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Investor reactions to major events in the sub-prime mortgage crisis

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A R T I C L E I N F O

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A B S T R A C T

We investigate how investor perceptions about the financial health of twenty-seven bank holding companies that controlled eighty percent of US banking assets at year-end 2006 changed during major events leading to the collapse of Lehman Brothers. We use the event study method to investigate whether and to what extent investors priced major events before the Lehman bankruptcy. Abnormal returns on the event days range from -9.25 to 4.80%. When the Federal Reserve Bank of New York is authorized to lend to Fannie Mae and Freddie Mac on 13 July 2008, sample bank holding companies average the lowest abnormal returns of -9.25. When the Federal Housing Agency places Fannie Mae and Freddie Mac under government conservatorship on 7 September 2008, abnormal returns average the highest at 4.80. The significant abnormal returns indicate that investors price the information released in the pre-crisis events.

1. Introduction

Investor perceptions about the health of a firm shape their trading decisions, and stock returns reflect the aggregate result of these trading decisions. We investigate how investor perceptions about the financial health of twenty-seven bank holding companies (BHCs) which controlled eighty percent of US banking assets at year-end 2006 changed during major events leading to the collapse of Lehman Brothers. We use the event study method to investigate whether and to what extent investors priced major events before the Lehman bankruptcy.

Although the financial crisis emerged as a mortgage crisis in the second quarter of 2007, it led to a liquidity crisis with systemically important institutions' failure and a contraction in credit lines of banks. The collapse of Lehman Brothers is the most traumatic single event in the crisis period and is a threshold for the start of the financial crisis (Griffith-Jones et al., 2010; Cukierman, 2019; Zhu et al., 2015). Bordalo et al. (2018) suggest that Lehman Brothers' collapse is a sign that the financial system is vulnerable and much more connected than previously thought. The focal point of the crisis is how investors view the contagion risk in commercial banking and the shadow banking system (Akhigbe et al., 2017; Acharya and Schnabl, 2010; Strahan and Tanyeri, 2015; Qian and Tanyeri, 2017). Consolidation of banks into 'too-big-to-fail' institutions increased financial dependence among banks, and homogeneity in the financial system increased systemic risk (Zhou, 2010). We take the bankruptcy of Lehman Brothers as the start of the global crisis. The Federal Reserve Bank of St. Louis provides a timeline of key events in the period from Freddie Mac's halting to buy risky mortgages to the bankruptcy of Lehman Brothers, which we define as the pre-crisis period (Federal Reserve Bank of St. Louis' Financial Crisis Timeline, 2022 - FRASER | St. Louis Fed, 2021). Our sample consists of firm-specific events such as bankruptcies, rating announcements, and bailouts. We exclude economic policy actions by regulatory authorities. We focus on firm-specific events as important information events that may alert investors to the possibility of the oncoming global crisis.

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Abnormal returns on the event days range from -9.25 to 4.80% using the market (S&P 500) adjusted model. When the Federal Reserve Board authorizes the Federal Reserve Bank of New York to lend to Fannie Mae and Freddie Mac on 13 July 2008, sample BHCs average the lowest abnormal returns of -9.25%. When the Federal Housing Agency places Fannie Mae and Freddie Mac under government conservatorship on 7 September 2008, abnormal returns average the highest at 4.80%. The second-lowest average abnormal returns of -3.40% are on September 15, 2008, the bankruptcy of Lehman Brothers. Investors price the new information released in the pre-crisis events as signals of the oncoming crisis.

Banks' stock prices convey essential information to investors and policymakers. Stock prices incorporate investors' expectations about the future and reflect all information promptly. A financial crisis is an information event, and stock prices should incorporate information about the crisis if the efficient market hypothesis hold (Ricci, 2015; Cubillas et al., 2012; Gorton, 2018). Yet, many scholars claim that markets did not convey enough information to market participants until the crisis started (Duffie, 2019). This raises a fundamental question: did the market participants fail to price the information that the events before the Lehman bankruptcy released? This paper analyzes how BHC returns react to firm-specific events in the pre-crisis period (including Lehman Brothers' collapse) in the 2007–2008 financial crisis.

The contribution of this study is threefold. First, we investigate whether markets react to specific pre-crisis events as potential signals for the oncoming crisis. Second, unlike previous literature that focuses on a single event during the crisis or pays attention only to the crisis period (Chong, 2011; Cukierman, 2019; Eichengreen et al., 2012; Ivashina and Scharfstein, 2010; Veronesi and Zingales, 2010), this study examines multiple major events before the start of the crisis. Third, a systemically important event affects all firms and hence the index which is the measure of the market portfolio. Our novel methodology separates how the event affects the market (measured using the S&P500 index) and how the event affects the individual bank holding companies. The rest of the study proceeds as follows: Section 2 describes the sample and research method. Section 3 tabulates and discusses the results. Section 4 concludes.

2. Sampling framework, timeline of events, and the event study method

We take the bankruptcy filing of Lehman Brothers as the start of the global crisis, which signaled the possibility of bankruptcies of systematically important institutions (Carey et al., 2012; Cukierman, 2019; Ivashina and Scharfstein, 2010; Longstaff, 2010). Lehman's bankruptcy triggered huge losses in the financial sector, and as of early 2009, four investment banks failed because of their risky trading and excessive leverage (Allen and Carletti, 2010; Edey, 2009; Lewis, 2009).

We identify the important information events based on the crisis timeline of the St. Louis Federal Reserve FRED database[1]. There are 307 events in the crisis timeline and 54 events in the pre-crisis period. The database[1] classifies events into three categories: (1) Federal Reserve Board Policy Actions (such as the introduction of new policy tools, redesign of existing tools, changes in monetary policy.), (2) Market Events (such as rating, bankruptcy, and firm related announcements), (3) Other Policy Actions (such as fiscal policy actions by Congress and Treasury). We focus on the market events, and Table 1 shows the timeline of 23 market (firm-specific) events that take place before the bankruptcy of Lehman Brothers. Table 1 shows the timeline of all 23 firm-specific events in the pre-crisis period (Edey, 2009; Eichengreen et al., 2012; Hall, 2008; Hildebrand, 2008; Ivashina and Scharfstein, 2010; Kashyap and Zingales, 2010; Lewis, 2009; Longstaff, 2010; Veronesi and Zingales, 2010). The timeline of events starts on February 1, 2007, with Freddie Mac's stopping to buy risky subprime mortgages and ends on September 15, 2008, with Lehman Brothers' bankruptcy.

We analyze twenty-seven BHCs listed on S&P 500. BHCs in our sample are considered 'too big to fail', and a possible failure of these institutions is likely to have implications for the broader financial system (Edey, 2009; Hildebrand, 2008; Ivashina and Scharfstein, 2010).We obtain the daily returns of BHCs and returns of the S&P500 index from CRSP. Table 2 lists sample BHCs, their market capitalizations, and the book value of assets from 2006 to 2010 (data from Compustat). At year-end 2006 (the beginning of the sample period), sample BHCs combined market share averages 80% (as a percent of commercial banking industry assets). Their combined market capitalization is 20% of the total market capitalization of the S&P 500.

We use the Brown and Warner (1985) event study methodology to measure how the major events leading to the crisis affected investor perceptions about the value of BHCs. The estimation window covers 251 trading days from 3rd January to 29th December 2006. We use the same estimation window for all events to ensure that the estimation window is a period clean of any events that are the harbinger for the coming crisis. Abnormal returns difference realized returns from expected returns. The global crisis affected the S&P500 index along with all its constituents. Hence, we disaggregate the market-adjusted model into three components to analyze the effect on the market index and the BHCs.

$$A_{i,t} = R_{i,t} - R_{m,t} = \left(R_{i,t} - \overline{R}_{m,}\right) + \left(\overline{R}_i - \overline{R}_m\right) \quad (1)$$

where $A_{i,t}$ is abnormal return using the market-adjusted model, $R_{i,t}$ is the return of BHC *i* on day *t*, $R_{m,t}$ is the return on the market index (S&P500) on day t, $\overline{R}_m$ is mean return of the index in the estimation window and $\overline{R}_i$ is the mean return of BHC *i* in the estimation window. Eq. (1) disaggregates the abnormal return calculated using the market-adjusted model ($R_{i,t}$ -$R_{m,t}$) into three components. The first component ($R_{i,t} - \overline{R}_{i,}$) subtracts the mean returns of BHC *i* in the estimation window (the 251 trading days from 3rd January to 29th December 2006) from the realized returns of BHC *i* on day *t* (where *t* is in event window). This first component shows how the event affects the returns of the BHC benchmarked against its average returns in a period where the event has no effect (the estimation window). Brown and Warner (1985) refer to this first component as the abnormal returns calculated using the mean adjusted return

[1] Available at https://www.newyorkfed.org/medialibrary/media/research/global_economy/Crisis_Timeline.pdf.

Table 1
Timeline of events.

No	Date	Event	Synopsis
1	February 01, 2007	Freddie Mac stops buying risky mortgages	The Federal Home Loan Mortgage Corporation (Freddie Mac) announces that it will no longer buy the riskiest subprime mortgages and mortgage-related securities
2	April 02, 2007	New Century Chapter 11 filing	New Century Financial Corporation, a leading subprime mortgage lender, files for Chapter 11 bankruptcy protection
3	June 01, 2007	S&P downgrades over 100 bonds	Standard and Poor's and Moody's Investor Services downgrade over 100 bonds backed by second-lien subprime mortgages
4	June 07, 2007	Bear Stearns suspends redemptions	Bear Stearns informs investors that it is suspending redemptions from its High-Grade Structured Credit Strategies Enhanced Leverage Fund
5	July 11, 2007	S&P places 612 securities on credit watch	Standard and Poor's places 612 securities backed by subprime residential mortgages on a credit watch
6	July 24, 2007	Country Wide warning	Countrywide Financial Corporation warns of "difficult conditions."
7	July 31, 2007	Bear Stearns liquidates two funds	Bear Stearns liquidates two hedge funds that invested in various types of mortgage-backed securities
8	August 06, 2007	American Home Mortgage Chapter 11 filing	American Home Mortgage Investment Corporation files for Chapter 11 bankruptcy protection.
9	August 09, 2007	BNP Paribas halts redemptions	BNP Paribas, France's largest bank, halts redemptions on three investment funds.
10	August 16, 2007	Fitch downgrades Countrywide	Fitch Ratings downgrades Countrywide Financial Corporation to BBB+, its third-lowest investment-grade rating, and Countrywide borrows the entire $11.5 billion available in its credit lines with other banks
11	September 14, 2007	Bank of England to provide liquidity support Northern Rock	The Chancellor of the Exchequer authorizes the Bank of England to provide liquidity support for Northern Rock, the United Kingdom's fifth-largest mortgage lender.
12	October 15, 2007	Citi, BofA, JPMorgan plan for Master Liquidity Enhancement Conduit	Citigroup, Bank of America, and JPMorgan Chase announced plans for an $80 billion Master Liquidity Enhancement Conduit to purchase highly rated assets from existing special purpose vehicles.
13	December 21, 2007	Citi, BofA, JPMorgan stop plans for Master Liquidity Enhancement Conduit	Citigroup, JPMorgan Chase, and Bank of America abandon plans for the Master Liquidity Enhancement Conduit, announcing that the fund "is not needed at this time."
14	January 11, 2008	BofA purchase of Countrywide	Bank of America announces that it will purchase Countrywide Financial in an all-stock transaction worth approximately $4 billion.
15	January 18, 2008	Fitch downgrades and S&P places CreditWatch Negative on Ambac	Fitch Ratings downgrades Ambac Financial Group's insurance financial strength rating to AA, Credit Watch Negative. Standard and Poor's place Ambac's AAA rating on CreditWatch Negative.
16	February 17, 2008	Northern Rock taken into state ownership	Northern Rock is taken into state ownership by the Treasury of the United Kingdom.
17	March 05, 2008	Carlyle Capital receives a default notice	Carlyle Capital Corporation receives a default notice after failing to meet margin calls on its mortgage bond fund.
18	March 24, 2008	FED New York supports JPMorgan to buy Bear Stearns	The Federal Reserve Bank of New York announces that it will provide term financing to facilitate JPMorgan Chase and Co.'s acquisition of The Bear Stearns Companies Inc. A limited liability company (Maiden Lane) is formed to control $30 billion of Bear Stearns assets that are pledged as security for $29 billion in term financing from the New York Fed at its primary credit rate. JPMorgan Chase will assume the first $1 billion of any losses on the portfolio.
19	June 05, 2008	S&P downgrades AMBAC and MBIA	Standard and Poor's downgrades monoline bond insurers AMBAC and MBIA from AAA to AA.
20	July 11, 2008	The Office of Thrift Supervision closes IndyMac Bank	The Office of Thrift Supervision closes IndyMac Bank, F.S.B. The Federal Deposit Insurance Corporation (FDIC) announces the transfer of the insured deposits and most assets of IndyMac Bank, F.S.B. to IndyMac Federal Bank, FSB.
21	July 13, 2008	FED New York is authorized to lend Fannie Mae and Freddie Mac	The Federal Reserve Board authorizes the Federal Reserve Bank of New York to lend to the Federal National Mortgage Association (Fannie Mae) and the Federal Home Loan Mortgage Corporation (Freddie Mac), should such lending prove necessary.
22	September 07, 2008	FHFA places Fannie Mae and Freddie Mac in government conservatorship	The Federal Housing Finance Agency (FHFA) places Fannie Mae and Freddie Mac in government conservatorship. U.S. Treasury Department announces three additional measures to complement the FHFA's decision: (1) Preferred stock purchase agreements between the Treasury/FHFA and Fannie Mae and Freddie Mac to ensure the GSEs positive net worth; (2) a new secured lending facility which will be available to Fannie Mae, Freddie Mac, and the Federal Home Loan Banks; and (3) a temporary program to purchase GSE MBS.
23	September 15, 2008	Lehman Brothers Chapter 11 filing	Lehman Brothers Holdings Incorporated files for Chapter 11 bankruptcy protection

model. The second component ($R_{m,t} - \overline{R}_{m,}$) subtracts the index's mean return in the estimation period from the return on the index on day *t*. The second component shows how the event affected the index benchmarked against its mean returns in a period where the event has no effect. The third component ($\overline{R}_i - \overline{R}_m$) subtracts the mean returns of the index from the mean returns of BHC *i* in the estimation window. The third component shows the extent to which the BHC returns outperformed (or underperformed) the index in a period where the event has no effect. Thus, we disaggregate the effect of the event on the BHC and the effect on the index. We test the significance of abnormal returns for the 27 BHCs on each of the 23 event days (calculated using market adjusted and mean adjusted

Table 2
Bank holding companies in the sample
The table reports the market share (in billions of $ and as a percent of total banking assets) of Bank Holding Companies in the sample.

Bank Holding Company	2006		2007		2008		2009		2010	
	Market Cap.	Total Assets	Market Cap.	Total Assets	Market Cap.	Total Assets	Market Cap.	Total Assets	Market Cap.	Total Assets
BB and T Corp.	23	121	16	132	15	152	17	165	18	157
BBVA USA	2	34	4	58	1	62	2	64	1	63
Bank of America Corp.	240	1,463	183	1,720	70	1,822	130	2,231	135	2,268
Bank of NY Mellon	29	103	55	197	32	237	33	212	37	247
C I T Group Inc.	11	77	4	90	1	80	5	60		51
Citigroup Inc.	274	1,884	147	2,187	36	1,938	75	1,862	137	1,913
Comerica Inc.	9	58	6	62	2	67	4	59	7	54
Fifth Third Bancorp	22	100	13	110	4	119	7	113	11	111
First Horizon National	5	37	2	37	2	31	2	26	3	24
Huntington Bancshares	5	35	5	54	2	54	2	51	5	53
JPMorgan Chase and Co.	168	1,351	147	1,562	118	2,175	171	2,031	166	2,117
Keycorp	15	92	9	99	4	105	4	93	7	91
M and T Bank Corp.	13	57	8	64	6	65	7	68	10	68
Marshall and Ilsley Corp.	12	56	7	59	3	62	2	57	3	50
National City Corp.	23	140	10	150	3	143				
Northern Trust Corp.	13	60	16	67	11	82	12	82	13	83
PNC Financial Services	21	101	22	138	17	291	24	271	31	264
Peoples United Financial	6	10	5	13	6	20	5	212	5	250
Regions Financial Corp.	27	143	16	141	5	146	6	142	8	132
Santander Bancorp	83	9	40	9	58	7	57	6		6
Suntrust Banks Inc.	29	182	21	179	10	189	10	174	14	172
Synovus Financial Corp.	10	31	7	33	2	35	98	32	2	30
Toronto Dominion Bank	43	40	50	60	30	122	53	145	65	176
US Bancorp	63	219	54	237	43	267	43	281	51	307
Wachovia Corp.	82	520	115	707	75	782	12	760		
Wells Fargo	105	481	120	481	101	575	110	1,309	138	1,243
Zions Bancorporation	7	42	8	46	5	52	2	55	1	51

models) using the t-statistic:

$$t = \overline{A}_t / \widehat{S}(\overline{A}_t) \; Wehere \; \widehat{S}(\overline{A}t) = \sqrt{\sum\nolimits_{t=3\ Jan\ 2006}^{t=29\ Dec\ 2006} (\overline{A}_t - \overline{\overline{A}})^2 / 205 \overline{A}_t = \frac{1}{27} \sum_{i=1}^{i=27} A_{i,t'}}$$

$$\overline{\overline{A}} = \frac{1}{251} \sum_{t=3\ Jan\ 2006}^{t=29\ Dec\ 2006} \overline{A}_t.$$

Fig. 1 plots the Chicago Board of Exchange Volatility Index (VIX) from January 2006 to January 2010. VIX is a measure of investor sentiment and is known as the "fear index" since it spikes during market turmoil. VIX index is below 20% from January 2006 to July 2007 with only one spike of 21% on May 17, 2006. Until July 2007, VIX hovered between 9 and 18%. Yet, after July 26, 2007, VIX steadily stayed above 20%, a sign of high volatility and uncertainty in the market. For instance, when BNP Baripas halted redemptions on three investment funds on August 9, 2007, the VIX index increased to 26.48% from 21.45%. In addition, following the default notice of Carlyle Capital VIX index increased by 10%. Although policy actions taken by FED and other regulatory units attempted to settle down the market, the index stayed over 20% until the collapse of Lehman Brothers. Then, it increased to over 30%, indicating fear in the markets.

3. Results

Table 3 reports the average abnormal returns on the 23 event dates and the t-statistics calculated using the market-adjusted and mean adjusted models. The results show that investors react significantly to 19 of the 23 events. Our results show that investors price

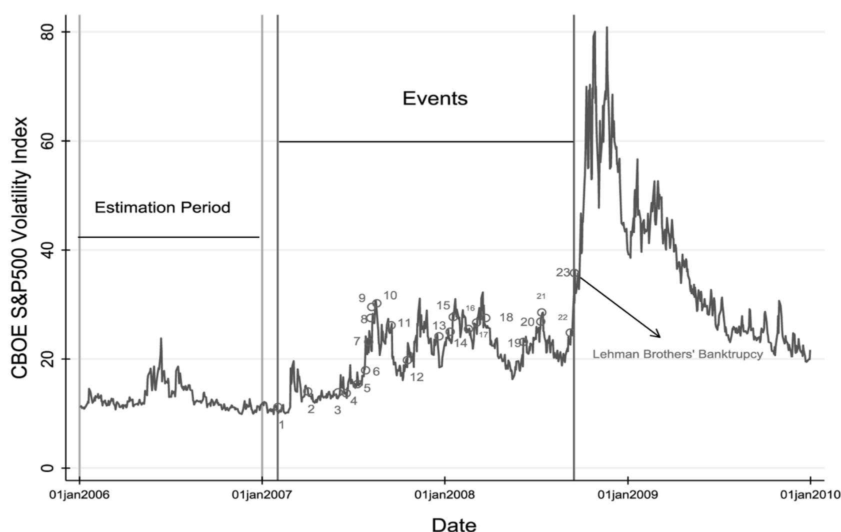

Fig. 1. Plot of VIX - CBOE Volatility Index
The figure plots daily closing levels and the S&P 500 Volatility Index (VIX), estimation period, and numbers of events in the analysis. The sample period is January 1, 2006 – January 1, 2010.

the firm-specific pre-crisis events. All of the events with insignificant abnormal returns are before September 2007. As the crisis loomed closer, the market reaction proves significant. One possible interpretation of the results is that the distinction between risk and uncertainty helps to explain market behavior after the summer of 2007. Until the crisis, the risk is related to the ratings of the securities. As the housing market began to disintegrate, confidence in the security ratings eroded, and uncertainty increased (Roubini and Mihm, 2014).

Investors reacted differentially to announcements of government support to banks in difficult conditions. For instance, while the opening of the term auction facility to Bear and Stearns had a positive impact (abnormal returns of 1.48%), the authorization of the Federal Reserve Bank of New York to lend Fannie Mae and Freddie Mac had the most negative impact (abnormal returns of -9.25%). Fannie Mae and Freddie Mac had a pivotal role in the housing market and are considered to be 'too big to fail' due to both the size of the portfolio they hold and the fact that they provided liquidity to the market during the crisis (Frame et al., 2015). In 2008, as the crisis deepened, Fannie Mae and Freddie Mac had a combined loss of $14.2 billion (Frame et al., 2015). The Federal Reserve Bank of New York's authorization to lend Fannie Mae and Freddie Mac caused markets to react negatively and investors perceived the event as a substantial increase in the potential default probability of these institutions on July 13, 2008. Two months later, on September 7, 2008, the two institutions went into government conservatorship. This time, the market reacted positively and abnormal returns averaged 4.76%. Smooth operational transition and positive bond market reaction imply that investors perceived the conservatorship as successful (Frame et al., 2015).

The event study methodology assumes that events are unanticipated and event-related information does not leak before the event. The methodology also assumes there are no confounding events on the same day. Violations of these two assumptions hinder the method's measurement of the investor reaction to announcements (Cornett et al., 2011; Fescioglu-Unver and Tanyeri, 2013; Mulherin and Simsir, 2015; Yilmaz and Tanyeri, 2016; Tunyi, 2021). The sample period from February 2007 to September 2008 is turbulent. Some sample event days include other coinciding information releases. Some sample event days have event-related information released before the announcement. These violations of the event study methodology may explain the counterintuitive results on two event days. First, on August 6, 2007, American Home Mortgage Investment Corp. files for Chapter 11 bankruptcy protection, but the abnormal returns average 2.36 and 4.73% using market adjusted and mean adjusted models. On August 2, 2007, Michael Strauss (the CEO) sent an email announcing the company's severe financial difficulties. The market had already partially incorporated the bad news before August 6th. Furthermore, on August 6, a drop in oil prices was a piece of welcome news that confounded the market reaction to the information about the bankruptcy that is released on the same day. Second, the market reacted positively on August 16, 2007, despite a downgrade of Countrywide Financial by Fitch rating. Although the market responded negatively to the downgrade in the morning session, stocks had trimmed some of those losses by mid-afternoon as the FED added temporary reserves to the banking system.

Table 3
Abnormal returns on event day
Table reports mean abnormal returns (in percent) on event days and t-statistics calculated using the market adjusted and mean adjusted models. ** and * denote significance at 1 and 5%, respectively

Date	Event	Abnormal return (SP500 adjusted) ($R_{i,t} - R_m$)	Abnormal return (mean adjusted) ($R_{i,t} - \overline{R}_i$)	SP500 Return (mean adjusted) ($R_{m,t} - \overline{R}_{m,t}$)	Relative performance (estimation period) ($\overline{R}_i - \overline{R}_m$)	Market (SP500) adjusted T-test	Mean adjusted T-test
01-Feb-07	Freddie Mac stops buying risky mortgages	-0.11	0.39	0.48	-0.008	-0.25	0.90
02-Apr-07	New Century Chapter 11 filing	-1.68	-1.47	0.21	-0.008	-3.94**	-3.43**
01-Jun-07	S&P downgrades over 100 bonds	0.32	0.65	0.32	-0.008	0.75	1.52
07-Jun-07	Bear Stearns suspends redemptions	0.35	-1.46	-1.81	-0.008	0.81	-3.41**
11-Jul-07	S&P places 612 securities on credit watch	-0.22	0.31	0.52	-0.008	-0.51	0.72
24-Jul-07	Country Wide warning	-0.75	-2.78	-2.03	-0.008	-1.76	-6.50**
31-Jul-07	Bear Stearns liquidates two funds	-0.53	-1.84	-1.32	-0.008	-1.24	-4.31**
06-Aug-07	American Home Mortgage Chapter 11 filing	2.36	4.73	2.36	-0.008	5.52**	11.07**
09-Aug-07	BNP Paribas halts redemptions	-1.16	-4.17	-3.02	-0.008	-2.72**	-9.76**
16-Aug-07	Fitch downgrades Countrywide	4.80	5.08	0.27	-0.008	11.23**	11.89**
14-Sep-07	Bank of England to provide liquidity support Northern Rock	0.34	0.31	-0.03	-0.008	0.79	0.73
15-Oct-07	Citi, BofA, JPMorgan plan for Master Liquidity Enhancement Conduit	-0.76	-1.65	-0.89	-0.008	-1.79	-3.85**
21-Dec-07	Citi, BofA, JPMorgan stop plans for Master Liquidity Enhancement Conduit	1.35	2.97	1.61	-0.008	3.15**	6.95**
11-Jan-08	BofA purchase of Countrywide	1.89	0.49	-1.41	-0.008	4.43**	1.14
18-Jan-08	Fitch downgrades and S&P places CreditWatch Negative on Ambac	-0.77	-1.42	-0.66	-0.008	-1.80	-3.32**
17-Feb-08	Northern Rock taken into state ownership	-1.56	-1.69	-0.14	-0.008	-3.65**	-3.97**
05-Mar-08	Carlyle Capital receives a default notice	-1.54	-1.06	0.47	-0.008	-3.62**	-2.49**
24-Mar-08	FED New York supports JPMorgan to buy Bear Stearns	0.26	1.75	1.48	-0.008	0.62	4.10**
05-Jun-08	S&P downgrades AMBAC and MBIA	-0.97	0.94	1.90	-0.008	-2.26*	2.20*
11-Jul-08	The Office of Thrift Supervision closes IndyMac Bank	-0.31	-1.46	-1.16	-0.008	-0.72	-3.42**
13-Jul-08	FED New York is authorized to lend Fannie Mae and Freddie Mac	-9.25	-10.19	-0.96	-0.008	-21.65**	-23.87**
07-Sep-08	FHFA places Fannie Mae and Freddie Mac in government conservatorship	4.76	6.76	2.00	-0.008	11.14**	15.83**
15-Sep-08	Lehman Brothers Chapter 11 filing	-3.40	-8.16	-4.77	-0.008	-7.97**	-19.11**

4. Conclusion

One important question about the global crisis is whether market participants anticipate the crisis. To investigate this question, we would like to measure the impact of pre-crisis events with and without investor anticipation. Even though we cannot measure how investors would have priced the information content of events before the crisis, this paper shows that investors react significantly to 19 of the 23 events in the sample. Furthermore, all four of the insignificant events are before September 2007. As the crisis draws closer, investors reacted more significantly to the information released in sample events. These results indicate that investors' perception of the financial health of the largest 27 BHCs changed significantly as the crisis drew closer. As such, in line with the results of Roubini and Mihm (2014), we conclude that the Lehman Brothers' bankruptcy is not a cause of the crisis but rather a consequence of the severity of the crisis.

CRediT authorship contribution statement

Başak Tanyeri Günsür: Conceptualization, Methodology, Writing – original draft, Formal analysis. **Emre Bulut:** Data curation, Formal analysis, Conceptualization, Methodology, Writing – original draft.

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