Financial Econometrics Series

SWP 2015/15

The Impact of the Lehman Brothers’ Bankruptcy on the Performance of Chinese Sectors

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Kumari Ranjeeni and Susan Sunila Sharma

ABSTRACT
This paper investigates the impact of the news announcement of the Lehman Brothers’ (LBs’) bankruptcy on the performance of Shanghai Stock Exchange (SSE) sectors. Unlike the assumption in this literature that firms are homogenous, we address the unknown issue: does LBs’ bankruptcy have a heterogenous effect on stock returns of sectors listed on SSE? We employ an event study approach and use daily data for a total of 845 firms grouped into nine sectors, we find fresh results, previously undocumented in this literature. First, our results show that unlike the United States (see Ranjeeni 2014), Chinese Energy and Financial sectors were insignificantly affected from LBs’ bankruptcy. This implies that these sectors can provide cross-country diversification opportunities for US investors during volatile periods. Second, we find statistically insignificant effect of LBs’ bankruptcy on the performance of the financial sector while most of the other sectors suffered significantly. This implies that the Chinese market level analysis conducted by Bianconi et al. (2013) is influenced by the performance of the financial sector. Finally, our results highlight on the heterogeneous effect of LBs’ bankruptcy on different Chinese sectors and at different time intervals surrounding the event.

KEYWORDS: Lehman Brothers’ bankruptcy, Global Financial Crisis, abnormal returns, Chinese sectors, event study.

JEL: G01, G11, G14, G33

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1. INTRODUCTION

The event study approach is a widely used analytical technique in the field of finance to examine the impact of significant event(s) on the performance of financial stock prices. Based on the theory of market efficiency, event studies reflect the immediate effect of a particular event on the performance of stock returns. Both firm specific and economy wide events are investigated using this approach. According to Schweitzer (1989) there are two types of events which are examined using event study approach namely a single event with one time occurrence and events with frequent occurrence such as earnings announcements. Based on an event with single occurrence, a number of studies examined the impact of the financial crisis on the performance of stock returns (see Kryzanowski et al., 1995; Dumontaux and Pop, 2009; Pichardo and Bacon, 2009; Raddatz, 2010; Mio and Fasan, 2012; Ranjeeni, 2014). Kryzanowski et al. (1995) examined the impact of the Canadian stock market crash of 1987 on the performance of screen – sorted portfolios abnormal returns, volatility, and residual risk premium. Kryzanowski et al. (1995) find an inverse relationship between the behaviors of beta sorted portfolios and systematic risk over different time intervals. Additionally, the lowest beta sorted portfolio had a statistically significant increase in its residual risk premium and higher negative abnormal returns following the 1987 stock market crash. Mio and Fasan (2012) examined whether Corporate Social Performance (CSP) had any impact on Corporate Financial Performance (CFP) due to LBs’ bankruptcy. They find CSP to be positively correlated with short-term CFP (Abnormal Returns) during the crisis due to LBs’ bankruptcy.

In addition, studies have largely analyzed the impact of LBs’ bankruptcy on the performance of stock returns in the US stock market (see for example, Dumontaux and Pop, 2009; Pichardo and Bacon, 2009; Ranjeeni, 2014). Dumontaux and Pop (2009) examined the performance of the US
surviving financial institutions (disaggregated large banks and “non-bank” Diversified Financial Industry) for the year 2008\(^2\) and find contagion effects from LBs’ bankruptcy discriminatory towards biggest financial firms in the financial sector with significant effects on surviving “non-bank” financial services firms (mortgage and speciality finance, investment services and diversified financial services firms). Pichardo and Bacon (2009) analyzed the impact of the LBs’ bankruptcy on the performance of 15 investment firms over the period 1 September 2008 to 27 October 2008. They find the investment firms’ stock prices on and around the event date significantly negatively affected from LBs’ bankruptcy. Ranjeeni (2014) investigated the impact of LBs’ bankruptcy on the performance of New York Stock Exchange (NYSE) sectors and financial industries over the period 9 September 2008 to 15 September 2008. Ranjeeni (2014) documents that the impact of LBs’ bankruptcy varied across NYSE sectors and financial industries. She finds that the financial sector and the diversified financial industry were most significantly adversely affected during LBs’ bankruptcy.

There is less evidence on the effect of LBs’ bankruptcy on the international markets. For instance, the US stock market differs from the Chinese stock market both in terms of nature and composition. China’s capital market is relatively closed and state controlled (Bianconi et al., 2013) that provides opportunities for diversification (Bhar and Nikolova, 2009a, b). China’s stock index is dominated by financial companies while the US stock market has a diversified composition (Bianconi et al., 2013). According to the 15 October 2013 Shanghai Stock Exchange Composite Index constituents’, while financial companies alone constitute the majority, 41 per cent of the total current market capitalization, each of the other nine sectors

\(^2\) The investigation was done from \(-2\) to +2 days from LBs’ bankruptcy.
representation is less than 20 per cent\(^3\). Limited studies have examined the performance of Chinese stock returns during LBs’ bankruptcy. Raddatz (2010)\(^4\) is the only study that used an event study methodology to examine the effect of LBs’ bankruptcy on the performance of Chinese stock returns of ten individual banks. Raddatz (2010) revealed that globally and within countries, those banks relying heavily on non-deposit sources of funds experienced a substantial fall in stock returns. On the other hand, Bianconi et al. (2013) examined the impact of the US financial crisis on the performance of Chinese stock returns at aggregate market level using daily data from January 2003 to July 2010. Bianconi et al. (2013) provides evidence that the effect of the US financial stress on the Chinese stock market is negligible and much less relative to Brazil, Russia and India.

A limitation of Bianconi et al. (2013) market level analysis is that all the firm and sector constituents of the market are incorrectly assumed to be homogenous in nature. A branch of research has revealed that the share market firms and sectors are heterogeneous in nature (see for instance, Pennings and Garcia, 2004; Beltratti, 2005; Hanson et al., 2008; Narayan and Sharma, 2011) due to the varying levels of industry concentration (see inter alia, Hou and Robinson, 2006), investors information processing ability (see Merton, 1987; Schiller, 2001; Sims, 2001; Hong et al., 2007), speed of information flow to different industries (see for example, Narayan and Sharma, 2011), and firm-specific characteristics, the structure of the industry to which firms belong and the state of the economy (Chou et al., 2012). LBs’ bankruptcy occurs in the US financial sector. Since Chinese stock market is dominated by financial companies and the Chinese financial and energy sectors are weakly integrated with the US stock market (Bhar and

\(^3\) Each of the other nine Chinese sectors representation is as follows: industrials and energy (15%), materials and consumer discretionary (8%), consumer staples (4%), utilities, health care, and information technology (3%) and telecommunication services (1%).

\(^4\) Raddatz (2010) examined the impact of LBs’ bankruptcy on stock price returns of 662 individual banks across China and other 43 countries excluding the US.
Nikolova, 2009a, b; Morales and Gassie, 2011), the market level analysis of Bianconi et al. (2013) is likely to be influenced by the financial companies performance. Therefore, a disaggregate level analysis is needed to analyze the performance of the Chinese stock market.

The gap in the literature is the absence of disaggregate level analysis to examine the immediate impact of LBs’ bankruptcy on the performance of Chinese sectors. We use an event study methodology to fill this research gap. Such an investigation is essential for the following reasons. First, disaggregate sectoral level analysis will show whether any of the Chinese sectors were significantly affected during LBs’ bankruptcy. “Firms of different industries … may have different sensitivities to business cycles …” (Chou et al., 2012, p.359) depending on the products produced and the stage of the industry’s life cycle. This implies that the impact of LBs’ bankruptcy may vary across sectors. In support, Ranjeeni (2014) provides evidence that LBs’ bankruptcy had varied impact on the performance of sectors in the US stock market. Therefore, sectoral level analysis will reveal whether Chinese sectors performed heterogeneously or homogeneously during the volatile period of LBs’ bankruptcy announcement.

Second, our analysis will enable the determination of whether Chinese financial and energy sectors, which are weakly integrated with the US, were insulated from the impact of LBs’ bankruptcy. This will provide insights on whether Chinese financial and energy sectors could provide cross-country diversification opportunities for US investors. Finally, using an event study methodology, we examine the evolution of cumulative returns at sector level from four trading days prior to LBs’ bankruptcy till the date on which LBs’ bankruptcy is announced. The aforementioned five trading days is dominated by negative news announcements on LBs’ (Bartram and Bodnar, 2009). Since the speed at which information flows to industries vary (Narayan and Sharma, 2011) along with investors information processing ability, our event study
analysis will provide insights on the immediate response of each of the Chinese sectors during LBs’ bankruptcy.

The balance of the paper is organized as follows. In the next section, we discuss the data and methodology used in this study. In section 3, we provide main findings. In the final section, we provide some concluding remarks.

2. DATA AND METHODOLOGY

2.1. Data
We use Shanghai Stock Exchange (SSE) Composite Index as the market index and examine the performance of its sector constituents. The 15 October 2013 SSE Composite Index constituents’ firm data list, which contained information on company name, ticker symbol and Global Industry Classification Standards (GICS) are downloaded from Bloomberg database. Following this, each of the firms’ ticker symbols are used to download their respective last price data expressed in USD from Bloomberg database. Table 1 details the sample selection procedure. In order to avoid biasness in the results, we removed those firms from the sample that had missing data during the estimation period which is from 14 August 2006 to 29 December 2006. Consequently, the sample used in this paper consists of a total of 845 firms. These firms are divided into nine sectors\(^5\) according to their respective GICS. These nine sectors are consumer discretionary (consists of 148 firms), consumer staples (consists of 62 firms), energy (consists of 19 firms), financial (contains 92 firms), health care (contains 60 firms), industrial (contains 205 firms), information technology (contains 59 firms), material (contains 156 firms), and utility (contains 44 firms) sectors.

\(^5\) We excluded Telecommunication Services sector because there were only two firms that belonged to this sector.
2.2. Methodology

Our empirical analysis uses an event study approach\(^6\) to examine the impact of the news announcement on LBs’ bankruptcy on the stock returns of the SSE sectors. Analogous to Dumontaux and Pop (2009), Pichardo and Bacon (2009), Raddatz (2010), Mio and Fasan (2012) and Ranjeeni (2014), we define the event date as the news announcement of LBs’ bankruptcy that occurs in the US on Monday 15 September 2008. On “September 15, 2008 (Mon) ... 12.30 am EST: Lehman Brothers Holdings Incorporated files for Chapter 11 bankruptcy protection. SEC Filing ...” (Bartram and Bodnar, 2009, pp 1280-1281). We then synchronise this event date with the corresponding date in China. Since China is 13 hours ahead of US, the event date of 15 September 2008, 12.30 am relates to 1.30 pm in China on the same calendar day. We allow some time for the market participants in China to become aware of LBs’ bankruptcy. The SSE trading hours in the afternoon session for continuous auction opens at 1.00 pm and closes at 3.00 pm (Shanghai Stock Exchange, 2010). Consequently, the event of LBs’ bankruptcy that occurred on 15 September 2008 at 12.30 am in the US will be better reflected on 16 September 2008 in China. Accordingly, in this paper, the event of LBs’ bankruptcy corresponds to 16 September 2008 in China.

We choose 15 September 2008 in the US as the event date due to the following reasons. First, despite an enormous loss of $4 billion reported by LBs’ on 10 September 2008\(^7\) (see Bartram and Bodnar, 2009), the event of 15 September 2008 stands out due to the extent and pace of its alarming consequences (Raddatz, 2010). “September 15, 2008 has been proclaimed Wall Street’s

\(^6\) Event study was introduced in the late 1960s by seminal works of Ball and Brown (1968) and Fama et al. (1969).

\(^7\) Our event window of \([-4, 0]\) trading days incorporates the effect of LBs’ huge loss reported on 10 September 2008.
worst day in seven years. The Dow Jones Industrial average lost more than 500 points, more than 4%, which is the steepest fall since the day after the September 11th attacks” (Pichardo and Bacon, 2009, p. 44). On 15 September 2008, LBs’ had total assets of $639 billion making it the largest failure in the US history. This stimulates the need to examine the response of the Chinese stock market to the catastrophic news on the immense failure of the largest fixed interest security dealer, LBs’. Second, it is the news announcement of LBs’ bankruptcy on 15 September 2008 that triggered the GFC. Despite the ongoing mortgage and banking crisis since early 2007, the bankruptcy of LBs’ on 15 September 2008 marks the “real” anticlimax era in the stock market performance (Bartram and Bodnar, 2009). It triggered overwhelming declines in index levels, escalated price volatility universally (Bartram and Bodnar, 2009; Chong, 2011; Eichler et al., 2011; Samarakoon, 2011) and infected the entire global financial system (Eichengreen et al., 2012). The intense transmission of financial crisis from the US to emerging markets also starts following the bankruptcy of LBs’ (Dooley and Hutchison, 2009; Bianconi et al., 2013) and was recorded higher than the peak levels during the Asian crisis (Balakrishnan et al., 2011). The emerging economies’ response at the start of the subprime crisis was limited relative to the US and other industrial economies (Dooley and Hutchison, 2009). Finally, the findings of this paper will reveal whether investors’ could benefit by investing in any of the Chinese sectors during such a volatile period.

Similar to Ranjeeni (2014), we use a shorter event window of 5 trading days to control for multiple negative news announcements around LBs’ bankruptcy impairing the results. Two such negative news announcements were as follows. First, Fannie Mae and Freddie Mac were placed into government conservatorship by the Federal Housing Finance Agency on Sunday, 7 September 2008 (see Bartram and Bodnar, 2009) and the subsequent day was 5 trading days
prior to LBs’ bankruptcy. Second, American International Group (AIG) was bailed out on the day subsequent to the event date. To control for the aforementioned negative news announcements, we exclude 5 trading days prior to LBs’ bankruptcy and the days subsequent to the event date from the event window. According to the timeline of events provided in Bartram and Bodnar (2009)\(^8\), negative news announcements on LBs’ starts from 4 trading days prior to LBs’ bankruptcy (9 September 2008).

On 9 September 2008, (−4 trading days) “Lehman Brothers shares plummet to lowest level on Wall Street in more than a decade” (Bartram and Bodnar, 2009, p.1280)\(^9\). On 10 September 2008, (−3 trading days), “Lehman Brothers puts itself up for sale after reporting a $4 billion loss and says it will spin off its troubled commercial real estate assets” (Bartram and Bodnar, 2009, p.1280). On 12 September 2008 (−1 trading days), “With Lehman Brothers facing collapse, US officials struggle to find a buyer for the distressed investment bank” (Bartram and Bodnar, 2009, p.1280). On 15 September 2008, (the event day, “0”), “12.30am EST: Lehman Brothers Holdings Incorporated files for Chapter 11 bankruptcy protection. SEC Filing” (Bartram and Bodnar, 2009, p.1281). Since negative news announcements on LBs’ dominated the timeline of events for the period −4 trading days to the event date, (see Bartram and Bodnar, 2009), the impact of the LBs’ bankruptcy is analyzed for an event window of [−4, 0] trading days. The [−4, 0] trading days ranges from 10 September 2008 to 16 September 2008 in China.

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\(^8\) For a detailed timeline of events that occurred during the GFC, refer to Bartram and Bodnar (2009).

\(^9\) The sharp decline in LBs’ shares indicates that after Fannie Mae and Freddie Mac were put into government conservatorship by the Federal Housing Finance Agency on Sunday, 7 September 2008 (Bartram and Bodnar [2009]), the market participants anticipated that LBs’ would be the next most troubled investment bank, which greatly affected the investor confidence amongst the LBs’ shareholders.
We measure abnormal returns using the following two models. The first model (Equation 1) is the most commonly used Fama et al. (1969) market model\(^{10}\) that is based on the Capital Asset Pricing Model (CAPM) (for related studies see Brown and Warner, 1985; Peterson, 1989; MacKinlay, 1997; Song and Walkling, 2000; Miyajima and Yafeh, 2007; Chern et al., 2008; Lee and Connolly, 2010; Butler et al., 2011; Chen and Lai, 2013). Conventionally, event studies employ a period immediately prior to the event period in estimating normal period returns (Ranjeeni, 2014). Since the GFC was a period characterized by high levels of volatility, it will be inappropriate to have an estimation period immediately prior to the event of LBs’ bankruptcy. Similar to Raddatz (2010) and Ranjeeni (2014), we use an estimation period prior to the GFC to forecast normal period returns that would have eventuated in the absence of GFC. Federal Reserve Bank of St. Louis (2014) identifies the crisis period ranging from 27 February 2007 to 30 December 2009. However, in January 2007, an event known as "Chinese Correction" triggered high volatility in Chinese markets (Bianconi et al., 2013). In order to avoid the event of Chinese correction impairing our estimation period results, we exclude the month of January 2007 and use an estimation period of 100 days before 31 December 2006. The estimation period of 100 trading days used in this paper falls within the typical lengths of estimation period (see Peterson, 1989) and is defined as 14 August 2006 to 29 December 2006.

In the estimation period, for each firm, share price returns at time \(t\) is regressed on the concurrent market index return. The estimated alpha \((\hat{\alpha}_t)\) and beta \((\hat{\beta}_t)\) coefficients obtained from the

\(^{10}\) The Fama et al., (1969) market model is superior to the market adjusted returns model (referred to as Model 2 in this paper). This is because the market adjusted returns model is a restricted market model with alpha constrained to zero and beta constrained to be one (MacKinlay, 1997).
model’s prediction are used to calculate the expected return \( E(R_{it}) \) for each firm at time \( t \) during the event period.

\[
E(R_{it}) = \hat{\alpha}_i + \hat{\beta}_i R_{mt}
\]  

(1)

where; \( E(R_{it}) \) represents expected return for firm \( i \) at time \( t \); \( \hat{\alpha}_i \) is the estimated alpha for firm \( i \); \( \hat{\beta}_i \) is the estimated beta for firm \( i \); \( R_{mt} \) is the SSE Composite Index return at time \( t \).

The expected returns are considered to be “normal returns” which are unaffected by the event. Abnormal returns \( (AR_{it}) \) are the difference between stock’s actual realized return \( (R_{it}) \) during the event and the predictions based on the Fama et al. (1969) market model.

\[
AR_{it} = R_{it} - E(R_{it})
\]  

(2)

where \( AR_{it} \) represents abnormal return for firm \( i \) at time \( t \); \( R_{it} \) is the actual realized return for firm \( i \) at time \( t \); \( E(R_{it}) \) represents expected return for firm \( i \) at time \( t \).

“The event study literature typically privileges the analysis of cumulative returns because the cumulative impact of the events is easier to visualize” (Raddatz, 2010, p.11). Also, negative news announcements on LBs’ dominated the event window of \([-4, 0]\) trading days (Bartram and Bodnar, 2009). Similar to the conventional event study reporting, we focus on the evolution of average cumulative returns over the event window of \([-4, 0]\) trading days. However, the daily average abnormal returns (AAR) on the event date are also reported.

The AAR for each of the sectors at any particular day \( t \) is computed as follows:

\[
AAR_{Gt} = \frac{\sum_{i=1}^{N} AR_{it}}{N}
\]  

(3)
where \( N \) is number of firms in the sector; \( AR_{it} \) denotes abnormal return for security \( i \) at time \( t \); and \( AAR_{GT} \) denotes average abnormal return for the sector.

The \( AAR_{GT} \) then is accumulated through time to generate the cumulative average abnormal return (CAAR). The CAAR for each sector at any particular day \( t \) is computed as follows:

\[
CAAR_{Gt} = \sum_{t=1}^{T_2} AAR_{Gt}
\]

(4)

where \( CAAR_{Gt} \) denotes cumulative average abnormal return for sectors over a series of time during the event window of \([-4, 0]\) trading days; \( T_1 \) is the first period in which the \( AAR_{Gt} \) are accumulated; and \( T_2 \) represents the last period in which the \( AAR_{Gt} \) are accumulated.

Since we examine the sample of securities at the sector level, cross-sectional dependence in the AR arising from event date clustering can occur to a greater extent and cause measurable misspecifications (Brown and Warner, 1985). Event date clustering arises when the sample of securities simultaneously suffer from other events apart from the event under investigation (Brown and Warner, 1980; Foster, 1980). Prior studies (see for instance, Beaver, 1968; Patell and Wolfson, 1979) provide evidence that variance of stock returns increases for the days immediately around events and can cause misspecification of hypothesis tests conducted using standard event study procedures (Brown and Warner, 1985). For that reason, tests for mean AR should “always use standard errors that are robust to cross-sectional variation in true abnormal returns” (Harrington and Shrider, 2007). Harrington and Shrider (2007) show that the standardized cross-sectional test statistic suggested by Boehmer et al. (1991) is a good candidate as it divides the mean standardized prediction error by a heteroskedasticity-robust standard error. The analysis which follows will therefore use the standardized cross-sectional test statistic.
proposed by Boehmer et al. (1991)\textsuperscript{11} to test the statistical significance of AR as it provides robust results in the presence of both event date clustering and event induced variances (Boehmer et al., 1991).

The second model (see Equation 5) is the market adjusted returns model. Brown and Warner (1985) find that for event studies conducted using daily data, the market adjusted return model performs reasonably well and is also powerful in the presence of event date clustering. This model is used in scenarios whereby “it is not feasible to have a pre-event estimation period for the normal model parameters” (MacKinlay, 1997, p.18). Accordingly, we use the market adjusted returns model as it does not depend on past returns to forecast normal period returns (Dumontaux and Pop, 2009) during LBs’ bankruptcy. Under the market adjusted return model, the normal period return is the current event period market return.

\[ AR_{it} = R_{it} - R_{mt} \]  

(5)

where; \( AR_{it} \) represents abnormal return for firm \( i \) at time \( t \); \( R_{it} \) is the actual realized return for firm \( i \) at time \( t \); \( R_{mt} \) is the SSE Composite Index return at time \( t \). We follow Brown and Warner (1985) and use the ordinary cross-sectional test approach to test the statistical significance of the Model 2 AAR and CAARs.

\textsuperscript{11} The Boehmer et al. (1991) standardized cross-sectional test is a hybrid formed by combining the two approaches of standardized residuals (Patell, 1976) and the ordinary cross-sectional method (see Brown and Warner, 1980).
3. MAIN FINDINGS

In this section, we discuss the event study results for nine sectors. We present the findings of AAR and CAARs using Model 1 (CAPM) for each of the sectors in Panels A and B of Table 2, respectively. Results based on AAR reveal that there is statistically significant effect of LB’s bankruptcy on stock returns of five sectors, namely energy, healthcare, industrial, material, and utility. The CAAR for [-4,0] trading days event window show that LBs’ bankruptcy has a statistically significant effect on stock returns of seven sectors, namely consumer discretionary, consumer staples, health care, industrial, information technology, materials and utility sectors. In the case of material sector, there is significant effect of LBs’ bankruptcy only on the event date, over the [-4,0] trading days window and four days before the event date. We also document that there is statistically insignificant effect of LBs’ bankruptcy on stock returns of energy (except on the event date) and financial sectors. In contrast, Ranjeeni (2014) documents that the stock returns of energy and financial sectors in the US market were significantly affected during LBs’ bankruptcy. The CAAR of the US financial sector was significantly adversely affected (at 1% level) over all multi day intervals analyzed in this paper (Ranjeeni, 2014). Apart from [-4,-3] and [-4,-2] multi day intervals, the CAAR of the US Energy sector was largely significantly affected on the other intervals (Ranjeeni, 2014). This reveals that Chinese stock market and the sectors that constitute the market behave differently compared to the same sectors in the US market (Ranjeeni, 2014). The contradiction between the sectors of the US and Chinese stock market is due to the fact that Chinese financial and energy sectors are weakly integrated with the US stock market (Bhar and Nikolova, 2009a, b; Morales and Gassie, 2011). This implies that Chinese energy and financial sectors can provide cross-country diversification opportunities for US investors during volatile periods.
Moreover, Bianconi et al. (2013) also provides evidence that the effect of the US financial stress on the Chinese stock market is negligible. However, our sector-level analysis provides evidence in support of sector heterogeneity (Narayan and Sharma, 2011 and Ranjeeni, 2014) by showing that some of the sectors in the Chinese stock market are statistically significantly affected while others are statistically insignificantly affected by LBs’ bankruptcy. This implies that since Chinese stock market is dominated by financial companies, the market level analysis by Bianconi et al. (2013) is influenced by the performance of the financial sector.

There are two other aspects of our findings which are worth highlighting. First, the results reported in Panel A of Table 2 reveals that the LBs’ bankruptcy has a positive effect on stock returns of four sectors (namely healthcare, industrial, material, and utility). This result is consistent with the work of Ranjeeni (2014) where she documents that the same four sectors in the US market are significantly positively affected during LBs’ bankruptcy. Second, in Panel B of Table 2, we notice in the case of five sectors, namely consumer discretionary, healthcare, industrial, information technology, and utility sectors, the LBs’ bankruptcy has a consistent positive effect on stock returns in all five different widow combinations. In addition, in the case of consumer staples and material sectors, LBs’ bankruptcy positively affected stock returns in four ([-4], [-4,3], [-4,1], [-4,0]) and two ([-4], [-4,0]) out of five event windows, respectively (see Panel B of Table 2). These sectors are positively affected due to the fact that these sectors are stable sectors of the economy with an inelastic demand. Consequently, even in a recession, people will continue to demand for basic amenities. This reveals there is heterogeneous effect of LBs’ bankruptcy on different sectors and at different time intervals surrounding the event. Our findings support our motivation for conducting this analysis at the sector level.
The results based on market adjusted return model (see Equation 5) is reported in Table 3. The AAR based results show that LBs’ bankruptcy has a positive and statistically significant effect on the stock returns of all eight sectors except in the case of Energy sector. The CAAR based results reported in Panel B of Table 3 is consistent with what we earlier document using CAPM based return model. Again, we are able to report that the stock returns of four sectors (consumer discretionary, industrials, information technology, and utility) are consistently positively affected by the LBs’ bankruptcy during all five trading days event window.

**INSERT TABLE 3**

### 3.1. Robustness test

As a robustness test, we check whether the Fama et al. (1969) market model (Model 1) results are influenced by the day-of-the-week (DOW) effects using the following model adopted from Gibbons and Hess (1981). For each firm, share price return at time $t$ is regressed on the concurrent market index return and dummy variables for each DOW except Wednesday. The estimated alpha ($\hat{a}_i$) and beta ($\hat{\beta}_i$) coefficients obtained from the model’s prediction are used to calculate the expected return and abnormal return for each firm at time $t$ during the event period using equations 1 and 2, respectively. The DOW model has the following form:

$$R_{it} = \alpha_0 + \beta_1 R_{mt} + \delta_1 D_{1t} + \delta_2 D_{2t} + \delta_4 D_{4t} + \delta_5 D_{5t} + \mu_{it} \quad (6)$$

Where $R_{it}$ is the actual realized return for firm $i$ at time $t$; $R_{mt}$ is the SSE Composite Index return at time $t$; $D_{1t}$ is a dummy variable for Monday (i.e., $D_{1t}=1$ if observation $t$ falls on Monday and zero otherwise); $D_{2t}$ is a dummy variable for Tuesday (i.e., $D_{2t}=1$ if observation $t$ falls on Tuesday and zero otherwise); $D_{4t}$ is a dummy variable for Thursday (i.e., $D_{4t}=1$ if
observation $t$ falls on Thursday and zero otherwise); $D_{5t}$ is a dummy variable for Friday (i.e., $D_{5t}=1$ if observation $t$ falls on Friday and zero otherwise).

The results based on the DOW adjusted returns are reported in Table 4. The AAR based results (see Panel A of Table 4) reveal that, there is statistically significant and negative effect of LBs’ bankruptcy on stock returns of energy sector. This result is consistent with CAPM based model. However, the statistically significant and positive effect of LBs’ bankruptcy on stock returns has reduced to only one sector, namely healthcare sector. In the case of other three sectors (namely, industrial, material, and utility) where CAPM adjusted returns reported statistically significant and positive results, has become insignificant when we adjusted returns using DOW dummies.

**INSERT TABLE 4**

Furthermore, the CAAR based results (see Panel B of Table 4) also reports less cases of statistically significant effect of LBs’ bankruptcy on stock returns. We find that only in two cases, industrial and utility, the LBs’ bankruptcy consistently affected the stock returns during all five event window trading days. It is also worth highlighting that when we adjusted stock returns using DOW dummies, we find that LB’s bankruptcy has a statistically significant and negative effect on stock returns of the financial sector on three out of five trading days event window, [-4,2], [-4,1], and [-4,0]. In contrast, the US based results of Ranjeeni (2014) show that the financial sector was significantly adversely affected (at 1% level) over all five event window trading days. On the other hand, in the case of Chinese energy sector, there is insignificant effects of LBs’ bankruptcy on stock returns over all five event window trading days. The Chinese energy sector results are consistent with the CAPM based results. Overall, the Chinese financial and energy sector results support the earlier implication on providing cross-country
diversification opportunities for US investors during volatile periods arising from weak integration of both energy and financial sectors.

4. CONCLUSION

Based on the market level analysis, Bianconi et al. (2013) provide evidence that the effect of the US financial stress on the Chinese stock market is negligible. Since Chinese stock market is dominated by financial companies and the Chinese financial and energy sectors are weakly integrated with the US stock market (Bhar and Nikolova, 2009a, b; Morales and Gassie, 2011), the market level analysis of Bianconi et al. (2013) is likely to be influenced by the financial companies performance. Motivated by Narayan and Sharma (2011) sectoral level analysis, we use a disaggregate approach to examine the impact of LBs’ bankruptcy on the performance of Chinese sectors.

The main contributions of this paper are as follows. First, our results provide evidence that unlike in the US, LBs’ bankruptcy had insignificant effect on the performance of energy (except on the event date) and financial sectors in the Chinese stock market during the investigated period. This implies that energy and financial sectors in the Chinese stock market can provide cross-country diversification opportunities for US investors during volatile periods. Second, our results show that the Chinese market level analysis is influenced by the performance of the financial sector during LBs’ bankruptcy as although the impact on the financial sector was negligible, most sectors suffered significantly. This implies that the Chinese market level analysis in Bianconi et al. (2013) is influenced by the performance of the financial sector.
Finally, our results highlight on the heterogeneous effect of LBs’ bankruptcy on different Chinese sectors and at different time intervals surrounding the event.

Finally, we used an event study approach to analyze the performance of Chinese sectors during LBs’ bankruptcy. A limitation of the event study paradigm is that the abnormal performance of firms during the event period is attributed only to the event under investigation. However, security prices are simultaneously affected by various news announcements or events. In order for the statistical tests to appropriately reflect the impact of the event under investigation, in event studies, it is a common practice to gather a sufficiently large sample of securities experiencing the event such that other random factors are negated. The sampling of a sufficiently large sample of firms will ensure that the single commonality among the firms is the event. We also undertook all necessary measures to ascertain reliable results under conditions of event induced variances. First, we used the most popular Fama et al. (1969) market model along with the market adjusted returns model to do the analysis. Second, we used the robust Boehmer et al. (1991) standardized cross-sectional test to examine the significance of the Fama et al. (1969) capital asset price market model results. Finally, we adjusted for the day of the week effects in the Fama et al. (1969) market model to check the robustness of the results.

REFERENCES


Table 1. Sample Data Set
Notes: This table details the sample selection procedure. In order to avoid biasness in the results, we removed those firms from the sample that had missing data during the estimation period. Since the Telecommunication Services sector had only one firm, it was dropped from the analysis and only 9 sectors are analyzed in this paper.

<table>
<thead>
<tr>
<th>Sectors</th>
<th>Total Firms</th>
<th>Number of Firms Removed</th>
<th>Ticker Symbol of Firms Removed</th>
<th>Firms Remaining</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer Discretionary</td>
<td>170</td>
<td>22</td>
<td>601801 CH Equity, 603123 CH Equity, 601339 CH Equity, 601799 CH Equity, 601965 CH Equity, 601888 CH Equity, 601098 CH Equity, 601633 CH Equity, 601238 CH Equity, 601599 CH Equity, 601928 CH Equity, 601907 CH Equity, 601929 CH Equity, 601566 CH Equity, 601777 CH Equity, 603766 CH Equity, 601999 CH Equity, 601258 CH Equity, 601058 CH Equity, 601010 CH Equity, 603008 CH Equity, 603001 CH Equity, 600998 CH Equity, 601116 CH Equity, 601933 CH Equity</td>
<td>148</td>
</tr>
<tr>
<td>Consumer Staples</td>
<td>65</td>
<td>3</td>
<td>600998 CH Equity, 601116 CH Equity, 601933 CH Equity</td>
<td>62</td>
</tr>
<tr>
<td>Energy</td>
<td>31</td>
<td>12</td>
<td>601101 CH Equity, 601898 CH Equity, 601872 CH Equity, 601808 CH Equity, 601978 CH Equity, 601857 CH Equity, 601666 CH Equity, 601011 CH Equity, 601918 CH Equity, 603003 CH Equity, 601699 CH Equity</td>
<td>19</td>
</tr>
<tr>
<td>Financials</td>
<td>114</td>
<td>22</td>
<td>601288 CH Equity, 601169 CH Equity, 601328 CH Equity, 601009 CH Equity, 601588 CH Equity, 601998 CH Equity, 601939 CH Equity, 601818 CH Equity, 601628 CH Equity, 600999 CH Equity, 601601 CH Equity, 601788 CH Equity, 601901 CH Equity, 601688 CH Equity, 601398 CH Equity, 601166 CH Equity, 601377 CH Equity, 601336 CH Equity, 601099 CH Equity, 601318 CH Equity, 601555 CH Equity, 600617 CH Equity</td>
<td>92</td>
</tr>
<tr>
<td>Health Care</td>
<td>60</td>
<td>0</td>
<td>-</td>
<td>60</td>
</tr>
<tr>
<td>Industrials</td>
<td>258</td>
<td>53</td>
<td>601111 CH Equity, 601890 CH Equity, 601126 CH Equity, 603167 CH Equity, 601311 CH Equity, 601700 CH Equity, 601299 CH Equity, 601800 CH Equity, 601919 CH Equity, 601268 CH Equity, 601106 CH Equity, 601117 CH Equity, 601186 CH Equity, 601390 CH Equity, 601989 CH Equity, 601866 CH Equity, 601688 CH Equity, 601179 CH Equity, 601608 CH Equity, 601766 CH Equity, 603128 CH Equity, 601880 CH Equity, 601038 CH Equity, 601002 CH Equity, 601333 CH Equity, 601177 CH Equity, 601188 CH Equity, 601886 CH Equity, 601100 CH Equity, 601218 CH Equity, 601008 CH Equity, 601222 CH Equity, 601718 CH Equity, 601518 CH Equity, 601789 CH Equity, 601618 CH Equity, 601018 CH Equity, 601567 CH Equity, 600017 CH Equity, 601727 CH Equity, 601616 CH Equity, 600018 CH Equity, 601107 CH Equity, 603333 CH Equity, 601669 CH Equity, 601558 CH Equity, 601313 CH Equity, 601000 CH Equity, 601369 CH Equity, 601717 CH Equity, 601636 CH Equity, 600213 CH Equity, 600610 CH Equity</td>
<td>205</td>
</tr>
<tr>
<td>Information Technology</td>
<td>66</td>
<td>7</td>
<td>601908 CH Equity, 603366 CH Equity, 603000 CH Equity, 601519 CH Equity, 601231 CH Equity, 601012 CH Equity, 601877 CH Equity</td>
<td>59</td>
</tr>
<tr>
<td>Materials</td>
<td>180</td>
<td>24</td>
<td>601600 CH Equity, 601992 CH Equity, 601678 CH Equity, 601118 CH Equity, 603993 CH Equity, 601005 CH Equity, 603002 CH Equity, 601996 CH Equity, 601677 CH Equity, 601216 CH Equity, 601028 CH Equity, 601958 CH Equity, 603399 CH Equity, 601003 CH Equity, 601137 CH Equity, 601515 CH Equity, 601208 CH Equity</td>
<td>156</td>
</tr>
<tr>
<td>Utilities</td>
<td>49</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>----</td>
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<td></td>
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<tr>
<td></td>
<td>601158 CH Equity, 601991 CH Equity, 601199 CH Equity, 601139 CH Equity, 600629 CH Equity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>993</td>
<td>148</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>845</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2: Fama et al. (1969) market model based results
Notes: This table reports results based on the Fama et al. (1969) market model with an estimation period of 100 trading days before the Global Financial Crisis (14/08/2006 to 29/12/2006). In panel A, we report AAR based results for 9 sectors on the event date 16 September 2008 and in Panel B we report results based on CAAR using event window of [-4,0] trading days. * - statistics are reported in the parenthesis. *, ** and *** denote statistical significance at 10%, 5%, and 1% levels respectively based on the Boehmer et al. (1991) standardized cross sectional approach for significance testing.

<table>
<thead>
<tr>
<th>Panel A: AAR based results</th>
<th>Panel B: CAAR based results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-4</td>
</tr>
<tr>
<td>Consumer Discretionary</td>
<td>-0.0022 (-0.601)</td>
</tr>
<tr>
<td>Consumer Staples</td>
<td>0.0048 (0.878)</td>
</tr>
<tr>
<td>Energy</td>
<td>-0.0161* (-1.832)</td>
</tr>
<tr>
<td>Financials</td>
<td>0.0014 (-0.171)</td>
</tr>
<tr>
<td>Health Care</td>
<td>0.0133*** (2.628)</td>
</tr>
<tr>
<td>Industrials</td>
<td>0.0068*** (2.894)</td>
</tr>
<tr>
<td>Information Technology</td>
<td>0.0052 (0.476)</td>
</tr>
<tr>
<td>Materials</td>
<td>0.004* (1.762)</td>
</tr>
<tr>
<td>Utilities</td>
<td>0.0087* (1.647)</td>
</tr>
</tbody>
</table>
Table 3: Market Adjusted Returns based results
Notes: This table reports robustness test results based on the market adjusted return model. In panel A, we report results based on AAR for 9 sectors on the event date 15 September 2008 and in Panel B we report results based on CAAR using event window of [-4,0] trading days. t - statistics are reported in the parenthesis. *, ** and *** denote statistical significance at 10%, 5%, and 1% levels respectively based on the ordinary cross sectional approach for significance testing.

<table>
<thead>
<tr>
<th>Panel A: AAR based results</th>
<th>Panel B: CAAR based results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-4</td>
</tr>
<tr>
<td>Consumer Discretionary</td>
<td>0.0105*** (3.798)</td>
</tr>
<tr>
<td>Consumer Staples</td>
<td>0.0119*** (3.001)</td>
</tr>
<tr>
<td>Energy</td>
<td>-0.0036 (-0.428)</td>
</tr>
<tr>
<td>Financials</td>
<td>0.0148*** (3.417)</td>
</tr>
<tr>
<td>Health Care</td>
<td>0.028*** (6.871)</td>
</tr>
<tr>
<td>Industrials</td>
<td>0.0158*** (6.772)</td>
</tr>
<tr>
<td>Information Technology</td>
<td>0.0126*** (2.578)</td>
</tr>
<tr>
<td>Materials</td>
<td>0.0182*** (7.438)</td>
</tr>
<tr>
<td>Utilities</td>
<td>0.0223*** (4.137)</td>
</tr>
</tbody>
</table>
Table 4: Robustness test – Day-of-the-week effect based results

Notes: This table reports results that have been adjusted for the DOW effects in the Fama et al. (1969) market model. The estimation period used is 100 trading days before the Global Financial Crisis (14/08/2006 to 29/12/2006). In panel A, we report AAR based results for 9 sectors on the event date 16 September 2008 and in Panel B we report results based on CAAR using event window of [-4,0] trading days. t-statistics are reported in the parenthesis. *, ** and *** denote statistical significance at 10%, 5%, and 1% levels respectively based on the ordinary cross sectional approach for significance testing.

<table>
<thead>
<tr>
<th>Panel A: AAR based results</th>
<th>Panel B: CAAR based results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(-4)</td>
</tr>
<tr>
<td>Consumer Discretionary</td>
<td>-0.0047</td>
</tr>
<tr>
<td>Consumer Staples</td>
<td>0.0012</td>
</tr>
<tr>
<td>Energy</td>
<td>-0.0173*</td>
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<tr>
<td>Financials</td>
<td>-0.0005</td>
</tr>
<tr>
<td>Health Care</td>
<td>0.0101**</td>
</tr>
<tr>
<td>Industrials</td>
<td>0.0036</td>
</tr>
<tr>
<td>Information Technology</td>
<td>-0.0009</td>
</tr>
<tr>
<td>Materials</td>
<td>0.0003</td>
</tr>
<tr>
<td>Utilities</td>
<td>0.0072</td>
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</tbody>
</table>