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Earnings Surprises, Growth Expectations, and Stock Returns or Don't Let an Earnings Torpedo Sink Your Portfolio

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Abstract. We provide new evidence that the inferior returns to growth stocks relative to value stocks are the result of expectational errors about future earnings performance. Our evidence demonstrates that growth stocks exhibit an asymmetric response to earnings surprises. We show that while growth stocks are at least as likely to announce negative earnings surprises as positive earnings surprises, they exhibit an asymmetrically large negative price response to negative earnings surprises. After controlling for this asymmetric price response, we find no remaining evidence of a return differential between growth and value stocks. We conclude that the inferior return to growth stocks is attributable to overoptimistic expectational errors that are corrected through subsequent negative earnings surprises.

Keywords: earnings surprises, earnings torpedoes, value, growth, glamour

JEL Classification: G14, M41

1. Introduction

It is well-established that 'growth' or 'glamour' stocks have historically underperformed other stocks in terms of realized stock returns over the five years after portfolio formation. We demonstrate that this phenomenon can be explained by the fact that growth stocks exhibit an asymmetric response to negative earnings surprises. We first show that growth stocks issue at least as many negative earnings surprises as positive earnings surprises. Rational expectations therefore implies that the negative expected return to negative earnings surprises be no larger in magnitude than the positive expected return to positive earnings surprises. In contrast, we find that the average realized negative return to negative earnings surprises is significantly larger in magnitude than the average realized positive return to positive earnings surprises. After controlling for the asymmetric response of growth stocks to negative earnings surprises, we show that there is no remaining evidence of a stock return differential between growth stocks and other stocks.

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Our results provide compelling evidence that the inferior returns to growth stocks are the result of expectational errors about future earnings performance. Existing research focuses on distinguishing among three explanations for the inferior returns to growth stocks. First, some argue that investors have overly optimistic expectations about the prospects of growth stocks, resulting in lower subsequent stock returns when these expectations are not met (Lakonishok, Shleifer and Vishny (LSV), 1994). Second, some argue that growth stocks are less risky (Fama and French (FF), 1992). Third, some argue that methodological problems with the measurement of long-term abnormal returns create the illusion of inferior returns to growth stocks (Fama, 1998; Kothari, Sabino and Zach, 1999). Our evidence is consistent with the first explanation and inconsistent with the second and third explanations.

Our paper also resolves the inconclusive evidence reported by La Porta, Lakonishok, Shleifer and Vishny (1997) and Bernard, Thomas and Wahlen (1997). These papers examine whether the differential stock returns between growth stocks and other stocks are clustered around earnings announcements, but report weak and inconclusive results. We provide more powerful tests by conditioning on the sign of the earnings surprise and by incorporating the price response to preannouncements of earnings news. These features of our research design are important, because negative earnings news is frequently preannounced for growth stocks (Skinner, 1994, 1997; Soffer, Thiagarajan and Walther, 2000). Consistent with the importance of controlling for preannouncements, we show that evidence of an asymmetric reaction to negative earnings surprises in growth stocks weakens considerably when focusing exclusively on earnings announcement date returns.

Finally, we show that the intertemporal performance of growth stocks relative to other stocks is directly related to intertemporal patterns in the relative proportion of growth stocks reporting negative earnings surprises. Thus, while growth stocks underperform on average, they systematically outperform other stocks in 'boom' periods during which a relatively low frequency of negative earnings surprises are reported. In short, our paper provides the most compelling evidence to date that the inferior returns to growth stocks are directly linked to expectational errors about future earnings performance.

The next section of the paper formulates our research hypothesis and empirical predictions. Section 3 describes our sample and research design, Section 4 presents the empirical results and Section 5 concludes.

2. Hypothesis and Empirical Predictions

Our primary objective is to test the hypothesis that the inferior stock returns experienced by growth stocks are attributable to expectational errors made by investors. Following previous research, we use the market-to-book ratio as our primary measure of growth (LSV, 1994). A specific behavioral explanation for the expectational error hypothesis is developed in more depth by LSV. The basic idea is that investors tend to set their expectations for long-run future sales and earnings growth too high for stocks with high past growth and/or high expected short-run future growth. These overoptimistic expectations lead to high pricing multiples, such as high market-to-book ratios. Over time, subsequent earnings announcements reveal that the optimistic expectations reflected in these pricing multiples are not sustainable, resulting in the inferior stock price performance.

The key to testing the expectational errors hypothesis is to first identify the subsequent events informing investors that their expectations are overoptimistic, and to then show that the inferior stock price performance is concentrated around these events. Existing papers employ two research designs in this respect. First, La Porta et al. (1997) and Bernard et al. (1997) examine the stock returns around future earnings announcement dates. If investors in growth stocks become aware of their expectational errors through subsequent earnings announcements, then the lower stock returns associated with growth stocks should be concentrated around these subsequent earnings announcements. These studies report mixed results. For example, La Porta et al. find that only about 20% of the inferior returns of growth stocks are concentrated around subsequent earnings announcements, and that this figure drops to about 15% for large firms. Further, the studies provide no statistical evidence that these percentages are significantly different from what would be expected by chance if the inferior returns were distributed evenly over time. An obvious shortcoming of this research design is that many firms preannounce earnings, and preannouncements are particularly prevalent in the case of negative earnings surprises in large growth firms (Skinner, 1994, 1997; Kasznik and Lev, 1995; Soffer, Thiagarajan and Walther, 2000).

The second type of research design focuses on the association between analysts' long-run forecasts of EPS growth and subsequent realizations of EPS growth and stock returns. Research by La Porta (1996) and Dechow and Sloan (1997) shows that analysts' long-run EPS forecasts are systematically overoptimistic for growth firms, and that the magnitude of the overoptimism in these forecasts is systematically related to the inferior stock price performance of growth firms. While the results of these studies are consistent with the expectational error hypothesis, they have been criticized on the grounds that analysts' expectations may not be representative of investors' expectations, and that the long-run abnormal stock returns used in these studies may be misspecified (Fama, 1998; Kothari, Sabino and Zach, 1999).

In this paper, we introduce a new research design that avoids the problems described above. Our research design is based on the premise that investors will revise downward their overoptimistic expectations for growth stocks in response to subsequent negative earnings surprises. This premise leads to two predictions. First, we predict an asymmetrically large negative stock return for growth stocks reporting negative earnings surprises. This asymmetrically large stock return arises as the negative earnings surprises causes investors to revise downwards their previously overoptimistic expectations. Second, we predict that the entire return differential between growth stocks and other stocks will be realized during periods in which negative earnings surprises are reported.

Our basic premise, that investors realize their expectations are overoptimistic upon observing negative earnings surprises, seems natural. There is little reason to believe that investors will revise their overoptimistic expectations downward for firms that are meeting or beating earnings expectations. Moreover, the financial press is replete with examples of growth firms experiencing large stock price declines in response to quite pedestrian negative earnings surprises.[1] Finally, we see no reason to believe that the competing risk and misspecification explanations for the inferior returns to growth stocks would predict that the inferior returns are concentrated around negative earnings surprises.

Our primary prediction is that growth stocks exhibit an asymmetrically large negative price response to negative earnings surprises. The relation between growth stocks and

(a) Unrelated:
The return differential between value and growth stocks is the same regardless of the subsequent earnings surprise

Stock Type	Earnings Surprise		
	Negative	Positive	All
Value	−4% (25%)	6% (25%)	1% (50%)
Growth	−6% (25%)	4% (25%)	−1% (50%)
All	−5% (50%)	5% (50%)	0% (100%)

(b) Asymmetric response to negative surprises:
The return differential between value and growth stocks is all concentrated in subsequent negative earnings surprise quarters

Stock Type	Earnings Surprise		
	Negative	Positive	All
Value	−3% (25%)	5% (25%)	1% (50%)
Growth	−7% (25%)	5% (25%)	−1% (50%)
All	−5% (50%)	5% (50%)	0% (100%)

Figure 1. Illustration of alternative hypothetical abnormal return combinations for portfolios of value and growth stocks over subsequent quarters, stratified by the nature of the subsequent quarterly earnings surprises. The numbers in parentheses represent the hypothetical relative frequencies with which stocks enter a cell.

earnings surprises has been previously studied by Basu (1977) and Dreman and Berry (1995). However, both of these studies predict that stock returns will be more pronounced for high (low) growth stocks reporting negative (positive) earnings surprises. In contrast, our predictions pertain only to high growth stocks reporting negative earnings surprises. This difference is crucial, because the stock return behavior predicted in these two prior studies would be expected even if the reaction to an earnings surprise was unrelated to the growth characteristics of the stock. We illustrate this point in Figure 1(a).

Figure 1(a) illustrates hypothetical average abnormal returns to growth and value stocks under the assumption that the return differential to growth and value stocks is realized regardless of the sign of the subsequent earnings surprise. The rows of the table report the average abnormal returns for value and growth stocks over a one-quarter holding period. For simplicity, we assume that value stocks have a 1% average abnormal return, while growth stocks have a −1% average abnormal return, and that stocks are distributed in equal numbers between the two categories. The columns report the abnormal returns stratified by the nature of the earnings surprise reported during the quarter. For simplicity, we assume that stocks reporting a positive earnings surprise have an average abnormal return of 5%

and stocks reporting a negative earnings surprise have an average abnormal return of −5%. We also assume that stocks are distributed 50% in each of the surprise categories (i.e., firms are equally likely to miss or beat expectations, but no firms exactly meet expectations).

The above assumptions provide the row and column totals of Figure 1(a). The distribution of the returns among the other cells depends on the relation between the growth characteristics and the stock price response to earnings surprises. Figure 1(a) is prepared under the assumption that the 2% return differential between growth and value stocks occurs regardless of the earnings surprise. For example, the average abnormal return for firms reporting a positive earnings surprise is 5%. Hence, growth firms reporting positive earnings surprises have an average abnormal return of 5% plus −1% to give 4%, while value firms reporting positive earnings surprises have an average abnormal return of 5% plus 1% to give 6%. The key feature of the returns in Figure 1(a) is that the average return differential between growth and value stocks is the same regardless of the sign of the earnings surprise. Thus, this table presents exactly the relation that would be expected if the two effects were completely unrelated, as predicted by Basu (1977) and Dreman and Berry (1995). Average abnormal returns are more pronounced for growth (value) stocks reporting negative (positive) earnings surprises.

Figure 1(b) illustrates the average abnormal returns to growth and value stocks under the assumption that the return differential to growth and value stocks is concentrated in subsequent negative earnings surprise quarters. The row and column totals are prepared using the same assumptions used in Figure 1(a). However, the distribution of the returns between the other cells is different from Figure 1(a). The average abnormal returns for firms reporting positive earnings surprises are the same regardless of the value/growth classification. The entire differential between value and growth stocks is concentrated in firms reporting negative earnings surprises. Because only 50% of securities are assumed to report negative surprises, the average return differential between value and growth stocks is magnified to 4% for these securities, thus maintaining the average differential across all stocks of 2%. The key feature of Figure 1(b) is that the differential returns for growth and value stocks are only realized during quarters when negative earnings surprises are reported. Figure 1(b) illustrates the two key predictions that we test in this study. First, we see a large asymmetric negative reaction to negative earnings surprises in growth stocks. Second, there is no evidence of a value/growth return differential in stocks reporting positive earnings surprises, indicating that the value/growth return differential is entirely concentrated in firms reporting negative earnings surprises.

Our third and final prediction concerns the timing of the return differential. Our version of the expectational hypothesis predicts that the differential returns to growth and value stocks will be concentrated around the release date of negative earnings news. Evidence in support of this prediction would corroborate the link between the differential return behavior and earnings surprises. Such evidence is not presented in either Basu (1977) or Dreman and Berry (1995). Past research by La Porta et al. (1997) and Bernard et al. (1997) focuses on the returns to growth and value stocks during short (2–3 day) windows centered on quarterly earnings announcement dates. However, as described earlier, there has been a growing trend for management to preannounce earnings (Skinner, 1994, 1997; Kasznik and Lev, 1995; Soffer, Thiagarajan and Walther, 2000). The evidence indicates that preannouncements predominantly convey adverse earnings news,[2] and are more likely in litigation intensive industries, which tend to be industries with high growth firms (e.g., computer hardware and software, drugs, electrical equipment, and retail). By announcing adverse earnings news early, these firms accelerate the associated stock price decline, thus avoiding large stock price declines on the earnings announcement date and reducing the expected costs of any potential stockholder litigation.[3] This evidence suggests that negative earnings surprises in growth firms are particularly prone to preannouncement. Since these observations are also those that we hypothesize will exhibit an asymmetrically large stock price response to earnings news, our research design uses a return measurement interval designed to capture preannouncements.

3. Sample and Research Design

We obtain quarterly earnings forecasts from the I/B/E/S historical database, which contains 139,027 observations with non-missing data on the consensus forecast of quarterly earnings, realized quarterly earnings, and stock prices between 1984 and 1996. We use the consensus forecast provided by I/B/E/S in the final month of the fiscal quarter for which earnings is being forecast. I/B/E/S collects the forecast data through the first half of the month and releases the forecast data around the middle of the month. Thus, we can be sure that the forecasts do not contain any information from earnings preannouncements made after the middle of the final month of the quarter.[4] We also require that sample firms have the required data to compute the growth/value measures (described below) on COMPUSTAT and daily stock return data for at least one quarter on CRSP. These requirements reduce the final sample size to 103,274 firm-quarter observations.

Our research design consists of classifying firm-quarters on the basis of growth/value characteristics and tracking their subsequent stock return and earnings surprise characteristics. Prior research shows that the differential returns to growth and value stocks persist for five years after the date the growth/value characteristics are measured (LSV). We therefore track stock return and earnings surprise characteristics for the 20 quarters that follow the measurement of the growth/value characteristics. For example, growth/value characteristics measured using data from the fourth quarter of 1989 are related to stock returns and earnings surprises for each of the subsequent 20 quarters (i.e., the first quarter of 1990 through the fourth quarter of 1994).

We measure growth/value characteristics in a similar manner to previous research. We focus on the market-to-book ratio, since this variable has received the most attention in previous research. We measure market-to-book (MB) as the market value of outstanding shares at the end of the quarter divided by book value of common equity at the end of the quarter. We also report results using the price-to-trailing earnings ratio (PE) and the I/B/E/S median analyst forecast of long-term earnings growth.

We measure the earnings surprise for a quarter by subtracting the median forecast of quarterly EPS from realized quarterly EPS. We then create three indicator variables, which we label SURPRISE, GOOD, and BAD. SURPRISE takes on the value of -1 if the earnings surprise is negative, 0 if the earnings surprise is 0, and 1 if the earnings surprise is positive. GOOD takes on the value of 1 if the earnings surprise is positive and zero otherwise. BAD takes on the value of 1 if the earnings surprise is negative and zero otherwise. Finally, we create a continuous variable that captures both the sign and magnitude of the forecast error, which we label FE. FE is the earnings surprise divided by the stock price at the end of the final month of the fiscal quarter for which earnings is being forecast. We winsorize the 1% tails of this variable to mitigate outlier problems.

Throughout the paper we compute stock returns as buy-hold with-dividend stock returns and compute abnormal returns by subtracting the return over the corresponding period on a size-matched portfolio.[5] The size-matched portfolio is constructed by allocating all firm-quarter observations in our sample to decile portfolios on the basis of market capitalization at the beginning of the quarter. An equal-weighted portfolio return is computed for each size portfolio in each quarter. Raw buy-hold returns for individual securities are then adjusted by subtracting the return on the portfolio to which the security belongs based on its market capitalization at the beginning of the quarter. Our objective is to examine stock return behavior over the 20 quarters following the measurement of the growth/value characteristics and to relate the returns to the earnings surprises reported in each of these 20 quarters. To this end, we cumulate abnormal returns over four different intervals for each quarter. These intervals are illustrated in Figure 2.

The first abnormal return measurement interval begins two days after the announcement of earnings for the previous quarter and ends the day after the announcement of earnings for the current quarter. We obtain quarterly earnings announcement dates from COMPUSTAT. We refer to the quarterly return measured over this interval as 'fullret.' This interval averages 63 trading days in length. We next divide this interval into two sub-intervals, the later of which is designed to capture earnings-related announcements. The first interval begins two days after the announcement of earnings for the prior quarter and ends thirteen trading days before the end of the current fiscal quarter. The second interval begins twelve trading days before the end of the current fiscal quarter and ends the day after the announcement

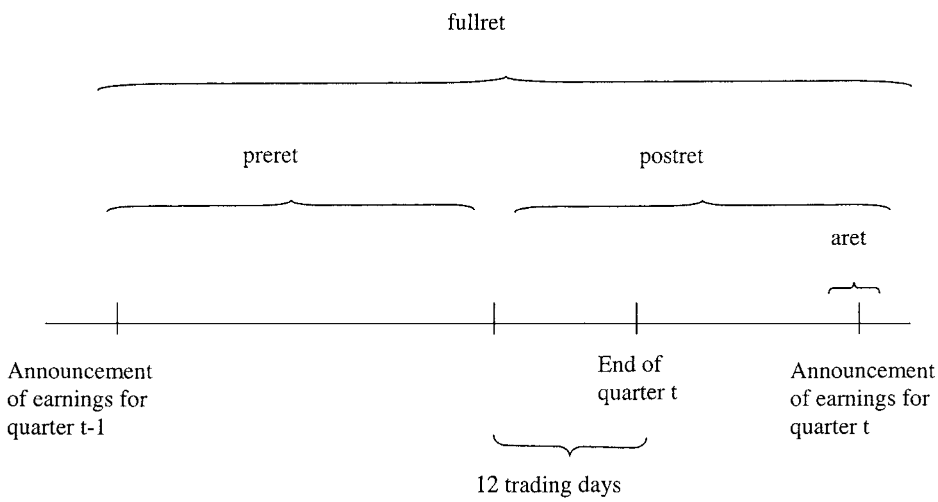

Figure 2. Illustration of the alternative intervals over which the abnormal stock return relating to the announcement of earnings for quarter t is measured.

of earnings for the current quarter. Evidence in Skinner (1997) and Soffer et al. (2000) indicates that over 75% of all earnings preannouncements occur within two weeks on either side of the fiscal quarter end, so we expect the large majority of earning surprises to be announced during this second interval. The two intervals each average 31 trading days in length, so return comparisons across the two intervals are simplified. We refer to the stock returns cumulated over the first interval as 'preret' and over the second interval as 'postret.' Finally, we measure stock returns around the quarterly earnings announcement date, which we define as the three-day period beginning one day prior to the earnings announcement date and ending on the day after the announcement date. We use this return measurement interval for comparisons with prior research that also uses this interval (La Porta et al., 1997; Bernard et al., 1997). We expect this interval to miss much of the response to negative earnings surprises since most adverse earnings news tends to be preannounced. We refer to the return measured over this interval as 'aret.'

4. Empirical Results

We begin by reporting descriptive evidence on each of our predictions after which we provide formal statistical tests of our predictions using regression analysis. We then conduct robustness tests using alternative measures to classify firms as 'growth' or 'glamour' stocks. Finally, we report on the intertemporal relation between earnings surprises and the return differential between growth and value stocks.

4.1. Descriptive Evidence

Table 1 provides descriptive evidence on the relation between the MB effect and earnings surprises. This table stratifies our sample of firm-quarter observations into quintiles based on the MB ratio and then divides each quintile into three categories based on the sign of the earnings surprise. Each of the resulting 15 cells in Table 1 reports the mean quarterly abnormal stock returns (fullret). Each cell also reports the number of observations falling into that cell and the proportion of each row's observations falling into that cell. The column at the far right and the row at the bottom of the table report the grand averages across the earnings surprise portfolios and the growth portfolios respectively.

Focusing first on the rightmost column, we see clear evidence of the previously documented MB effect in returns. The average abnormal return declines monotonically from 0.66% for the low growth quintile to −0.58% for the high growth quintile. This represents a 1.24% quarterly differential, which translates into a 5.05% compound annual return differential. This return differential is somewhat smaller than the 8–10% differential reported in previous research, such as Lakonishok et al. (1994). However, their research design is based on decile portfolios, and is not restricted to firms for which analysts' forecasts are available. Moving to the bottom row, we see the well-documented return differential between firms reporting negative versus positive earnings surprises. The average quarterly abnormal return for firms reporting negative surprises is −5.04% while the corresponding return for positive surprises is 5.50%. Firms reporting a zero surprise report a positive return of 1.63%. This latter result reflects the fact that firms are more likely to report a negative surprise (47.8%) than

Table 1. Mean quarterly abnormal stock returns over the subsequent twenty quarters for portfolios of stocks formed on growth and the sign (positive, negative, or zero) of the subsequent quarterly earnings surprise.

	Earnings Surprise Portfolio			
	Negative	Zero	Positive	All
Growth portfolio				
1 (Low growth)	−3.57% 138,752 (50.0%)	1.13% 17,143 (6.2%)	5.44% 121,439 (43.8%)	0.66% 277,334 (100%)
2	−3.91% 136,405 (49.0%)	2.01% 23,803 (8.6%)	4.93% 117,842 (42.4%)	0.35% 278,050 (100%)
3	−4.89% 134,089 (48.3%)	1.71% 31,214 (11.3%)	5.29% 112,127 (40.4%)	−0.03% 277,430 (100%)
4	−5.82% 130,977 (47.3%)	1.54% 42,049 (15.2%)	5.65% 104,034 (37.5%)	−0.40% 277,060 (100%)
5 (High growth)	−7.32% 122,099 (44.1%)	1.65% 52,789 (19.1%)	6.32% 102,051 (36.8%)	−0.58% 276,939 (100%)
All growth portfolios	−5.04% 662,322 (47.8%)	1.63% 166,998 (12.0%)	5.50% 557,493 (40.2%)	0.00% 1,386,813 (100%)

Growth is measured using the MB ratio (low MB = low growth, high MB = high growth). Stock returns are cumulated over the period beginning two days following the announcement of earnings for the previous quarter and ending on the day following the announcement of earnings for the current quarter (Fullret). Each cell reports the mean abnormal portfolio stock return, the number of observations in the portfolio, and the percentage of that row's observations falling into that cell. Abnormal returns are computed using a decile-based size adjustment.

a positive surprise (40.2%) so that a zero surprise for the remaining firms (12.0%) is actually a better than expected outcome. The fact that there are more negative surprises than positive surprises overall reflects the previously documented average over-optimism in sell-side analysts' earnings forecasts for our sample period (Abarbanell and Lehavy, 2000; Brown, 2001).

Table 1 provides descriptive evidence on our first two predictions. Recall from Figure 1(b) that these predictions require that all of the MB return differential is concentrated in the negative earnings surprise portfolios. The evidence in Table 1 shows this to be the case. The mean abnormal returns for the zero and positive surprise portfolios show no systematic trend as a function of growth. If anything, the high growth portfolio returns actually seem to be slightly higher than the low growth portfolio returns, opposite to what is necessary to explain the overall value vs. growth effect. However, the negative surprise portfolios tell a different story. The mean abnormal returns decline monotonically across growth portfolios from a high of −3.57% for portfolio 1 to a low of −7.32% for portfolio 5. The pattern of returns clearly coincides with the asymmetric response to negative surprises depicted in Figure 1(b), rather than with the unrelated effects depicted in Figure 1(a). This pattern indicates that the predictable lower returns for high MB firms are realized when these firms subsequently report negative earnings surprises.

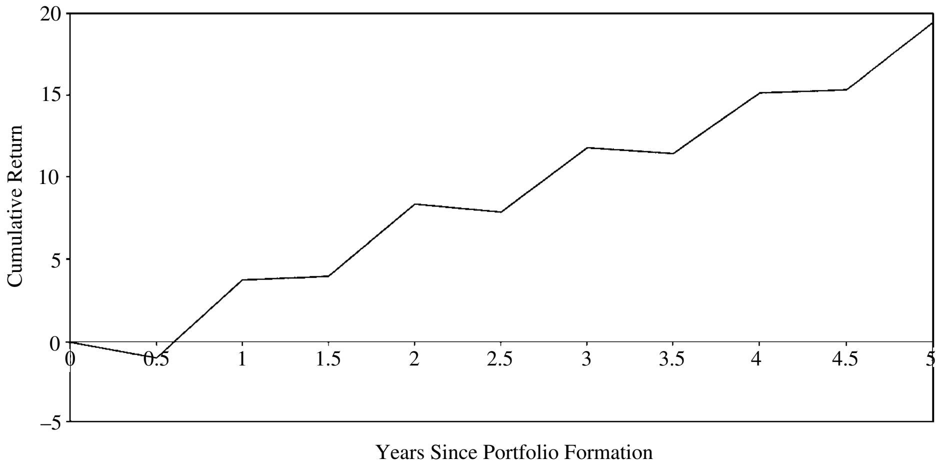

Figure 3. Cumulative average abnormal return for a MB (market-to-book) hedge portfolio over the five years following portfolio formation. The hedge portfolio consists of a long position in the lowest quintile of MB stocks and a short position in the highest quintile of MB stocks for each of the firm-quarters in our sample. Returns for the first half of each year are cumulated over the four quarterly 'Preret' periods during which very little earnings information is typically released. Returns for the second half of each year are cumulated over the four quarterly 'Postret' periods, during which most earnings information is typically released.

Our third prediction is that the asymmetric returns to growth and value are concentrated around the release of earnings news. Figure 3 provides descriptive evidence on this prediction. Figure 3 plots the returns to a hedge portfolio that takes a long position in a portfolio of low MB stocks and an offsetting short position in a portfolio of high MB stocks. We assign stocks to quintiles based on MB at the end of each quarter and then track the mean stock returns for each quintile over the subsequent five years. The hedge portfolio returns are computed by subtracting the highest quintile mean returns from the lowest quintile mean returns. To distinguish between the stock price movements attributable to earnings news versus other factors, such as risk, we divide each of the annual returns into two components. The first component represents the cumulative abnormal return over the four quarterly 'preret' periods. Recall that the 'preret' return period begins two days after the announcement of last quarter's earnings and ends 13 days before the end of the fiscal quarter and so excludes the release of earnings news, including earnings preannouncements. The second component represents the cumulative abnormal return over the four quarterly 'postret' return periods which begins 12 days before the end of the quarter and ends on the day after the earnings announcement, and so captures the release of earnings news, including any preannouncements. Our third prediction is that the returns to the MB hedge portfolio will be concentrated in the 'postret' period.

Consistent with previous research (Fama and French, 1992; Lakonishok et al., 1994), Figure 3 demonstrates that our MB hedge portfolio yields systematic positive returns. The cumulative five-year return is just below 20%. This return differential is somewhat smaller than that documented in previous research for three reasons. First, we use quintiles rather than deciles, so differences between the extreme portfolios are smaller. Second, by restricting the sample to the larger, more closely followed stocks in I/B/E/S, we restrict attention to stocks for which these types of strategies are typically less profitable.[6] Third, our sample period is concentrated in the 1980s and 1990s, where the MB effect is somewhat weaker than in the 1960s and 1970s. The important feature of Figure 3 is that the return differential is clearly concentrated in the second half of each 'year' (postret) as we see from the steeper slope in that interval, which provides clear evidence that the MB return differential is concentrated around the release of earnings news. Returns during the first half of the 'year' (preret) account for less than 20% of the total predictable returns to the MB hedge portfolio.

To illustrate the asymmetric response of returns to earnings news for growth stocks, Figure 4 plots quarterly abnormal returns (fullret) against earnings surprises (FE) separately for growth and value stocks.[7] Figure 4 clearly shows how the relation between stock returns and earnings surprises differs between growth and value stocks. For value stocks the relation is fairly symmetric—for both positive and negative surprises the return/earnings relation looks similar, with returns increasing in the magnitude of the earnings surprise to a maximum of a little over 5% in absolute value for both good and bad news.[8] For growth stocks we see a very different response to positive and negative surprises. When earnings news is positive, returns climb steeply over a small range of forecast error, to a maximum a little over 10% (thus even when the news is good, the reaction is stronger for growth stocks). However, when firms miss their forecasts the effect is dramatic. For even small forecast errors (of less than 0.5% of stock price) the stock price reaction declines rapidly into the −10% to −15% range, and continues to decline beyond this, into the −15% to −20% range. The sharp

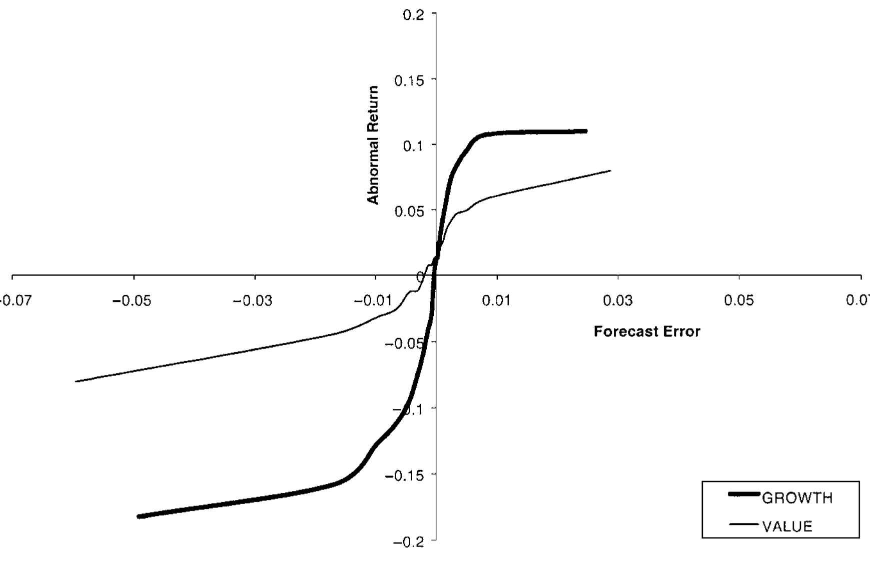

Figure 4. Earnings surprise response functions for value and growth stocks. This graph plots the quarterly abnormal returns for value and growth stocks respectively as a function of the magnitude of the quarterly earnings forecast error. Each plot is formed by dividing the stocks into 20 portfolios based on the magnitude of the forecast error, and then plotting the mean portfolio abnormal returns and forecast errors. The resulting points are joined using smoothed lines.

drop is the earnings "torpedo"—the fact that missing analysts' forecasts, even by small amounts, causes disproportionately large stock price declines. It is also clear from Figure 4 that when earnings news is positive, growth stocks outperform value stocks, but that when growth stocks disappoint, they underperform value stocks by substantially more than they outperform when the news is good (i.e., the area between the two plots is much greater in the negative forecast region than in the positive forecast region). As our regressions show, it is this large differential reaction to bad news that accounts for the overall underperformance of growth stocks. We turn to these regressions next.

4.2. Regression Analysis

In this section, we provide statistical tests of our predictions using regression analysis. We begin in Table 2 by regressing stock returns on growth portfolio membership and both the sign of the earnings surprise and the magnitude of the earnings surprise. We further allow for a growth variable interaction with each of these explanatory variables. The purpose of these regressions is to demonstrate that the negative relation between growth and future stock returns (the MB effect) is robust to the inclusion of various earnings surprise metrics including those that control for the magnitude of the earnings surprise. These regressions do not allow for an asymmetric response to negative earnings surprises. In Table 3, we allow for an asymmetric response to negative earnings surprises using the following regression model:

$$R_{it\tau} = \alpha + \beta_1 \cdot \text{Growth}_{it} + \beta_2 \cdot \text{Good}_{it\tau} + \beta_3 \cdot \text{Bad}_{it\tau} + \beta_4 \cdot (\text{Good}_{it\tau} * \text{Growth}_{it}) + \beta_5 \cdot (\text{Bad}_{it\tau} * \text{Growth}_{it}) + \varepsilon_{it\tau} \quad (1)$$

where

i indexes firms, t indexes calendar quarters in which growth portfolio assignments are made, and τ indexes the 20 subsequent quarters over which we track returns and earnings surprises for each growth (firm-quarter) observation;

Growth_{it} = growth quintile to which firm i is assigned in quarter t (0 = low growth quintile, ... 4 = high growth quintile);

$R_{it\tau}$ = the announcement-to-announcement (fullret) abnormal stock return for firm i in quarter $t + \tau$;

$\text{Good}_{it\tau}$ = indicator variable taking the value of 1 if the firm-quarter observation reports a positive earnings surprise in quarter $t + \tau$ and 0 otherwise;

$\text{Bad}_{it\tau}$ = indicator variable taking the value of 1 if the firm-quarter observation reports a negative earnings surprise in quarter $t + \tau$ and 0 otherwise.

As an alternative specification, we also estimate regressions of the following form, and report these results in Table 4:

$$R_{it\tau} = \alpha + \beta_1 \cdot \text{Growth}_{it} + \beta_2 \cdot \text{Good}_{it\tau} + \beta_3 \cdot \text{Bad}_{it\tau} + \beta_4 \cdot \text{FE}_{it\tau} + \beta_5 \cdot (\text{Good}_{it\tau} * \text{Growth}_{it} * \text{FE}_{it\tau}) + \beta_5 \cdot (\text{Bad}_{it\tau} * \text{Growth}_{it} * \text{FE}_{it\tau}) + \varepsilon_{it\tau} \quad (2)$$

Table 2. Estimated coefficients (adjusted t-statistics) from regressions of quarterly stock returns ('fullret') on 'growth' portfolio membership, the sign of the earnings surprise for that quarter (defined as −1, 0, or +1), and the analysts' forecast error for the quarter.

Quarters from: (Number of Obs.)	Intercept	Growth	Surprise	Surprise ∗ Growth	Forecast Error	Forecast Error ∗ Growth	Adjusted R-Squared
Year 1	0.0014	−0.0014					0.02%
(n = 349,678)	(1.25)	(−3.06)					
	0.0078	−0.0034	0.0476	0.0058			8.02%
	(7.07)	(−7.41)	(41.38)	(12.00)			
	0.0144	−0.0022	0.0110	0.0094	4.0602	0.5498	10.59%
	(13.07)	(−4.98)	(6.78)	(14.71)	(29.76)	(7.99)	
Year 2	0.0059	−0.0029					0.05%
(n = 305,416)	(5.01)	(−6.13)					
	0.0085	−0.0020	0.0437	0.0054			7.50%
	(7.54)	(−4.42)	(37.11)	(10.96)			
	0.0135	−0.0020	0.0113	0.0077	3.5877	0.5867	9.96%
	(11.99)	(−4.45)	(6.72)	(11.69)	(25.81)	(8.87)	
Year 3	0.0046	−0.0023					0.03%
(n = 269,864)	(3.77)	(−4.64)					
	0.0066	−0.0012	0.0405	0.0056			7.35%
	(5.66)	(−2.46)	(33.47)	(11.10)			
	0.0110	−0.0011	0.0093	0.0075	3.2185	0.6377	9.72%
	(9.46)	(−2.21)	(5.31)	(10.82)	(22.14)	(9.06)	
Year 4	0.0045	−0.00239					0.03%
(n = 241,668)	(3.67)	(−4.50)					
	0.0056	−0.0009	0.0371	0.0062			7.12%
	(4.65)	(−1.74)	(29.82)	(11.97)			
	0.0094	−0.0006	0.0081	0.0069	2.8238	0.7371	9.62%
	(7.91)	(−1.22)	(4.45)	(9.62)	(19.09)	(10.47)	
Year 5	0.0051	−0.0026					0.08%
(n = 220,185)	(4.14)	(−5.06)					
	0.0061	−0.0014	0.0358	0.0058			7.02%
	(5.10)	(−2.88)	(28.45)	(11.97)			
	0.0097	−0.0012	0.0080	0.0062	2.5912	0.6880	9.45%
	(8.06)	(−2.36)	(4.25)	(8.38)	(17.53)	(9.92)	
All 20 quarters	0.0065	−0.0032					0.06%
(n = 1,386,813)	(5.36)	(−6.56)					
	0.0092	−0.0026	0.0414	0.0059			7.49%
	(7.89)	(−5.36)	(34.12)	(11.67)			
	0.0137	−0.0025	0.0123	0.0070	3.1803	0.5842	9.80%
	(11.74)	(−5.28)	(7.15)	(10.19)	(21.53)	(8.39)	

Growth portfolios are MB quintiles (low MB = quintile 0, low MB = quintile 4). Growth portfolios are formed at the beginning of Year 1, and regressions employ returns and earnings data over the subsequent twenty quarters, reported in annual blocks of four quarters. We estimate regressions of the following form:

$$R_{it\tau} = \alpha + \beta_1 \cdot \text{Growth}_{it} + \beta_2 \cdot (\text{Surprise}_{it\tau} * \text{Growth}_{it}) + \beta_3 \cdot \text{FE}_{it\tau} + \beta_4 \cdot (\text{FE}_{it\tau} * \text{Growth}_{it}) + \varepsilon_{it\tau},$$

where

$R_{it\tau}$ = the size-adjusted stock return (where the size adjustment is the return on the corresponding CRSP size-decile portfolio) for firm i in quarter $t\tau$, where t indexes calendar quarters and τ indexes the 20 subsequent quarters over which we estimate these regressions;

Growth_{it} = the growth quintile into which firm i was assigned in quarter t (where 0 denotes the low growth quintile and 4 denotes the high growth quintile) and growth is measured as the firm's market-to-book (MB) ratio at the end of quarter t;

$\text{FE}_{it\tau}$ = Realized EPS for firm i in quarter $t\tau$ minus the corresponding consensus analyst forecast of EPS, deflated by the firm's stock price at the end of fiscal quarter $t\tau$; and

$\text{Surprise}_{it\tau}$ = −1 if $\text{FE}_{it\tau}$ is negative, +1 if $\text{FE}_{it\tau}$ is positive, and 0 otherwise.

The t-statistics are adjusted for cross-correlation in the residuals resulting from multiple appearances of the R_{it} observations.

Table 3. Estimated coefficients (adjusted t-statistics) from regressions of quarterly stock returns ('fullret') on 'growth' portfolio membership, good (bad) news indicator variables coded one if the earnings surprise is positive (negative) and zero otherwise, and interaction terms.

Quarters from: (No. of Obs.)	Intercept	Growth	Good	Bad	Good ∗ Growth	Bad ∗ Growth	Adjusted F-Statistic (p-Value)	Adjusted R-Squared
Year 1	0.0163	0.0012	0.0388	−0.0561	0.0016	−0.0099	8.80	8.14%
(n = 349,678)	(4.27)	(0.97)	(9.28)	(−13.66)	(1.04)	(−6.72)	(0.0030)	
Year 2	0.0112	0.0019	0.0411	−0.0462	0.0003	−0.0103	11.24	7.58%
(n = 305,416)	(2.81)	(1.37)	(9.44)	(−10.71)	(0.19)	(−6.62)	(0.0008)	
Year 3	0.0132	0.0011	0.0338	−0.0473	0.0025	−0.0086	3.92	9.72%
(n = 269,864)	(3.15)	(0.74)	(7.46)	(−10.53)	(1.52)	(−5.34)	(0.0477)	
Year 4	0.0092	0.0023	0.0336	−0.0407	0.0021	−0.0102	6.48	7.63%
(n = 241,669)	(2.14)	(1.56)	(7.20)	(−8.78)	(1.23)	(−6.14)	(0.0109)	
Year 5	0.0090	0.0018	0.0330	−0.0386	0.0017	−0.0097	6.12	7.08%
(n = 220,186)	(2.09)	(1.16)	(7.01)	(−8.27)	(1.00)	(−5.76)	(0.0137)	
All 20 quarters	0.0158	0.0020	0.0347	−0.0481	0.0022	−0.0095	5.80	7.57%
(n = 1,386,813)	(3.81)	(1.48)	(7.70)	(−10.78)	(1.33)	(−5.95)	(0.0160)	

Growth portfolios are MB quintiles (low MB = quintile 0, high MB = quintile 4). Growth portfolios are formed at the beginning of Year 1, and regressions employ returns and earnings data measured over the subsequent twenty quarters, reported in annual blocks of four quarters. We estimate regressions of the following form:

$$R_{it\tau} = \alpha + \beta_1 \cdot \text{Growth}_{it} + \beta_2 \cdot \text{Good}_{it\tau} + \beta_3 \cdot \text{Bad}_{it\tau} + \beta_4 \cdot (\text{Good}_{it\tau} * \text{Growth}_{it}) + \beta_5 \cdot (\text{Bad}_{it\tau} * \text{Growth}_{it}) + \varepsilon_{it\tau},$$

where

$R_{it\tau}$ = the market-adjusted stock return (where the market return is the CRSP value-weighted market index) for firm i in quarter $t\tau$, where t indexes calendar quarters and τ indexes the 20 subsequent quarters over which we estimate these regressions;

Growth_{it} = the growth quintile into which firm i falls in quarter t (where 0 denotes the low growth quintile and 4 denotes the high growth quintile) and growth is measured as the firm's market-to-book (MB) ratio at the end of quarter t;

$\text{Good}_{it\tau}$ = 1 if $\text{FE}_{it\tau}$ is positive, and 0 otherwise; and

$\text{Bad}_{it\tau}$ = 1 if $\text{FE}_{it\tau}$ is negative, and 0 otherwise.

The F-statistic is from an F-test is of the restriction that $\beta_4 = -\beta_5$.
The t-statistics and F-statistics are adjusted for cross-correlation in the residuals resulting from multiple appearances of the R_{it} observations.

where all variables are as defined above and $\text{FE}_{it\tau}$ is the forecast error defined as realized EPS for firm i in quarter $t + \tau$ minus the corresponding consensus analyst forecast of EPS, deflated by the firm's stock price at the end of fiscal quarter $t + \tau$. This specification allows for a differential (good vs. bad) stock price response *per unit of earnings surprise* across growth quintiles, and so allows for an asymmetric response that is a function of the magnitude of the forecast error. Specification (2) is thus the appropriate specification if investors react asymmetrically to both the sign and the magnitude of negative earnings surprises in growth stocks, while (1) is more appropriate if the asymmetric reaction is a function of the sign, but not the magnitude, of the surprise. We find that specification (1) explains the value vs. growth phenomenon better than (2), consistent with the idea that missing analysts' forecasts by even small amounts results in large stock price declines for growth stocks.

Table 4. Estimated coefficients (adjusted t-statistics) from regressions of quarterly stock returns ('fullret') on 'growth' portfolio membership, good (bad) news indicator variables coded one if the earnings surprise is positive (negative) and zero otherwise, forecast error, and growth interaction terms conditioned on the sign of the earnings surprise.

Quarters from: (No. of Obs.)	Intercept	Growth	Good	Bad	FE	Good ∗ Growth ∗ FE	Bad ∗ Growth ∗ FE	Adjusted R-Squared
Year 1	0.0220	−0.0010	0.0232	−0.0400	2.7873	0.6220	1.4270	10.47%
(n = 349,678)	(10.36)	(−2.03)	(10.74)	(−19.07)	(25.08)	(6.89)	(22.78)	
Year 2	0.0183	−0.0009	0.0231	−0.0335	2.5341	0.5677	1.3300	9.87%
(n = 305,416)	(8.20)	(−1.73)	(10.15)	(−14.96)	(21.95)	(6.16)	(21.31)	
Year 3	0.0164	−0.0002	0.0200	−0.0316	2.2227	0.7265	1.3001	9.63%
(n = 269,864)	(7.06)	(−0.32)	(8.40)	(−13.48)	(19.89)	(7.98)	(20.84)	
Year 4	0.0146	0.0002	0.0177	−0.0291	1.9094	0.8574	1.3297	9.54%
(n = 241,669)	(6.09)	(0.38)	(7.19)	(−12.95)	(16.54)	(9.74)	(21.48)	
Year 5	0.0137	−0.0001	0.0176	−0.0262	1.7797	0.7000	1.2608	9.40%
(n = 220,186)	(5.60)	(−0.11)	(7.00)	(−10.51)	(15.61)	(8.34)	(20.84)	
All 20 quarters	0.0193	−0.0012	0.0217	−0.0337	2.2370	0.5207	1.2889	9.78%
(n = 1,386,813)	(8.35)	(−2.29)	(9.18)	(−14.43)	(18.97)	(6.05)	(20.88)	

Growth portfolios are MB quintiles (low MB = quintile 0, high MB = quintile 4). Growth portfolios are formed at the beginning of Year 1, and regressions employ returns and earnings data measured over the subsequent twenty quarters, reported in annual blocks of four quarters. We estimate regressions of the following form:

$$R_{it\tau} = \alpha + \beta_1 \cdot \text{Growth}_{it} + \beta_2 \cdot \text{Good}_{it\tau} + \beta_3 \cdot \text{Bad}_{it\tau} + \beta_4 \cdot \text{FE}_{it\tau} + \beta_5 \cdot (\text{Good}_{it\tau} * \text{Growth}_{it} * \text{FE}_{it\tau}) + \beta_5 \cdot (\text{Bad}_{it\tau} * \text{Growth}_{it} * \text{FE}_{it\tau}) + \varepsilon_{it\tau},$$

where

$R_{it\tau}$ = the market-adjusted stock return (where the market return is the CRSP value-weighted market index) for firm i in quarter $t\tau$, where t indexes calendar quarters and τ indexes the 20 subsequent quarters over which we estimate these regressions;

Growth_{it} = the growth quintile into which firm i falls in quarter t (where 0 denotes the low growth quintile and 4 denotes the high growth quintile) and growth is measured as the firm's market-to-book (MB) ratio at the end of quarter t;

$\text{FE}_{it\tau}$ = Realized EPS for firm i in quarter $t\tau$ minus the corresponding consensus analyst forecast of EPS, deflated by the firm's stock price at the end of fiscal quarter $t\tau$; and

$\text{Good}_{it\tau}$ = 1 if $\text{FE}_{it\tau}$ is positive, and 0 otherwise; and

$\text{Bad}_{it\tau}$ = 1 if $\text{FE}_{it\tau}$ is negative, and 0 otherwise.

The t-statistics are adjusted for cross-correlation in the residuals resulting from multiple appearances of the R_{it} observations.

We also estimate specification (1) using alternative return measurement intervals in the dependent variable and report these results in Table 5. These regressions illustrate that the MB effect and its relation to earnings surprises are concentrated in the 'postret' return measurement interval, when most earnings news is released.

Our basic sample consists of approximately 103,000 firm-quarters, giving us potentially 2.06 million regression observations as we track each firm-quarter over the subsequent 20 quarters. The actual 'full' sample is on the order of 1.4 million observations, primarily because we lose firm-quarters outside the end of our sample period as we move forward through the 20 quarters, and because of missing earnings announcement dates. We conduct

Table 5. Estimated coefficients (adjusted t-statistics) from regressions of stock returns measured over various intervals on 'growth' portfolio membership, good (bad) news indicator variables coded one if the earnings surprise is positive (negative) and zero otherwise, and interaction terms.

Return Measurement Interval	Intercept	Growth	Good	Bad	Good ∗ Growth	Bad ∗ Growth	Adjusted F-Statistic (p-Value)	Adjusted R-Squared
Fullret	0.0065 (5.36)	−0.0032 (−6.56)						0.06%
Fullret	0.0158 (3.81)	0.0002 (0.15)	0.0347 (7.70)	−0.0481 (−10.78)	0.0022 (1.33)	−0.0095 (−5.95)	5.80 (0.0160)	7.57%
Preret	0.0009 (1.20)	−0.0005 (−1.47)						0.00%
Preret	0.0048 (1.72)	0.0010 (0.97)	0.0097 (3.18)	−0.0195 (−5.27)	0.0001 (0.12)	−0.0034 (−3.14)	2.48 (0.1153)	1.68%
Postret	0.0053 (5.94)	−0.0026 (−7.27)						0.08%
Postret	0.0106 (3.46)	−0.0003 (−0.27)	0.0238 (7.13)	−0.0310 (−9.38)	0.0020 (1.65)	−0.0063 (−5.32)	4.11 (0.0426)	6.34%
Aret	0.0010 (2.48)	−0.0005 (−3.04)						0.01%
Aret	0.0023 (1.53)	−0.0006 (−1.09)	0.0112 (6.95)	−0.0122 (−7.64)	0.0015 (2.54)	−0.0010 (−1.80)	0.16 (0.6892)	4.26%

Growth portfolios are MB quintiles (low MB = quintile 0, high MB = quintile 4). Growth portfolios are formed at the beginning of Year 1, and regressions employ returns and earnings data measured over the subsequent twenty quarters, providing a sample of 1,386,813 observations. We estimate regressions of the following form:

$$R_{it\tau} = \alpha + \beta_1 \cdot \text{Growth}_{it} + \beta_2 \cdot \text{Good}_{it\tau} + \beta_3 \cdot \text{Bad}_{it\tau} + \beta_4 \cdot (\text{Good}_{it\tau} * \text{Growth}_{it}) + \beta_5 \cdot (\text{Bad}_{it\tau} * \text{Growth}_{it}) + \varepsilon_{it\tau},$$

where

$R_{it\tau}$ = the market-adjusted stock return (where the market return is the CRSP value-weighted market index) for firm i in quarter $t\tau$, where t indexes calendar quarters and τ indexes the 20 subsequent quarters over which we estimate these regressions;
Growth_{it} = the growth quintile into which firm i falls in quarter t (where 0 denotes the low growth quintile and 4 denotes the high growth quintile) and growth is measured as the firm's market-to-book (MB) ratio at the end of quarter t;
$\text{Good}_{it\tau}$ = 1 if $\text{FE}_{it\tau}$ is positive, and 0 otherwise; and
$\text{Bad}_{it\tau}$ = 1 if $\text{FE}_{it\tau}$ is negative, and 0 otherwise.

The F-statistic is from an F-test is of the restriction that $\beta_4 = -\beta_5$.
The t-statistics and F-statistics are adjusted for cross-correlation in the residuals resulting from multiple appearances of the R_{it} observations.

our regression results both at the annual level, where we include each of the four firm-quarters from each of the five subsequent years, and the five-year level, where we pool observations across all 20 firm-quarters.

This regression approach leads to a dependence problem, because each quarterly return can be included as the dependent variable up to four times in the annual regressions and up to 20 times in the five-year regressions. To correct this problem, we adjust the t-statistics by dividing by the square root of the maximum number of times each observation can enter the regression. In the annual-level regressions, we divide by $\sqrt{4}$. In the five-year level regressions, we divide by $\sqrt{20}$. If all observations entered the maximum number of times, then this procedure would be asymptotically equivalent to using generalized least squares with a residual variance-covariance matrix that sets each of the off-diagonal elements relating to the same dependent variable observation equal to the residual variance. However, because not all observations enter the maximum number of times, our procedure leads to a slight downward bias in our 'adjusted' t-statistics. The F-statistics are adjusted in a similar manner, dividing by 4 at the annual level and 20 at the five-year level.

Turning first to the regression results in Table 2, we first estimate a simple regression of return on growth. As expected based on previous research, growth loads with a significantly negative coefficient in each of the five years. The coefficients have a simple interpretation in this regression. The intercept provides an estimate of the expected quarterly abnormal return for the low growth quintile, and the coefficient on growth provides an estimate of the expected quarterly abnormal return differential between adjacent growth quintiles. Focusing on the 'All 20 Quarters' regression, the intercept is $0.0065 (t = 5.36)$ and the coefficient on growth is -0.0032 ($t = -6.56$). These coefficients indicate an annualized abnormal return to the lowest growth quintile of 2.6% ($4 \times 0.65\%$) and an annualized abnormal return to the highest growth quintile of -2.5% $\{4 \times [0.65\% - 4 \times 0.32\%]\}$ for an annualized average differential of 5.1%.

The next regression includes growth, surprise (defined earlier as a $+1/0/-1$ indicator variable reflecting the sign of the earnings surprise), and a surprise $*$ growth interaction. This regression allows the sensitivity of abnormal returns to earnings surprises to vary as a function of the growth quintile to which the stock belongs. The coefficient on growth remains negative in all regressions and is statistically significant in all regressions except for year 4. As expected, the coefficient on surprise is consistently positive and highly statistically significant, indicating that stock returns are correlated with the sign of earnings surprises. In addition, the coefficient on the surprise $*$ growth interaction is consistently positive and statistically significant, indicating that the stock returns of high growth firms are more responsive to earnings surprises than those of low growth firms. The final regression in Table 2 also includes the earnings forecast error (defined earlier) and a forecast error $*$ growth interaction. Surprise, forecast error, and their respective growth interactions all load with positive coefficients, indicating that stock returns respond to both the sign and the magnitude of earnings forecast errors, and that these responses are increasing in growth. Nevertheless, even after controlling for all of these effects (which substantially increase the explanatory power of the regressions), the coefficient on the growth main-effect variable remains reliably negative. Thus, none of the regressions in Table 2 explain the value vs. growth phenomenon. However, none of these regressions allow for an asymmetric response to good and bad news earnings surprises.

We now move on to Table 3, which estimates the regression specification in (1) that allows for a differential response to good and bad earnings news. In this specification, the intercept measures the expected abnormal quarterly return on a low growth, zero earnings surprise observation. The coefficient on growth measures the return differential on zero earnings surprise observations in adjacent growth quintiles. The coefficients on the good (bad) indicator variables measure the incremental return for a low growth observation reporting a positive (negative) earnings surprise. Finally, the coefficient on the good $*$ growth (bad $*$ growth) interaction measures the return differential on positive (negative) earnings surprises in adjacent growth quintiles. If the MB effect is independent of earnings surprises (as depicted in Figure 1(a)), then we should simply continue to observe a significantly negative coefficient on growth—i.e., the effect should manifest itself regardless of the sign of the earnings surprise. However, if the MB effect is concentrated in firms reporting negative earnings surprises (as depicted in Figure 1(b)), then we should see a significantly negative coefficient on bad $*$ growth, and the coefficient on growth should no longer be negative.

Consistent with our predictions, the results in Table 3 demonstrate that the MB effect is concentrated in negative earnings surprise observations. None of the coefficients on growth or good $*$ growth are significantly negative, and many are significantly positive. To the extent these coefficients are zero or positive, they indicate that there is either no differential performance between value and growth stocks or that growth stocks outperform value stocks in those states of the world where earnings news is neutral or positive. Thus, the fact that value outperforms growth in these data cannot be explained by the 'no news' or 'good news' observations. In contrast, the coefficients on bad $*$ growth are consistently negative and highly statistically significant, indicating that (consistent with Figure 1(b)) the stock price response to bad news is much more pronounced for growth stocks. Thus, the return differential must be embedded in this set of observations. We also test statistically whether the absolute value of the coefficients on bad $*$ growth are larger than those on good $*$ growth. If the response to earnings surprises were symmetric within growth quintiles, these two coefficients would sum to zero. Table 3 reports an F-statistic to test the restriction that they sum to zero, which is uniformly rejected at conventional significance levels. Thus, the results in Table 3 provide clear evidence of an asymmetrically large response to negative earnings surprises in high growth firms.

Table 4 next presents the results of specification (2), which modifies the Table 3 specification to include the magnitude of the forecast error (FE) in the asymmetric growth interaction. Specification (2) does not perform as well as specification (1) in explaining the asymmetric response of the value vs. growth phenomenon. In particular, the coefficient on growth remains reliably negative in several of the Table 4 regressions, including the overall results. In contrast, this coefficient is never negative in Table 3. In addition, the asymmetric reaction to bad news for growth stocks is much more clearly evident in Table 3 than in Table 4. In Table 3, the coefficient on bad $*$ growth is consistently four to five times larger than that on good $*$ growth, while in Table 4 the analogous coefficient for bad news is only one to two times as large as that on good news. These results indicate that it is the simple fact of an earnings disappointment that matters for investors in growth stocks, rather than the magnitude of the disappointment.

To test our third prediction, Table 5 reports a subset of the regressions in Tables 2 and 3 using alternative return measurement intervals for the dependent variable. In the interest of brevity, we only report results for the 'All 20 Quarters' sample.[9] The table reports both the simple regression of returns on growth and the full regression specification from Table 3 that allows for an asymmetric response to earnings surprises. Each regression is first reported using the same 'fullret' quarter returns as shown in Tables 2 and 3 as a benchmark. We then report each of the regressions using the 'preret,' 'postret,' and 'aret' return measurement intervals. Recall that 'preret' spans the first half of the period between formal earnings announcements, when little earnings news is released, while 'postret' captures the second half of this period, when most earnings news is released. Finally, 'aret' captures the three-day announcement window itself, but excludes any preemptive earnings disclosures.

Focusing first on the simple regressions of returns on growth, we find a negative and statistically significant coefficient for all of the return measurement periods except 'preret.' The relative coefficient magnitudes vary considerably. The coefficient in the 'fullret' regression is −0.0032, versus −0.0005 in the 'preret' regression and −0.0026 in the 'postret' regression, so over 80% of the overall MB effect is concentrated in the 'postret' period, despite the fact that 'preret' and 'postret' each average 31 days. The coefficient on 'aret' is only −0.0005 implying that three-day earnings announcement window captures less than 20% of the total MB effect. La Porta et al. (1997) and Bernard et al. (1997) also find that only a small portion of the total MB effect is concentrated in the formal earnings announcement period. Overall, these results confirm that the MB effect is concentrated in the 31 days leading up to earnings announcements, but that only a small part of the effect is concentrated in the three-day announcement window. This is consistent with much of the MB effect being driven by preemptive earnings disclosures, and in particular with the tendency for managers of growth firms to preannounce adverse earnings news.

The second set of regressions in Table 5 investigate how the asymmetric response of growth stocks to negative earnings surprises varies across the different return measurement intervals. The first regression uses the 'fullret' return measurement interval, and confirms our previous (Table 3) finding that the MB effect is concentrated in growth firms that report negative earnings surprises. The regressions using 'preret' and 'postret' generally confirm this finding, although the results are much stronger in the 'postret' returns. In both regressions, the coefficients on growth and good $*$ growth are non-negative while those on bad $*$ growth are again negative, relatively large in magnitude and strongly significant. The R-squared of the 'postret' regression is almost four times as large as in the 'preret' regression, consistent with most of the earnings-related variation in returns occurring during the 'postret' period (the R-squareds are 6.3% and 1.7%, respectively). The results for the regression using 'aret' are somewhat different. In this regression, there is no evidence of an asymmetrically large reaction to negative earnings surprises for growth firms, and the coefficient on the bad $*$ growth interaction is not statistically significant. When combined with the strongly significant results for the 'postret' period (which includes 'aret'), these results imply that most adverse earnings news for growth stocks is preannounced, so that the accompanying stock price reactions generally occur before the earnings announcement period.

4.3. Alternative Measures of Growth

All tests conducted thus far have used the MB ratio as a measure of 'growth' or 'glamour.' Prior research identifies alternative measures of 'growth' or 'glamour' that also have predictive ability with respect to future stock returns. Two of the most frequently encountered growth proxies are price-to-earnings ratios (Lakonishok et al., 1994) and analysts' forecast of long-term earnings growth (Dechow and Sloan, 1997; La Porta, 1996). In Table 6, we provide our basic regression analysis using these alternative measures of growth to demonstrate that our results are not sensitive to the particular measure of growth that is employed. We measure the price-to-earnings ratio as the ratio of stock price to most recent annual EPS

Table 6. Estimated coefficients (adjusted t-statistics) from regressions of quarterly stock returns ('fullret') on 'growth' portfolio membership, good (bad) news indicator variables coded one if the earnings surprise is positive (negative) and zero otherwise, and interaction terms.

Growth Measure	Intercept	Growth	Good	Bad	Good ∗ Growth	Bad ∗ Growth	Adjusted F-Statistic (p-Value)	Adjusted R-Squared
MB	0.0065 (5.36)	−0.0032 (−6.57)						0.06%
MB	0.0158 (3.81)	0.0002 (0.15)	0.0347 (7.70)	−0.0481 (−10.78)	0.0022 (1.33)	−0.0095 (−5.95)	5.79 (0.0160)	7.57%
PE	0.0051 (4.45)	−0.0026 (−5.46)						0.04%
PE	0.0137 (3.77)	0.0008 (0.61)	0.0338 (8.42)	−0.0466 (−11.76)	0.0025 (1.63)	−0.0093 (−6.19)	5.61 (0.0179)	7.83%
LTG	0.0071 (5.64)	−0.0033 (−6.38)						0.07%
LTG	0.0082 (2.00)	0.0031 (2.04)	0.0246 (5.48)	−0.0262 (−5.89)	0.0086 (5.10)	−0.0190 (−11.40)	10.59 (0.0011)	8.61%

Growth portfolios are measured using MB quintiles (low MB = quintile 0, high MB = quintile 4), PE quintiles (low PE = quintile 0, high PE = quintile 4), and LTG quintiles (low LTG = quintile 0, high LTG = quintile 4). Growth portfolios are formed at the beginning of Year 1, and regressions employ returns and earnings data measured over the subsequent twenty quarters, providing a sample of 1,386,813 observations. We estimate regressions of the following form:

$$R_{it\tau} = \alpha + \beta_1 \cdot \text{Growth}_{it} + \beta_2 \cdot \text{Good}_{it\tau} + \beta_3 \cdot \text{Bad}_{it\tau} + \beta_4 \cdot (\text{Good}_{it\tau} * \text{Growth}_{it}) + \beta_5 \cdot (\text{Bad}_{it\tau} * \text{Growth}_{it}) + \varepsilon_{it\tau},$$

where

$R_{it\tau}$ = the market-adjusted stock return (where the market return is the CRSP value-weighted market index) for firm i in quarter $t\tau$, where t indexes calendar quarters and τ indexes the 20 subsequent quarters over which we estimate these regressions;

Growth_{it} = the growth quintile into which firm i falls in quarter t (where 0 denotes the low growth quintile and 4 denotes the high growth quintile) and growth is measured as the firm's market-to-book (MB) ratio at the end of quarter t;

$\text{Good}_{it\tau}$ = 1 if $\text{FE}_{it\tau}$ is positive, and 0 otherwise; and

$\text{Bad}_{it\tau}$ = 1 if $\text{FE}_{it\tau}$ is negative, and 0 otherwise.

The F-statistic is from an F-test is of the restriction that $\beta_4 = -\beta_5$.
The t-statistics and F-statistics are adjusted for cross-correlation in the residuals resulting from multiple appearances of the R_{it} observations.

at the end of each fiscal quarter. We measure long-term growth using the median forecast of long-term growth provided by I/B/E/S in the last month of the fiscal quarter. We then examine (as before) the relation between stock returns, growth portfolio membership, and earnings surprises over the subsequent 20 quarters.

Table 6 reports remarkably similar results across all measures of growth. The first two rows of Table 6 present our original results for the MB ratio for benchmarking purposes, and then presents results for the price-to-earnings ratio (PE) and analyst forecasts of long-term-growth (LTG). In all cases, a simple regression of quarterly abnormal returns on growth yields significantly negative coefficients of similar magnitude, ranging from −0.0026 for PE to −0.0033 for LTG. These coefficients translate to annual return differentials between the lowest and highest growth quintiles of 4.16% and 5.12% respectively. When we allow for an asymmetric response to negative earnings surprises, the negative coefficient on growth disappears, and the coefficients on bad ∗ growth are all reliably negative and significantly larger in absolute value than those on good ∗ growth. These results provide clear evidence of a large asymmetric response to negative earnings surprises for growth firms and confirm that all of the MB, PE, and LTG return differentials are realized in firm quarters when negative earnings surprises are released.

4.4. Intertemporal Variation in the Relative Performance of Growth Stocks

The basic result in the paper—that value generally outperforms growth and that this difference is largely explained by a differential response to adverse earnings surprises—may seem hard to reconcile with the stock market experience of the late 1990s, during which time growth stocks substantially outperformed value stocks overall. Yet there is nothing about this stock market era that is *necessarily* inconsistent with our arguments or evidence—it could simply be that this period was characterized by unusually strong earnings performance. To investigate whether there is a significant intertemporal relation between the value vs. growth return differential and the nature of earnings surprises, we estimate a regression of hedge portfolio returns on aggregate differences in earnings surprises. For each calendar quarter in our sample period, we construct a hedge portfolio return we label MRET(HML)_t (the average 'fullret' return for high growth firms, minus the average 'fullret' return for low growth firms), and a net earnings surprise indicator we label MSURP(HML)_t (the average value of SURP for high growth firms minus the average value of SURP for low growth firms). Results from a quarterly time-series regression of MRET(HML)_t on MSURP(HML)_t are as follows:

$$\text{MRET(HML)}_t = -0.010 + 0.090 * \text{MSURP(HML)}_t; \quad \text{Adj. } R^2 = 10.3\%; \text{Obs.} = 150.$$
$$(t\text{-statistic}) \qquad (-1.57) \quad (4.26)$$

Consistent with our arguments, the regression indicates that there is a reliably positive intertemporal relation between the differential return on growth stocks versus value stocks and the extent to which growth stocks report relatively good earnings news.[10] Moreover, the distribution of MSURP(HML) (not reported) indicates that growth strategies will outperform value strategies in about 25% of calendar quarters.[11] Thus, intertemporal variation in the relative frequency of good versus bad earnings surprises helps explain variation in the relative performance of value and growth stocks. This confirms that in periods when growth stocks experience unusually good earnings performance (such as the late 1990s), growth stocks can outperform value stocks.

5. Conclusion

We demonstrate that growth stocks exhibit an asymmetrically large negative price response to negative earnings surprises and show that this asymmetric response to negative earnings surprises explains the return differential between 'growth' and 'value' stocks. Another way of stating this result is that the lower returns of growth stocks relative to value stocks are entirely attributable to quarters when negative earnings surprises are announced. Growth stocks perform at least as well as value stocks in quarters when zero or positive earnings surprises are announced. We also show that the inferior performance of growth stocks is concentrated in the 31 days leading up to quarterly earnings announcements, when most earnings-related news is released. Finally, we find that relatively little of the return differential is observed at the formal earnings announcement date, presumably because managers of growth firms tend to preannounce negative earnings surprises (Skinner, 1997; Soffer et al., 2000).

Our results provide strong support for the expectational errors hypothesis in explaining the inferior returns to growth stocks. LSV (1994) argue that the return differential arises because investors initially have overly optimistic expectations about the future earnings' prospects of growth stocks, leading to subsequent price declines when these expectations are not met. Our evidence is consistent with LSV's argument—we show that these price declines are sudden and occur during relatively short periods of time when adverse earnings news is released, confirming that this is an earnings-related phenomenon.[12] Others, such as Fama and French (1992), argue that the lower returns to growth stocks reflect the fact that these stocks are less risky on some dimension that has not been identified by academics, but that is priced by investors. Our findings make this argument less plausible, since it implies that the risk premium to value investors is only realized in those states of the world where negative earnings surprises are announced.

Our evidence also has implications for other areas of capital markets research. First, our research extends previous evidence on non-linearities in the relation between returns and earnings (e.g., Hayn, 1995; Freeman and Tse, 1992). Second, our findings have implications for managers' financial reporting and disclosure strategies. If managers of growth firms are aware that their firms' stock prices suffer large downward adjustments when they report earnings disappointments, they may have incentives to manage reported earnings and/or manage analysts' expectations of reported earnings to avoid negative earnings surprises (e.g., see Bartov, Givoly and Hayn, 2002; Matsumoto, 2002). The evidence provided in this paper offers a framework for understanding why managers engage in such behavior.

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Notes

1. Three recent anecdotes illustrate this phenomenon, often referred to by investment professionals as the 'earnings torpedo' effect. First, on December 9, 1997, Oracle (market-to-book ratio = 12) experienced a 29% drop in

its stock price in response to the announcement of earnings of \$0.19 versus consensus expectations of \$0.23. Second, on September 21, 2000, Intel (market-to-book ratio = 12) experienced a 22% drop in its stock price in response to a preannouncement of earnings of about \$0.38 versus consensus expectations of \$0.41. Third, on October 12, 2000 Home Depot (market-to-book = 8) experienced a 29% drop in its stock price in response to a preannouncement of earnings of about \$0.28 versus consensus expectations of \$0.31.

2. For example, Soffer et al. (2000) report that 67% of the preannouncements in their sample convey adverse earnings news.
3. Skinner (1997) provides evidence that earlier disclosure of adverse earnings news reduces expected litigation costs. However, there are other potential reasons why managers might preannounce adverse earnings news more often than other earnings news. For example, they view preannouncements as a means to preserving their reputation and credibility with security analysts who follow their firm's stock.
4. Note that one limitation of this procedure is that measures of earnings surprise derived using this forecast date are unlikely to pick up surprise information that is revealed in the earlier part of the quarter. We also replicated our results using the earliest consensus forecast available after the release of the prior quarter's earnings announcement. The results were almost identical, suggesting that very little earnings news is released in the earlier part of the fiscal quarter.
5. Our results are robust to alternative methods of computing abnormal returns, including a simple market adjustment and a market model adjustment. We explicitly avoid making an adjustment for the MB effect, because our objective is to explain the MB effect.
6. The fact that the use of size-adjusted returns yields almost identical inferences to market-adjusted or market model adjusted returns in our tests supports this explanation.
7. To create the plot for 'value' and 'growth' we take the bottom and top growth quintiles (as before) respectively and within each of these form 20 portfolios by ranking the observations based on FE. We then plot the mean returns against the mean forecast error for each of these 20 portfolios and join these points using the Excel smooth line charting feature.
8. The non-linear, S-shaped relation between earnings and returns is noted by Freeman and Tse (1992), as well as others since then.
9. The results display a consistent pattern during each of the five component years.
10. The regression also indicates that value outperforms growth on average for our sample. The mean value of MSURP(HML) is -0.052, so the mean difference between growth and value is $-0.010 + (0.090 * -0.052) = -0.015$ or about -1.5% per quarter.
11. The 75th percentile value of MSURP(HML) is 0.11, indicating that the expected value of MRET at this level of MSURP(HML) is approximately $0[-0.010 + (0.090 * 0.11) = 0]$. Thus, the expected value of MRET (HML) is greater than zero for the upper quartile of the MSURP(HML) distribution.
12. Our evidence may also shed light on recent psychological explanations for anomalous stock market behavior, such as those offered by Daniel, Hirshleifer and Subrahmanyam (1998) or Barberis, Shleifer and Vishny (1998). Barberis et al. (1998) argue that stock prices overreact to consistent patterns of good or bad news. This is consistent with the notion that growth stocks gradually become overpriced as investors observe a series of consistently good earnings reports, but then "fall to earth" when those stocks report earnings disappointments and investors realize their expectations were overly optimistic.

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