EARNINGS ANNOUNCEMENTS, STOCK PRICE REACTION AND POST-EARNINGS ANNOUNCEMENT DRIFT

Writing Sample

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June 2023

Abstract. This study examines changes in a firm's equity value in response to annual earnings announcements, both 20 days before and after the announcement dates, for publicly traded companies listed on the S&P500 Stock Exchange during the period 2013 - 2014. An event study methodology is employed, encompassing a total of 3638 events. The findings of the study, which is also reflected through evidence of significant abnormal returns and post-earnings announcement drift around earnings announcement dates, indicate that earnings announcements possess significant information content. Higher-than-expected earnings are correlated with increases in the equity value, while lower-than-expected earnings are associated with decreases in the equity value.

1 Introduction

Financial information about any company is crucial when assessing the value of stock prices. Investors do consider this publicly available financial information to evaluate the potential future prospects of a company. Earnings serve as a measure of the company's profit or loss from business activities and events over a defined period. Dividend and earnings announcements are the two most significant financial pieces of information used by investors to make decisions regarding the purchase and sale of a firm's shares (Lonie et al., 1996). The capital market generates expectations and speculation about announcements before they are made. If a company announces earnings that deviate from market expectations, the market will react unexpectedly. If the earnings announcement surpasses expected earnings (generally considered good news), the stock price will surge. Conversely, if the earnings announcement falls short of expected earnings (typically seen as bad news), the stock price will decline.

This paper aims to review the event study methodology by measuring the impact of annual earnings announcements on equity value within the S&P500 capital market. The remainder of this study is structured as follows: Section 2 presents the methodology, Section 3 presents the data, Section 4 presents the empirical results, and Section 5 concludes this article.

2 Methodology

Event study methodology is used to test how efficient is the S&P500 market. The study focuses on the quarter earnings announcement for the listed companies in S&P500 from 2013 to 2014. The announcements correspond to the quarterly earnings for the year 2013 and 2014. For each firm and quarter, three pieces of information are compiled: the date of announcement, the actual EPS and the average EPS forecast.

The surprise element of any earnings announcement can be calculated by measuring actual EPS and average EPS forecast. Each announcement is assignment to one of three categories: good news, no news, or bad news. Each announcement is categorized using the deviation of the actual earnings form the expected earnings. Good news: If the actual exceeds expected by more than 2.5 percent the announcement. Bad news: If the actual is more than 2.5 percent less than expected the announcement. No news: Announcements in which the absolute value of the actual return minus the expected return is less than the 5 percent are designated as no news..

With the announcement categorized, it is necessary to specify a length of observation interval, an event window, and an estimation window. The interval is set to one day, thus daily stock returns are used. In this paper, 41-day event window is used to calculate the abnormal returns of the security and 41 days' event window consists of 20 trading days before and 20 trading days after the event. Estimation window consisting of 250 days prior to the event window consists of 270 trading days before the announcement date and 21 trading days before the announcement date, has been used which is considered to be large enough to have an assumption that expected disturbance term will be zero.

2.1 Measurement for Abnormal Return

Abnormal returns or excess returns were computed by subtracting the normal return of the security from actual return of any security over the event window. The abnormal returns are computed as per (MacKinlay, 1997).

$$AR_{it} = R_{it} - E(R_{it}) \tag{1}$$

where,

R_{it} : Actual returns of security i at time t;

$E(R_{it})$: Expected returns of security i at time t.

The assumption for the statistical models that asset returns are jointly multi-variate normal and independently and identically distributed through time is imposed. This distributional assumption is sufficient for the constant mean return model and the market model to be correctly specified. Also one can easily modify the statistical framework so that the analysis of the abnormal returns is autocorrelation and heteroscedasticity consistent by using a generalized method -of-moments approach.

The CAR_k is the sample cumulative abnormal return (CAR) for the event time.

$$CAR_k = \sum AR_{it} \tag{2}$$

Given N events, the sample aggregated abnormal returns for period t is

$$\overline{AR_t} = \frac{1}{N}\sum_{i=1}^{N} AR_{it}. \tag{3}$$

The average abnormal return is calculated by taking the averages cross-sectionally. These ARs can be summed over the event window and CAR is calculated:

$$\overline{CAR_k} = \sum_{k} \overline{AR_t}. \tag{4}$$

2.2 Measurement for Normal Return

2.2.1 Constant Mean Return Model

The constant mean return model is perhaps the simplest model, it is calculated by

$$E(R_{it}) = \alpha_i + \varepsilon_{it}; E(\varepsilon_{it}) = 0, Var(\varepsilon_{it}) = \sigma^2\varepsilon \tag{5}$$

where,

$E(R_{it})$: Expected returns of security i during time period t;

α_i : Constant mean for security i;

ε_{it} : Disturbance/error term of security i at time t.

Ordinary least square (OLS) method is used to calculate the constant mean model in this study. Under the OLS, for i^{th} firm in the event time, I will have the OLS estimators of the constant mean model for an estimation window of observation in estimation time to find α_i.

2.2.2 Market Model

The estimated market model is used

$$E(R_{it}) = \alpha_i + \beta_i R_{Index} + \varepsilon_{it}; E(\varepsilon_{it}) = 0, Var(\varepsilon_{it}) = \sigma^2\varepsilon. \tag{6}$$

A daily closing price of value-weighted S&P 500 return index (VWRETD) is used to find out the market return. α_i, β_i and ε_{it} are the parameters of the market model.

2.3 The Hypothesis Test

For large estimation window, its variance is

$$var(\overline{AR_t}) = \frac{1}{N^2}\sum_{i=1}^{N} \sigma_\varepsilon^2. \tag{7}$$

So, the variance of CAR will be

$$var(\overline{CAR_k}) = \sum_k var(\overline{AR_t}). \tag{8}$$

Using these estimates, the abnormal returns and cumulative returns for any event period can be analyzed.

The null hypothesis, H_0, is abnormal returns are not significantly different from zero in quarterly earnings announcements. Assuming the normal distribution of CAR, the inferences can be drawn by standardizing CAR to test whether CAR equals to zero. The test statistic θ can be written as

$$\theta = \frac{\overline{CAR_k}}{\sqrt{var(\overline{CAR_k})}} \sim N(0,1). \tag{9}$$

3 Sample and data description

Listed companies of S&P 500 which have announced their earnings per share (EPS) on a quarterly basis were used for estimation window. The period for this study is from 2013 to 2014, and the companies, having insufficient data of earnings announcements, were excluded from the sample. This excluded several listed firms, and our final data consist of 488 firms, and the total number of events used for analysis is 3,638 due to two identified events miss the actual EPS in data set. Table 1 presents number of each three earnings news categories across the 3,638 event observations. Number of earnings announcements of good news, no news and bad news is 1867, 1032, 739 respectively. Event day is defined as a day when any firm made the quarterly announcement of EPS and the firm's share was traded on that day. Next trading day was used as an event day if the stocks were not traded on the day of announcements due to holiday in the stock market.

TABLE 1

Event classification for the period 2013- 2014

Event category	No. of events
Good News	1867
No News	1032
Bad News	739
Total	3638

4 Analysis and results

I replicated two models, the market model and the constant mean return model, and drawn the plots of the cumulative abnormal returns, with the CAR's from the market model in Figure 1 and the CAR's from the constant mean return model in Figure 2.

Figure 1 indicates the average CAR for the bad news firms decreases progressively from Day -20 to Day -1, and the average CAR for the good news firms shows stable behavior over this period. The CAR for earnings announcements covering bad news starts from negative, then onward stays in the negative range, shows a steep dip from event day. The CAR for good news stays positive range from the start of the event window. From the event day it begins to visibly rise and continues this trend until the second day after the event day. Later on, it begins to get stable. The CAR for no news firms in this case shows less significantly decrease from Day 0 to Day 2 than bad news firms, then onward shows stable behavior.

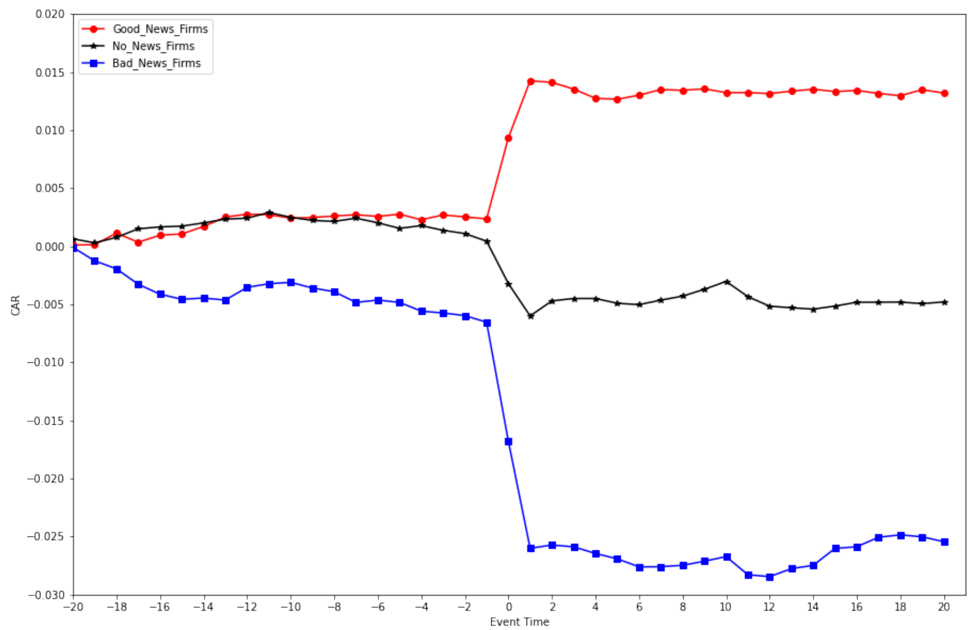

Figure 1: Plot of cumulative abnormal return for earning announcements from event day -20 to event day 20. The abnormal return is calculated using market model as the normal return measure.

Figure 2 indicates CAR behavior in case of constant mean return model. The CAR for negative news firms start moving down 20 days before the event, and it reaches a bottom 15 days before the earnings announcements are made. The CAR for positive news firms starts briefly moving downward from Day -18 to Day -17 and from Day -12 to Day -11 before the event, and surprisingly, it touches the negative value at the seventeenth day prior to the announcement.

As indicated in Figure 1 and Figure 2, the CAR for no news firms in case of two models behaves in the same manner, except CAR in case of constant mean return model touches back the positive value at the eighth day after the event day. There is a wide variance between CAR for bad news and CAR for no news in the day after the announcement. Compared to the results of the paper, investors adopt a more prudent treatment of

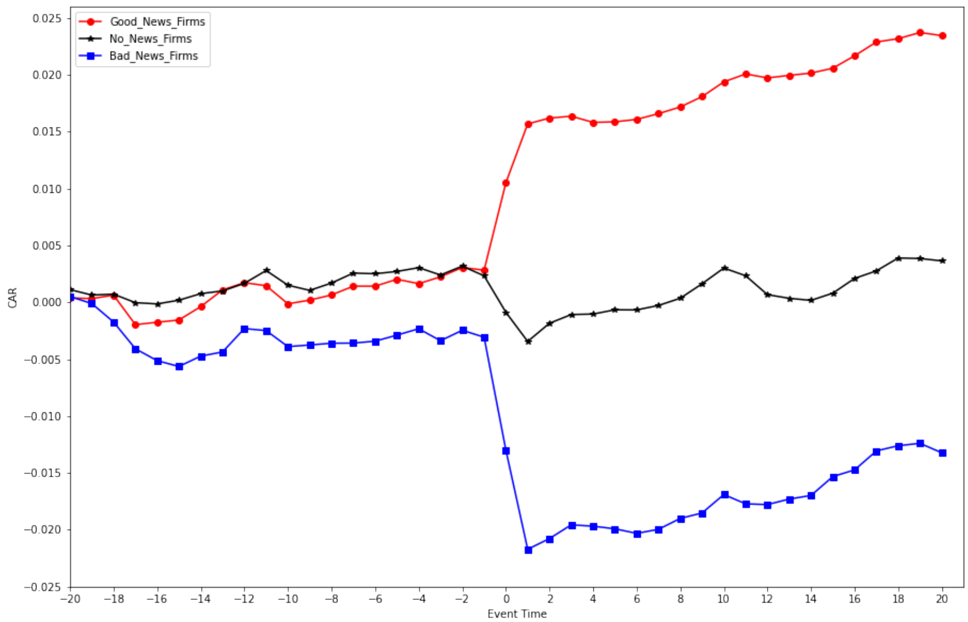

Figure 2: Plot of cumulative abnormal return for earning announcements from event day -20 to event day 20. The abnormal return is calculated using mean constant model as the normal return measure.

companies with negative news.

Tables 2 presents the sample average abnormal return for the specified day in event time and the sample average cumulative abnormal return for day -20 to the specified day. It is evident from the results that the absolute value of CAR is greater in the case of the negative earnings shocks (i.e. bad news) sample. compared to positive earnings shocks (i.e. good news) sample. This observation is true for the pre-event window, post-event window and day of the event. This specifies that compared to good news, market reacts more strongly in bad news sample.

As discussed in methodology, I apply test statistics θ. The test is applied to assess the statistical significance of aforementioned CAR for stocks. Furthermore, it is applied for all the three earnings announcement categories. Table 3 presents the results of the test statistics.

Concentrating on the event day (day 0) the sample average abnormal return for the positive news firm using the market model is 0.6983 percent, with the variance of the one day good news average abnormal return is 0.0014 percent, the value of θ is 9.6607 and the null hypothesis is strongly rejected. It will show the earnings announcement event will effect stock prices. The sample abnormal return of bad news firms at the event day is -1.0247 percent.Given the standard error of 0.0022 percent, leading to θ equal to -11.6737 and again strong evidence against the null hypothesis. As would be expected, the abnormal return of the no news firms is small at -0.3648 percent and with a standard error 0.0009 percent.

There is some evidence of the announcement effect on day one. The average abnormal return is 0.4908 percent and -0.9222 percent for the positive news and the negative news firms respectively. The source of these day one effects is likely to be that some of the earnings announcements are made on event day zero after the close of the stock market. In these cases, the effects will be captured in the return on day one.

The conclusions using the abnormal returns from the constant return model are consistent with those from the market model. However, there is some loss of precision using the constant return model, as the variance of the average abnormal return increases for all three categories. When measuring abnormal returns with the constant mean return model the standard errors increase from 0.0014 percent to 0.0016 percent for good news firms, from 0.0009 percent to 0.0010 percent for no news firms, and from 0.0022 percent to 0.0023 percent for bad news firms. These increases are to be expected when considering a sample of large firms such as those in the S&P 500 because these stocks tend to have an important market component whose variability is eliminated using the market model(MacKinlay, 1997) .

5 Conclusion

In this study, I compute AR and CAR around earnings announcements to measure the information efficiency of earnings announcements in the S&P 500 index. Our results of this example are essentially consistent with the literature I replicated. These significant abnormal returns witnessed on and around the event day also infer that the information contents exhibited by earnings announcements are considered useful by the market.

To some extent, the market gradually learns the upcoming announcement. This trend is more noticeable in the figure of both of models' bad news firms, it takes longer (more than 20 days) for investors to regain confidence for the bad news firms.

This event study had certain limitations. Firstly, the statistical analysis is based on assumption that returns are jointly normal and temporally independently and identically distribution. The normality assumption is important for the exact finite sample results to hold. Without assuming normality, all results would be asymptotic. Secondly, the period covered by the sample is short. Also, nonsynchronous trading can introduce a bias. For example, the daily prices of securities are closing prices. These closing prices generally do not occur at the same time each day. The non-trading effect induces biased in the moments of returns. Another limitation is not to consider the trading volume in the event window.

Market practitioners can benefit from this event study through analyzing certain sectors for possible abnormal return generation. It can also be used for possible formulation of a trading strategy which can be executed based market under or over reaction to earnings announcement information.

TABLE 2

Event day	Market Model					
	Good News		No News		Bad News	
	AR(%)	CAR(%)	AR(%)	CAR(%)	AR(%)	CAR(%)
-20	0.0107	0.0107	0.0638	0.0638	-0.0092	-0.0092
-19	0.0028	0.0135	-0.0340	0.0297	-0.1164	-0.1256
-18	0.1002	0.1137	0.0468	0.0765	-0.0686	-0.1942
-17	-0.0794	0.0343	0.0739	0.1504	-0.1333	-0.3275
-16	0.0611	0.0954	0.0162	0.1666	-0.0849	-0.4124
-15	0.0102	0.1056	0.0068	0.1734	-0.0445	-0.4569
-14	0.0649	0.1704	0.0277	0.2011	0.0114	-0.4455
-13	0.0809	0.2514	0.0325	0.2337	-0.0181	-0.4636
-12	0.0247	0.2760	0.0078	0.2415	0.1099	-0.3537
-11	-0.0040	0.2720	0.0494	0.2909	0.0309	-0.3228
-10	-0.0297	0.2423	-0.0415	0.2493	0.0121	-0.3107
-9	0.0051	0.2475	-0.0267	0.2226	-0.0486	-0.3593
-8	0.0127	0.2602	-0.0087	0.2139	-0.0319	-0.3912
-7	0.0112	0.2714	0.0279	0.2418	-0.0922	-0.4833
-6	-0.0143	0.2571	-0.0394	0.2024	0.0200	-0.4633
-5	0.0192	0.2763	-0.0480	0.1543	-0.0199	-0.4832
-4	-0.0487	0.2276	0.0233	0.1777	-0.0757	-0.5589
-3	0.0421	0.2697	-0.0403	0.1374	-0.0156	-0.5745
-2	-0.0174	0.2523	-0.0281	0.1093	-0.0224	-0.5969
-1	-0.0166	0.2357	-0.0655	0.0438	-0.0568	-0.6537
0	0.6983	0.9340	-0.3648	-0.3211	-1.0247	-1.6784
1	0.4908	1.4248	-0.2788	-0.5998	-0.9222	-2.6006
2	-0.0136	1.4112	0.1297	-0.4701	0.0285	-2.5721
3	-0.0579	1.3533	0.0203	-0.4498	-0.0158	-2.5879
4	-0.0793	1.2740	0.0001	-0.4497	-0.0568	-2.6448
5	-0.0081	1.2658	-0.0409	-0.4906	-0.0464	-2.6911
6	0.0348	1.3006	-0.0121	-0.5028	-0.0690	-2.7601
7	0.0489	1.3495	0.0392	-0.4636	0.0012	-2.7589
8	-0.0073	1.3422	0.0341	-0.4295	0.0121	-2.7468
9	0.0135	1.3558	0.0586	-0.3709	0.0348	-2.7120
10	-0.0335	1.3223	0.0684	-0.3025	0.0402	-2.6719
11	0.0010	1.3233	-0.1313	-0.4338	-0.1563	-2.8282
12	-0.0088	1.3145	-0.0825	-0.5162	-0.0164	-2.8446
13	0.0209	1.3353	-0.0132	-0.5294	0.0690	-2.7756
14	0.0165	1.3518	-0.0121	-0.5415	0.0280	-2.7476
15	-0.0199	1.3320	0.0265	-0.5150	0.1462	-2.6013
16	0.0093	1.3412	0.0329	-0.4822	0.0140	-2.5873
17	-0.0254	1.3158	0.0005	-0.4817	0.0819	-2.5054
18	-0.0196	1.2963	0.0016	-0.4801	0.0203	-2.4850
19	0.0516	1.3479	-0.0141	-0.4942	-0.0163	-2.5014
20	-0.0287	1.3192	0.0151	-0.4791	-0.0423	-2.5437

TABLE 2 (Cont.)						
	Constant Mean Return Model					
Event	Good News		No News		Bad News	
day	AR(%)	CAR(%)	AR(%)	CAR(%)	AR(%)	CAR(%)
-20	0.0378	0.0378	0.1113	0.1113	0.0501	0.0501
-19	-0.0058	0.0321	-0.0481	0.0631	-0.0612	-0.0111
-18	0.0303	0.0624	0.0081	0.0712	-0.1625	-0.1736
-17	-0.2589	-0.1966	-0.0748	-0.0036	-0.2350	-0.4085
-16	0.0208	-0.1758	-0.0109	-0.0145	-0.1047	-0.5132
-15	0.0198	-0.1559	0.0326	0.0181	-0.0511	-0.5644
-14	0.1179	-0.0380	0.0578	0.0759	0.0911	-0.4732
-13	0.1463	0.1082	0.0236	0.0994	0.0365	-0.4367
-12	0.0639	0.1722	0.0666	0.1660	0.2054	-0.2313
-11	-0.0270	0.1452	0.1129	0.2789	-0.0177	-0.2490
-10	-0.1589	-0.0137	-0.1291	0.1498	-0.1410	-0.3900
-9	0.0324	0.0187	-0.0453	0.1045	0.0145	-0.3756
-8	0.0453	0.0640	0.0644	0.1688	0.0154	-0.3602
-7	0.0775	0.1415	0.0876	0.2564	0.0012	-0.3590
-6	-0.0002	0.1413	-0.0057	0.2507	0.0168	-0.3422
-5	0.0605	0.2018	0.0201	0.2708	0.0533	-0.2889
-4	-0.0383	0.1635	0.0331	0.3038	0.0559	-0.2329
-3	0.0598	0.2233	-0.0641	0.2397	-0.1050	-0.3380
-2	0.0825	0.3058	0.0776	0.3173	0.0917	-0.2462
-1	-0.0242	0.2816	-0.0848	0.2325	-0.0605	-0.3067
0	0.7687	1.0504	-0.3206	-0.0880	-0.9931	-1.2998
1	0.5170	1.5674	-0.2564	-0.3444	-0.8711	-2.1709
2	0.0512	1.6185	0.1600	-0.1844	0.0942	-2.0766
3	0.0165	1.6351	0.0762	-0.1082	0.1208	-1.9558
4	-0.0544	1.5806	0.0044	-0.1038	-0.0120	-1.9679
5	0.0049	1.5855	0.0375	-0.0663	-0.0230	-1.9908
6	0.0215	1.6069	-0.0009	-0.0672	-0.0401	-2.0309
7	0.0505	1.6575	0.0390	-0.0282	0.0354	-1.9956
8	0.0585	1.7160	0.0633	0.0351	0.0959	-1.8997
9	0.0912	1.8072	0.1274	0.1624	0.0478	-1.8519
10	0.1295	1.9367	0.1383	0.3007	0.1621	-1.6898
11	0.0694	2.0061	-0.0676	0.2331	-0.0817	-1.7715
12	-0.0343	1.9718	-0.1665	0.0666	-0.0067	-1.7782
13	0.0219	1.9936	-0.0321	0.0345	0.0489	-1.7293
14	0.0203	2.0139	-0.0181	0.0164	0.0312	-1.6981
15	0.0429	2.0568	0.0636	0.0800	0.1661	-1.5319
16	0.1094	2.1662	0.1296	0.2096	0.0587	-1.4732
17	0.1208	2.2870	0.0663	0.2759	0.1669	-1.3063
18	0.0296	2.3166	0.1132	0.3891	0.0457	-1.2606
19	0.0538	2.3704	-0.0046	0.3846	0.0209	-1.2397
20	-0.0270	2.3434	-0.0212	0.3633	-0.0832	-1.3229

TABLE 3						
	Market Model			Constant Mean Return Model		
	Good News	No News	Bad News	Good News	No News	Bad News
Std	0.0014	0.0009	0.0022	0.0016	0.0010	0.0023
θ	9.6670	-5.5926	-11.6737	15.1078	3.6137	-5.8455

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