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Study of the impact of the Great Recession on the relation between earnings surprises and stock returns

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Abstract

This paper examines the impact of the Great Recession on the relation between earnings surprises and stock returns and examines the role that informed and uninformed investors play in the formation of the post-earnings announcement drift (PEAD). We use quarterly earnings surprises (SUE), firms' standardized unexpected returns, calculated as actual earnings minus expected earnings, scaled by stock price one day prior to the earnings announcement, and one-year future stock returns, the subsequent twelve-month abnormal stock returns, calculated as the difference between the firm's buy-and-hold return and the value-weighted market buy-and-hold return, to test whether the Great Recession had an impact on PEAD using multivariate analysis. We document that the Great Recession had a significant impact on PEAD. Specifically, we find that PEAD disappears or inverts during the Great Recession. This provides evidence in support of the ideas developed in the prior literature that informed investors play a significant role in the formation of PEAD. Wall Street institutional and even individual investors would find this study useful in their arbitrage decision making processes.

1. Introduction

A new study by Ormos and Timotity (2016) examines the participation in financial markets of informed and uninformed traders during the Great Recession. They find that informed traders step away from financial markets in this period, whereas uninformed traders do not. This study led us to the idea that the Great Recession might provide us with a laboratory to test the ideas developed in the studies of Ball and Brown (1968), Mendenhall (2004), Ke and Ramalingegowda (2005) and Hirshleifer, Myers, Myers and Teoh (2008) who study the role that informed and uninformed investors play in the formation of post-earnings announcement drift (PEAD).

Ball and Brown (1968) documented for the first time the existence of a PEAD. PEAD occurs when cumulative stock returns drift upwards for a while after a 'good' earnings announcement and drift down after a 'bad' earnings announcements. The above mentioned studies attempt to explain the existence of PEAD with the role that informed and uninformed investors play in financial markets. Therefore, in this paper we examine the impact of the Great Recession on the relation between earnings surprises and stock returns.

Our a priori expectation for PEAD during the Great Recession is to be less pronounced than in the before the Great Recession period since Ormos and Timotity (2016) find that informed traders step away from financial markets in this period, whereas uninformed traders do not and Hirshleifer, Myers, Myers and Teoh (2008) document that uninformed individual investors are not responsible for the formation of PEAD. Naturally, by testing this hypothesis and finding evidence 'for' or 'against' it will help us understand better PEAD and provide evidence in support of the theories explaining PEAD with the role of informed investors. We document that PEAD weakens or even inverts in the Great Recession and post-recession period. This provides evidence in support of the ideas developed in the prior literature that informed investors play a significant role in the formation of PEAD.

2. Literature Review, Hypothesis Development and Methodology

In this paper we extend the literature in the area of the role of different investors in the formation of stock prices around earnings announcements. The studies in this field document evidence suggesting that share prices may not immediately fully reflect information released at earnings announcements, such as studies by Ball and Brown (1968), Bernard and Thomas (1989), Chan, Jegadeesh, and Lakonishok (1996) and Livnat and Mendenhall (2006). Ball and Brown (1968) were first to document the existence of post-earnings announcement drift (PEAD). PEAD occurs when cumulative stock returns tend to drift upwards for a while after 'good' earnings announcements and drift down after 'bad' earnings announcements. Bernard and Thomas (1989) examine different explanations for the existence of PEAD, such as beta-shifts, exclusion of non-beta risks, taxes, which seem not to be causing the PEAD and also delayed price response and transaction costs explanations which seem somewhat related to PEAD. Mendenhall (2004) also focuses on PEAD and its impact on investor arbitrage activities and the role it plays in forming market efficiency. Ke and Ramalingegowda (2005) focus on the role of short-term oriented institutional investors in financial markets in their attempts to profit from PEAD. Hirshleifer, Myers, Myers and Teoh (2008) study the role of investors in the formation of PEAD but they focus on individual investors. They find that it is not individual investors who cause the PEAD. They

find that these investors indeed profit from PEAD and also contribute to market efficiency with their trading.

In addition to the studies which focus on the role of investors, multiple studies focus on the relation of earnings to stock returns in general, such as studies by Das and Lev (1994), Kothari, Lewellen and Warner (2006). Das and Lev (1994) examine the non-linearity in the relation of earnings to returns, by examining several different non-linear specifications. Kothari, Lewellen and Warner (2006) also examine the role of earnings announcements on stock returns. They find, contrary to prior studies, that stock returns are not related to past earnings announcements but seem to be related to concurrent earnings. Livnat and Mendenhall (2006) also examine PEAD but from methodological standpoint – they test whether there is a difference in results when using different data sources, Compustat versus I/B/E/S. They document that indeed there is a difference. Johnson and Zhao (2012) study stock returns at the earnings announcement date and find evidence in agreement with past studies that large proportion of stock returns tend to move in direction opposite to the surprise. They focus their study on those contrarian stocks and find that these stocks do not seem to exhibit presence of PEAD.

In a new study, Ormos and Timotity (2016) use Budapest Stock Exchange intradaily data in the period January 2, 2008 to December 31, 2008 to study the role of informed traders and uninformed traders during the Great Recession. They find that informed traders step away from financial markets in this period, whereas uninformed traders do not. This study led us to the idea that the Great Recession provides us with a great laboratory to test the ideas developed in the studies of Ball and Brown (1968), Bernard and Thomas (1989), Chan, Jegadeesh, and Lakonishok (1996), Mendenhall (2004), Ke and Ramalingegowda (2005), Livnat and Mendenhall (2006) and Hirshleifer, Myers, Myers and Teoh (2008) that informed and uninformed investors might impact the formation of PEAD.

What the prior research suggests is that when firms are sorted into deciles based on unexpected earnings stock returns behave in unexpected manner. Firms in the top decile (those with favorable earnings surprises) significantly outperform those in the bottom decile (those with unfavorable earnings surprises). Therefore, this prior research documents a systematic positive relation between earnings surprises and returns during the subsequent twelve-month period. We use quarterly earnings surprises (SUE – firms' standardized unexpected earnings, calculated as actual earnings minus expected earnings, scaled by stock price one day prior to the earnings announcement) and one-year future stock returns (the subsequent twelve-month abnormal stock returns, calculated as the difference between the firm's buy-and-hold return and the value-weighted market buy-and-hold return) to test whether the Great Recession had an impact on the PEAD.

As documented by Ormos and Timotity (2016), as informed investors step away from financial markets, and as Hirshleifer, Myers, Myers and Teoh (2008) document that uninformed individual investors are not responsible for the formation of PEAD, our a priori expectation for PEAD during the Great Recession is to be less present. Hence, the hypothesis that we test is:

H0: PEAD does not differ during the Great Recession period.

To test the hypothesis, we use the following regression model:

$$BHAR_i = \alpha_i + \beta_i SUE_i + \delta_i CV + \varepsilon_i,$$ (1)

Where BHAR is the future 12 month abnormal return, SUE is the firms' standardized unexpected return, calculated as actual earnings minus expected earnings, scaled by stock price one day prior to the earnings announcement, CV are the control variables used in this study, the market value of equity, book-to-market ratio, momentum (3-month abnormal returns prior to the earnings announcement date), and return volatility (1-year standard deviation of daily stock returns) and ε_i is the error term. Therefore, if β_i in the recession period is significantly different from β_i in the non-recession period, we would reject H0.

3. Data

The data in this study are from the Institutional Brokers' Estimate System (I/B/E/S) and the Center for Research in Security Prices (CRSP) at the University of Chicago. The period that we examine is 2002-2014. The Great Recession period is defined using guidance from the National Bureau of Economic Research (NBER) and set as starting on December 1, 2007 and ending on June 30, 2009. We winsorize all non-returns data at the 1 and 99 percent levels to minimize the influence of outliers on our results.

The focus in these tables is on the relation between quarterly earnings surprises (SUE – firms' standardized unexpected returns, calculated as actual earnings minus expected earnings, scaled by stock price one day prior to the earnings announcement) and one-year future stock returns (the subsequent twelve-month abnormal stock returns, calculated as the difference between the firm's buy-and-hold return and the value-weighted market buy-and-hold return). In order to avoid survivorship bias, if the firm delists during our sample period we take the delisting returns on the day of delisting and assume they are invested in a value-weighted market portfolio for the remainder of the future returns period. Table 1 details the sample selection procedure.

Table I. Sample Selection.

This table details the sample selection procedure.

PEAD following Quarterly Earnings Announcements	
Quarterly earnings announcements in I/B/E/S from January 2000 through December 2013	258,726
Less: Observations without prior year earnings announcement	(37,789)
Less: Observations with missing CRSP data	(30,763)
Less: Observations with a stock price of less than $1	(3,234)
Sample for Bivariate Tests	186,940
Less: Missing data for control variables	(2,652)
Final Sample for Multivariate Tests	184,288

Table 2 presents descriptive statistics for the variables used in our analyses. The firms in our sample are large, with a mean and median market value of $4 billion and $595.73 million, respectively. However, a number of smaller firms are also represented in our sample, with the lowest quartile containing firms with a market value of equity of less than $166.30 million.

Table II. Descriptive Statistics.

This table presents descriptive statistics for the variables used in our analyses.

Panel A						
Descriptive Statistics - Bivariate Sample						
Variable	**N**	**Mean**	**Median**	**Lower Quartile**	**Upper Quartile**	**Std Dev**
Future 12mo Return	186,940	0.1391	0.0827	-0.1723	0.3379	0.6148
Future 12mo AbReturn	186,940	0.0385	-0.0209	-0.2347	0.1996	0.5620
SUE	186,940	-0.0007	0.0014	-0.0042	0.0060	0.0564
Panel B						
Descriptive Statistics - Multivariate Sample						
Variable	**N**	**Mean**	**Median**	**Lower Quartile**	**Upper Quartile**	**Std Dev**
Future 12mo Return	184,288	0.1395	0.0830	-0.1714	0.3377	0.6149
Future 12mo AbReturn	184,288	0.0388	-0.0207	-0.2337	0.1993	0.5621
SUE	184,288	-0.0007	0.0014	-0.0042	0.0059	0.0554
MVE (millions)	184,288	4045.76	595.73	166.30	2280.16	11448.64
BTM	184,288	0.6015	0.4973	0.2906	0.7785	0.4999
Momentum	184,288	0.0153	-0.0023	-0.0985	0.1009	0.2081
Return Volatility	184,288	0.0288	0.0242	0.0168	0.0354	0.0173

4. Analysis

Table 3 presents multivariate regression results when examining the pooled data and including year fixed effects and common controls (specifically, the market value of equity, book-to-market ratio, momentum (3-month abnormal returns prior to the earnings announcement date), and return volatility (1-year standard deviation of daily stock returns).

When regressing SUE on future returns on the pooled sample, we find results consistent with findings in prior research (e.g., Ball and Brown 1968, Bernard and Thomas, 1989) which document a positive relation between accounting earnings and returns over the subsequent year. However, the pooled results are surprisingly weak (p-value=0.0678) and with a smaller value than has been found in prior literature. Importantly, when this same relation is regressed in each year, the relation between earnings surprise and future returns is somewhat unstable.

Table III. Examining Relation between Earnings Surprise and Future Returns by Year.

DV: Future 12 Month Abnormal Return (BHAR) Based on Equation (1).

This table presents bivariate regression results pooled across our sample period and by calendar year, in order to show how the relation between SUE and future abnormal stock returns (BHARs) changes across time and to identify the anomalous time period. Pooled (panel) results are then presented at the bottom.

	Intercept		Earnings Surprise	
	Coefficient	**P-Value**	**Coefficient**	**P-Value**
2002	0.3345***	(0.0017)	1.0971	(0.2044)
2003	0.2196***	(<.0001)	0.8560***	(0.0004)
2004	0.0327***	(<.0001)	0.3420**	(0.0068)
2005	0.0455***	(<.0001)	0.6165***	(<.0001)
2006	-0.0290***	(<.0001)	0.5775***	(<.0001)
2007	-0.0799***	(<.0001)	0.4652***	(<.0001)
2008	0.0178***	(0.0012)	0.2550*	(0.0413)
2009	0.1516***	(<.0001)	-0.8576***	(<.0001)
2010	0.0193***	(0.0028)	0.2621**	(0.0125)
2011	-0.0246***	(0.0001)	0.4699***	(0.001)
2012	0.0765***	(<.0001)	0.2029	(0.5159)
2013	0.0269***	(<.0001)	0.0858	(0.8038)
2014	-0.0219***	(<.0001)	0.4370*	(0.0463)
Pooled	0.0385***	(<.0001)	0.1148*	(0.0678)

Note: Statistical significance at the 1%, 5% and 10% confidence level is represented by ***, ** and *, respectively. P-values are presented in parentheses next to the estimated coefficients and are calculated using robust standard errors clustered by firm.

Specifically, the size and statistical significance of the coefficient declines dramatically in the later years of our sample. Of particular note, however, is the large negative and significant coefficient in 2009, coinciding with the Great Recession and the beginning of the subsequent recovery. However, because this anomaly could be driven by a number of other omitted variables, we next examine the relation between earnings and future returns in a multivariate setting.

In Table 4 we split the sample into excluding 2009 (the anomalous year in question) and 2009 alone and show multivariate regression results for each sample. We then alternatively split the sample into excluding earnings announcements occurring the recession (using NBER dates of December 1, 2007-June 2009) and just earnings announcements during the recession. All regression results use robust standard errors clustered by firm to account for heteroscedasticity and autocorrelation.

Table IV. Examining the Impact of the Great Recession on the Earnings/Returns relation.

In this table we split the sample into excluding 2009 (the anomalous year in question) and 2009 alone and show multivariate regression results for each sample. I then alternatively split the sample into excluding earnings announcements occurring the recession (using NBER dates of December 1, 2007-June 2009) and just earnings announcements during the recession. All regression results use robust standard errors clustered by firm to account for heteroscedasticity and autocorrelation.

	Panel A							
	Pooled			**Excluding 2009**			**Just 2009**	
	DV: Future Return (BHAR)			**DV: Future Return (BHAR)**			**DV: Future Return (BHAR)**	
Intercept	0.0389***	-0.0216***	-0.079***	0.0260***	-0.0221***	-0.0480***	0.1514***	-0.2143***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)
SUE	0.1184*	0.1792***	0.2420***	0.4636***	0.4523***	0.4783***	-0.8951***	-0.4597**
	(0.0673)	(0.0044)	(<.0001)	(<.0001)	(<.000)	(<.0001)	(<.0001)	(0.0216)
MVE (natural log)			0.0000			0.0000		0.0000**
			(0.2187)			(0.8869)		(0.0061)
BTM			0.0483***			0.0451***		0.0052
			(<.0001)			(<.0001)		(0.8044)
Momentum			-0.0130			-0.0001		-0.1141***
			(0.1800)			(0.9912)		(0.0014)
ReturnVolatility			1.6441***			0.1824		7.2451***
			(<.0001)			(0.4199)		(<.0001)
Year Fixed Effects	Excluded	Included	Included	Excluded	Included	Included	N/A	N/A
Observations	184,288	184,288	184,288	168,106	168,106	168,106	16,182	16,182
Adjusted R-Squared	0.0001	0.0226	0.0266	0.0021	0.0242	0.0258	0.0071	0.0409
F-Value	3.35*	103.02***	86.02***	65.61***	103.71***	87.99***	18.78***	36.17***

Note: Statistical significance at the 1%, 5% and 10% confidence level is represented by ***, ** and *, respectively. P-values are presented in parentheses under the estimated coefficients and are calculated using robust standard errors clustered by firm.

	Panel B							
	Pooled			**Excluding Recession Period**			**Just Recession Period**	
	DV: Future Return (BHAR)			**DV: Future Return (BHAR)**			**DV: Future Return (BHAR)**	
Intercept	0.0389***	-0.0216***	-0.0790***	0.0296***	0.0221***	-0.0236***	0.08400***	-0.2277***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.0044)	(<.0001)	(<.0001)
SUE	0.1184*	0.1792***	0.242***	0.4325***	0.4208***	0.4387***	-0.5687***	-0.0900
	(0.0673)	(0.0044)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.0006)	(0.5661)
MVE (natural log)			0.0000			0.0000		0.0000***
			(0.2187)			(0.1522)		(0.0011)
BTM			0.0483***			0.0565***		0.0216
			(<.0001)			(<.0001)		(0.3101)
Momentum			-0.0130			0.0540***		-0.1968***
			(0.1800)			(<.0001)		(<.0001)
ReturnVolatility			1.6441***			0.2333		6.7465***
			(<.0001)			(0.2961)		(<.0001)
Year Fixed Effects	Excluded	Included	Included	Excluded	Included	Included	N/A	N/A
Observations	184,288	184,288	184,288	158,101	158,101	158,101	26,187	26,187
Adjusted R-Squared	0.0001	0.0226	0.0266	0.0018	0.0248	0.0283	0.0031	0.0394
F-Value	3.35*	103.02***	86.02***	52.51***	105.40***	89.56***	11.80***	39.96***

Note: Statistical significance at the 1%, 5% and 10% confidence level is represented by ***, ** and *, respectively. P-values are presented in parentheses under the estimated coefficients and are calculated using robust standard errors clustered by firm.

We find further evidence from our multivariate analysis that the relation between SUE and future returns is radically different in the Great Recession period. When partitioning our sample to 2009 observations and non-2009 observations (Panel A), we find that in years besides 2009 the relation between SUE and future returns is remarkably steady with a strong positive significant coefficient. However, in 2009, the relation inverts to a strong negative significant coefficient. This strong negative significant coefficient holds even when controlling a number of other factors which influence future returns, including size, book-to-market, momentum, and return volatility. Because we speculate that the anomalous relation is driven by the Great Recession, we next partition our sample based on whether the quarterly earnings announcement occurs during the Great Recession[1]. We find further evidence that the relation between earnings and future returns is radically different during the Great recession.

Specifically, we find that the relation between earnings and future returns is now negative. This implies that, during the Great Recession, earnings surprises resulted in contrarian responses over the subsequent twelve months. Alternatively, the market ignores the information in accounting numbers and responds more dramatically to other information in recession periods. Thus, the PEAD appears to either be significantly reduced in impact or is completely inverted for earnings announcements which occur in the Great Recession. Overall, regardless of the mechanism, this is consistent with prior work noting that informed investors generally failed to participate during the Great Recession (Ormos and Timotity, 2016) resulting in a response driven primarily by uninformed investors.

5. Conclusion

This paper examines the impact of the Great Recession on the relation between earnings surprises and stock returns. We use quarterly earnings surprises and one-year future stock returns to test whether the Great Recession had an impact on PEAD using univariate and multivariate analysis. We find that the relation between earnings and future returns is negative during the Great Recession. This suggests that during the Great Recession, earnings surprises resulted in contrarian responses over the subsequent twelve months. This suggests that PEAD appears to either be significantly reduced in impact or is completely inverted for earnings announcements which occur in the Great Recession. Overall, regardless of the mechanism, this is consistent with prior work noting that informed investors generally stopped participating in financial markets during the Great Recession (Ormos and Timotity, 2016), hence resulting in a response driven primarily by uninformed investors. This is evidence in support of the ideas developed in Mendenhall (2004), Ke and Ramalingegowda (2005) and Hirshleifer, Myers, Myers and Teoh (2008) that informed investors play a significant role in the formation of PEAD.

A major limitation of the study however is due to the brief period of the Great Recession and that we examine only the effects of one recession. In a future study, we intend to extend this study by examining several past recessions and their impact on PEAD.

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[1] We follow guidance by the National Bureau of Economic Research (NBER) and identify all earnings announcements as occurring during the Great Recession if earnings are announced between December 2007 and June 2009.

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