EQUITY STRATEGY RESEARCH

Value Relevance of Analysts' Earnings Forecasts

September 1, 2003

This research report investigates the statistical relation between earnings surprises and abnormal stock returns. We define an earnings surprise simply as the difference between actual earnings per share ("EPS") and the most recent consensus analyst forecast of EPS. We measure the effect of these positive or negative earnings surprise on stock prices compared with the returns on the overall market.

Data Description

The sample for this study consists of all publicly traded US firms over the period 1985-2001. The capital market data include stock prices and returns from the University of Chicago's, Center for Research in Security Prices ("CRSP"). Analyst forecast data include quarterly consensus earnings forecasts and revisions from the Institutional Brokers Estimates System ("I/B/E/S"). Actual earnings data are also from I/B/E/S.

Event Study Methodology

To understand the impact of earnings surprises on stock prices, and thus to discover if there are any trends or patterns useful for trading, we perform an *event study*. We take the announcement of earnings as our event, particularly noting whether those earnings were a positive or negative surprise given consensus analyst forecasts. We want to see if stock prices after the event display abnormal returns (i.e. returns in excess of their expected return after compensating for risk).

The traditional event study methodology of Fama, Fisher, Jensen, and Roll (1969) involves calculating cumulative average abnormal returns ("*CAAR*s"). This process has three steps:

1. Calculate daily abnormal returns ("*AR*s") for each firm in the days surrounding the announcement of the event being studied. Daily *AR*s can be calculated using various benchmarks: (1) market model; (2) net-of-market return; (3) net-of-characteristic matched portfolio (or matched firm) return; or (4) an equilibrium asset pricing model, such as the CAPM.

   This study uses the statistical market model to estimate expected returns. We can then compare those expected returns to actual returns to find daily

abnormal returns. The market model posits that the only factor determining the return on stock *i*, at time *t*, is the return on the market at time *t*. This relation is modeled linearly, as in equation (1).

$$E(R_{i,t}) = b_0 + b_1 \cdot E(R_{M,t}) \quad (1)$$

This model is very similar to CAPM, except that the intercept is taken to be a constant rather than the risk-free rate. The market model parameters, b_0 and b_1, can be estimated via ordinary least squares regression. As our data for the regression, we use daily returns from days –170 to –20 relative to the earnings announcement. This is the *estimation window*. Assuming that returns more than 20 days prior to the event are not influenced by the event itself, we think of this window as a "normal" period. Once we have our estimated values of b_0 and b_1, we can find predicted returns in our *event window* by plugging in the market return.

The market model predicts what the return should be on the stock in normal conditions; by taking the difference between actual and predicted returns for each security at each point in time during the event window, as in equation (2), we find daily abnormal returns. The event window is often something like -10 to 10 relative to the earnings announcement at day 0.

$$AR_{i,t} = R_{i,t} - E(R_{i,t}) \quad (2)$$

2. Calculate the average abnormal return ("*AAR*") for each day in the event window. This aggregates the abnormal returns for all *N* stocks to find the average abnormal return at each time *t*. This helps eliminate idiosyncrasies in measurement due to particular stocks.

$$AAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{i,t} \quad (3)$$

3. Finally, sum the average abnormal returns over the *T* days in the event window (i.e. over all times *t*) to form the cumulative average abnormal return (*CAAR*).

$$CAAR_T = \sum_{t=1}^{T} AAR_t \quad (4)$$

The *CAAR* is a useful statistical analysis in addition to the AAR because it helps us get a sense of the aggregate effect of the abnormal returns.

Particularly if the influence of the event during the event window is not exclusively on the event date itself, the *CAAR* can prove very useful.

Event Study Results

We divide the data into two groups: those with positive earnings surprise events and those with negative earnings surprise events. This separation is performed *ex post*; the goal of our analysis is to see if, *ex ante*, knowledge of the direction of an earnings surprise is useful in predicting abnormal returns. Table 1 summarizes our data regarding earnings surprises.

We then examine the *AAR*s and *CAAR* for each group and use statistical analysis to test the significance of our data. Essentially, we want to see if there are positive (negative) abnormal returns when there is a positive (negative) earnings surprise. The results of this analysis are presented in Table 2.

Table 1
Summary of Consensus Analyst Forecasts

Year	Number of Quarterly Forecasts	Percentage of Positive Surprises	Number of Firms Covered
1985	6,143	34.7%	1,840
1986	6,102	37.9%	1,841
1987	5,804	42.9%	1,799
1988	5,471	44.5%	1,723
1989	5,932	39.5%	1,824
1990	5,884	37.8%	1,773
1991	5,880	38.7%	1,747
1992	6,091	41.6%	1,814
1993	6,600	42.6%	1,984
1994	7,720	46.1%	2,377
1995	8,594	46.7%	2,674
1996	9,360	45.3%	2,819
1997	9,871	48.3%	3,025
1998	10,487	44.2%	3,239
1999	10,432	47.7%	3,204
2000	9,022	48.3%	2,875
2001	8,253	39.8%	2,549

Table 2
Abnormal Returns Around Earnings Announcements

Positive Earnings Surprise Relative to Consensus Forecast						Negative Earnings Surprise Relative to Consensus Forecast					
t	AAR	t-stat	CAAR	t-stat	N	t	AAR	t-stat	CAAR	t-stat	N
-20	-0.02%	(-1.10)	-0.02%	(-1.10)	53,031	-20	-0.05%	(-4.13)	-0.05%	(-4.13)	73,699
-19	0.03%	(2.06)	0.01%	(0.68)	53,033	-19	-0.01%	(-0.65)	-0.06%	(-3.38)	73,696
-18	0.03%	(2.17)	0.04%	(1.81)	53,033	-18	-0.05%	(-3.48)	-0.11%	(-4.77)	73,698
-17	-0.01%	(-0.98)	0.03%	(1.08)	53,031	-17	-0.04%	(-3.33)	-0.15%	(-5.79)	73,697
-16	0.02%	(1.58)	0.05%	(1.67)	53,031	-16	-0.06%	(-4.36)	-0.21%	(-7.13)	73,696
-15	0.00%	(-0.02)	0.05%	(1.52)	53,032	-15	-0.04%	(-3.06)	-0.25%	(-7.76)	73,697
-14	0.02%	(1.65)	0.08%	(2.03)	53,032	-14	-0.04%	(-3.19)	-0.30%	(-8.39)	73,695
-13	0.04%	(2.93)	0.12%	(2.93)	53,032	-13	-0.03%	(-2.13)	-0.33%	(-8.60)	73,693
-12	0.01%	(0.79)	0.13%	(3.03)	53,032	-12	-0.05%	(-3.96)	-0.38%	(-9.43)	73,695
-11	0.01%	(0.96)	0.14%	(3.18)	53,030	-11	-0.05%	(-3.67)	-0.43%	(-10.11)	73,691
-10	0.03%	(1.89)	0.17%	(3.60)	53,031	-10	-0.02%	(-1.33)	-0.45%	(-10.04)	73,690
-9	0.05%	(3.50)	0.22%	(4.46)	53,029	-9	-0.02%	(-1.20)	-0.46%	(-9.96)	73,692
-8	0.03%	(2.32)	0.25%	(4.93)	53,030	-8	-0.03%	(-2.05)	-0.49%	(-10.13)	73,691
-7	0.03%	(1.91)	0.28%	(5.26)	53,029	-7	-0.03%	(-2.25)	-0.52%	(-10.37)	73,686
-6	0.03%	(1.88)	0.31%	(5.56)	53,030	-6	-0.04%	(-3.03)	-0.57%	(-10.80)	73,683
-5	0.04%	(2.66)	0.34%	(6.05)	53,027	-5	-0.02%	(-1.24)	-0.58%	(-10.77)	73,683
-4	0.07%	(5.24)	0.42%	(7.14)	53,027	-4	-0.02%	(-1.68)	-0.61%	(-10.85)	73,682
-3	0.09%	(6.50)	0.51%	(8.47)	53,028	-3	0.02%	(1.68)	-0.58%	(-10.15)	73,682
-2	0.17%	(11.67)	0.68%	(10.92)	53,027	-2	0.01%	(0.96)	-0.57%	(-9.66)	73,680
-1	0.48%	(29.36)	1.16%	(17.21)	53,028	-1	-0.17%	(-11.03)	-0.73%	(-11.88)	73,676
0	0.78%	(38.81)	1.94%	(25.27)	53,027	0	-0.44%	(-23.60)	-1.17%	(-16.74)	73,673
1	0.31%	(15.52)	2.25%	(27.99)	53,026	1	-0.34%	(-18.01)	-1.51%	(-20.20)	73,671
2	-0.04%	(-2.59)	2.21%	(26.84)	53,025	2	0.01%	(1.01)	-1.50%	(-19.54)	73,667
3	-0.08%	(-6.03)	2.13%	(25.05)	53,022	3	0.00%	(-0.28)	-1.50%	(-19.19)	73,665
4	-0.03%	(-2.60)	2.09%	(24.02)	53,018	4	-0.01%	(-0.42)	-1.51%	(-18.89)	73,659
5	-0.01%	(-0.97)	2.08%	(23.36)	53,016	5	0.03%	(2.00)	-1.48%	(-18.13)	73,660
6	0.01%	(1.03)	2.09%	(23.12)	53,009	6	0.03%	(2.41)	-1.45%	(-17.33)	73,655
7	0.00%	(0.09)	2.09%	(22.72)	53,007	7	0.04%	(2.94)	-1.41%	(-16.46)	73,650
8	0.01%	(1.01)	2.11%	(22.52)	53,006	8	0.04%	(3.22)	-1.37%	(-15.57)	73,642
9	0.00%	(-0.09)	2.11%	(22.12)	53,007	9	0.04%	(3.11)	-1.33%	(-14.74)	73,637
10	0.00%	(-0.10)	2.11%	(21.74)	53,002	10	0.05%	(3.58)	-1.28%	(-13.86)	73,628
11	0.02%	(1.94)	2.13%	(21.74)	53,000	11	0.04%	(3.54)	-1.24%	(-13.02)	73,621
12	0.02%	(1.19)	2.15%	(21.62)	52,998	12	0.03%	(1.97)	-1.21%	(-12.47)	73,617
13	-0.01%	(-0.49)	2.14%	(21.21)	52,995	13	0.07%	(5.17)	-1.15%	(-11.40)	73,609
14	-0.02%	(-1.75)	2.12%	(20.61)	52,989	14	0.02%	(1.18)	-1.13%	(-11.04)	73,605
15	0.01%	(0.76)	2.13%	(20.45)	52,985	15	0.04%	(3.34)	-1.09%	(-10.33)	73,597
16	-0.02%	(-1.21)	2.11%	(19.97)	52,983	16	0.02%	(1.86)	-1.07%	(-9.88)	73,596
17	-0.03%	(-2.09)	2.08%	(19.37)	52,981	17	0.03%	(1.99)	-1.04%	(-9.43)	73,592
18	-0.04%	(-3.13)	2.04%	(18.62)	52,980	18	0.01%	(1.11)	-1.02%	(-9.13)	73,582
19	-0.02%	(-1.40)	2.02%	(18.16)	52,978	19	-0.02%	(-1.51)	-1.04%	(-9.25)	73,576
20	-0.02%	(-1.54)	2.00%	(17.70)	52,976	20	0.02%	(1.58)	-1.02%	(-8.89)	73,569

Figure 1
Average Stock Price Reactions around Earnings Announcements

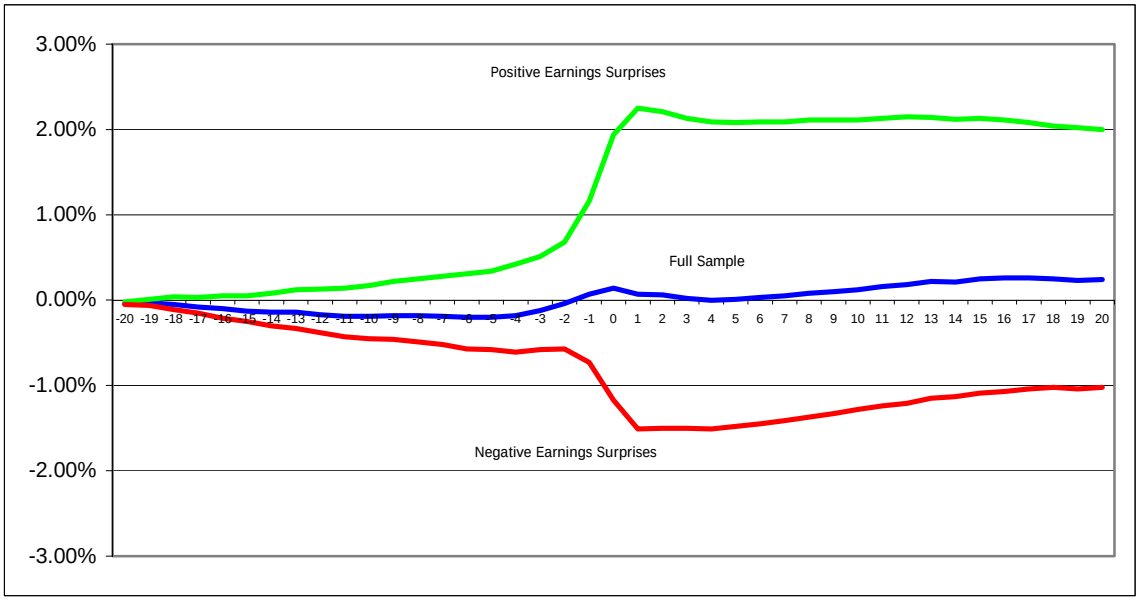

Figure 1 graphs these results. First, note that there appears to be no general trend for all the data—a trading strategy is only viable if the nature of the earnings surprise is known *ex ante*. Second, there appears to be a slight positive (negative) trend in the days leading up to a positive (negative) earnings surprise. This could be the result of insider trading.

The most noticeable trend is during the event itself. The price rises (falls) considerably for a positive (negative) surprise. Profiting from this may be difficult because of the relatively short time horizon of the rise (fall). In particular, note that there seems to a small correction for both graphs (most noticeable for positive surprises) after the initial swing.

Table 3 displays the most critical data. For the 3 days around the earnings announcement, there are highly statistically significant[1] abnormal returns in the case of both positive and negative surprises.

Table 3
Average 3-day Abnormal Return around Earnings Announcements

	Full Sample	Positive Surprise	Negative Surprise
CAAR	0.10%	1.57%	-0.95%
t-statistic	(5.52)	(48.32)	(-30.39)

[1] A *t*-statistic is statistically significant at the 5% confidence level if it is greater than 1.96 in absolute value.