group comparison test p-value		
					1 vs. 4	1 vs. 2,3,4	2 vs. 3
Well-performing firms (i.e., firms reporting a positive earnings surprise):							
Quarter 1	-0.48	0.59	-0.09	0.76	<.01	<.01	<.01
	(0.08)	(0.13)	(0.13)	(0.16)			
	[6.00]	[4.54]	[0.69]	[4.75]			
	5,916	2,957	2,874	5,184			
Quarter 2	-0.64	0.41	0.14	0.96	<.01	<.01	.17
	(0.10)	(0.15)	(0.13)	(0.18)			
	[6.40]	[2.73]	[1.08]	[5.33]			
	5,723	2,864	2,774	5,012			
Quarter 3	-1.11	0.41	0.01	1.17	<.01	<.01	.05
	(0.21)	(0.16)	(0.12)	(0.20)			
	[5.29]	[2.56]	[0.08]	[5.85]			
	5,542	2,750	2,700	4,808			
Quarter 4	-1.23	0.06	0.25	0.93	<.01	<.01	.47
	(0.25)	(0.20)	(0.17)	(0.22)			
	[4.92]	[0.30]	[1.47]	[4.23]			
	5,374	2,661	2,587	4,616			
Underperforming firms (i.e., firms reporting a negative earnings surprise):							
Quarter 1	-0.68	0.63	-0.07	1.49	<.01	<.01	.01
	(0.13)	(0.22)	(0.17)	(0.24)			
	[5.23]	[2.86]	[0.41]	[6.21]			
	4,245	2,595	2,238	4,413			
Quarter 2	-0.35	0.97	-0.01	1.85	<.01	<.01	<.01
	(0.15)	(0.23)	(0.15)	(0.25)			
	[2.33]	[4.22]	[0.07]	[7.40]			
	4,039	2,494	2,117	4,159			
Quarter 3	-0.27	0.95	0.12	2.27	<.01	<.01	.01
	(0.15)	(0.25)	(0.19)	(0.26)			
	[1.80]	[3.80]	[0.63]	[8.73]			
	3,896	2,394	2,007	3,970			
Quarter 4	-0.20	1.16	0.33	2.47	<.01	<.01	<.01
	(0.16)	(0.23)	(0.17)	(0.26)			
	[1.25]	[5.04]	[1.94]	[9.50]			
	3,771	2,292	1,926	3,776			

Table 5: The Dynamics of PEAD around Future Earnings Announcements

This table presents the test of the differential rate of adjustment in firm valuation during future earnings announcement seasons as compared to the rate of adjustment in the periods outside of future earnings announcement season. Equation 1 estimates the overall trend for a particular group. Equation 2 allows the slope of the trend to differ depending on earnings announcement season.

Equation 5.1: $BHAR_{pt} = \alpha_0 + \beta_{overall\_trend} * t + \varepsilon_{pt}$

Equation 5.2: $BHAR_{pt} = \sum_{season=1}^{8} \alpha_{season} + \beta_0 * noEarningsSeason_t * t + \beta_1 * EarningsSeason_t * t + \varepsilon_{pt}$,

where t is the time index, $noEearnSeason_t$ is an indicator variable equal to 1 during the no-earnings season and 0 during the earnings announcement season, and $EarnSeason_t$ is an indicator variable equal to 1 during the earnings announcement season and 0 otherwise.

	Group 1 $\Delta Mkt_{it} \leq 0$, $\Delta R\&D_{it} \leq 0$		**Group 2 $\Delta Mkt_{it} \leq 0$, $\Delta R\&D_{it} > 0$**		**Group 3 $\Delta Mkt_{it} > 0$, $\Delta R\&D_{it} \leq 0$**		**Group 4 $\Delta Mkt_{it} > 0$, $\Delta R\&D_{it} > 0$**	
	Eq. 1	**Eq. 2**	**Eq. 1**	**Eq. 2**	**Eq. 1**	**Eq. 2**	**Eq. 1**	**Eq. 2**
Well-performing firms (i.e., firms reporting a positive earnings surprise):								
$\beta_{overall\_trend}$	-0.0152 [-29.30]		0.0299 [124.46]		0.0324 [40.22]		0.0401 [156.35]	
β_0		-0.0096 [-11.85]		0.0287 [80.01]		0.0396 [42.14]		0.0417 [99.42]
β_1		0.0259 [5.03]		0.0512 [22.36]		0.0740 [12.32]		0.06142 [22.93]
MSE	0.0289	.0054	0.1125	0.0413	0.1320	0.0815	0.2020	0.0867
Adjusted R^2	.78	.93	.98	.99	.87	.99	.99	.99
Underperforming firms (i.e., firms reporting a negative earnings surprise):								
$\beta_{overall\_trend}$	0.0017 [3.90]		0.0176 [35.19]		0.0206 [44.26]		0.0235 [61.63]	
β_0		0.0034 [4.54]		0.0161 [22.70]		0.0179 [32.64]		0.0201 [35.67]
β_1		0.0376 [7.94]		0.0377 [8.31]		0.0414 [11.81]		0.0496 [13.77]
MSE	0.0004	0.0009	0.0390	0.0154	0.0535	0.0151	0.0696	0.02178
Adjusted R^2	.05	.73	.83	.98	.88	.99	.94	.99

Table 6: Summary of Results

	Firms Reporting Positive Earnings Surprise				Firms Reporting Negative Earnings Surprise			
	Immediate Abnormal Returns %	Long Term Drift %	4-qtr change in Sales as % of Assets	4-qtr change in Net Income as % of Assets	Immediate Abnormal Returns %	Long Term Drift %	4-qtr change in Sales as % of Assets	4-qtr change in Net Income as % of Assets
Group1: ΔMktg- ΔR&D-	2.36	-3.03	3.32	-1.23	-2.56	1.71	2.74	-0.20
Group2: ΔMktg- ΔR&D+	2.21	7.78	3.73	0.06	-2.55	5.37	2.56	1.16
Group3: ΔMktg+ ΔR&D-	3.08	7.79	3.76	0.25	-2.34	4.05	3.10	0.33
Group4: ΔMktg+ΔR&D+	2.84	9.56	7.26	0.93	-2.51	4.90	3.57	2.47

Figure 1: One-Year Post-Earnings-Announcement Drift, Full Sample (number of announcements = 127,056)

This chart depicts the post-earnings-announcement drift pattern for the general population of firms covered by IBES and CRSP databases. The sample is split into deciles based on the magnitude of the earnings surprise. We align all data by the date of the earnings announcement (t=0) and track total buy-and-hold abnormal returns for 252 trading days (one calendar year) starting from day t=3 for each day for each decile.

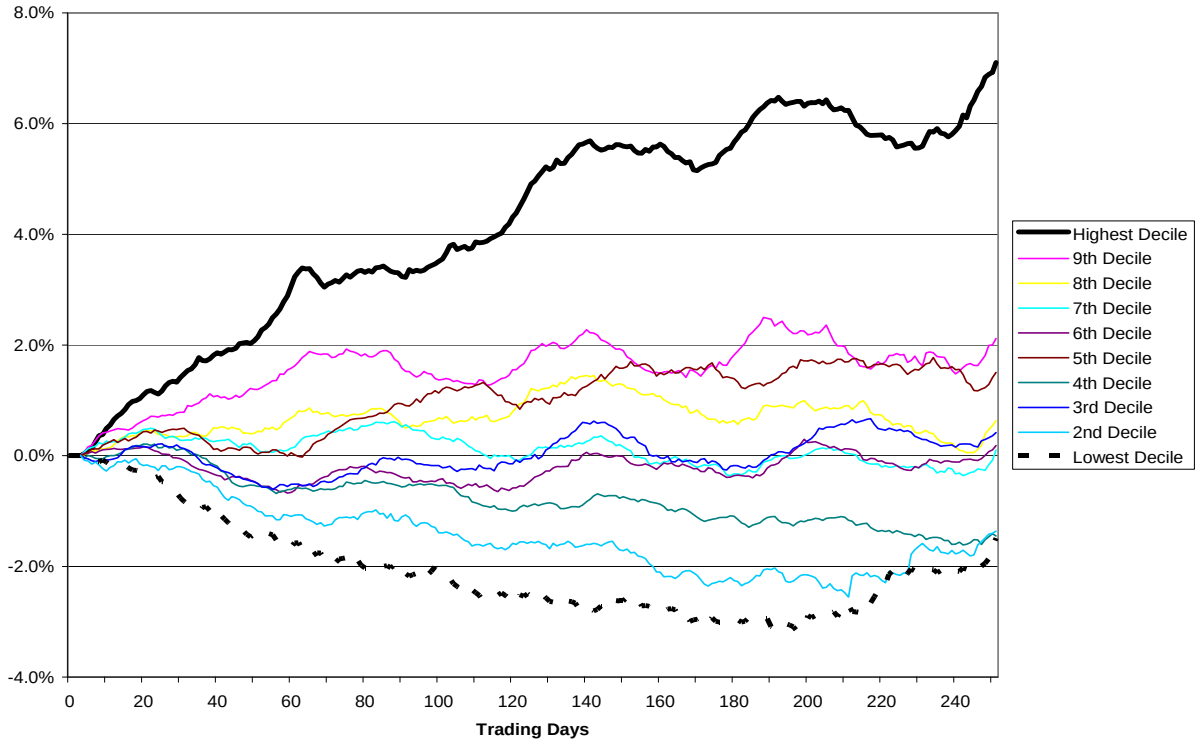

Figure 2: Study Timeline

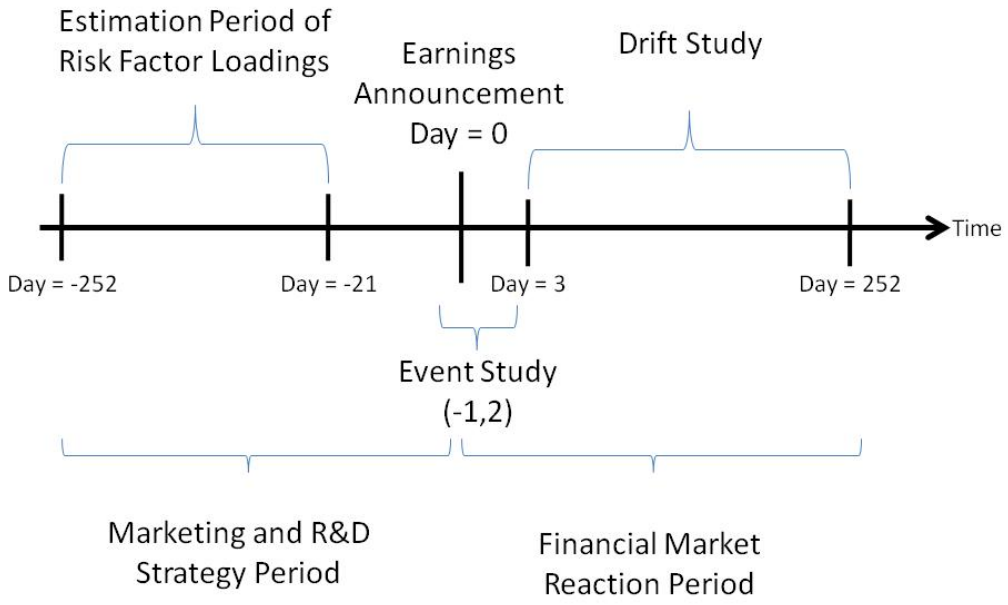

Figure 3: One-Year Post-Earnings-Announcement Drift

These charts depict the post-earnings-announcement drift in the general population of firms covered by IBES and CRSP and firms covered by IBES and CRSP and reporting their R&D and SGA spending in Compustat database. We align all data by the date of the earnings announcement (t=0) and track total buy-and-hold abnormal returns for 252 trading days (one calendar year) starting from day t=3 for each day.

Figure 3a: All firms in the IBES and CRSP databases (number of quarterly earnings announcements=127,056)

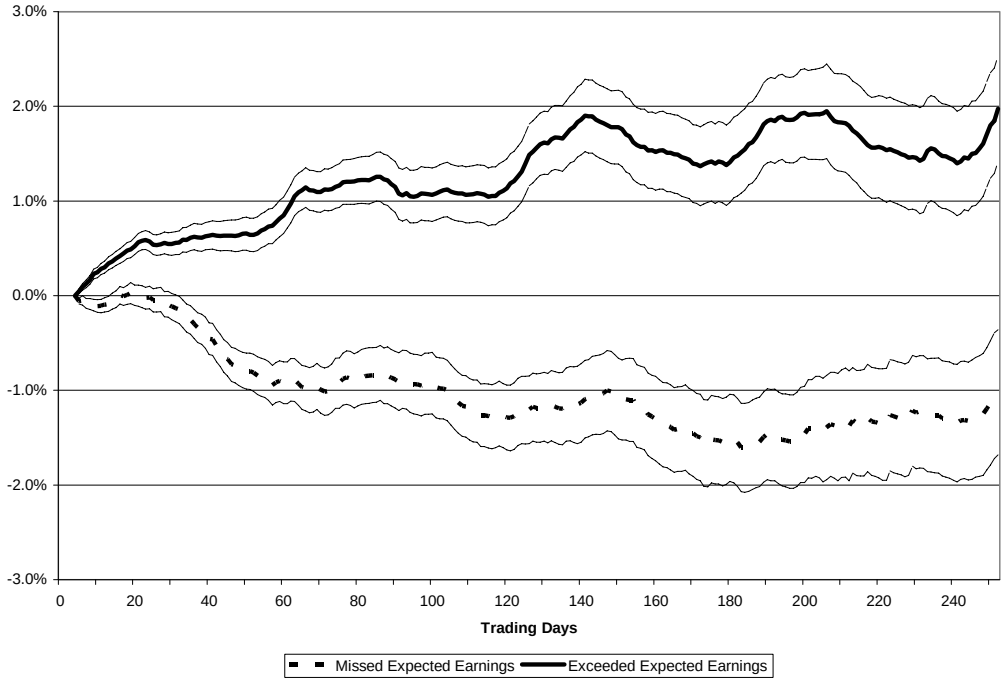

Figure 3b: Firms covered in IBES and CRSP and reporting SGA and R&D in Compustat (number of quarterly earnings announcements=31,348)

Figure 4: Post-Earnings-Announcement Drift Conditional on Changes in Marketing and R&D Spending Pattern

These charts depict the post-earnings-announcement drift for our study sample conditional on the changes in their marketing and R&D spending. We align all data by the date of the earnings announcement (t=0) and track total buy-and-hold abnormal returns for 252 trading days (one calendar year) starting from day t=3 for each day.

Figure 4a: Firms that exceed their expected earnings (number of observations = 17,266)

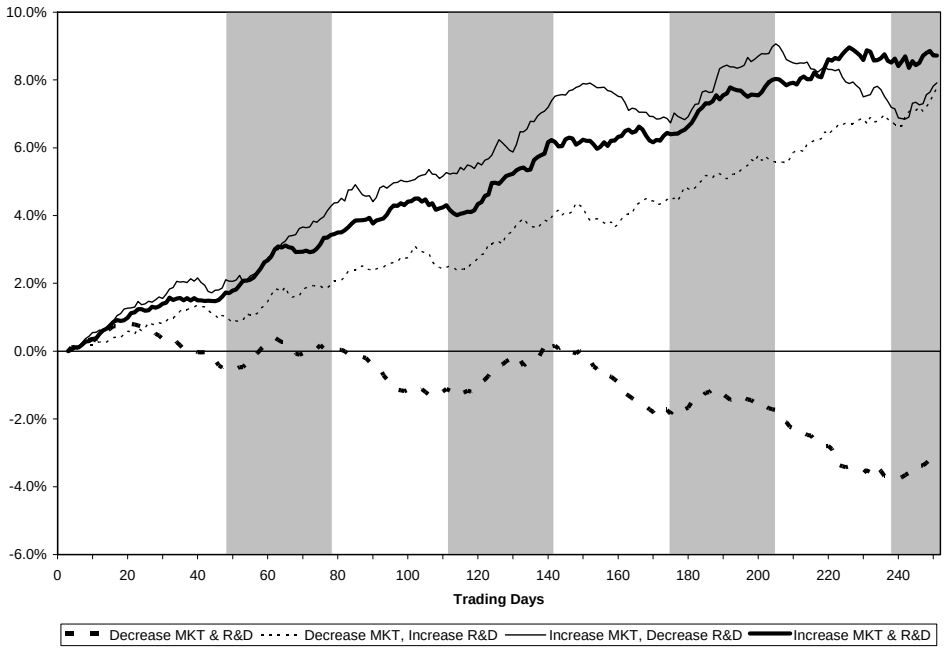

Figure 4b: Firms that missed their expected earnings (number of observations = 14,082)