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The Extreme Future Stock Returns following Extreme Earnings Surprises

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Abstract:

We investigate the stock returns subsequent to large quarterly earnings surprises, where the benchmark for an earnings surprise is the consensus analyst forecast. By defining the surprise relative to an analyst forecast rather than a time-series model of expected earnings, we document returns subsequent to earnings announcements that are much larger, persist for much longer, and are more heavily concentrated in the long portion of the hedge portfolio than shown in previous studies. We show that our results hold after controlling for risk and previously documented anomalies, and are positive for every quarter between 1988 and 2000. Finally, we explore the financial results and information environment of firms with extreme earnings surprises and find that they tend to be "neglected" stocks with relatively high book to market ratios, low analyst coverage, and high analyst forecast dispersion. In the three subsequent years, firms with extreme positive earnings surprises tend to have persistent earnings surprises in the same direction, strong growth in cash flows and earnings, and large increases in analyst coverage, relative to firms with extreme negative earnings surprises.

Keywords: Earnings Surprise, Abnormal Returns, Market Inefficiency

Data Availability: The data used in this study are publicly available from the sources indicated in the text.

JEL classification: M4

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I. INTRODUCTION

This paper investigates firms' stock returns subsequent to large earnings surprises. By defining earnings surprises relative to the IBES consensus forecasts, rather than using a time-series model to define expected earnings, we document subsequent returns that are much larger and more persistent than shown in prior studies. We find that firms with large positive earnings surprises experience large positive stock returns over the three years subsequent to the earnings announcement. We also find that firms with negative earnings surprises experience negative stock returns over the subsequent three years, although the effect is less pronounced than for positive surprises. A hedge portfolio that takes a long position in the top decile of earnings surprises and a short position in the bottom decile of earnings surprises returns 14 percent in the year following the earnings announcement and 20 percent in the following two years. These results hold after controlling for risk, as measured by beta, size and the book-to-market ratio, and they hold after controlling for other documented market anomalies, including price momentum, accruals, pro forma exclusions and post-earnings-announcement-drift based on a time-series model of unexpected earnings. We show that our results are not concentrated in only a few industries and are not sensitive to whether we scale the surprise measure by price or total assets. We also show that our results are unaffected by the method of controlling for risk. In particular, the hedge returns are very similar when risk is measured by the excess market return over another sample firm with similar size and book-to-market ratio, as advocated in Barber and Lyon [1997]. Finally, regardless of the risk control used, the hedge returns are positive in nearly every future return window during the sample period. The magnitude of the returns, and the fact that most of the hedge returns come from the long position, make it unlikely that transaction costs can explain the results.

The earnings announcement is one of the biggest news events in the quarter and the interpretation of an extreme earnings surprise is relatively obvious. Given this, we investigate why the market fails to properly react to this well-publicized event and what leads to the price correction over the next few years. We find that at the time of the announcement, firms with extreme earnings surprises are generally smaller than the average firm, but they are not trivially small, with the top decile of earnings surprise firms averaging over $600 million in market value. Firms with extreme earnings surprises also have relatively low analyst coverage, but they are not without any coverage, averaging three analysts who submit forecasts to IBES. We also find that there is a relatively wide dispersion in analyst forecasts for the most extreme earnings surprise firms. In the three years following the earnings surprise, both the most extreme negative surprise firms and the most extreme positive surprise firms have the highest sales growth. However, firms reporting extreme good news have large increases in future cash flows and future earnings while firms reporting extreme bad news have much smaller increases in future cash flows and decreases in earnings. In addition, over the following three years the analyst forecast dispersion narrows for both groups of firms and analyst coverage significantly increases for the firms with extreme good news.

Three different literatures have examined stock returns subsequent to earnings surprises. First, a large number of papers have studied post-earnings announcement drift, where the benchmark for "earnings news" is the deviation from a seasonal random walk with drift, scaled by the standard deviation of prior earnings surprises (e.g. Ball and Brown [1968], Foster, Olsen and Shevlin [1984], Bernard and Thomas [1989, 1990], and Freeman and Tse [1989]; more recently, Johnson and Schwartz [2001], and Chordia and Shivakumar [2004]). Representing some of the earliest market inefficiency evidence, the main results are that the return over the 12 months following the earnings announcement is approximately 8 percent higher for firms in the top decile of earnings news than for firms in the bottom decile [Bernard and Thomas 1990, Table 2]. Further, the returns are realized largely around the next quarterly earnings announcement and there is no systematic drift, even for small firms, beyond nine months [Bernard and Thomas 1989, p. 12]. This market inefficiency appears to be caused by market participants' inability to fully incorporate the future predictability of the true earnings time series into their decisions at the earnings announcement date, either because they use a naïve expectation model [Bernard and Thomas 1990], because they underestimate the serial correlation in seasonal differences [Ball and Bartov 1996], or because they fail to take inflation into account [Chordia and Shivakumar 2004]. However, recent evidence in Johnson and Schwartz [2001] shows that the drift based on the time-series model of unexpected earnings has largely been eliminated in the 1991-1997 period.

A related set of papers uses analyst forecasts as the benchmark for an earnings surprise. Using Valueline forecasts, Abarbanell and Bernard [1992] report an eight percent hedge return between the top and bottom deciles of earnings surprise over the year following the earnings announcement, noting that the result is quite comparable to the previous evidence that used a time series model as the surprise benchmark.[1] Liang [2003] documents a 5.8% hedge return over the 60 days following the earnings announcement using IBES analyst forecasts as the surprise benchmark, and shows that the size of the drift is related to the heterogeneity of analyst forecast errors. However, her tests have a look-ahead bias and she does not examine returns beyond 60

[1] Abarbanell and Bernard also show that Valueline analysts underreact to earnings news in the same way that the market does, but that their underreaction is not nearly large enough to explain the magnitude of the post-earnings-announcement drift. Shane and Brous [2001] extend Abarbanell and Bernard's results by showing that approximately 46% of the drift is corrected by the subsequent earnings announcement and associated analyst forecast revisions.

days.[2] Finally, Chan, Jegadeesh and Lakonishok [1996] evaluate a trading strategy based on a moving average of analyst forecast revisions and find a 7.6% annual return after controlling for firm size, although the return is reduced to 3.1% after adding controls for prior stock returns and the earnings surprise based on a time-series model of expected earnings.

Recently a number of papers have examined the stock price behavior of firms who "meet or beat" the consensus analyst forecast versus those who miss the analyst forecast. Bartov, Givoly and Hayn [2002] and Kasznik and McNichols [2002] both find a market premium at the time of the announcement to meeting or beating the consensus analyst forecast, although both studies report no systematic difference in the stock returns between the two sets of firms over the subsequent three years. Bhorjraj, Hribar and Picconi [2003] examine the conflicting signals that arise when a firm beats the consensus forecast by one cent but has low earnings quality (as measured by accruals, R&D expenditures and advertising expenditures) versus a firm who misses the forecast by one cent yet has high earnings quality. They find that in the short run beating or missing the forecast is the dominant effect in future returns but that in the long run earnings quality is the dominant effect. Controlling for earnings quality, firms who beat the forecast by one cent have three year future returns that are 7% higher than firms who miss the forecast by one cent.

Our results are similar to the findings in the post-earnings-announcement drift literature in that we document an under-reaction to an earnings surprise, but it differs from this work in two important ways. First, by using the consensus analyst forecast as the benchmark for the earnings surprise, we find subsequent stock returns that continue two years longer and are three times larger than the results shown in the traditional drift literature. Second, by using IBES

[2] In particular, Liang's change in uncertainty variable uses information after the earnings announcement to form portfolios.

forecasts instead of Valueline forecasts and by extending the return window beyond 60 days, we document significantly more drift than found in Abarbanell and Bernard [1992] and Liang [2003].

Our study is similar to the "meet or beat" literature because we use the consensus forecast as the benchmark for an earnings surprise, but by focusing on the extreme surprises, we answer a different question than the one this literature has addressed. The "meet or beat" literature is interested in behavior immediately around zero surprise because this is where incentives to manage earnings and analyst expectations are the greatest; consequently, there are many subtle management actions and investor inferences at play. In contrast, it is very unlikely that a firm ended up in one of our extreme portfolios of earnings surprise because of any earnings management activity. Our study is about the market's inability to interpret of a very straightforward earnings signal without the confounding influence of earnings management.

Our results are surprisingly simple: firms who report a large positive earnings surprise do much better than expected in the future and firms who report a large negative earnings surprise do somewhat worse than expected. Although it changes from quarter to quarter, the cutoff to be in the most extreme decile of positive earnings surprises is to beat the consensus analyst forecasted quarterly earnings-per-share by approximately half of one percent of the price per share at the end of the fiscal quarter. Historically, these firms beat the market by 15 percent over the next two years (19 percent if we restrict the sample to firms with sufficient data to control for risk and other anomalies). The fact that most of the hedge portfolio return is earned by the decile of firms in the long position is unusual in the literature of market anomalies and greatly enhances the implementability of a trading strategy based on extreme earnings surprises.

In the next section we describe our variables and return calculations, methodology and descriptive statistics, in section III we present all our evidence documenting the abnormal stock returns related to extreme earnings surprises. With the size and nature of the market inefficiency described, section IV explores the cause of this anomaly. We conclude in section V.

II. METHODOLOGY, VARIABLE MEASUREMENT AND SAMPLE

We document remarkably large returns to a very simple investment strategy. To be certain that these returns are from an *implementable* investment strategy, we take extra steps in our research design to avoid any bias. In particular, we avoid a look-ahead bias in our tests by using only information that would have been known at the time the portfolios were formed. We also avoid survivorship bias by calculating the subsequent returns for all firms that were present at the time of portfolio formation, regardless of whether or not they were subsequently delisted.

To be precise, for every firm with sufficient independent variable information at the earnings announcement date, we compute market-adjusted buy-and-hold returns (inclusive of dividends and other distributions) beginning two days after the announcement date and extending one, two or three years into the future. For firms that are delisted during the future return period we calculate the remaining return by taking CRSP's delisting return and then reinvesting the proceeds in the value-weighted market portfolio. For firms that were delisted due to poor performance (delisting codes 500 and 520-584), we use a –35% delisting return for NYSE/AMEX firms and a –55% delisting return for NASDAQ firms, as recommended in Shumway [1997] and Shumway and Warther [1999].[3] Because we focus on returns to hedge portfolios that have equal long and short positions, the market adjustment to the returns has no

[3] Firms delisting due to poor performance constitute 0.87%, 1.72%, and 2.25% of our sample for the 1-year, 2-year and 3-year return windows, respectively. Practically speaking, our results are almost identical if we ignore the Shumway and Warther delisting correction.

effect. However, it does aid in interpreting the returns to an unhedged portfolio (for example, a portfolio that invests only in the highest decile of earnings surprises).[4] The resulting stock returns for one, two and three years subsequent to the earnings announcement for fiscal quarter t are labeled, $Ret1yr_t$, $Ret2yr_t$ and $Ret3yr_t$, respectively (firm indexing is suppressed).

The main independent variable in the study is the earnings surprise for quarter t, labeled $Surprise_t$. It is defined as the un-split-adjusted IBES actual earnings per share for quarter t less the most recent IBES median forecast preceding the announcement date, scaled by the market price per share at the end of quarter t. In untabulated results we also use total assets per share at the end of quarter $t-1$ as the deflator (computed as Compustat data item #44 divided by data item #15) and get almost identical results. Using price as the deflator has the logical disadvantage of referring to a market-based measure at the same time that we are positing that the market is inefficient. However, using price per share has the advantage that both the numerator and the denominator of the $Surprise_t$ variable are taken from IBES; whereas total assets per share must be constructed from Compustat data.[5]

For future return tests it is important to use the un-split-adjusted IBES database rather than manually un-split-adjusting the more commonly used split-adjusted IBES database. The un-split-adjusted database gives the earnings per share that was actually reported in the company's earnings announcement, which is the news that the market observed at the time. In contrast, since IBES limits the number of significant digits in their split-adjusted data set, it is impossible in many cases to manually un-split-adjust the data to generate the earnings data that

[4] Continuing the example, to realize the reported market-adjusted return on a portfolio that is long in the highest decile of earnings surprises you would buy an equally weighted portfolio of all these stocks and sell short the value-weighted market index by the same dollar amount.

[5] Another problem with using total assets per share as the deflator is that it may not be known at the earnings announcement date. To avoid a potential look-ahead bias, we used total assets per share at the end of quarter $t-1$ for this specification check.

was originally reported at the time the earnings announcement was made. In particular, for firms that have split their stock frequently, manually un-split-adjusting the data causes many earnings surprises to be coded as zero when they were actually non-zero at the time they were reported (see Baber and King 2002 and Payne and Thomas 2003).[6] More generally, the split adjustment is made to the historical data *ex-post* and, consequently, could induce a look-ahead bias in our tests.[7]

Because the un-split-adjusted IBES data is less frequently used in past research, and because we document large abnormal returns, we hand-collect additional press release and stock return data to verify the fidelity of the IBES data. First, if something about the use of the un-split-adjusted data is creating a hindsight bias then this effect would be most pronounced for firms with the largest split factors. To investigate this, we examine the 50 firms in our data that have a split factor of 16 or greater. For each observation we compare the earliest available IBES actual EPS in the un-split-adjusted database with the actual press release found on Lexis-Nexis. In all 50 cases, the data in IBES matched the data in the original press release; capital market participants had the necessary data to compute the surprise variable at the time of portfolio formation. Second, because our returns are large and positive in portfolio 10, we randomly select 50 observations from this portfolio and compute the one-year, two-year and three-year buy-and-hold returns by hand. Using the price, dividend and split data from Yahoo!, we find that these extreme returns did indeed occur as reported by CRSP.

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[6] As an example, Baber and Kang (2002) show that between 1993 and 1999 Dell's actual EPS beat the consensus forecast in 18 out of 24 quarters, yet the adjusted IBES data show a zero forecast error in 23 of the 24 quarters. Dell split its stock two-for-one six times during this period.

[7] Although the un-split-adjusted IBES data is clearly superior on conceptual grounds, as a practical matter there are not many firms in our sample that are affected by this problem. We also run our tests by manually un-split-adjusting the traditional split-adjusted data and find very similar results.

We form portfolios based on the earnings surprise variable using a variation of the standard decile ranking procedure. The standard procedure sorts the independent variables into deciles each period, assigns each observation its decile rank ranging between zero and nine, and then divides each decile rank by nine to yield a variable that takes on ten values ranging between zero and one [see Fama and MacBeth 1973 or Bernard and Thomas 1990]. The advantage of this procedure is that, by regressing returns on these transformed variables, the coefficient on the independent variable corresponds to the return earned on an equally-weighted portfolio that takes a long position in the top decile of the variable (coded as one) and a short position in the bottom decile of the variable (coded as zero).[8] However, sorting firms each period creates a look-ahead bias because, at the earnings announcement date for a particular firm, the earnings surprise for all other firms in that quarter may not yet be known. To avoid this bias we use the cut-off values that define the deciles of earnings surprises from period *t-1* to sort the earnings surprises for period t into ten groups, consistent with Bernard and Thomas [1989] and Collins and Hribar [2000]. The result is that not all ten groups have the same number of observations but otherwise the interpretation of the results is the same as for the standard procedure.[9] We use the same coding procedure based on the lagged decile cutoffs for the other independent variables in the multiple regressions.

To rule out the possibility that our hedge returns are simply capturing differential risk across the portfolios or are proxying for a previously-documented market anomaly, we estimate multiple regressions using control variables. As with the earnings surprise variable, each control

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[8] The exact portfolio that corresponds to a particular regression of returns on a matrix of regressors denoted by X puts small positive or negative weights on all the observations, not just those in the top or bottom deciles. The exact weights sum to zero and are given by the rows of the matrix $(X'X)^{-1}X'$.

[9] In the typical quarter more than 10 percent of the earnings surprises have the value of zero. In this case we assign all zeros the same decile rank (most often 5). While this causes the groups adjacent to the group of zeros to have proportionally fewer observations, it preserves the proper rank-ordering of the data.

variable is sorted into ten groups each quarter and the cut-off values between deciles from fiscal quarter *t-1* are used to sort the values into ten groups in quarter *t*. Each value is then replaced by its group ranked zero to nine and then scaled by nine. The risk controls are $Beta_t$, estimated using weekly returns over the two years prior to the end of fiscal quarter t; $Size_t$, defined as the log of the market value of equity at the end of fiscal quarter *t* (data item #61 times data item #14); and *Book to Market*$_t$, constructed as the book value of equity (data item #60) at the end of fiscal quarter *t* divided by the market value of equity at the end of fiscal quarter *t* (see Fama and French 1993 for a discussion of each risk control). We control for the accruals anomaly [Sloan 1996], where $Accruals_t$ are computed as GAAP earnings per share (data item #19) minus cash from operations per share (data item #108), scaled by market price per share at the end of fiscal quarter as reported by IBES. Although it is mostly a short-run anomaly, we also control for $Momentum_t$, calculated as the market-adjusted stock return for the six months prior to the earning announcement [see Chan et al. 1996]. Because it is also based on IBES data, we control for the "pro forma exclusions" anomaly described in Doyle et al. [2003]. *Pro Forma Exclusions*$_t$ are measured as the un-split-adjusted IBES actual earnings per share for quarter *t* less the GAAP earnings per share for quarter t, using either basic (data item #19) or diluted (data item #9), depending on the IBES basic/diluted flag, and scaled by market price per share at the end of quarter. Finally, we control for the traditional post-earnings-announcement drift anomaly by including the standardized unexpected earnings SUE_t, computed as in Bernard and Thomas [1990]. The numerator is equal to actual earnings before extraordinary items (Compustat data item #8) minus an expectation based on a seasonal random walk with trend. The trend is calculated as the mean seasonal change in actual earnings beginning with the prior quarter and using up to 36 quarters of history, if available. The denominator of SUE is the standard deviation of this measure of unexpected earnings over the past eight quarters. If there are less than eight observations to compute the trend and standard deviation, the observation is deleted. Consistent with prior literature, the SUE variable is winsorized at values -5 and 5. Putting this all together, we have the following regression:

$$\textit{Future Return}_t = \alpha_0 + \alpha_1 \textit{Surprise}_t + \alpha_2 \textit{Beta}_t + \alpha_3 \textit{Size}_t + \alpha_4 \textit{Book to Market}_t + \alpha_5 \textit{Accruals}_t + \alpha_6 \textit{Momentum}_t + \alpha_7 \textit{Pro Forma Exclusions}_t + \alpha_8 \mathrm{SUE}_t + \varepsilon_t, \quad (1)$$

where the *Future Return*$_t$ is either *Ret1yr*$_t$, *Ret2yr*$_t$ or *Ret3yr*$_t$.

The collective data requirements for the four prior anomaly variables eliminate over 40,000 observations, so we also estimate a regression with only *Surprise*$_t$ and the three risk control variables:

$$\textit{Future Return}_t = \alpha_0 + \alpha_1 \textit{Surprise}_t + \alpha_2 \textit{Beta}_t + \alpha_3 \textit{Size}_t + \alpha_4 \textit{Book to Market}_t + \varepsilon_t. \quad (2)$$

We estimate the regressions quarterly and report the mean coefficient estimates in the tables. The t-statistics are computed using the quarterly estimates [Fama and MacBeth 1973] where the standard errors are adjusted for serial correlation in the estimates using the Newey-West correction (see Verbeek, 2000, p. 104 for details).

As an additional test to rule out possibility that differential risk is behind our results, we employ the matched control firm method advocated in Barber and Lyon [1997]. For each firm-quarter we select a control firm whose market value is between 0.70 and 1.30 times the treatment firm's market value and has the closest book-to-market ratio to the treatment firm at the end of the fiscal quarter. We then calculate the risk-adjusted return as the difference between the treatment firm's return and the control firm's return over one, two or three years, labeled as $ARet1yr_t$, $ARet2yr_t$ or $ARet3yr_t$, respectively. The advantage of this approach is that any bias that might be due to the composition of the sample is present in both the treatment and control firm returns. Further, this approach does not depend on the validity of the linear rank regression specification; its weakness is that it can only control for a limited number of factors.[10]

Other variables used in the subsequent analysis are *Sales* (Compustat data item #2) and *Cash from Operations* (data item #108), each scaled by the market value of equity at the end of quarter *t* (data item #61 times data item #14) to be consistent with the scale variable for $Surprise_t$. Similarly, *GAAP Earnings* per share (data item #19) for quarter *t* is scaled by market price per share (data item #14). *Number of Analysts* is the number of analysts making earnings forecasts at quarter *t*, as reported by IBES. *Forecast Dispersion* is the standard deviation of analysts' earnings forecasts for quarter *t*, as reported by IBES. We also compute the change in the above variables over the three years subsequent to quarter *t*.

The Sample

The least restrictive sample consists of 159,789 firm-quarters between the years of 1988 and 2000 with sufficient CRSP and IBES data to compute $Surprise_t$ in at least one quarter and at least one year of subsequent returns. As discussed earlier, if a firm delisted subsequent to the earnings announcement date for quarter *t* it still remains in the sample, but with its subsequent

[10] Barber and Lyon show that controlling for risk using a matched control firm approach is preferred to including reference portfolio returns, such as a market index return or the Fama-French size and book-to-market portfolio factors in a regression. The reference portfolios and the Fama-French factors refer to a larger set of data than is in the sample, raising the possibility that a bias is introduced when newly listed firms are added to the reference portfolio or included in the Fama-French factor but are not present in the sample.

return constructed from its delisting return and the value-weighted market index. Table 1 gives the descriptive statistics for our sample. The mean stock return is slightly positive for one year ahead and slightly negative for two and three years ahead; the medians are negative due to the well-documented skewness in returns. The median Surprise is zero, meaning that the median firm met its analyst forecast for the quarter during our sample period. The distribution of Surprise is also reasonably symmetric. Although the exact cutoffs for the 10th percentile and 90th percentile of Surprise vary by period, the average values over all periods are –0.0120 and 0.0052, respectively (recall that this is scaled by price per share from the fiscal quarter end). The mean firm has a market value of $1,737 million, but the distribution is positively skewed, with a median of $293 million. The distribution of size is also quite large, ranging from $97 million for the 25th percentile to $1,040 million for the 75th percentile. Finally, the median firm has three analysts reporting to IBES.

III. FUTURE RETURNS TO EARNINGS SURPRISE INVESTMENT STRATEGY

We begin by reporting the mean future returns for each of the ten portfolios of earnings surprises, where the cutoffs between groups are determined by the decile ranking from the previous quarter (as discussed earlier). The results are based on the full sample of 159,789 firm-quarters, and are shown in Table 2. The first thing to note in Table 2 is the hedge return. In the first year subsequent to the earnings announcement date, firms in the top decile of earnings surprise earn a return that is 13.95% higher than firms in the bottom decile of earnings surprise. This is considerably higher than the eight percent return documented in the prior literature (where surprise is relative to a time series model). Further, the hedge return increases an additional 6 percent in the second year, to 19.89%, before starting to flatten out in the third year.[11] Further, these results are not due to a single unusual period; the two-year hedge return is positive in 44 out of 47 quarters.

The second thing to note in Table 2 is that there is no consistent ordering of portfolio returns over the firms in the negative surprise portfolios (portfolios one through five). The most extreme negative earnings surprise is not even the lowest return for two-year and three-year future returns.[12] In contrast, the subsequent returns for the good news portfolios (portfolios six through ten) are almost perfectly ordered for all three return periods.

The final observation from Table 2 is that roughly two-thirds of the hedge return comes from holding the long position in the portfolio of firms with the largest earnings surprises. This is noteworthy because the transaction costs associated with a short position are considerably higher than for a long position. A very simple investment strategy coming from Table 2 would be to simply go short in the value-weighted market index and long in firms with earnings surprises that are greater than 0.52% of the fiscal quarter end price (i.e. portfolio 10). This strategy would have earned a 14.93% return over the two years following the earnings announcement.[13]

Our next set of tests examines the future returns associated with an earnings surprise after controlling for risk and other documented market anomalies. Table 3 shows the results from estimating regression (1) over different return horizons. Recall that this regression is estimated

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[11] In untabulated results, we find that the fourth and fifth years after portfolio formation have no significant incremental returns beyond the year three return.

[12] Note that the mean stock returns in the three days around the earnings announcement are perfectly ordered across the ten portfolios of earning surprises, as shown later in Table 5. So, while the portfolio with the worst news had the most negative announcement period return, other portfolios actually had lower subsequent returns.

[13] As another reference point, we examined the size of the traditional post-earnings-announcement drift for our sample, which is from a later time period than studied by the bulk of the earlier literature. We sorted firms into deciles based on the SUE_t variable and used the cutoffs between deciles in quarter *t-1* to create 10 portfolios in quarter *t*. The returns to a hedge portfolio that is long in the top decile and short in the bottom decile for one, two, and three years ahead are 3.2%, 3.5% and 3.8%, respectively. The fact that the return to this strategy in a more recent period is smaller than documented during the earlier time periods is consistent with Johnson and Schwartz (2001).

separately for each quarter and the mean coefficients are tabulated.[14] In addition, the coefficient estimate from this regression corresponds to the estimated difference in returns between the top and bottom portfolios for that variable, controlling for the other variables in the regression. As seen in Table 3, the association between an earnings surprise and future returns is highly significant for all three return intervals and the estimated returns are similar in magnitude to the simple hedge returns shown in Table 2.[15] The estimated return is 9.7% after one year, 16.3% after two years and 19.7% after three years. The incremental returns to trading on the $Surprise_t$ variable diminish noticeably after the second year. There is very little additional return beyond year three; the mean coefficient on $Surprise_t$ in a regression with four years of future returns is 20.5% (untabulated).

The control variables in Table 4 all show estimated relations with future returns that are consistent with prior studies. The risk proxies $Beta_t$ and $Book\text{-}to\text{-}Market_t$ are positively related to future returns and Size_t is negatively related to future returns. The $Book\text{-}to\text{-}Market_t$ and $Size_t$ variables are not significant in this multiple regression but become so in univariate regressions. The $Accruals_t$ variable is highly significant and at magnitudes consistent with Sloan [1996] and many other subsequent studies. $Momentum_t$ is weakly significant in the first year, but not thereafter, consistent with the short-term nature of this anomaly [see Chan et al. 1996]. $Exclusions_t$ is significantly negative, but not as extreme as the results shown in Doyle et al. [2003], because the sample is not limited to firms with non-zero pro forma exclusions, as in their

[14] There are 52 quarters between 1988 and 2000. Because we use the decile cut points from quarter *t-1* to form portfolios in quarter *t*, we lose the first quarter of 1988. Consequently, the one-year future return regressions are estimated for 51 quarters. Because we don't have CRSP data beyond 2001, the two-year and three-year future return regressions are estimated over 47 quarters and 43 quarters, respectively.
[15] Recall that the sample has changed considerably between Table 2, which has 159,789 observations for the one-year returns and Table 3, which has only 85,368 observations for the one-year returns.

paper. Finally, SUE_t is insignificant for all return periods, consistent with the simple hedge return results from this variable reported in Footnote 13.

The data requirements for all the variables in Table 3 eliminate a very large portion of our original sample, mostly because of the data necessary to compute the SUE_t variable. For instance, the one-year return hedge portfolio results in Table 2 is based on 159,789 observations while the one-year return regression in Table 3 is based on only 85,368 observations. Because Table 3 shows that the $\mathrm{Surprise}_t$ variable is not merely proxying for SUE_t or one of the other anomaly variables, we estimate regressions in Table 4 that include the risk controls but not the anomaly controls. The less severe data requirements move the sample much closer to the simple hedge portfolio sample, with 126,108 observations in the one-year return regression. The results in Table 4 show that the future returns associated with extreme earnings surprises are not due to risk; the coefficients on the Surprise variable are very close to the returns for simple hedge portfolio.

The results in Table 4 are not due to a few extreme quarters. Figure 1 plots the estimated coefficient on $Surprise_t$ from the two-year return regressions for each quarter. As seen in the figure, the coefficient is positive in 47 out of the available 47 quarters. Similarly, the coefficient is positive 46/51 times in the one-year return regressions and is positive 40/43 times in the three-year return regressions, as shown in the right-hand column of Table 4. Because the returns extend over two years, the 47 bars in Figure 1 are not independent. The statistical tests in tables 3 and 4 take the overlapping periods into account but, as an alternative way to visualize the results, Figure 2 plots the one-year returns with no overlap in the data. In particular, each graph shows the twelve estimated coefficients on $Surprise_t$ from twelve years of annual cross-sectional regressions based on equation (2), with no overlap in the annual periods. To present all the data, we plot a separate graph for each quarter. With one small and one large exception, Figure 2 shows that the returns are large and positive each year, regardless of when the annual returns begin.

As a specification check we replicated Tables 2, 3 and 4 using total assets as the scale variable for earnings surprise and the other financial statement variables. Because total assets for the quarter may not be known at the earnings announcement date, we use total assets from the prior quarter to avoid a look-ahead bias. The untabulated results are very similar to those reported here. The two-year hedge return is 17.44% and the coefficient on Surprise_t in the two-year return regression that includes the risk control variables is 21.21%.

To see if the earnings surprise variable is simply identifying a few industries that, ex post, did unusually well over our sample period, we compare the full sample industry composition to the composition in the two extreme surprise portfolios. As seen in Table 5, both extreme portfolios are well distributed across many industries, with no one industry dominating either portfolio. The largest deviation from the full sample industry composition is probably in Business Services, which is under weighted in portfolio 10 by 1.5% and over weighted in portfolio 1 by 2.5%.

Finally, to control for risk without imposing the linear rank regression specification, we report the mean risk-adjusted returns to the ten portfolios, where the risk adjustment is made by subtracting the return for a matched control firm with a similar size and book-to-market ratio, as discussed earlier. The results in Table 6 are very similar to the results reported in prior tables. The hedge returns for one, two and three years are 13.38%, 23.24% and 28.66%, respectively. And, like the results in table 2, over two-thirds of the hedge return is due to the long position in portfolio 10; a long position in portfolio 10 yields returns that are 18% greater than the mean return for firms with similar size and book-to-market ratios over the next two years.

In summary, extreme earnings surprises are associated with unusually large future stock returns. This result holds in simple hedge portfolios and in regressions that control for risk and other market anomalies. The also hold when risk is controlled by a matched-control firm return. Further, the magnitude of the predictable future returns is far greater than in the post-earnings announcement drift literature and is slightly larger than the returns to the well-studied accruals anomaly.

IV. WHY IS THE MARKET INEFFICIENT WITH RESPECT TO EXTREME EARNINGS SURPRISES?

In this section we explore why such large future returns are available by trading on what is arguably the firm's most widely publicized news each quarter. Why is the market so inefficient with respect to extreme earnings surprises? We emphasize that this investigation is exploratory and the relations we observe may well be proxying for more fundamental drivers of market inefficiency.

Panel A of Table 7 describes various firm characteristics for each of the ten earnings surprise portfolios. To begin, note that portfolios one and ten have the smallest firms, on average. However, the average firm size in the portfolio is not trivial: the mean market value in portfolio one is $388 million and the mean market value in portfolio ten is $640 million. The requirement that our firm have an IBES forecast eliminates many of the extremely small firms from the broader sample of publicly traded companies. So the firms in the extreme earnings portfolios are smaller, but are not so small that it would be difficult purchase them.

Next, note that portfolios one and ten have the highest mean book to market ratios at 0.84 and 0.74, respectively. The mean book to market ratio gets much smaller toward the middle of the portfolios, reaching a minimum of 0.41 in portfolio six. Although it seems that high book to market "value" stocks are much more likely to generate an extreme earnings surprise, only the firms with the largest earnings surprises actually generate high future returns.[16]

For the financial variables in Table 7 we report the medians because there are some extreme values that heavily influence the means. All three variables, $Sales_t$, $Cash\ from\ Operations_t$, and $GAAP\ Earnings_t$, are scaled by the market value at the end of the fiscal quarter (which is the same as the denominator for $Surprise_t$). Sales in the current quarter as a percent of market value is much higher for both the extreme negative and extreme positive earnings surprise portfolios than it is for the middle portfolios. However, profitability, measured either as the median cash from operations or GAAP earnings, increases monotonically across the surprise portfolios, so the sales are profitable for the extreme positive surprise portfolio but are unprofitable for the extreme negative surprise portfolio.

Turning our attention to the information environment, the number of analysts and the standard deviation of their forecasts exhibit an interesting pattern across the earnings surprise portfolios. Firms in the bottom and top surprise portfolios have the lowest analyst coverage, with 2.75 and 3.17 analysts submitting forecasts to IBES, respectively. This compares to the sample average of 4.7 analysts shown in Table 1 or the approximately 6 analysts found in portfolios five and six. This is consistent with the results in Gleason and Lee [2002] who find that the abnormal returns following an analyst forecast revision are smaller for firms with larger analyst coverage and for forecasts revisions from "celebrity" analysts. The standard deviation of

[16] We explicitly control for the book to market ratio in the regressions in Tables 3 and 4. In untabulated results, we also find that our earnings surprise effect holds within each decile of the book to market ratio, generating two-year returns in excess of 20% in each decile.

the analysts' forecasts shows a similar pattern. The disagreement between analysts is highest in the lowest surprise portfolio, decreases as the surprise increases to portfolio five and then increases again over portfolios six through ten. In sum, there are fewer analysts following the firms with the most extreme earnings surprises and their forecasts are more divergent than for the average earnings surprise firms.

The picture that emerges from panel A of Table 7 is that the firms with extreme earnings surprises are extreme on other dimensions as well. They have the largest current sales, are either the least or most profitable, have the fewest number of analysts following them, and the greatest amount of disagreement between the analysts' forecasts prior to the earnings announcement. The stock return in the three days around the earnings announcement is monotonically increasing across the surprise portfolios, as shown in the last column in panel A, so the market is not completely unaware of the news in the earnings surprise. However, the subsequent returns documented earlier show that the announcement period reaction is far from complete.

Next we examine how the firm and analyst characteristics change over the three years after the earnings announcement. First, do firms with extreme earnings surprises generate more surprises in the future? For each of the 10 original earnings surprise portfolios, Figure 3 graphs the median earnings surprise over the next 12 quarters. The future *Surprise* variables are constructed exactly like the original *Surprise* variable except that we continue to scale by market price from the fiscal quarter preceding the original earnings announcement in order to keep the scaling variable constant through time. In a world with fully rational forecasting, the past forecast error should not predict future forecast errors. Nonetheless, Figure 3 shows a remarkable amount of persistence in forecast errors for the extreme portfolios. The firms in the top portfolio of earnings surprise have positive forecast errors in all of the next 12 quarters, and the firms in the bottom portfolio of earnings surprise have negative forecast errors for the next four quarters.[17] The underreaction in the stock price is mirrored by an underreaction in future analyst forecasts.

Panel B of Table 7 examines the changes in financial performance and analyst behavior during the three years after the earnings announcement. What causes the market to correct the mispricing? In terms of the future financial performance, the median change in sales over the next three years is highest in the two most extreme earnings surprise portfolios. Sales growth, however, does not necessarily create value. The median change in cash from operations over the next three years is lowest for bottom surprise portfolio and the highest for the top surprise portfolio. The median 3-year change in GAAP Earnings shows a similar pattern, although the top surprise portfolio isn't quite the largest value. The firms in the top portfolio converted the sales growth to cash growth and earnings growth while the firms in the bottom portfolio did not. Loosely speaking, the future return in the top surprise portfolio is "earned" in the sense that the future financial performance of these firms is exceptionally strong.

The final evidence we have about the market correction is seen in the future analyst variables. In the three years following the earnings announcement firms in the top portfolio of earnings surprise gain a little over one more analyst, on average, while the firms in the bottom surprise portfolio gain an average of only .36 analysts. The analyst community is "waking up" to the firms in the top surprise portfolio over the next three years, perhaps because they keep reporting positive earnings surprises or perhaps because they report exceptionally strong financial performance. In addition, the standard deviation of analyst forecasts decreases the most

[17] These results are consistent with the positive autocorrelation in Valueline forecast errors documented in Mendenhall (1991), Abarbanell and Bernard (1992), and Shane and Brous (2001).

for firms in the bottom and top surprise portfolios. As the future earnings surprises dissipate for the extreme firms, there is greater consensus among the future analyst forecasts.

The evidence in Table 7 suggests that the firms in the extreme earnings surprise portfolios are classic "neglected" stocks. They are smaller, have higher book to market ratios, have less analyst coverage and more dispersion in analysts' forecasts than firms in the other surprise portfolios. Besides the earnings surprise itself, other clues that the firms in the extreme portfolios will differ in their future returns are their large sales as a percent of market value and their extreme profitability. Over the next three years, the firms in the top surprise portfolio continue to outperform on a financial basis, turning the future sales growth into profit. They attract more analyst attention and the mispricing that was present at the portfolio formation date is corrected.

What Should the Announcement Return Be?

Another way to interpret our results is to ask, what would the announcement period return have been in an efficient market? A number of studies have documented an S-shaped relation between the announcement period return and unexpected earnings, where unexpected earnings is the earnings surprise variable as defined earlier [see Freeman and Tse 1992 for a summary). The interpretation of this pattern is generally that extreme earnings have a greater transitory component and hence the marginal value diminishes as the earnings become more extreme. But if the market significantly misprices extreme earnings then this interpretation may be incorrect. In Figure 4 we plot the announcement period return (computed over the three days surrounding the earnings announcement) against the mean earnings surprise in each portfolio, getting the familiar S-shaped curve. We then plot the hypothetically efficient announcement return that would result in a zero market-adjusted return for each portfolio in the two-year post-announcement period.[18] Note that the pattern for the efficient return resembles a check-mark more than an S-curve. To be fully efficient the announcement return for firms with negative earnings surprises should actually be lower across the board. For all positive earnings surprises the fully efficient announcement return is larger than the actual announcement return. The most extreme positive earnings surprise portfolio shows a diminishing marginal effect for the efficient return but the relation is still much steeper than the almost flat relation shown for the actual announcement return. Restating our main results, firms that report large positive earnings surprises perform much better in the next two years than the market anticipates at the announcement date.

V. CONCLUSION

By defining the earnings surprise relative to the consensus analyst forecast rather than relative to a time-series expectation, we document a price drift following an earnings announcement that is far bigger and longer lived than previously documented. The magnitude of the future return, the average size of the firms in the extreme portfolios, and the fact that most of the hedge return is earned by the long position make it unlikely that transaction costs prohibit the exploitation of this "earnings surprise" anomaly.[19] Rather, it appears extreme positive earnings news is less transitory than the market anticipates and, as firms with large positive surprises

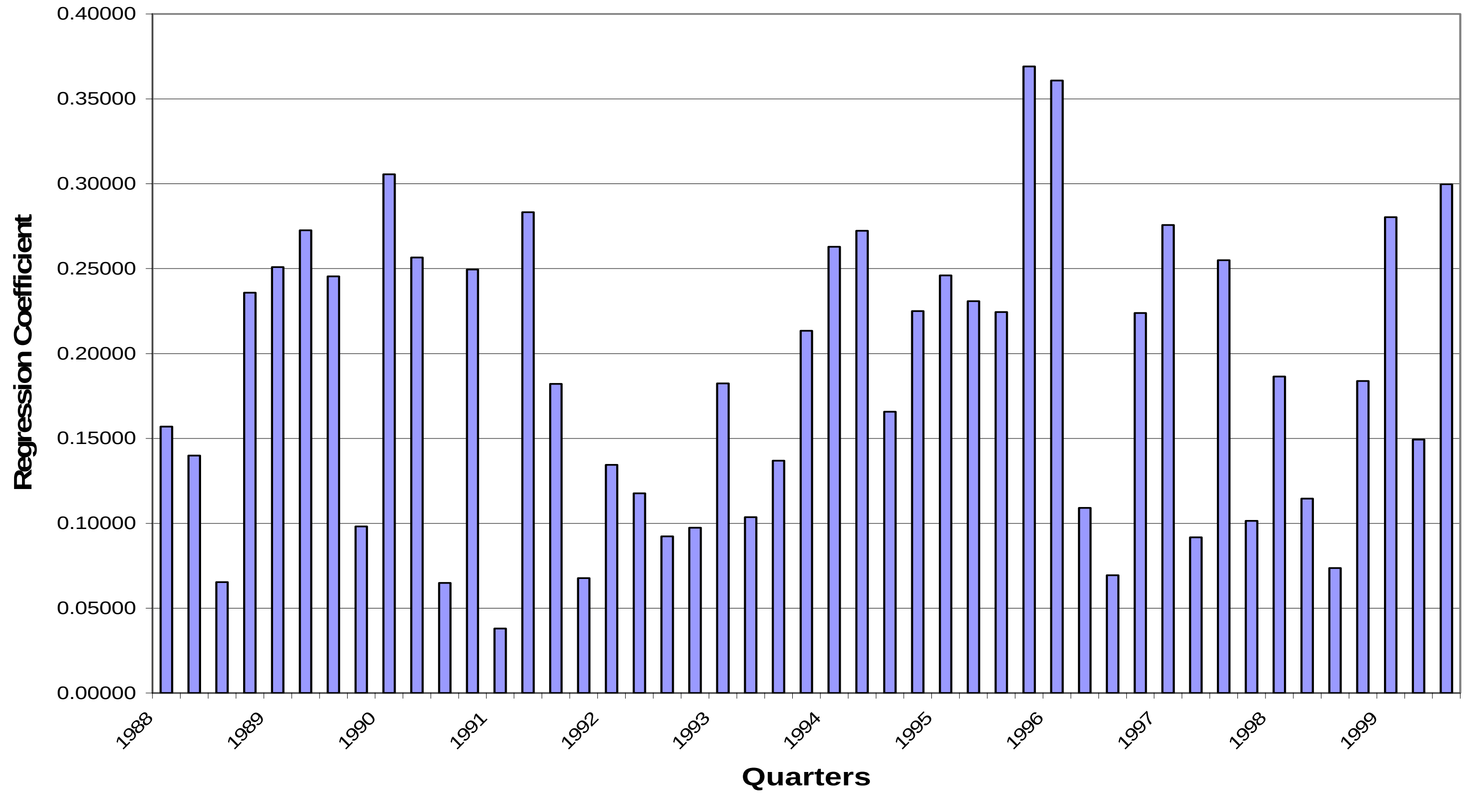
[18] The hypothetical announcement period return is $(1+r_a)(1+r_2)-1$, where r_a is the actual announcement period return and r_2 is the two-year return beginning two days after the announcement period.
[19] The real-world implementability of a trading strategy by a money manager depends on a number of factors beyond the simple transaction cost, including restrictions on holdings to less than 5% of the outstanding stock, prohibitions on short-sales and price pressure. See Bushee and Raedy [2004] for an excellent examination of these issues.

continue to outperform financially, they attract more analyst attention which eventually eliminates their underpricing.

As financial accounting research continues to explore the implications of market inefficiency, this simple but large anomaly opens new doors for examining the underlying causes of market mispricing and the stimulus for the subsequent market correction.

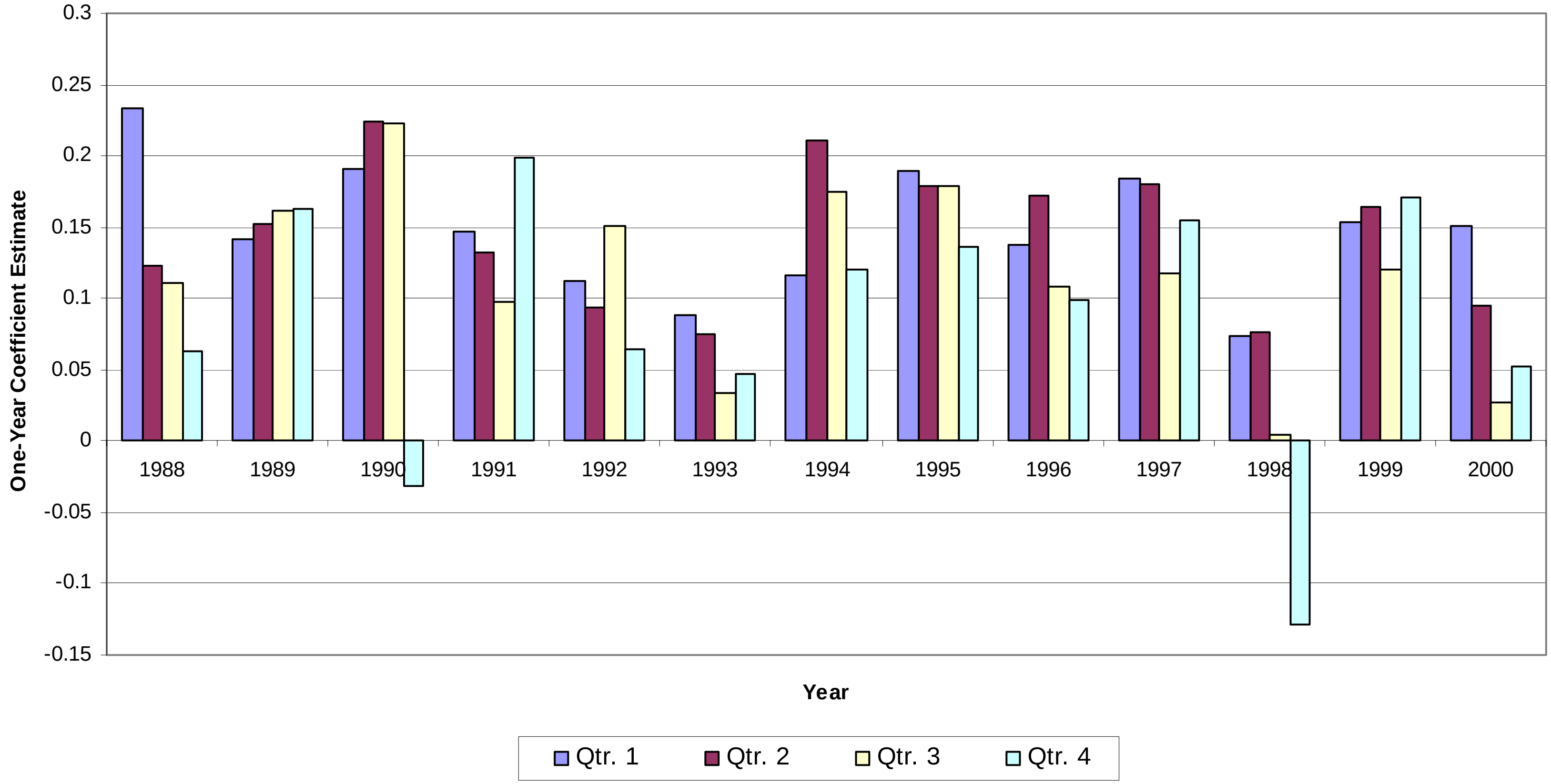
FIGURE 1

Coefficient Estimates on Surprise Variables for Each Quarter
From Two-Year Regressions



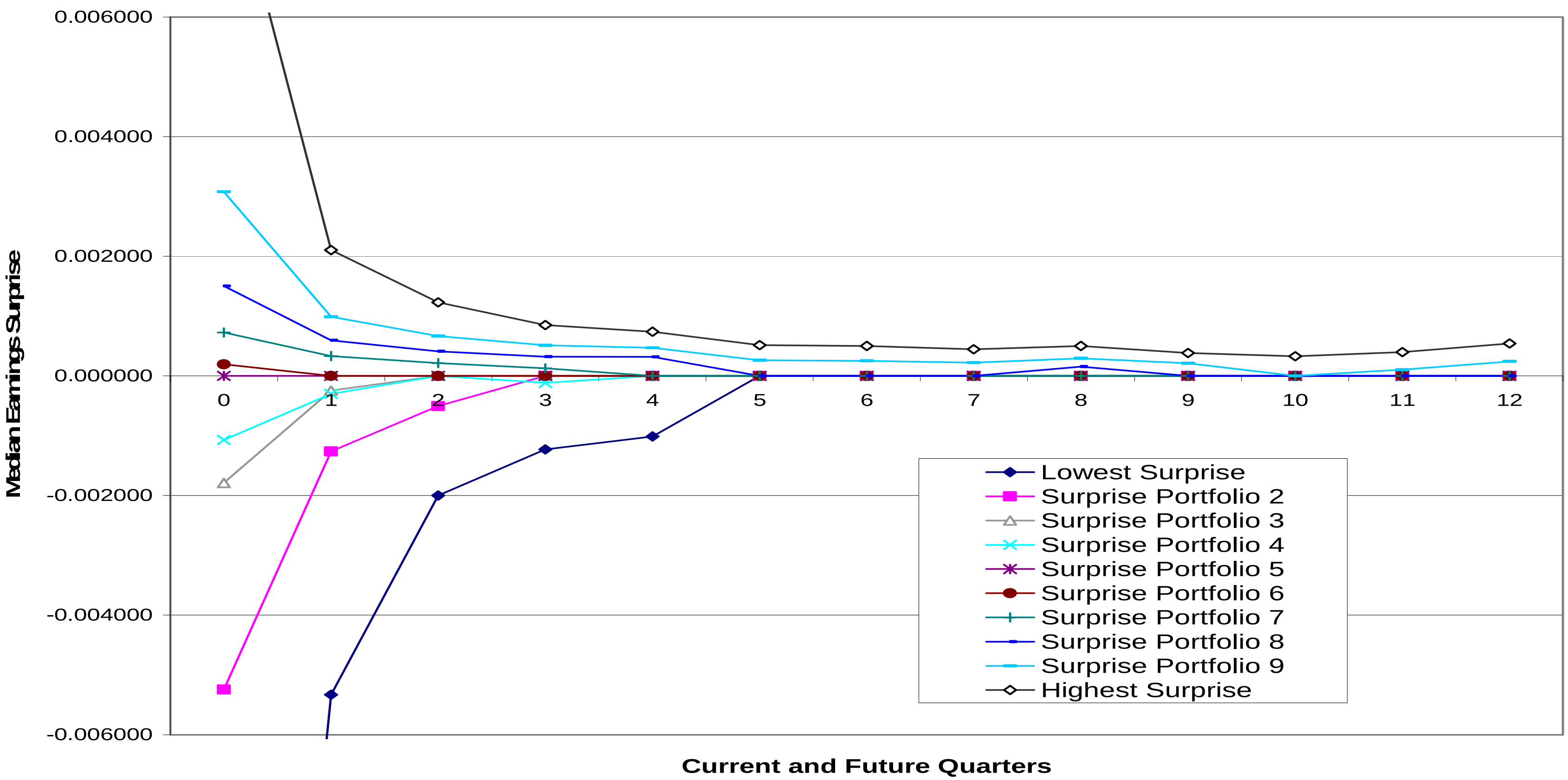
The quarterly regression coefficients measure the return on a portfolio that takes a long position in the top Surprise portfolio and a short position in the bottom Surprise portfolio, after controlling for the other risk variables in equation 2 (see Table 4). *Surprise* is the un-split-adjusted IBES actual earnings per share for quarter *t* less the most recent IBES median forecast preceding the announcement date, scaled by the market price per share at the end of the fiscal quarter as reported by IBES.

FIGURE 2
Coefficient Estimates on Surprise Variables for Each Year From One-Year Regressions, by Fiscal Quarter



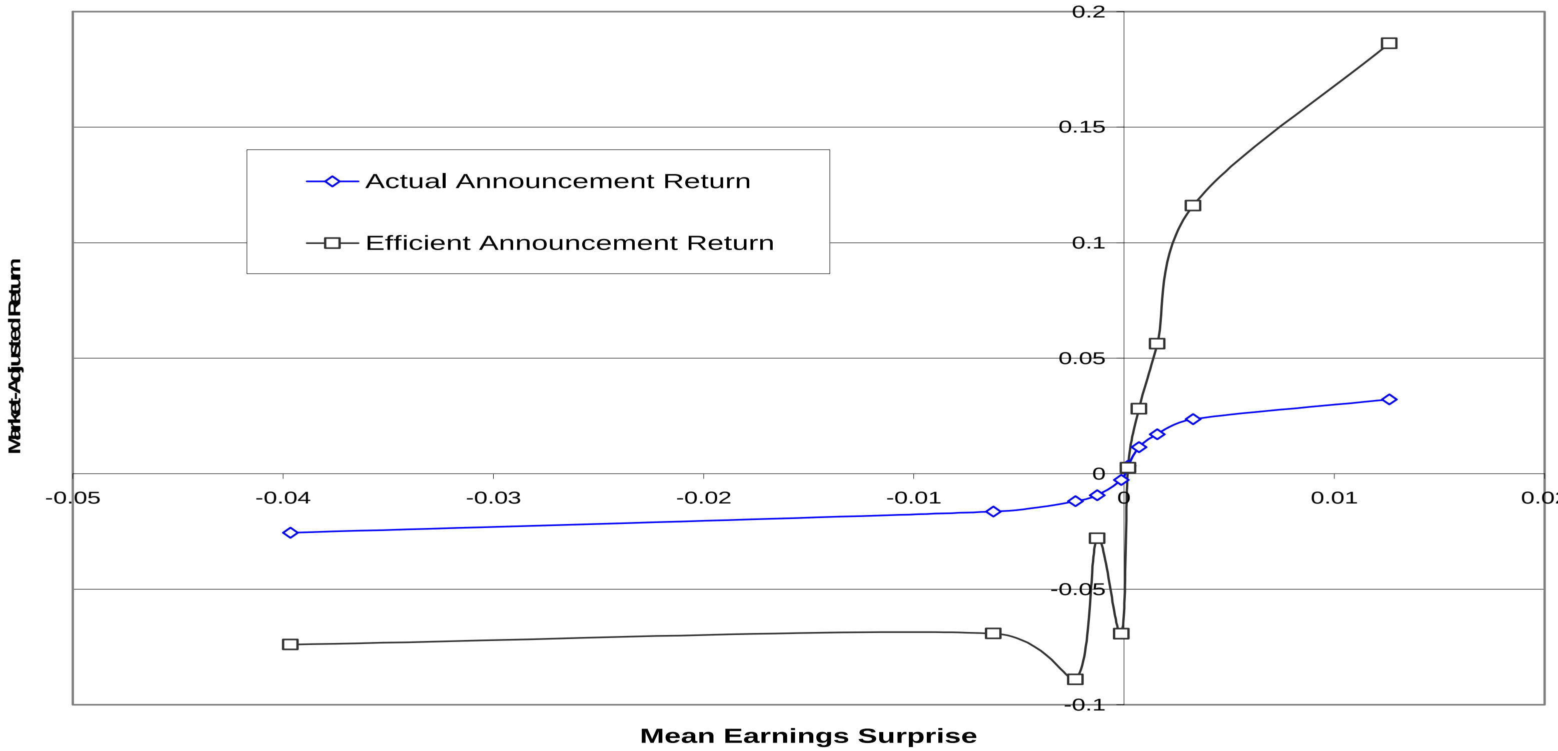
The regressions are estimated by fiscal quarter with one-year future returns as the dependent variable, thereby eliminating any overlap in the return periods. The annual regression coefficients measure the return on a portfolio that takes a long position in the top Surprise portfolio and a short position in the bottom Surprise portfolio, after controlling for the other risk variables in equation 2 (see Table 4). *Surprise* is the un-split-adjusted IBES actual earnings per share for quarter *t* less the most recent IBES median forecast preceding the announcement date, scaled by the market price per share at the end of the fiscal quarter as reported by IBES.

FIGURE 3
Median Earnings Surprise for Each Surprise Portfolio for the Current and Future Quarters



Surprise is the un-split-adjusted IBES actual earnings per share for quarter *t* less the most recent IBES median forecast preceding the announcement date, scaled by the market price per share at the end of the fiscal quarter as reported by IBES. The figure shows the median *Surprise* for the current quarter (#0) and for twelve subsequent quarters (#1 to #12). The median *Surprise* in the current quarter (not shown above) for the lowest and highest Surprise portfolios is -0.0232 and 0.0090, respectively.

FIGURE 4
Actual and Efficient Announcement Period Returns for each Earnings Surprise Portfolio



The hypothetically efficient return is the market-adjusted, compounded return starting one day prior to the earnings announcement and ending after two years. If this were the announcement period return, then the two-year market-adjusted return subsequent to the announcement would be zero. Earnings Surprise is the un-split-adjusted IBES actual earnings per share for quarter *t* less the most recent IBES median forecast preceding the announcement date, scaled by the price per share at the end of quarter *t.* The returns are buy-and-hold market-adjusted returns, inclusive of all distributions, where the market adjustment subtracts the returns on a value-weighted market index. Announcement period returns begin one trading day before the earnings announcement for quarter *t* and end one trading day after the announcement. Two-year returns begin two days after the earnings announcement for quarter *t* and extend two years into the future. In the event of delisting, CRSP's delisting return is first used, adjusting for the delisting bias documented in Shumway [1997], followed by the return on a value-weighted market portfolio.

TABLE 1
Descriptive Statistics

Variables	Mean	25%	Median	75%
Ret1yr	0.005	-0.363	-0.078	0.215
Ret2yr	-0.001	-0.600	-0.160	0.289
Ret3yr	-0.029	-0.817	-0.259	0.331
Surprise	-0.0031	-0.0020	0.0000	0.0015
Beta	0.99	0.57	0.92	1.33
Market Value ($M)	1,737	97	293	1,040
Book to Market	0.57	0.29	0.48	0.74
Accruals	-0.018	-0.031	-0.007	0.007
Momentum	0.003	-0.272	-0.057	0.163
Pro Forma Exclusions	0.003	0.000	0.000	0.000
SUE	0.086	-0.612	0.103	0.886
Total Assets ($M)	2,775	94	335	1,479
Number of Analysts	4.7	2.0	3.0	6.0
Forecast Dispersion	0.038	0.010	0.020	0.040

The sample consists of 159,789 firm-quarters from 1988 to 2000 with the data necessary to calculate the *Surprise* variable from IBES and *Ret1yr* from CRSP. *Ret1yr, Ret2yr* and *Ret3yr* are the market-adjusted, buy and hold stock returns, inclusive of all distributions, beginning 2 days after the earnings announcement for quarter *t* and extending 1 year, 2 years or 3 years into the future, respectively. The returns are market adjusted by subtracting the returns on a value-weighted market portfolio. In the event of delisting, CRSP's delisting return is first used, adjusting for the delisting bias documented in Shumway [1997], followed by the return on a value-weighted market portfolio. *Surprise* is the un-split-adjusted IBES actual earnings per share for quarter *t* less the most recent IBES median forecast preceding the announcement date, scaled by the market price per share at the end of the fiscal quarter as reported by IBES. *Beta* is estimated using weekly returns over the two years prior to quarter *t*. *Market Value* is the market value of equity at the end of quarter *t* (Compustat data item #61 times #14). *Book to Market* is the book value of equity at the end of quarter *t* (#60) divided by the market value of equity at the end of quarter *t* (#61 times #14). *Accruals* are computed as GAAP earnings per share for quarter *t* (#19) minus cash from operations per share for quarter *t* (#108 divided by #15), scaled by the market price per share at the end of the fiscal quarter (#14). *Momentum* is calculated as the market-adjusted (value-weighted) stock return for the six months prior to the earnings announcement, ending two days before the earnings announcement date. *Pro Forma Exclusions* are measured as the un-split-adjusted IBES actual earnings per share for quarter *t* less either the basic or diluted GAAP earnings per share for quarter *t* (#9 or #19), depending on the IBES basic/diluted flag, scaled by the market price per share at the end of the fiscal quarter (#14). *Total Assets* is defined as the total assets at the end of quarter *t* (#44). *Number of Analysts* is the number of analysts making earnings forecasts at quarter t, as reported by IBES. *Forecast Dispersion* is the standard deviation of analysts' earnings forecasts for quarter *t*, as reported by IBES. *SUE* is standardized unexpected earnings. The numerator of *SUE* is equal to actual earnings before extraordinary items (Compustat data item #8) minus an expectation based on a seasonal random walk with trend. The trend is calculated as the mean seasonal change in actual earnings beginning with ($Q_{t-1} - Q_{t-5}$) and using up to 36 quarters of history, if available. If at least 8 seasonal changes are not available to calculate the trend term, the observation is deleted. The denominator of *SUE* is the standard deviation of this measure of unexpected earnings over the past 8 quarters. If this measure of unexpected earnings is not available from Compustat for any of the prior eight quarters, the observation is deleted. All non-return variables are winsorized at 1% and 99%, except for SUE, which is winsorized at values of -5 and +5.

TABLE 2
Future Returns to Earnings Surprise Portfolios

***Surprise* Portfolio**	**N**	**Average Lower Bound of *Surprise* Portfolio**	**Mean *Surprise***	**Mean *Ret1yr***	**Mean *Ret2yr***	**Mean *Ret3yr***
1	16,254		-0.0397	-0.0458	-0.0496	-0.0943
2	15,830	-0.0120	-0.0062	-0.0195	-0.0537	-0.0581
3	15,618	-0.0042	-0.0023	-0.0441	-0.0781	-0.1181
4	8,050	-0.0016	-0.0013	0.0151	-0.0188	-0.0184
5	26,344	-0.0005	-0.0001	-0.0394	-0.0668	-0.1198
6	13,007	-0.0000	0.0002	0.0065	-0.0009	-0.0199
7	16,913	0.0004	0.0007	0.0197	0.0164	-0.0019
8	15,940	0.0011	0.0016	0.0344	0.0385	-0.0093
9	15,843	0.0023	0.0033	0.0588	0.0903	0.0641
10	15,990	0.0052	0.0126	0.0937	0.1493	0.1426
Hedge Return (Portfolio 10 – Portfolio 1)				**0.1395**	**0.1989**	**0.2369**

The sample consists of 159,789 firm-quarters from 1988 to 2000 with the data necessary to calculate the *Surprise* variable from IBES and *Ret1yr* from CRSP. The ten portfolios based on the *Surprise* variable are not equal because the groups are defined by the decile cutoffs for the *Surprise* variable from the previous quarter (to avoid a look-ahead bias). Due to this adjustment, the actual sample begins in the second quarter of 1988. In the typical quarter more than 10 percent of the earnings surprises have the value of zero. In this case we assign all zeros the same decile rank (typically 5). While this causes the portfolios adjacent to the portfolio of zeros to have proportionally fewer observations, it preserves the proper rank-ordering of the data. *Surprise* is the unadjusted IBES actual earnings per share for quarter *t* less the most recent IBES median forecast preceding the announcement date, scaled by the market price per share at the end of the fiscal quarter as reported by IBES. *Ret1yr*, *Ret2yr*, and *Ret3yr* are the market-adjusted, buy and hold stock returns, inclusive of all distributions, beginning 2 days after the earnings announcement for quarter *t* and extending 1 year, 2 years or 3 years into the future, respectively. The returns are market adjusted by subtracting the returns on a value-weighted market portfolio. In the event of delisting, CRSP's delisting return is first used, adjusting for the delisting bias documented in Shumway [1997], followed by the return on a value-weighted market portfolio. The Hedge return is the mean return on portfolio 10 less the mean return on portfolio 1.

TABLE 3
Quarterly Regressions of Future Returns on Earnings Surprise Portfolios and Control Variables

Return Interval = α_0 + α_1Surprise$_t$ + α_2 Beta$_t$ + α_3Book to Market$_t$ + α_4Size$_t$ + α_5Accruals$_t$ + α_6Momentum$_t$ + α_7Pro Forma Exclusions$_t$ + α_8SUE$_t$ + ε_t

Dependent Variable	*Intercept*	***Surprise***	*Beta*	*Book to Market*	*Size*	*Accruals*	*Momentum*	*Pro Forma Exclusions*	*SUE*
Ret1yr	-0.020 (-0.44)	**0.097** **(7.36)**	0.092 (1.34)	0.029 (0.54)	-0.067 (-1.15)	-0.089 (-8.18)	0.047 (1.63)	-0.041 (-4.01)	0.044 (0.72)
Ret2yr	-0.016 (-0.14)	**0.163** **(8.74)**	0.221 (1.89)	0.013 (0.11)	-0.125 (-1.59)	-0.145 (-7.49)	-0.004 (-0.11)	-0.066 (-3.19)	0.034 (0.48)
Ret3yr	-0.050 (-0.37)	**0.197** **(8.00)**	0.291 (3.11)	0.046 (0.30)	-0.120 (-0.30)	-0.197 (-9.27)	-0.023 (-0.75)	-0.101 (-7.32)	0.027 (0.31)

The sample consists of firm-quarters from 1988 to 2000 with available data from IBES, CRSP, and Compustat. The sample sizes are 85,368, 76,298, and 67,256 for the one, two, and three year time horizons, respectively. Regressions are estimated quarterly and mean coefficients are presented. Fama-Macbeth t-statistics, adjusted for serial correlation using the Newey-West correction are shown in parentheses below the coefficients. *Ret1yr*, *Ret2yr* and *Ret3yr* are the market-adjusted, buy and hold stock returns, inclusive of all distributions, beginning 2 days after the earnings announcement for quarter *t* and extending 1 year, 2 years or 3 years into the future, respectively. The returns are market adjusted by subtracting the returns on a value-weighted market portfolio. In the event of delisting, CRSP's delisting return is first used, adjusting for the delisting bias documented in Shumway [1997], followed by the return on a value-weighted market portfolio. *Surprise* is the un-split-adjusted IBES actual earnings per share for quarter *t* less the most recent IBES median forecast preceding the announcement date, scaled by the market price per share at the end of the fiscal quarter as reported by IBES. *Beta* is estimated using weekly returns over the two years prior to quarter *t*. *Size*, is the log of the market value of equity at the end of quarter *t* (#61 times #14). *Book to Market*, is the book value of equity at the end of quarter *t* (#60) divided by the market value of equity at the end of quarter *t* (#61 times #14). *Accruals* are computed as GAAP earnings per share for quarter *t* (#19) minus cash from operations per share for quarter *t* (#108 divided by #15), scaled by market price per share at the end of the fiscal quarter as reported by IBES. *Momentum* is calculated as the market-adjusted (value-weighted) stock return for the six months prior to the earnings announcement, ending two days before the earnings announcement date. *Pro Forma Exclusions* are measured as the un-split-adjusted IBES actual earnings per share for quarter *t* less either the basic or diluted GAAP earnings per share for quarter *t* (#9 or #19), depending on the IBES basic/diluted flag, scaled by the market price per share at the end of the fiscal quarter as reported by IBES. *SUE* is standardized unexpected earnings. The numerator of *SUE* is equal to actual earnings before extraordinary items (Compustat data item #8) minus an expectation based on a seasonal random walk with trend. The trend is calculated as the mean seasonal change in actual earnings beginning with ($Q_{t-1} - Q_{t-5}$) and using up to 36 quarters of history, if available. If at least 8 seasonal changes are not available to calculate the trend term, the observation is deleted. The denominator of *SUE* is the standard deviation of this measure of unexpected earnings over the past 8 quarters. If this measure of unexpected earnings is not available from Compustat for any of the prior eight quarters, the observation is deleted. All independent variables are assigned to a portfolio numbered from 0 to 9 based on the cutoff between deciles from the previous quarter. This portfolio number is then divided by 9 to yield a variable that lies between 0 and 1.

TABLE 4
Quarterly Regressions of Future Returns on Earnings Surprise Portfolios and Risk Control Variables

Return Interval = $\alpha_0 + \alpha_1$Surprise$_t$ + α_2 Beta$_t$ + α_3Book to Market$_t$ + α_4Size$_t$ + ε_t

Dependent Variable	*Intercept*	***Surprise***	*Beta*	*Book to Market*	*Size*	*Proportion of Positive Surprise Coefficients*
Ret1yr	-0.070 (-1.73)	**0.116** **(7.91)**	0.060 (0.99)	0.052 (0.83)	-0.045 (-0.85)	46/51
Ret2yr	-0.161 (-2.12)	**0.186** **(13.00)**	0.193 (1.63)	0.104 (1.04)	-0.103 (-1.46)	47/47
Ret3yr	-0.280 (-2.48)	**0.213** **(7.92)**	0.301 (2.63)	0.193 (1.40)	-0.106 (-1.39)	40/43

The sample consists of firm-quarters from 1988 to 2000 with available data from IBES, CRSP, and Compustat. The sample sizes are 126,108, 114,003, and 100,632 for the one, two, and three year time horizons, respectively. Regressions are estimated quarterly and mean coefficients are presented. Fama-Macbeth t-statistics, adjusted for serial correlation using the Newey-West correction are shown in parentheses below the coefficients. *Ret1yr*, *Ret2yr* and *Ret3yr* are the market-adjusted, buy and hold stock returns, inclusive of all distributions, beginning 2 days after the earnings announcement for quarter *t* and extending 1 year, 2 years or 3 years into the future, respectively. The returns are market adjusted by subtracting the returns on a value-weighted market portfolio. In the event of delisting, CRSP's delisting return is first used, adjusting for the delisting bias documented in Shumway [1997], followed by the return on a value-weighted market portfolio. *Surprise* is the un-split-adjusted IBES actual earnings per share for quarter *t* less the most recent IBES median forecast preceding the announcement date, scaled by the market price per share at the end of the fiscal quarter as reported by IBES. *Beta* is estimated using weekly returns over the two years prior to quarter *t*. *Size*, is the log of the market value of equity at the end of quarter *t* (#61 times #14). *Book to Market*, is the book value of equity at the end of quarter *t* (#60) divided by the market value of equity at the end of quarter *t* (#61 times #14). All independent variables are assigned to a portfolio numbered from 0 to 9 based on the cutoff between deciles from the previous quarter. This portfolio number is then divided by 9 to yield a variable that lies between 0 and 1.

TABLE 5
Sample Concentration by Industry based on 2 Digit SIC Codes

2 Digit SIC Code	***Name of Industry***	*% of Surprise Portfolio 10 Sample*	*% of Full Sample*	*% of Surprise Portfolio 1 Sample*
1	Agricultural production- crops	0.3%	0.2%	0.3%
2	Agricultural production- livestock	0.0%	0.0%	0.0%
7	Agricultural services	0.0%	0.0%	0.0%
8	Forestry	0.1%	0.0%	0.0%
10	Metal mining	0.9%	0.6%	0.7%
12	Coal mining	0.1%	0.1%	0.1%
13	Oil and gas extraction	4.1%	2.7%	3.4%
14	Nonmetallic minerals, except fuels	0.1%	0.1%	0.1%
15	General building contractors	1.8%	0.7%	0.8%
16	Heavy construction contractors	0.4%	0.3%	0.5%
17	Special trade contractors	0.3%	0.2%	0.4%
20	Food and kindred products	1.8%	2.1%	1.4%
21	Tobacco manufactures	0.1%	0.1%	0.1%
22	Textile mill products	0.9%	0.8%	1.0%
23	Apparel and other textile products	0.9%	0.9%	1.2%
24	Lumber and wood products	0.6%	0.6%	0.6%
25	Furniture and fixtures	0.7%	0.8%	0.5%
26	Paper and allied products	0.8%	1.3%	0.8%
27	Printing and publishing	1.0%	1.5%	0.7%
28	Chemicals and allied products	8.6%	6.7%	6.0%
29	Petroleum and coal products	1.0%	0.7%	0.8%
30	Rubber and miscellaneous plastics products	1.0%	1.0%	0.9%
31	Leather and leather products	0.2%	0.2%	0.2%
32	Stone, clay, glass, and concrete products	1.0%	0.7%	0.7%
33	Primary metal industries	2.9%	1.8%	2.3%
34	Fabricated metal products	1.2%	1.2%	1.1%
35	Industrial machinery and equipment	6.6%	6.2%	8.1%
36	Electrical and electronic equipment	5.8%	6.5%	6.9%
37	Transportation equipment	2.5%	2.2%	2.1%
38	Instruments and related products	5.4%	5.6%	6.2%
39	Miscellaneous manufacturing industries	0.9%	0.8%	1.3%
40	Local and interurban passenger transit	0.2%	0.3%	0.2%
41	Motor freight transportation and warehousing	0.0%	0.1%	0.1%

Table 5 Continued, Sample Concentration by Industry

2 Digit SIC Code	**Name of Industry**	*% of Surprise Portfolio 10 Sample*	*% of Full Sample*	*% of Surprise Portfolio 1 Sample*
42	U.S. Postal Service	0.8%	0.8%	1.1%
44	Water transportation	0.7%	0.4%	0.6%
45	Transportation by air	1.7%	0.8%	1.4%
46	Pipelines, except natural gas	0.1%	0.1%	0.0%
47	Transportation services	0.2%	0.3%	0.1%
48	Communications	2.7%	2.7%	3.1%
49	Electric, gas, and sanitary services	4.4%	4.5%	2.6%
50	Wholesale trade--durable goods	1.8%	2.2%	2.6%
51	Wholesale trade--nondurable goods	1.1%	1.2%	1.2%
52	Building materials, hardware, garden supply,	0.4%	0.3%	0.4%
53	General merchandise stores	0.8%	0.9%	1.1%
54	Food stores	0.7%	0.7%	0.5%
55	Automotive dealers and gasoline service	0.1%	0.3%	0.2%
56	Apparel and accessory stores	1.1%	1.1%	1.0%
57	Furniture, home furnishings and equipment	0.6%	0.7%	0.8%
58	Eating and drinking places	0.8%	1.5%	1.2%
59	Miscellaneous retail	1.5%	2.0%	2.3%
60	Depository institutions	6.7%	8.8%	3.9%
61	Nondepository credit institutions	0.9%	1.1%	1.1%
62	Security, commodity brokers, and services	1.3%	0.8%	0.4%
63	Insurance carriers	4.7%	3.8%	3.0%
64	Insurance agents, brokers, and service	0.3%	0.6%	0.3%
65	Real estate	0.3%	0.2%	0.4%
67	Holding and other investment offices	0.8%	1.0%	1.1%
70	Hotels, rooming houses, camps, and other	0.2%	0.4%	0.3%
72	Personal services	0.1%	0.3%	0.3%
73	Business services	8.7%	10.2%	12.7%
75	Automotive repair, services, and parking	0.1%	0.2%	0.3%
76	Miscellaneous repair services	0.0%	0.1%	0.1%
78	Motion pictures	0.6%	0.5%	0.7%
79	Amusement and recreational services	1.0%	0.8%	1.2%
80	Health services	0.9%	1.7%	1.4%
81	Legal services	0.0%	0.0%	0.0%
82	Educational services	0.2%	0.3%	0.2%
83	Social services	0.1%	0.2%	0.3%
87	Engineering and management services	1.0%	1.4%	1.5%
99	Misc	0.3%	0.3%	0.6%
Totals		100.0%	100%	100%

TABLE 6
Control-Firm-Adjusted Returns to Earnings Surprise Portfolios

***Surprise* Portfolio**	**N**	**Average Lower Bound of *Surprise* Portfolio**	**Mean *Surprise***	**Mean *ARet1yr***	**Mean *ARet2yr***	**Mean *ARet3yr***
1	14,638		-0.0397	-0.0484	-0.0524	-0.0739
2	14,562	-0.0120	-0.0062	-0.0276	-0.0218	0.0159
3	14,242	-0.0042	-0.0023	-0.0292	-0.0184	-0.0043
4	7,475	-0.0016	-0.0013	-0.0094	-0.0109	-0.0223
5	24,960	-0.0005	-0.0001	0.0033	0.0248	0.0689
6	12,273	0.0000	0.0002	-0.0012	0.0271	0.0243
7	15,868	0.0004	0.0007	0.0227	0.0693	0.0966
8	14,864	0.0011	0.0016	0.0456	0.1000	0.0962
9	14,661	0.0023	0.0033	0.0516	0.1180	0.1243
10	14,526	0.0052	0.0126	0.0854	0.1800	0.2127
Hedge Return (Portfolio 10 – Portfolio 1)				**0.1338**	**0.2324**	**0.2866**

The sample consists of 148,069 firm-quarters from 1988 to 2000 with the data necessary to calculate the *Surprise* variable from IBES and *ARet1yr* from CRSP. The ten portfolios based on the *Surprise* variable are not equal because the groups are defined by the decile cutoffs for the *Surprise* variable from the previous quarter (to avoid a look-ahead bias). Due to this adjustment, the actual sample begins in the second quarter of 1988. In the typical quarter more than 10 percent of the earnings surprises have the value of zero. In this case we assign all zeros the same decile rank. While this causes the portfolios adjacent to the portfolio of zeros to have proportionally fewer observations, it preserves the proper rank-ordering of the data. *Surprise* is the unadjusted IBES actual earnings per share for quarter *t* less the most recent IBES median forecast preceding the announcement date, scaled by the market price per share at the end of the fiscal quarter as reported by IBES. *ARet1yr*, *ARet2yr,* and *ARet3yr* are the differences in returns between a sample observation and a control firm matched on size and book-to-market; for each, the buy-and-hold stock returns are inclusive of all distributions, begin 2 days after the earnings announcement for quarter *t* and extend 1 year, 2 years or 3 years into the future, respectively. The control firm observation is from the same fiscal year and quarter, has a market value between 0.70 and 1.30 times the treatment firm's market value and has the closest book-to-market ratio within the matched size subset (the procedure is specified in Barber and Lyon [1997]). In the event of delisting, CRSP's delisting return is first used, adjusting for the delisting bias documented in Shumway [1997], followed by the return on a value-weighted market portfolio. The Hedge return is the mean return on portfolio 10 less the mean return on portfolio 1.

TABLE 7
Current and Future Characteristics of Firms in Earnings Surprise Portfolios

Panel A: Firm Characteristics at Time of *Surprise* Portfolio Formation

Earnings Surprise Portfolio	Mean Surprise	Mean Market Value ($M)	Mean Book To Market	Median Sales	Median CFO	Median GAAP Earnings	Mean Number of Analysts	Mean Forecast Std Dev	Mean 3-day Annc. Return
1	-0.0397	388	0.84	0.3921	0.0033	-0.0023	2.75	0.0801	-0.0256
2	-0.0062	1,089	0.66	0.2668	0.0142	0.0004	3.74	0.0512	-0.0164
3	-0.0023	1,725	0.56	0.2191	0.0165	0.0005	4.58	0.0402	-0.0119
4	-0.0013	2,506	0.54	0.2266	0.0181	0.0005	5.63	0.0377	-0.0093
5	-0.0001	3,091	0.45	0.1797	0.0137	0.0004	6.19	0.0217	-0.0027
6	0.0002	2,913	0.41	0.1692	0.0138	0.0004	6.45	0.0224	0.0035
7	0.0007	2,005	0.45	0.1884	0.0153	0.0005	5.68	0.0250	0.0115
8	0.0016	1,496	0.51	0.2225	0.0181	0.0006	4.80	0.0307	0.0171
9	0.0033	1,152	0.59	0.2677	0.0208	0.0008	4.12	0.0405	0.0236
10	0.0126	640	0.74	0.3754	0.0229	0.0011	3.17	0.0633	0.0322

Panel B: Firm Characteristics Over Three Years Subsequent to *Surprise* Portfolio Formation

Earnings Surprise Portfolio	Mean Surprise	Median 3-year Change in Sales	Median 3-year Change in CFO	Median 3-year Change in Earnings	Mean 3-year Change in Number of Analysts	Mean 3-year Change in Forecast Dispersion
1	-0.0397	3.611	0.1624	-0.0264	0.36	-0.0552
2	-0.0062	2.787	0.1970	0.0737	0.54	-0.0177
3	-0.0023	2.381	0.1979	0.0992	0.47	-0.0065
4	-0.0013	2.452	0.1949	0.1164	0.53	-0.0006
5	-0.0001	1.991	0.1748	0.1031	0.91	0.0017
6	0.0002	1.947	0.1724	0.1155	0.97	0.0024
7	0.0007	2.163	0.1939	0.1265	1.30	0.0024
8	0.0016	2.511	0.2073	0.1330	1.22	0.0012
9	0.0033	2.917	0.2322	0.1440	1.14	-0.0033
10	0.0126	3.951	0.2364	0.1321	1.05	-0.0228

The sample consists of 159,789 firm-quarters from 1988 to 2000 with the data necessary to calculate the Surprise variable from IBES and *Ret1yr* from CRSP. Surprise is the un-split-adjusted IBES actual earnings per share for quarter *t* less the most recent IBES median forecast preceding the announcement date, scaled by the market price per share at the end of the fiscal quarter as reported by IBES. Market Value is the market value of equity at the end of quarter *t* (#61 times #14). *Book to Market* is the book value of equity at the end of quarter *t* (#60) divided by the market value of equity at the end of quarter *t* (#61 times #14). Sales is Compustat data item #2, scaled by the market value of equity at the end of the fiscal quarter #61 times #14). Cash from Operations is defined as cash from operations for quarter *t* (#108), scaled by the market value of equity at the end of the fiscal quarter (#61 times #14). GAAP Earnings is basic earnings per share for quarter *t* (#19), scaled by the market price per share at the end of the fiscal quarter (#14). Number of Analysts is the number of analysts making earnings forecasts at quarter *t*, as reported by IBES. Forecast Std Dev is the standard deviation of analysts' earnings forecasts for quarter *t*, as reported by IBES. The 3-year change in Sales, CFO, and Earnings in Panel B are calculated as the sum of the particular variable from quarter *t+1* to quarter *t+12*, less the sum of the variable from quarter t-3 to t, scaled by the market value of equity at the end of quarter *t* (#61 times #14). The 3-year change in Number of Analysts and Forecast Dispersion is the difference between the variable at quarter *t+12* and quarter *t*. All variables are winsorized at 1% and 99%.

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