

EFFECT OF GROWTH AND MEDIUM OF GROWTH ON RESILIENCE TO GLOBAL FINANCIAL CRISIS

A Ph.D. Dissertation

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ON RESILIENCE TO GLOBAL FINANCIAL CRISIS

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By Emre Bulut

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ABSTRACT

EFFECT OF GROWTH AND MEDIUM OF GROWTH ON RESILIENCE TO GLOBAL FINANCIAL CRISIS

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Ph.D. in Department of Management

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This dissertation comprises three chapters about investor reactions to significant events and the growth strategy of large banks in the global financial crisis. The first chapter focuses on the subprime mortgage phase of the crisis. We examine whether investors significantly reacted to events until Lehman Brothers' collapse. We use the event study methodology to calculate abnormal returns of large banks in the sample. We find that investors reacted significantly to the events. As the crisis approaches, investors' reaction becomes more significant. Results suggest that Lehman Brothers' collapse is not a cause but a result of the crisis. The second chapter investigates the effect of the growth strategy of large banks on investor reactions to significant events during the global financial crisis. We construct a growth index decomposing into the merger index and organic growth index. Using the event study methodology, we find abnormal returns of the large sample banks. Applying cross-sectional event-specific and pooled OLS regressions, we analyze cross-sectional variations of investor reactions to significant events. Results indicate that investors significantly reacted to the growth strategy of large banks after the Lehman Brothers' collapse but not before. The third chapter examines investor reactions in Europe to major events until the Lehman Brothers' collapse. We calculate the abnormal returns of fifty-four banks

across sixteen countries in Europe with the event study methodology. Our findings show that investors react significantly to the events as the Lehman Brothers' failure comes closer. Hence the Lehman Brothers' bankruptcy is a major turning point during the crisis.

Keywords: Global Financial Crisis, the Lehman Brothers' collapse, large banks, growth strategy, mergers.



ÖZET

BÜYÜME VE BÜYÜME STRATEJİSİNİN KRİZE KARŞI DAYANIKLILIĞA ETKİSİ

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Aralık, 2022

Bu tez, yatırımcıların küresel krizdeki önemli olaylara ve büyük bankaların büyüme stratejilerine verdiği tepkiyi incelemektedir. İlk kısım, krizin eşik altı konut kredisi aşamasına odaklanmaktadır. Bu kısım, Lehman Brothers bankasının iflasına kadar olan firma bazlı olaylara yatırımcıların anlamı tepkiler verip vermediğini analiz etmektedir. Olay çalışması metodolojisi uygulanarak büyük bankaların olağan dışı getirileri hesaplanmıştır. Bulgular yatırımcıların verdiği tepkilerin anlamlı olduğunu ve kriz yaklaştıkça tepkilerin anlamlılığının arttığını göstermektedir. Bu bölümün sonuçları Lehman Brothers bankasının iflasının krizin sebebi değil sonucu olduğunu göstermektedir. İkinci kısımda, yatırımcıların büyük bankaların büyüme stratejilerine krizde verdiği tepkiyi araştırmaktadır. Bu kısımda önce birleşme ve organik büyüme bileşenlerinden oluşan büyüme endeksi oluşturulmakta ve sonra krizdeki piyasa bazlı olaylar tespit edilmektedir. Olay çalışması metodolojisiyle örneklemdeki büyük bankaların olağan dışı getirileri hesaplanmaktadır. Yatırımcıların krizdeki olaylara verdiği tepkilerin yatay kesit farklılığı analiz edilmektedir. Sonuçlar, yatırımcıların büyük bankaların büyüme stratejilerine gösterdiği tepkinin Lehman Brothers iflasından önce anlamlı olmadığını fakat iflastan sonra anlamlı olduğunu göstermektedir.

Üçüncü kısımda, Avrupa piyasasındaki yatırımcıların Lehman Brothers iflasından önceki firma bazlı olaylara verdiği tepki analiz edilmektedir. 16 Avrupa ülkesinde 54 büyük bankanın olağan dışı getirileri olay çalışması metodolojisiyle hesaplanmıştır. Bulgular, Lehman Brothers iflası yaklaştıkça yatırımcıların tepki anlamlılığının arttığını göstermektedir. Buna göre, bu kısım Lehman Brothers bankasının iflasının krizde önemli bir dönüm noktası olduğunu göstermektedir.

Anahtar kelimeler: Küresel finansal kriz, Lehman Brothers bankasının iflası, büyük bankalar, büyüme stratejileri, birleşmeler.



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CHAPTER 1

INTRODUCTION

1.1. Overview

The global financial crisis (GFC) that lasted from 2007 to 2010 was the worst since the Great Depression. It had far-reaching economic implications. (Hodson & Quaglia, 2009). A substantial downturn in the banking industry resulted in the failure of over 200 banks, costing the economy approximately \$3 trillion. Large banks play a central role in the GFC. Due to the rising number of mergers and acquisitions in the financial industry, banks have been more complex and have obtained greater market dominance and influence, making them 'too big to fail'. As a result, financial consolidation and the establishment of mega-banks would endanger the integrity of the financial system and the economy. Bank consolidation into 'too-big-to-fail' entities increased financial dependency among banks, and homogeneity in the financial system increased systemic risk (Zhou, 2010). As the stock prices of banks provide essential information to investors and policymakers and incorporate investors' expectations about the future, large banks need additional scrutiny due to their prominence in global banking and their role as actors in the events leading up to the GFC. (Ioannou et al., 2019). In this thesis, we study investor perceptions about the financial health of large banks in the US and Europe changed during major events leading to the collapse of Lehman Brothers and how a bank's growth strategy affects its resilience to the GFC.

In the second chapter of the thesis, 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. Taking the bankruptcy filing of Lehman Brothers as the start of the global crisis, which signalled the possibility of failure of systematically important institutions (Carey et al., 2012; Cukierman, 2019), we conduct the event study methodology to analyze whether investors priced major events before Lehman Brothers' failure. This chapter aims to contribute to the literature by its novel methodology, which separates how the event affects the market (measured using the S&P500 index) and how the event affects individual bank holding companies. In addition, this study examines multiple major events before the start of the crisis, 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). The results show that investors price the firm-specific pre-crisis events, and as the crisis draws closer, investors react more significantly to the information released in sample events.

In the third chapter, we analyze how growth and medium of growth affect the resilience of twenty-six U.S. Bank Holding Companies (BHCs) to the GFC. We construct a growth index for banks since there are two ways of growth (organic or through merger and acquisitions (M&As)), and growth decision is a two-step decision; whether to grow and how to grow. The organic growth and merger indexes decompose the growth index into two components. The merger index tracks what percent of the change in size is due to the M&As of a BHC in question. The organic growth index by construction equals one minus the merger index. This chapter contributes to the literature by analyzing the role of M&As during the GFC, how M&As shape the industry and how acquisitions affect long-term value. Furthermore, to our best knowledge, this chapter is the first study that examines how the growth strategy affected the resilience of large US bank holding companies to the GFC. The results show that cross-sectional variation in the growth strategy of BHCs seem to affect investor reaction to the significant events after the Lehman bankruptcy but not before. Following the bankruptcy of Lehman Brothers, bailouts of significant banks to protect the stability of the financial system imposed a budgetary cost on society provoking investor responses.

The last chapter analyzes how European banks' returns react to firm-specific events in the pre-crisis period (including Lehman Brothers' collapse) in the GFC. European investors react significantly to the pre-crisis events. We use the event study methodology to calculate abnormal returns on firm-specific events. The chapter contributes to the literature in several ways. First, we show how European markets react to specific pre-crisis events as potential early warning indications of an upcoming crisis. Second, by investigating the European banking industry, we extend existing studies that mostly focus on US markets (Allen, Babus, et al., 2009; Berger & Bouwman, 2013a; Chen et al., 2022; Gorton, 2018; Günsür & Bulut, 2022; Lang & Jagtiani, 2010; Markman & Venzin, 2014; Spokeviciute et al., 2019). Third, by evaluating investors' reactions to events, our study contributes to a better understanding of the perplexing European component of the financial crisis. Results show that investors' reactions in Europe to crisis events are significant. Investors' perception of the financial health of the largest 54 banks in Europe change significantly as Lehman Brothers' failure draws closer. Until the failure of Lehman Brothers, US and European banks responded differently to certain events. When New Century declared bankruptcy on April 3, 2007, it had a substantial negative impact on the US market but had little influence on European markets since the bankruptcy was seen as a local market event (Duffie, 2019). Northern Rock's bankruptcy on February 17, 2008, sparked fear in the US market. Nonetheless, the European market did not react strongly to the incident, as rumors of a structural shift and a seamless management transfer obscured unfavourable sentiments in the Euro market. However, as the crisis approached, the two markets started to respond identically to events. For example, when Indymac fell on July 11, 2008, both markets reacted negatively and significantly. As the crisis approached, two markets' responses to events became increasingly significant, demonstrating market interconnectedness and the severity of the crisis. Finally, when Lehman Brothers failed on September 15, 2008, both markets had highly negative reactions. We also show that return on equity (ROE) and capital ratio have an effect on cross sectional variations of investors' reactions to significant events during the crisis period.

CHAPTER 2

INVESTOR REACTIONS TO MAJOR EVENTS IN THE SUB-PRIME MORTGAGE CRISIS*

2.1. 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 the 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, Ocampo & Stiglitz, 2010; Cukierman, 2019; Zhu, Xie, Li & Wu, 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, McNulty & Stevenson, 2017; Acharya & Schnabl, 2010; Strahan & Tanyeri, 2015; Qian & 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).

* This chapter is published in Günsür and Bulut (2022).

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 - 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.

Abnormal returns on the event days range from -9.25 to 4.80 percent 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 July 13, 2008, sample BHCs average the lowest abnormal returns of -9.25 percent. When the Federal Housing Agency places Fannie Mae and Freddie Mac under government conservatorship on September 7, 2008, abnormal returns average the highest at 4.80 percent. The second-lowest average abnormal returns of -3.40 percent 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, Fonseca & Gonzalez, 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, Mody, Nedeljkovic & Sarno, 2012; Ivashina & Scharfstein, 2010; Veronesi & 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 2.2 describes the sample and research method. Section 2.3 tabulates and discusses the results. Section 2.4 concludes.

2.2. 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 signalled the possibility of bankruptcies of systematically important institutions (Carey, Kashyap, Rajan & Stulz, 2012; Cukierman, 2019; Ivashina & 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 & 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. There are 307 events in the crisis timeline and 54 events in the pre-crisis period. The database¹ 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 2.1 shows the timeline of 23 market (firm-specific) events that take place before the bankruptcy of Lehman Brothers (Edey, 2009; Eichengreen et al., 2012; Hall, 2008; Hildebrand, 2008; Ivashina & Scharfstein, 2010; Kashyap & Zingales, 2010; Lewis, 2009; Longstaff, 2010; Veronesi & Zingales, 2010). The

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

timeline of events starts on February 24, 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 & Scharfstein, 2010). We obtain the daily returns of BHCs and returns of the S&P500 index from CRSP. Table 2.2 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 percent (as a percent of commercial banking industry assets). Their combined market capitalization is 20 percent of the total market capitalization of the S&P 500.

We use the (Brown & Warner, 1985) event study method 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 of the coming crisis. Abnormal returns difference realized returns from expected returns. The global crisis affects 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.

$$A_{i,t} = R_{i,t} - R_{m,t} = (R_{i,t} - \bar{R}_i) - (R_{m,t} - \bar{R}_m) + (\bar{R}_i - \bar{R}_m) \quad (2.1)$$

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 , $\bar{R}_m$ is mean return of the index in the estimation window and $\bar{R}_i$ is the mean return of BHC i in the estimation window. Equation (2.1) disaggregates the abnormal return calculated using the market-adjusted model ($R_{i,t} - R_{m,t}$) into three components. The first component ($R_{i,t} - \bar{R}_i$) subtracts the mean returns of bank i in the estimation

window (the 251 trading days from 3rd January to 29th December 2006) from the realized returns of bank 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 model. The second component $(R_{m,t} - \bar{R}_m)$ 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 $(\bar{R}_i - \bar{R}_m)$ 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 bank's mean 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 models) using the t-statistic:

$$t = \frac{\bar{A}_t}{\hat{s}(\bar{A}_t)} \text{ where } \hat{S}(\bar{A}_t) = \sqrt{\sum_{t=3 \text{ Jan } 2006}^{t=29 \text{ Dec } 2006} \frac{(\bar{A}_t - \bar{\bar{A}})^2}{250}}, \quad \bar{A}_t = \frac{1}{27} \sum_{i=1}^{27} A_{i,t},$$

$$\bar{\bar{A}} = \frac{1}{251} \sum_{t=3 \text{ Jan } 2006}^{t=29 \text{ Dec } 2006} \bar{A}_t \quad (2.2)$$

Figure 2.1 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 percent from January 2006 to July 2007 with only one spike of 21 percent on May 17, 2006. Until July 2007, VIX hovered between 9 and 18 percent. Yet, after July 26, 2007, VIX steadily stayed above 20 percent, a sign of high volatility and uncertainty in the market. For instance, when BNP Paribas halted redemptions on three investment funds on August 9, 2007, the VIX index increased to 26.48 percent from 21.45 percent. In addition, following the default notice of Carlyle Capital VIX index increased by 10 percent. Although policy actions taken by FED and other regulatory units attempted to settle down the market, the index stayed over 20 percent until the

collapse of Lehman Brothers. Then, it increased to over 30 percent, indicating fear in the markets.

2.3. Results

Table 2.3 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 the firm-specific pre-crisis events. All of the events with insignificant abnormal returns are before September 2007. As the crisis looms 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 & 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 Stearns has a positive impact (abnormal returns of 1.48 percent), 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 percent). 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, Fuster, Tracy & Vickery, 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 percent. 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. Furthermore, 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, McNutt, Strahan & Tehranian, 2011; Fescioglu-Unver & Tanyeri, 2013; Mulherin & Simsir, 2015; Yilmaz & 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 percent 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.

We check for any possible information leakages before two events by calculating abnormal returns on one day, two days, and three days prior to event days, respectively. Table 2.4 reports the results. On August 2, 2007 (one day prior to American Home Mortgage Investment Corp.'s filing for Chapter 11) mean-adjusted t-test is negative and significant (-10.99), indicating that when Michael Strauss (the CEO) sent an email announcing the company's severe financial difficulties, market reacted negatively to the event and the information leakage happened. However, abnormal returns are not significant two and three days prior to the event. In addition, On August 15, 2007 ((one day prior to the downgrade of Countrywide Financial by Fitch rating), mean-adjusted t-test for abnormal returns is not

significant. Yet, on August 14, 2007, and August 13, 2007 (two and three days prior to the downgrade of Countrywide Financial by Fitch rating) mean-adjusted t-test is negative and statistically significant, meaning that the market might incorporate the event three days before the event occurred. These results show that although markets reacted positively on the events days thanks to confounding events and any possible information leakages, the reaction was negative and significant prior to events proving investors react and market signal correctly to any negative events.

2.4. 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 does show 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 react 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.

Figure 2.1: 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.

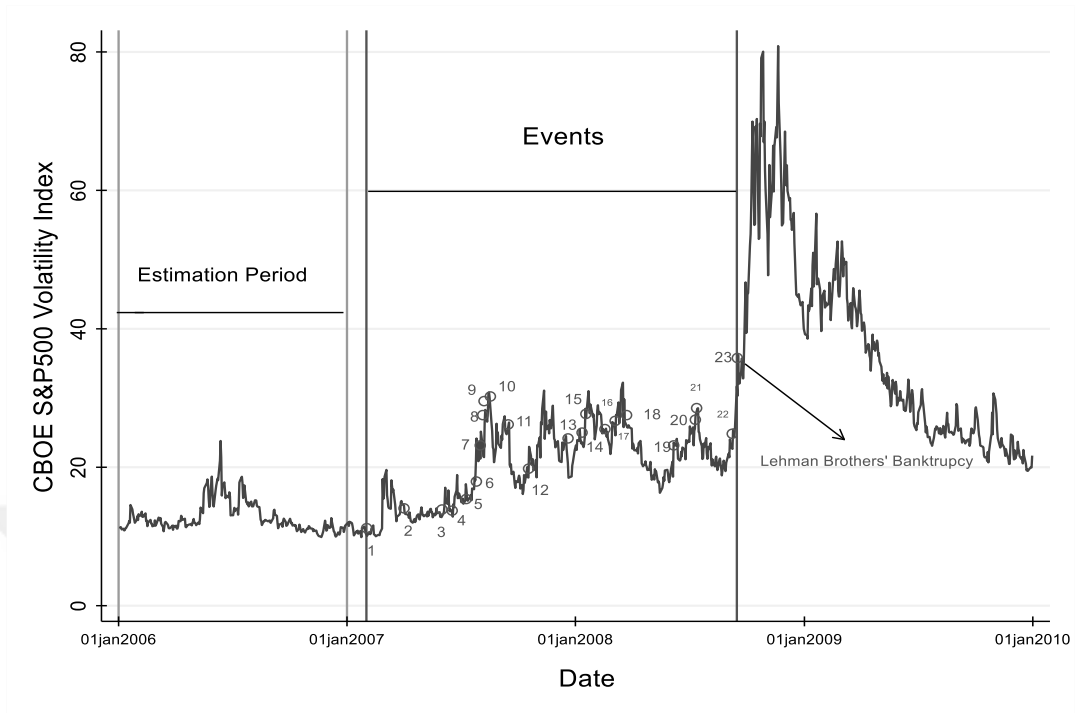


Table 2.1: Timeline of events

No	Date	Event	Synopsis
1	February 24, 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.

Note: Event Synopsis are taken from <https://fraser.stlouisfed.org/timeline/financial-crisis>.

Table 2.1 (cont'd)

No	Date	Event	Synopsis
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

Note: Event Synopsis are taken from <https://fraser.stlouisfed.org/timeline/financial-crisis>

Table 2.2: 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

Table 2.3: 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 percent, respectively.

Date	Event	Abnormal return (SP500 adjusted) $R_{i,t} - R_{m,t}$	Abnormal return (mean adjusted) $R_{i,t} - \bar{R}_i$	SP500 Return (mean adjusted) $R_{m,t} - \bar{R}_m$	Relative performance (estimation period) $\bar{R}_i - \bar{R}_m$	Market (SP500) adjusted T-test	Mean adjusted T-test
24-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 C.	-0.76	-1.65	-0.89	-0.008	-1.79	-3.85**
21-Dec-07	Citi, BofA, JPMorgan stop plans for Master Liquidity Enhancement C.	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**

Table 2.4: Abnormal Returns for different timelines of two events (American Home Mortgage bankruptcy and Fitch downgrades Countrywide)

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

Date	Event Timeline	Event	Abnormal return (SP500 adjusted) $R_{i,t} - R_{m,t}$	Abnormal return (mean adjusted) $R_{i,t} - \bar{R}_i$	SP500 Return (mean adjusted) $R_{m,t} - \bar{R}_m$	Relative performance (estimation period) $\bar{R}_i - \bar{R}_m$	Market (SP500) adjusted T-test	Mean adjusted T-test
01-Aug-07	$t=-3$	American Home Mortgage bankruptcy	-0.12	0.56	0.67	-0.008	-0.29	1.30
02-Aug-07	$t=-2$		-0.24	0.16	0.38	-0.008	-0.55	0.36
03-Aug-07	$t=-1$		-1.99	-4.69	-2.71	-0.008	-4.66**	-10.99**
06-Aug-07	$t=0$		2.36	4.73	2.36	-0.008	5.52**	11.07**
13-Aug-07	$t=-3$	Fitch downgrades Countrywide	-1.40	-1.50	-0.10	-0.008	-3.29**	-3.51**
14-Aug-07	$t=-2$		-0.30	-2.16	-1.87	-0.008	-0.70	-5.05**
15-Aug-07	$t=-1$		0.88	-0.56	-1.44	-0.008	2.05	-1.31
16-Aug-07	$t=0$		4.80	5.08	0.27	-0.008	11.23**	11.89**

CHAPTER 3

EFFECT OF GROWTH AND MEDIUM OF GROWTH ON RESILIENCE TO GLOBAL FINANCIAL CRISIS: EVIDENCE FROM THE US BANKING INDUSTRY

3.1 Introduction

Banks in the global system have been consolidating since the 1980s. There are fewer banks than before; however, the surviving bank is generally larger and more diversified (Amel, Barnes, Panetta & Salleo, 2004; Berger, Demsetz & Strahan, 1999; Jones & Critchfield, 2005). The dynamic structure of globalization, competition, and market conditions require banks to be capable of changes via appropriate growth strategies (Vazirani, 2012).

The growth of a firm is crucial in terms of its sustainable success (Akinbuli & Kelilume, 2013). The US banking industry has expanded in two different ways. First, it has grown through de novo expansion and opened branch offices in new markets (organic growth). The second and most important factor is merging with or acquiring other financial institutions (inorganic growth). While banks can grow using these two methods, the most significant factor that has contributed to the growth of the US financial industry has been mergers and acquisitions. (Berger & Humphrey, 1994) According to Rhoades (1985), from 1980 to 1985, 72% of the top 20 banks in the country were formed through mergers. The increasing number of mergers and acquisitions has contributed to the growth of the US financial industry. (Berger & Humphrey, 1994).

Banks may engage in mergers and acquisitions to achieve economies of scale and scope, capture larger market shares (Larsson, 1990), and create a synergy that makes the value of the firm after M&A more than the combined values of the

original two separate banks (Hitt, Harrison & Ireland 2001), to perform asset restructuring (John & Ofek, 1995) and to create a better customer and corresponding bank networks. The objectives list them shortly are intended to benefit shareholders. However, it is not clear if these actions improve banks' performance. A surprising number of studies also suggest that merger and acquisition activity has detrimental effects (Behr & Heid, 2011). Many studies suggest that mergers and acquisitions do not improve banks' efficiency and do not create value. These studies also find little evidence that these activities can lead to productivity gains (Berger, 1998; A. N. Berger & Mester, 2003; Boyd & Graham, 1998; Cuesta & Orea, 2002; DeLong, 2003; DeYoung, 1997; Focarelli, Panetta & Salleo, 2002; Hadlock, Houston & Ryngaert, 1999; Houston, James, Ryngaert, 2001; Houston & Ryngaert, 1994; Koetter, 2008; Koetter et al., 2007; Peristiani, 1997; Rhoades, 1985, 1998).

The literature seeks to answer two specific questions about M&As: 1-Does a merger and acquisition activity create value (if so, for whom)? 2- Does M&A provide banks resilience to the crisis? Reporting an in-depth review of the studies examining whether mergers offer real benefits to the acquiring firm (Lubatkin, 1983) makes two striking deductions. First, M&As do not provide real benefits since managers can make mistakes or desire to maximize their wealth rather than consider stockholders' wealth. Second, they provide real benefits; however, we may not observe them because administration problems can accompany the merger and cancel out these benefits. More importantly, the author argues that there might be possible methodological issues in specifying the benefits correctly.

The financial crisis of 2008 was the biggest economic calamity in U.S. history, surpassing even the Great Depression. A significant slump in the banking sector caused about 200 banks to collapse, costing the economy around \$3 trillion. On the other hand, regulatory authorities or governments bailed out large banks classified as “too big to fail” (TBTF) banks. TBTF banks may have expanded through M&As to become more resilient to the crisis. However, bailing out TBTF banks cost around \$500bn (TARP) to the US economy, causing systemic risk and deteriorated financial stability of the systems. (De Nicolo & Kwast, 2002).

Banks have become more complex and gained more market shares and power, making them 'too big to fail' due to the increasing number of mergers and acquisitions in the financial sector. Hence financial consolidation and the emergence of mega-banks would threaten the financial system's integrity and the national economy. Given their importance in global banking and their position as players in the events leading up to the 2007/08 financial crisis, large US banks need more scrutiny since size has been a recurring element of the US financial system (Ioannou, Wojcik & Dymski, 2019). The events of the 2008 financial crisis have therefore triggered the larger debate concerning the relationship between bank consolidation and financial stability, as they present a striking tension between the potentially destabilizing or stabilizing effect that bank M&A can have on the financial system. (Maslak & Senel, 2022).

Our key result is that cross-sectional variation in the growth strategy of BHCs seem to affect investor reaction to the significant events after the Lehman bankruptcy but not before. As the collapse of Lehman Brothers approached, the risk became uncertain, and the subprime phase of the crisis transitioned into a liquidity crisis. Following the bankruptcy of Lehman Brothers, bailouts of significant banks to protect the stability of the financial system imposed a budgetary cost on society, provoking investor responses.

This study aims to investigate how a bank's growth strategy affects its resilience to the Global Financial Crisis (GFC). We construct a growth index for banks since there are two ways of growth (organic or through M&A), and growth decision is a two-step decision; whether to grow and how to grow. The growth index measures the percentage change in the total value of assets for the sample BHCs from the beginning of 1980 to the end of 2006. The period for change in size starts in 1980 when the US deregulation regarding interstate banking and branching started in the early 1980s. We choose the end of 2006 as the ending period since the sub-prime mortgage crisis began in 2007. The organic growth index and merger index decompose the growth index into two components: Growth through M&As and growth through investment in existing lines of business. The merger index tracks what percent of the change in size is due to the M&As of a BHC in question. The organic growth index by construction equals one minus the merger index.

We examine how growth and medium of growth affect the resilience of twenty-six U.S. Bank Holding Companies (BHCs) to the GFC. Our study helps to identify how severely banks were affected by the GFC or 2007-2008 financial crisis in two ways. First, most studies pay attention to the macroeconomic factors that are the roots of the GFC (Taylor, 2009) but have not analyzed why some banks are more affected than others. This study helps to understand the role of M&As during the GFC, how M&As shape the industry and how acquisitions affect the long-term value by investigating the performance of BHCs. Second, to our best knowledge, this is the first study that examines how the growth strategy affected the resilience of large US bank holding companies.

3.2. Data and Methodology

3.2.1. Sample

We use S&P 500 to identify the large and systemically important Bank Holding Companies (BHCs) in the US. There are 64 banks in Compustat index constituents with North American Industry Classification System (NAICS) code of '522110' indicating 'commercial banking'. We take 26 bank holding companies listed in the S&P500 index as of the end of 2006. We exclude CIT since it became a BHC in 2008. In line with the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, Berger and Bouwman (2013) define banks with total assets exceeding 50 billion USD to be "too big to fail" (TBTF). In addition, five of the sample BHCs qualify as Global Systemically Important Financial Institutions (G-SIFIs) by the Financial Stability Board (FSB)². The 26 BHCs in the sample are "too big to fail," and the failure of any of these institutions would likely have repercussions for the entire financial system on their importance. (Edey, 2009; Hildebrand, 2008; Ivashina & Scharfstein, 2010). Table 3.1 shows the classification of sample BHCs as TBTF or G-SIFI. Eighteen BHCs are classified as TBTF, and five BHCs are classified as G-SIFI. Table 3.2 reports their market capitalizations and the book value of assets from year-end 2006 to year-end 2010. By the end of 2006 (the start of the sample period), the combined market share in assets of the sample BHCs was an average of

² Available at <https://www.fsb.org/work-of-the-fsb/market-and-institutional-resilience/post-2008-financial-crisis-reforms/ending-too-big-to-fail/global-systemically-important-financial-institutions-g-sifis/>.

80% of commercial banking industry assets³. Sample BHCs account for 20 percent of the S&P 500's market capitalization.

A drawback of our merger sample is that we only can access the assets value of target banks that are Federal Deposit Insurance Corporation (FDIC) insured or under the FED's supervisory. Financial institutions classified as 'other institutions type definitions'⁴ or not FDIC insured do not have statement data. There are 40 mergers excluded from our sample. Table 3.3 reports the mergers that are excluded from our sample. Excluded deals might be retrieved from other databases and be the subject of further research. Figure 3.1 illustrates our sampling procedure. In addition, foreign banking organizations (in our case, BBVA, Santander, and TD Bank) have only US domestic mergers available. As the database does not include the global merger activity of foreign banks and their underlying macroeconomic factor is different from than US domestic banks (Beltratti & Stulz, 2012), including foreign banks might distort our results. Hence, we run regressions with and without including foreign banks in our sample.

3.2.2. Constructing Growth Index

We first construct a growth index to test the effect of growth and medium of growth on the resilience of BHCs to the crisis. The growth index measures the percentage change in the book value of assets from the year 1980 to 2006. The *merger index* tracks what percent of the change in size is due to the M&As of a BHC in question. The *organic growth index* by construction equals one minus the *merger index*.

$$Growth\ Index = \frac{Total\ Assets_{2006} - Total\ Assets_{1980}}{Total\ Assets_{1980}} \quad (3.1)$$

$$Merger\ Index\ (Inorganic\ Growth) = \frac{Total\ Assets\ Value\ of\ Mergers}{Total\ Assets_{2006} - Total\ Assets_{1980}} \quad (3.2)$$

$$Organic\ Growth = 1 - Inorganic\ Growth\ (Merger\ index) \quad (3.3)$$

³ Available at <https://www.federalreserve.gov/releases/h8/20070209/>.

⁴ Available at <https://www.ffiec.gov/npw/Help/InstitutionTypes#institution-type>.

The total value of a BHC's mergers is the sum of its targets' total asset value adjusted by the 2006 Consumer Price Index from St. Louis FED's FRED database. We retrieve Bank Holding Company merger data from the Federal Reserve Bank of Chicago database. The merger database provides bank holding companies of both the surviving and non-surviving financial institutions. However, the BHC merger file does not show the merger's deal size. Hence, we apply the latest available total asset value of the target bank (non-survivor bank) as the deal size. Financial statement data (book and market value of total assets from 1980 to 2006) is obtained from WRDS Bank Regulatory Database. One flaw of the merger index is that bank regulatory data provides only FDIC-insured financial institutions' (target bank) statements.

Table 3.4 shows total assets value, merger value (in billions of \$), merger index values (in percent), and the number of mergers as of 2006 in the sample BHCs. Merger and total asset values are adjusted to the 2006 Consumer Price Index from St. Louis FED's FRED database. The 26 BHCs in the sample engaged in 369 mergers with a deal value totalling 4.5 trillion USD and a total asset value of 7.4 trillion USD. The sample BHC engages, on average, in 14 mergers with a mean deal value of 175 billion dollars. Table 3.4 shows that Wells Fargo engaged in the most number of mergers (70), and Bank of America has the largest deal value with 1052.4 billion dollars). Peoples United Financial has the lowest number of mergers in numbers (1), and Santander has the lowest merger value with 0.1-billion-USD. A striking takeaway from the table is that despite Citigroup's low number of mergers (2), the value of its mergers is one of the most valuable ones. Focusing on merger index values, Keycorp has a merger index value of 88%. That is, from 1980 to the end of 2006, Keycorp's 88% asset growth comes from mergers, and only 12% percent of its asset growth consists of organic growth. On the other hand, Santander's merger index is only 1%. Figure 3.2 illustrates a summary of JP Morgan Chase's merger activity from 1823 to 2006 as an example of a BHC's becoming a large bank.

3.2.3. Identifying Market Events with Event Study Methodology

We use the event study methodology developed by Brown & Warner (1985) to evaluate how stock market investors price the public information revealed in corporate events. The M&A literature uses event study to measure the reaction of

stock market investors to M&A deal announcements. (Bertin et al., 1989; Cornett, Hovakimian, Palia & Tehranian, 2003; Cornett & Tehranian, 1992; Cybo-Ottone & Murgia, 2000; Desai & Stover, 1985). The event study examines the acquiring and target bank's stock returns surrounding the M&A announcement day. The sign (positive or negative) and the significance of cumulative abnormal return on the M&A announcement day describe the impact of the M&A announcement on the stock performance of the acquirer bank, target bank, or combined entity.

We use the event study methodology to measure investor reactions during the GFC. We identify significant events using the crisis timeline from the St. Louis Federal Reserve's FRED database, and pinpoint important events in disseminating information. The crisis timeline features 307 different events. New York FED's database separates events into three groups: 1) Policy actions taken by the Federal Reserve Board (including the introduction of new policy tools, the redesign of existing tools, and changes in monetary policy), 2) Market Events (including rating, bankruptcy, and firm-related announcements), and 3) Other Policy Actions (such as fiscal policy actions by Congress and Treasury). This paper focuses on market events such as bankruptcies, rating announcements, and bailouts. We exclude economic policy actions by regulatory authorities. We focus on market events as important information events that may alert investors to the impending global crisis. We use Brown & Warner (1985) event study methodology.

Figure 3.3 illustrates the event timeline. The estimation window covers 251 trading days from 3rd January to 29th December 2006. The timeline of events starts on February 24, 2007, with Freddie Mac's stopping to buy risky subprime mortgages and ends on October 1, 2010, with Freddie Mac's release of a statement on improperly executed affidavits.

We aim to ensure that the estimation window is a period clean of any events from the coming crisis. Therefore, we apply the estimation window uniformly across all events. Abnormal returns are the difference between realized returns from expected returns. We obtain the daily returns of BHCs and the daily adjusted returns of the S&P500 index from CRSP. The global crisis affects 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.

$$A_{i,t} = R_{i,t} - R_{m,t} = (R_{i,t} - \bar{R}_i) - (R_{m,t} - \bar{R}_m) + (\bar{R}_i - \bar{R}_m) \quad (3.4)$$

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 , $\bar{R}_m$ is the mean return of the index in the estimation window and $\bar{R}_i$ is the mean return of BHC i in the estimation window. $(R_{i,t} - \bar{R}_i)$ demonstrates the impact on BHC returns relative to the average returns in a period where the event had no effect (the estimation window). This first part is the abnormal returns determined by the mean adjusted return model, as described by Brown & Warner (1985). The second component demonstrates the impact of the event on the index $(R_{m,t} - \bar{R}_m)$, which is calculated by comparing the index's mean returns during the event period with those of a control period. The third component $(\bar{R}_i - \bar{R}_m)$ indicates the extent to which the mean returns of the bank outperformed (or underperformed) the index during a period in which the event had no effect. As a result, we disaggregate how the event affects the BHC and the proxy for the market, the index. We use the t-test to examine the significance of abnormal returns for the 26 BHCs across each of the event days (calculated using market-adjusted and mean-adjusted models):

$$t = \frac{\bar{A}_0}{\hat{S}(\bar{A}_0)} \text{ where } t=0 \text{ denotes event day 0 and } \hat{S}(\bar{A}_0) = \sqrt{\frac{\sum_{t=3 Jan 2006}^{t=29 Dec 2006} (\bar{A}_t - \bar{A})^2}{250}},$$

$$\bar{A}_t = \frac{1}{26} \sum_{i=1}^{i=26} A_{i,t},$$

$$\bar{A} = \frac{1}{251} \sum_{t=3 Jan 2006}^{t=29 Dec 2006} \bar{A}_t \quad (3.5)$$

Table 3.5 lists market events and the abnormal returns we calculate on those event days. Accordingly, there are 55 events in the sample. The event timeline starts on February 24, 2007, with the announcement that Freddie Mac's no longer buying the riskiest subprime mortgages and mortgage-related securities and ends on October 1, 2010, with the Freddie Mac statement that there may be affidavits that were improperly executed in connection with foreclosures.

Table 3.5 reports the events with the highest and the lowest mean-adjusted abnormal returns as Fannie Mae's request of \$19 billion from the U.S. Treasury Department (a mean-adjusted abnormal return of 22.95 percent) on May 8, 2009, and the announcement of the results of stress test for 19 largest US BHCs on May 7, 2009 (a mean adjusted abnormal return of -11.75 percent), respectively.

3.3. Testable Hypothesis

Most of the research on M&A transactions spanning a half-century mainly focuses on the United States (see, for example, Bertin, Ghazanfari & Torabzadeh, 1989; Cornett et al., 2003; Cornett & Tehranian, 1992; Cornett et al., 2011; Cybo-Ottone et al., 2000; Desai & Stover, 1985; Fescioğlu-Ünver & Tanyeri, 2013; Gleason & Mathur, 1998; Kim & Finkelstein, 2009; Madura & Wiant, 1994; Subrahmanyam, Raangan & Rosenstein, 1997; Sushka & Bendeck, 1988; Trifts & Scanlon, 1987; Zhang, 2006). Several lines of evidence suggest that acquirers have a negative impact rather than generate shareholder value when they engage in M&A transactions (Amihud, Delong & Saunders, 2002; Cornett et al., 2003; Gleason & Mathur, 1998; Hagendorff, Collins & Keasey, 2008; Kim & Finkelstein, 2009; Madura & Wiant, 1994; Soussa & Wheeler, 2006; Subrahmanyam et al., 1997; Sushka & Bendeck, 1988) while others report positive results (Bertin et al., 1989; Choi, Francis & Hasan, 2010; Cornett & Tehranian, 1992; Cybo-Ottone et al., 2000; Desai & Stover, 1985; Goddard, Molyneux & Zhou, 2012; Ismail & Davidson, 2007; Lensink & Maslennikova, 2007; Lepetit, Patry & Rous, 2004).

Similarly, several studies on M&A announcements for European and emerging markets report mixed results. While some studies find positive significant abnormal returns creating shareholder value (Beitel, Schiereck & Wahrenburg, 2004; Cybo-Ottone et al., 2000; Williams & Lao, 2008), others report significant negative or inconclusive results on the M&A announcement day (Crouzille, Lepetit & Bautista, 2008; Ekkayokkaya, Holmes & Paudyal, 2009; Hekimoglu & Tanyeri, 2010; Lepetit et al., 2004; Yilmaz & Tanyeri, 2016).

Based on the mixed results of the literature, we construct our hypothesis as follows:

Hypothesis: Growth strategy does not have a significant impact on the BHCs' resilience to the GFC.

Alternative Hypothesis: Growth strategy has a significant impact on the BHCs' resilience to the GFC.

Following Berger and Bouwman (2013), we include control variables mainly in seven categories: Risk and opacity, size and safety net protection, ownership, organizational structure and strategy, competition, location, and profitability. Each control variable has its value at the end of 2006 to control for the turbulent effect of the crisis beginning from 2007 on BHCs' statements.

Banks with lower capital ratios, higher credit risk, higher loan concentration, and larger real estate loan portfolios are riskier than their peers. Therefore, higher risk has a negative impact on banks' stock performance during the crisis (Berger & Bouwman, 2013; Dietrich & Wanzenried, 2010; Maudos & Fernandez de Guevara, 2004; Cole & White, 2012). To control for risk and opacity, we add *Capital_Ratio*, *Credit_Risk*, *Loan_Concentration*, and *Commercial Real_Estate*.

Capital_Ratio is the ratio of equity capital to total assets. *Credit_Risk* is the Basel I risk-weighted assets divided by total assets (*BHCK3210/BHCK2170* in *WRDS Bank regulatory Data*), and *Loan_Concentration* is the bank bank-level Herfindahl–Hirschman index (HHI) index of six loan categories (Commercial real estate, residential real estate, construction and industrial, consumer, agriculture and other ($(BHCK1766 + BHCK2746 + BHKB538 + BHCK1415 + BHCK1590 + BHCK1564) / BHCK2170$) in *WRDS Bank regulatory Data*). The larger HHI indicates more concentration in the loan portfolio. *Commercial Real_Estate* is a sign of high leverage (Berger & Bouwman, 2013). We add commercial real estate divided by total assets (*BHCK3656/BHCK2170* in *WRDS Bank regulatory Data*).

Liquidity helps banks survive a crisis, and more liquid banks tend to be more profitable (Lall, 2014; Akhigbe et al., 2012). On the other hand, liquid assets, such as trading assets, are hard to monitor, leading to liquidity risk (Morgan, 2002). Hence liquidity might have a positive or negative effect on bank performance during the

crisis. We capture the liquidity effect by adding *Brokered_Deposits*, *Trading_Assets*, and *Cash_Holdings*. *Brokered_Deposits* is brokered deposits divided by total assets $((BHDMA164+BHDMA243)/BHCK2170$ in WRDS Bank regulatory Data). *Trading_Assets* is trading assets divided by total assets $(BHCK3545/BHCK2170$ in WRDS Bank regulatory Data), and *Cash_Holdings* is (cash plus marketable securities) divided by total assets $(BHCK0010/BHCK2170$ in WRDS Bank Regulatory Data).

The literature suggests that larger banks have a better chance of survival than smaller ones (Akhigbe et al., 2012). In addition, an optimal regulatory bank size reduces bankruptcy risk (Berger & Bouwman, 2013; Lall, 2014). In addition, core deposits are a reliable source of finance (Akhigbe et al., 2012). Banks that depend on core deposits tend to have better stock performance. However, deposit insurance linked with core deposits and the likelihood of being bailed out by regulatory authorities may lead to higher risk-taking owing to an increased moral hazard incentive (Gropp, Grundl & Guttler, 2010; Hakenes & Schnabel, 2010; Matutes & Vives, 1996). We control for the impact of size and safety net protection on bank performance by adding *Size* and *Core Deposits*. *Size* is the natural log of total assets, *Core Deposits* is the sum of transaction deposits, saving deposits, and small (denominations less than \$100,000) time deposits divided by total assets.

$((BHCB2389+BHOD2389+BHCB2604+BHCB6648)/BHCK2170$ in WRDS Bank Regulatory Data).

Ownership structure has an impact on bank stock performance. Foreign banks are less likely to be affected by a shock and have stable stock performance (Giannetti & Ongena, 2009). We add *Foreign Ownership* to capture the ownership effect. *Foreign Ownership* is a dummy variable if the BHC is foreign origin equals to one; otherwise zero.

Organizational structure and strategy are also determinants for bank stock performance as centralized organizations are complex and depend heavily on hard information, indicating distance may have a role in how well a bank performs (Stein, 2002). As banks operate in more states tend to be more complex, and banks with a higher fraction of headquarters' deposits are less complicated, we include *NR_States*

and *HQ_Deposits* to control for organizational structure and complexity. *NR_States* is the natural log number of states in which the bank has branches. *HQ_Deposits* is the fraction of deposits in headquarters (defined as the office with the highest number of deposits). *HQ* deposits divided by total assets.

Competition might affect the bank's market shares and performance (Beck, Demircug-Kunt & Levine, 2006). On the other hand, strict competition might have an adverse effect on a bank's stock performance (Martinez-Miera & Repullo, 2010). Bank's deposit concentration in a local market is an indicator of the banks' local market power. We add *Local_Market_Power* to capture the competition effect. *Local_Market_Power* is bank level HHI index of deposit concentration for the local markets in which the bank operates. We define a local market based on the definition of Core Based Statistical area (CBSA) and non-CBSA county.

Banks' location plays an important role in the banks' stock performance. For instance, banks that operate in a high-growth real estate price area are likely to be adversely affected worse than others (Berger & Bouwman, 2013). In addition, competition may be strict in metropolitan areas. Banks with a high number of branches in metropolitan areas might struggle in turmoil. We control for location by including *Metro_Mkts* and *House_Price_Index_Growth*. *Metro_Mkts* is the number of metropolitan markets as a fraction of all markets in which a bank is active, and *House_Price_Index_Growth* is a deposit-weighted gauge of the growth in the house prices for each state that a BHC operates. State-level house price indices are taken from Federal Housing Finance Agency's "purchase only index". Then we construct and index for each state that a bank operates. For each bank, the house price index growth is the house price index times the ratio of each bank's deposits in that state, summed across all states.

Finally, profitability increases resilience to bad conditions. More profitable banks tend to have better stock performance (Ayadi, Ayadi & Trablesi, 2019; Cornett & Tehranian, 2004; Deng et, Kang & Low, 2013; Lall, 2014). We include *ROE* to control for profitability. *ROE* is net income divided by equity (*BHCK4340/BHCKC245* in *WRDS Bank Regulatory Data*).

Table 3.6 displays the definition and data sources of the control variables. Table 3.7 reports the summary statistics of the variables. On average, 26 BHCs in the sample have a -0.1% mean-adjusted return. Mergers, on average, compose 45% of the asset growth of BHCs. Furthermore, risk indicators show that BHCs have a mean of 10% capital ratio and 8% credit risk. Finally, sample BHCs have an average of 6.5% foreign ownership with a mean of 14.5% of profitability (ROE).

Table 3.8 displays the correlation matrix of the control variables. Size is correlated with trading assets (0.72) and the number of states (0.79) (Wooldridge, 2010; Studenmund & Johnson, 2021).

3.4. Pooled-OLS Regression

To investigate how cross-sectional variation of the growth strategy of BHCs may affect the investor reaction to significant events during the GFC. We run pooled-OLS regression. We also control for a set of bank characteristics. Control variables include bank characteristics that may affect BHCs' stock performance during the crisis (Akhigbe et al., 2012; Berger & Bouwman, 2013; Lall, 2014). We drop BBVA, Santander, and TD Dominion Bank from our sample to see the effect of the merger index on the US BHCs' resilience to crisis. As the merger database only covers US domestic mergers, foreign banks' US domestic merger indices averages eight percent, below the sample mean (forty-seven percent). In addition, underlying macroeconomic (such as inflation, GDP, sovereign risk) characteristics of foreign banks (Beltratti & Stulz, 2012) from US BHCs might distort our results. The model is:

$$R_{it} = \alpha + \beta_1 \text{Merger Index}_{it} + \sum_{k=2}^{k=16} \beta_k X_{k,i} + \varepsilon_{it} \quad (3.6)$$

where AR_i is the mean-adjusted abnormal return of BHC_{*i*} on the event day *t*, α is constant, Merger Index_{it} is the merger index as the explanatory variable, $\sum_{k=2}^{k=16} X_{k,it}$ is the same set of banks characteristics without foreign ownership dummy variable as control variables, and ε_i is the error term.

Regarding robustness, we replace the mean-adjusted return as our dependent variable with the market-adjusted return. Also, we divide our sample into two: Before and after Lehman Brothers' collapse to diminish the distorting effect of the crisis, especially after Lehman Brothers' collapse, and to evaluate the impact of our main independent variable (merger index) on BHCs performance during the two phases of the crisis (sub-prime mortgage crisis and global financial crisis). Equation (3.6) displays the regression for full and subsamples.

In addition, we introduce event-fixed effects to capture event-specific effects. Equation (3.7) indicates the regression model for the full sample with event-fixed effects:

$$AR_{it} = \alpha + \beta_1 \text{Merger Index}_{it} + \sum_{k=2}^{k=16} \beta_k X_{k,it} + \sum_{l=1}^{l=55} \beta_l \text{Event_Fixed_Effect}_l + \varepsilon_{it} \quad (3.7)$$

Equations (3.8) and (3.9) show the regressions models for the sub-samples (Before and after the Lehman Brothers collapse) with event-fixed effects:

$$AR_{it} = \alpha + \beta_1 \text{Merger Index}_{it} + \sum_{k=2}^{k=16} \beta_k X_{k,it} + \sum_{l=1}^{l=20} \beta_l \text{Event_Fixed_Effect}_l + \varepsilon_{it} \quad (3.8)$$

$$AR_{it} = \alpha + \beta_1 \text{Merger Index}_{it} + \sum_{k=2}^{k=16} \beta_k X_{k,it} + \sum_{l=1}^{l=35} \beta_l \text{Event_Fixed_Effect}_l + \varepsilon_{it} \quad (3.9)$$

Furthermore, before running regression, we test for heteroscedasticity suggested by Breusch-Pagan (1979).

Table 3.9 displays the heteroscedasticity test results for the full sample and subsamples. The results suggest that there is heteroscedasticity in all models. Hence, clustering by banks, we apply robust standard errors to eliminate heteroscedasticity from our regression models (White, 1980).

Table 3.10 reports the results of pooled-OLS regression results. Panel A shows full sample results. In models 1 and 2, there is no event-fixed effect. In models 3 and 4,

we introduce event fixed effect. Panel A results show that the merger index is negative and significant at 10% in all regression specifications (models 1,2,3, and 4). Panel B displays results for the subsample before Lehman Brothers' Collapse. We do not include event-fixed effects in models 5 and 6. Although the sign of the coefficient of the merger index is negative, it is insignificant in all models of the subsample. Panel B results suggest that cross-sectional variation in the growth strategy of BHCs do not seem to affect investor reaction to the significant events before the Lehman bankruptcy.

In panel C, we report results after Lehman Brothers' collapse. The merger index is negative and statistically significant in models 9,10,11, and 12 at 5%. The results suggest that growing through mergers during the GFC phase of the crisis decreases BHCs performance. The merger index effect is negative and significant on bank performance in all regression specifications (models 9,10,11, and 12).

Overall, results suggest that cross-sectional variation in the growth strategy of BHCs seem to affect investor reaction to the significant events after the Lehman bankruptcy but not before. One explanation of our results is that as the Lehman Brothers' bankruptcy drew closer, the risk became uncertain, and the subprime phase of the crisis turned into a liquidity crisis (Roubini and Mihm, 2014). After Lehman Brothers' failure, bailouts of large banks to ensure the stability of the financial system created a fiscal burden on society, causing investor reactions (Völz & Wedow, 2010). Another interpretation of the results is that as our sample BHCs are systemically important banks, they would be supported if needed.(Demirgüç-Kunt & Huizinga, 2013; Ioannou, Wojcik & Dymiski, 2019; Zhu, Li & Li, 2017). Mergers alone might not be helpful for BHCs performance but becoming 'too big to fail' through mergers guarantees government support which helps large banks overcome difficult conditions.

3.5. Single Event Cross-Sectional Regression

We now explore how the growth strategy of BHCs may affect the investors' reaction to significant events during the GFC. The model of the cross-sectional regression is as follows:

$$AR_i = \alpha_0 + \beta_1 \text{Merger Index}_i + \sum_{k=2}^{k=17} \beta_k X_{k,i} + \varepsilon_i \quad (3.10)$$

where AR_i is the mean-adjusted abnormal return, indicating the stock performance of BHC_{*i*} on the event day t . α is constant, Merger Index_i is the merger index as our main explanatory variable, $\sum_{k=2}^{k=17} X_{k,i}$ is the set of bank characteristic as control variables, and ε_{it} is the error term.

Tables 3.11 and 3.12 report the results of cross-sectional analysis before and after Lehman Brothers' collapse, respectively. The dependent variable in the regressions is the mean-adjusted abnormal return for 20 events in Table 3.11 and 35 events in Table 3.12. The results show that the merger index has no significant impact on the resilience of BHCs to GFC.

Table 3.11 displays that the coefficient of the merger index is positively significant in only one event (Fitch Ratings downgraded Countrywide on August 16, 2007). However, the impact of the merger index on abnormal return is statistically insignificant on 19 events before Lehman Brothers' collapse.

Similarly, table 3.12 displays that after Lehman Brothers' collapse, the merger index is negative significant on August 6, 2009, when Fannie Mae reported a loss of \$14.8 billion in the second quarter of 2009. Yet, it is insignificant in 34 events. Hence, we fail to reject our null hypothesis that mergers have no impact on the resilience of BHCs to the crisis. Overall, event-specific cross-sectional analysis suggests mergers do not help explain BHCs performance during the crisis.

3.6. Robustness

3.6.1. Including Foreign Banks

In this section, we include BBVA, Santander, and TD Dominion Bank in our sample for robustness. The regression models in this section are as follows:

$$AR_{it} = \alpha + \beta_1 \text{Merger Index}_{it} + \beta_2 \text{Foreign Dummy}_i + \sum_{k=3}^{k=17} \beta_k X_{k,it} + \varepsilon_{it} \quad (3.11)$$

where AR_i is the mean-adjusted abnormal return of BHC_i on the event day t , α is constant, Merger Index_{it} is the merger index as the explanatory variable, Foreign Dummy_i is the foreign dummy that indicates foreign ownership of the BHC_i , $\sum_{k=3}^{k=17} X_{k,it}$ is the same set of banks characteristics in equation (3.6) and ε_i is the error term.

We also divide the sample into two, as in section 3.4. In addition, we introduce event-fixed effects to capture event-specific effects. Equation (3.12) indicates the regression model for the full sample with event-fixed effects:

$$AR_{it} = \alpha + \beta_1 \text{Merger Index}_{it} + \beta_2 \text{Foreign Dummy}_i + \sum_{k=3}^{k=17} \beta_k X_{k,it} + \sum_{l=1}^{l=55} \beta_l \text{Event}_{FixedEffect_l} + \varepsilon_{it} \quad (3.12)$$

Equations (3.13) and (3.14) show the regressions models for the sub-samples (Before and after the Lehman Brothers collapse) with event-fixed effects:

$$AR_{it} = \alpha + \beta_1 \text{Merger Index}_{it} + \beta_2 \text{Foreign Dummy}_i + \sum_{k=3}^{k=17} \beta_k X_{k,it} + \sum_{l=1}^{l=20} \beta_l \text{Event}_{FixedEffect_l} + \varepsilon_{it} \quad (3.13)$$

$$AR_{it} = \alpha + \beta_1 \text{Merger Index}_{it} + \beta_2 \text{ForeignDummy}_i + \sum_{k=3}^{k=17} \beta_k X_{k,it} + \sum_{l=1}^{l=35} \beta_l \text{Event}_{FixedEffect_l} + \varepsilon_{it} \quad (3.14)$$

Table 3.13 shows the results. The merger index is not significant in models 1 and 2. In models 3 and 4, we introduce event fixed effect. The merger index becomes marginally negative and statistically significant at 10%. In short, panel A results

show that when we include event-fixed effects, the merger index becomes negative significant. That is, growing through mergers might seem to affect investors' reaction.

Panel B displays results for the subsample before Lehman Brothers' Collapse. We do not include event-fixed effect in models 5 and 6. Although the sign of the coefficient of the merger index is positive, it stays insignificant in all models of the subsample. Panel B results suggest that growing through mergers does not affect investor reactions during the subprime crisis.

In panel C, we report results after Lehman Brothers' collapse. The merger index is negative and significant in models 10,11, and 12 at 10%. The results suggest that growing through mergers during the GFC phase of the crisis decreases BHCs performance. The merger index is marginally negative and significant in five of the twelve models. The results are consistent with the findings of section 3.5. Therefore, cross-sectional variation in the growth strategy of BHCs seem to affect investor reaction to the significant events after the Lehman bankruptcy but not before.

3.6.2. Using Absolute Abnormal Returns as Performance Measure

We use absolute mean-adjusted and absolute market-adjusted abnormal returns to evaluate whether the merger index has a significant impact on the resilience of BHCs. We run the same regression models in section 3.4. Table 3.14 contains the results. When we use absolute abnormal returns as the performance measure, the merger index becomes insignificant in the full sample and subsamples.

3.6.3. Using Bank Profitability (ROE) as the Performance Measure

Return on Equity (ROE) is one of the most common profitability measures in the literature. Banks with higher ROE are more profitable. Therefore, higher ROE increases resilience to bad conditions. Hence, the literature uses ROE as bank performance. (Ayadi et al., 2019; Cornett & Tehranian, 2004; Deng et al., 2013; Lall, 2014). This section replaces ROE with abnormal returns as a performance measure. The difference between ROE ratios in subsequent years would indicate BHCs'

relative performance during the crisis. As the GFC started in 2007 and ended in 2010, we take the difference of each crisis year's ROE relative to the 2006 ROE of BHCs as the performance gauge. We run four cross-sectional regressions. Models are as follows:

$$\Delta ROE_{2007i} = ROE_{2007i} - ROE_{2006i} = \alpha + \beta_1 \text{Merger Index}_i + \sum_{k=2}^{k=15} \beta_k X_{k,i} \quad (3.15)$$

$$\Delta ROE_{2008i} = ROE_{2008i} - ROE_{2006i} = \alpha + \beta_1 \text{Merger Index}_i + \sum_{k=2}^{k=15} \beta_k X_{k,i} \quad (3.16)$$

$$\Delta ROE_{2009i} = ROE_{2009i} - ROE_{2006i} = \alpha + \beta_1 \text{Merger Index}_i + \sum_{k=2}^{k=15} \beta_k X_{k,i} \quad (3.17)$$

$$\Delta ROE_{2010i} = ROE_{2010i} - ROE_{2006i} = \alpha + \beta_1 \text{Merger Index}_i + \sum_{k=2}^{k=15} \beta_k X_{k,i} \quad (3.18)$$

where ΔROE_i is the difference of return on equity of BHC_{*i*} on year *t* as the performance measure of BHC_{*i*}, α is constant, Merger Index_i is the merger index as the explanatory variable, Foreign Dummy_i is the foreign dummy that indicates foreign ownership of the BHC_{*i*}, and $\sum_{k=3}^{k=16} X_{k,it}$ is the same set of banks characteristics in equation (3.6), excluding ROE and foreign ownership dummy and, ε_i is the error term. Table 3.15 reports the results. Although the merger index has a positive, marginally significant effect on bank profitability in 2008 (Model 2), it is not significant and does not affect the profitability in other models. In addition, we include foreign banks in our sample and run the following regressions:

$$\begin{aligned} \Delta ROE_{2007i} = ROE_{2007i} - ROE_{2006i} = & \alpha + \beta_1 \text{Merger Index}_i \\ & + \beta_2 \text{Foreign Dummy}_i + \sum_{k=3}^{k=16} \beta_k X_{k,i} \end{aligned} \quad (3.19)$$

$$\begin{aligned} \Delta ROE_{2008i} = ROE_{2008i} - ROE_{2006i} = & \alpha + \beta_1 \text{Merger Index}_i \\ & + \beta_2 \text{Foreign Dummy}_i + \sum_{k=3}^{k=16} \beta_k X_{k,i} \end{aligned} \quad (3.20)$$

$$\Delta ROE_{2009i} = ROE_{2009i} - ROE_{2006i} = \alpha + \beta_1 \text{Merger Index}_i + \beta_2 \text{Foreign Dummy}_i + \sum_{k=3}^{k=16} \beta_k X_{k,i} \quad (3.21)$$

$$\Delta ROE_{2010i} = ROE_{2010i} - ROE_{2006i} = \alpha + \beta_1 \text{Merger Index}_i + \beta_2 \text{Foreign Dummy}_i + \sum_{k=3}^{k=16} \beta_k X_{k,i} \quad (3.22)$$

where ΔROE_i is the difference of return on equity of BHC_i on year t as the performance measure of BHC_i, α is constant, Merger Index_i is the merger index as the explanatory variable, Foreign Dummy_i is the foreign dummy that indicates foreign ownership of the BHC_i, and $\sum_{k=3}^{k=16} X_{k,it}$ is the same set of banks characteristics in equation (3.6), excluding ROE and ε_i is the error term. Table 3.15 contains the results suggesting that the merger index is marginally significant at 10% in 2008. Table 3.15 and 3.16 results are almost similar. Therefore, we conclude that growing through mergers does not affect bank profitability during the crisis.

3.6.4. Using Bank Profitability (ROA) as the Performance Measure

ROA represents a bank's management's capacity to make profits from its assets and is one of the key measures of bank profitability (Athanasoglou, Brissimis & Delis, 2008). We replace ROA with ROE as the profitability measure and run the same regression in the previous section. Tables 3.17 and 3.18 summarize the results for US domestic banks and the full sample, respectively. Our results are robust even we change profitability measure. The merger index is positive and significant at 10% in 2008. However, the index does not impact profitability in other years.

3.6.5. Pooled-OLS Regressions Using Bank Profitability (ROE and ROA) as Performance Measures

In this section, we also run pooled-OLS regressions to test whether growth strategy has an effect BHCs' profitability during crisis with different control variables. We construct four different models.

$$\begin{aligned}
ROE = & \alpha_{it} + \beta_1 \text{Merger Index} + \beta_2 \text{Capitalratio}_{it} + \beta_3 \text{NPLratio}_{it} \\
& + \beta_4 \text{Loanstodeposits}_{it} + \beta_5 \text{Assetstructure}_{it} + \beta_6 \text{Size}_{it} \\
& + \varepsilon_{it}
\end{aligned} \tag{3.23}$$

$$\begin{aligned}
ROE = & \alpha_{it} + \beta_1 \text{Merger Index} + \beta_2 \text{Capitalratio}_{it} + \beta_3 \text{NPLratio}_{it} \\
& + \beta_4 \text{Loanstodeposits}_{it} + \beta_5 \text{Assetstructure}_{it} + \beta_6 \text{Size}_{it} \\
& + \sum_{l=1}^{l=5} \beta_l \text{Year_Fixed_Effect}_l + \varepsilon_{it}
\end{aligned} \tag{3.24}$$

$$\begin{aligned}
ROA = & \alpha_{it} + \beta_1 \text{Merger Index} + \beta_2 \text{Capitalratio}_{it} + \beta_3 \text{NPLratio}_{it} \\
& + \beta_4 \text{Loanstodeposits}_{it} + \beta_5 \text{Assetstructure}_{it} + \beta_6 \text{Size}_{it} \\
& + \varepsilon_{it}
\end{aligned} \tag{3.25}$$

$$\begin{aligned}
ROA = & \alpha_{it} + \beta_1 \text{Merger Index} + \beta_2 \text{Capitalratio}_{it} + \beta_3 \text{NPLratio}_{it} \\
& + \beta_4 \text{Loanstodeposits}_{it} + \beta_5 \text{Assetstructure}_{it} + \beta_6 \text{Size}_{it} \\
& + \sum_{l=1}^{l=5} \beta_l \text{Year_Fixed_Effect}_l + \varepsilon_{it}
\end{aligned} \tag{3.26}$$

In equation (3.23), the dependent variable is the return on equity. The main independent variable is the merger index, and control variables are capital ratio, nonperforming loans (NPL) ratio, loans to deposits ratio, asset structure, and size, respectively. Dependent and control variables data cover the period from 2006 to 2010, and merger index data is as of 2006 only. We retrieve all control variables data from WRDS bank regulatory data.

In equation (3.24). We use the same dependent variables and bank characteristics of equation (3.23). However, now we add year-fixed effect to eliminate any unobservable year-specific heterogeneity. Similarly, in equations (3.25) and (3.26), we use the same regressions in equations (3.23) and (3.24), respectively, but we use return on assets as the performance measure (dependent variable).

Banks with higher capital-to-asset ratios are less risky and safer than banks with lower capital ratios. Furthermore, banks with higher equity-to-asset ratios often need

less external borrowing, which improves profitability (Berger & Bouwman, 2013; Dietrich & Wanzenried, 2010). Some research, on the other hand, suggests that banks with higher capital ratios saw more severe stock price drops during the crisis. (Akhigbe et al., 2012). Hence, we add *Capital Ratio* as a bank characteristic determinant to our models. Capital ratio is equity divided by total assets. (*BHCK3210/BHCK2170 in WRDS bank regulatory data*)

Nonperforming loan ratio is a prominent credit risk management statistic that is based on the idea that banks with a high nonperforming loan ratio manage credit risk poorly and are hence less profitable than their peers. (Cornett & Tehranian, 2004; Dietrich & Wanzenried, 2010; Kumar, Thrikawala & Acharya, 2022).

Nonperforming Loans Ratio is nonperforming loans divided by total loans. (*BHDMF639/BHCK2125 in WRDS bank regulatory data*)

A greater degree of intangibility in assets results in weaker collateral and a lower liquidation value, lowering a company's debt capacity. (Chang, Lee & Lee, 2009; Flannery & Rangan, 2006; Rajan et al., 1995). *Asset Structure* is the ratio of intangible assets to total assets. (*BHCK2143/BHCK2170 in WRDS bank regulatory data*)

LoanstoDeposit is a metric used to analyze liquidity. The literature has conflicting feelings about the effect of the loans-to-deposit ratio on bank performance. While some claim that it has a positive impact (Heffernan & Fu, 2010), others argue that it has a detrimental effect (Akhigbe et al., 2012; Tan & Floros, 2012). As interest income rises, higher ratios may imply better bank performance. A high ratio, on the other hand, may reduce liquidity and raise the probability of default. *LoanstoDeposit* is the ratio of deposits to loans (Heffernan & Fu, 2010). (*BHCP2200/BHCK2125 in WRDS bank regulatory data*)

According to the literature, larger banks have a higher probability of surviving than smaller ones (Akhigbe et al., 2012). Furthermore, an ideal regulatory bank size decreases the chance of insolvency (Berger & Bouwman, 2013; Lall, 2014). Smaller banks, on the other hand, may be more lucrative and perform better (Heffernan & Fu,

2010). *Size* is the natural logarithm of total assets. (Natural logarithm of *BHCK2170* in WRDS bank regulatory data)

Table 3.19 displays the results. The merger index has no significant effect in all model specifications on BHCs profitability during the crisis, supporting our main regression results. The only variable that has a negative and statistically significant effect at 1% level on the profitability of BHCs during GFC is nonperforming loans.

3.7. Conclusion

Reducing the size of the largest financial organizations that brought the global economy to the brink of collapse would be at the top of any list of changes in the financial system in late 2008. This study aims to investigate the impact of a bank's growth strategy on its resilience to the Global Financial Crisis (GFC) by constructing a growth index for banks since there are two ways of growth (organic or through M&A), and growth decision is a two-step decision; whether to grow and how to grow. We examine how growth and medium of growth affect the resilience of twenty-six U.S. Bank Holding Companies (BHCs) to the GFC.

Our key result is that cross-sectional variation in the growth strategy of BHCs seem to affect investor reaction to the significant events after the Lehman bankruptcy but not before. This result is consistent with the literature, which claims that, on average, mergers do not increase banks' performance (A. Berger & Humphrey, 1994; DeYoung, 1997; Focarelli et al., 2002; Houston & Ryngaert, 1994).

We conclude that as the collapse of Lehman Brothers approached, the risk became uncertainty, and the subprime phase of the crisis transitioned into a liquidity crisis. Following the bankruptcy of Lehman Brothers, bailouts of significant banks to protect the stability of the financial system imposed a budgetary cost on society, provoking investor responses. Furthermore, mergers might help banks to become 'too big to fail and get government support as large banks are assumed to be best able to play the default function of fostering general efficiency in economic transactions because of their size (Ioannou et al., 2019).

However, when interpreting our findings, a word of caution is required. Although our evidence shows that mergers negatively impact BHCs' resilience to crisis, we do not differentiate merger types (such as FDIC-assisted mergers or not). In addition, our sample only covers bank holding companies, and while calculating abnormal returns, the drawbacks of event study methodology (confounding events, information leakage, etc.) might prevail. Further research might examine different countries and types of mergers and bank sizes.



Figure 3.1: Sample Selection Procedure

The figure displays the sample selection procedure in the analysis.

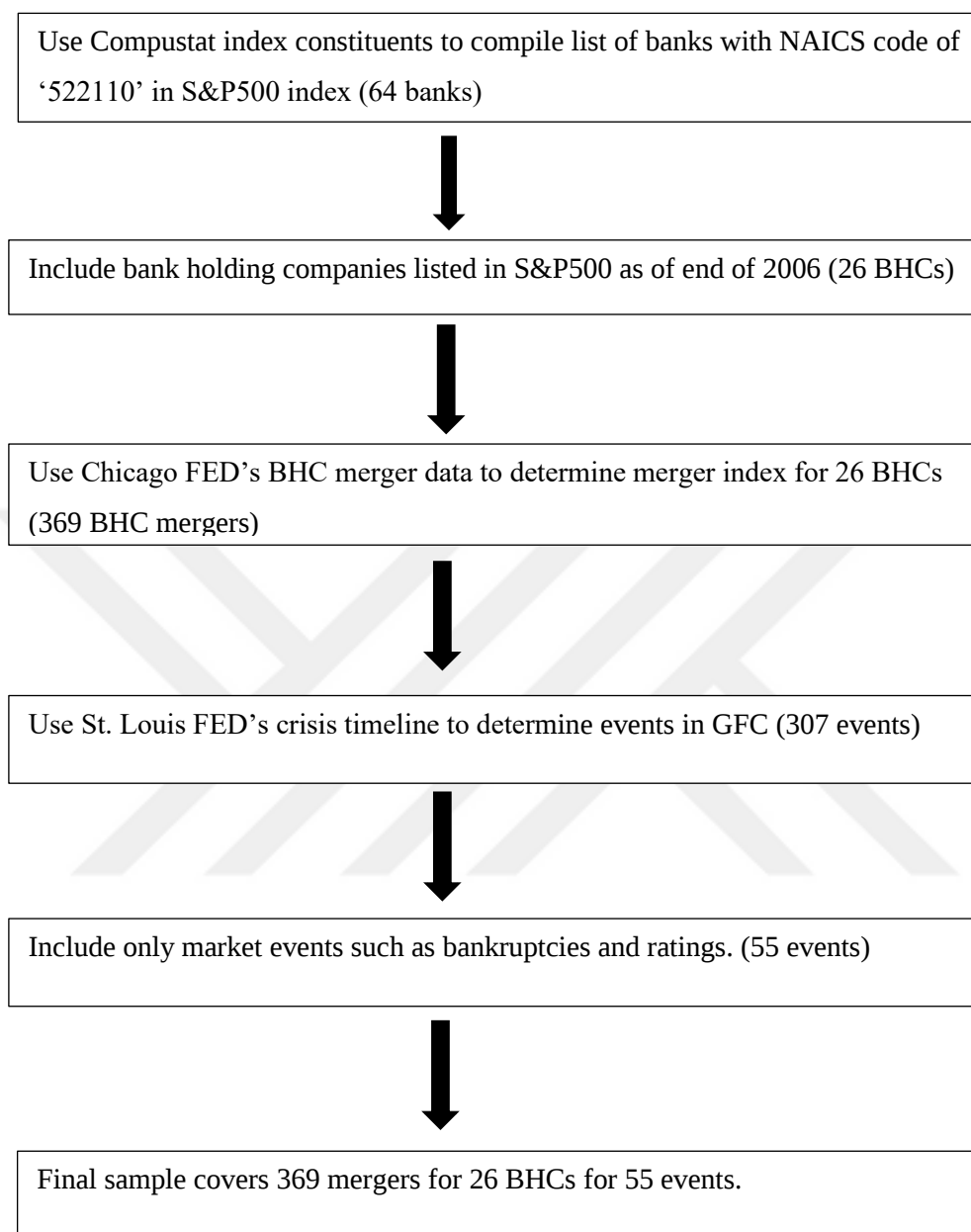
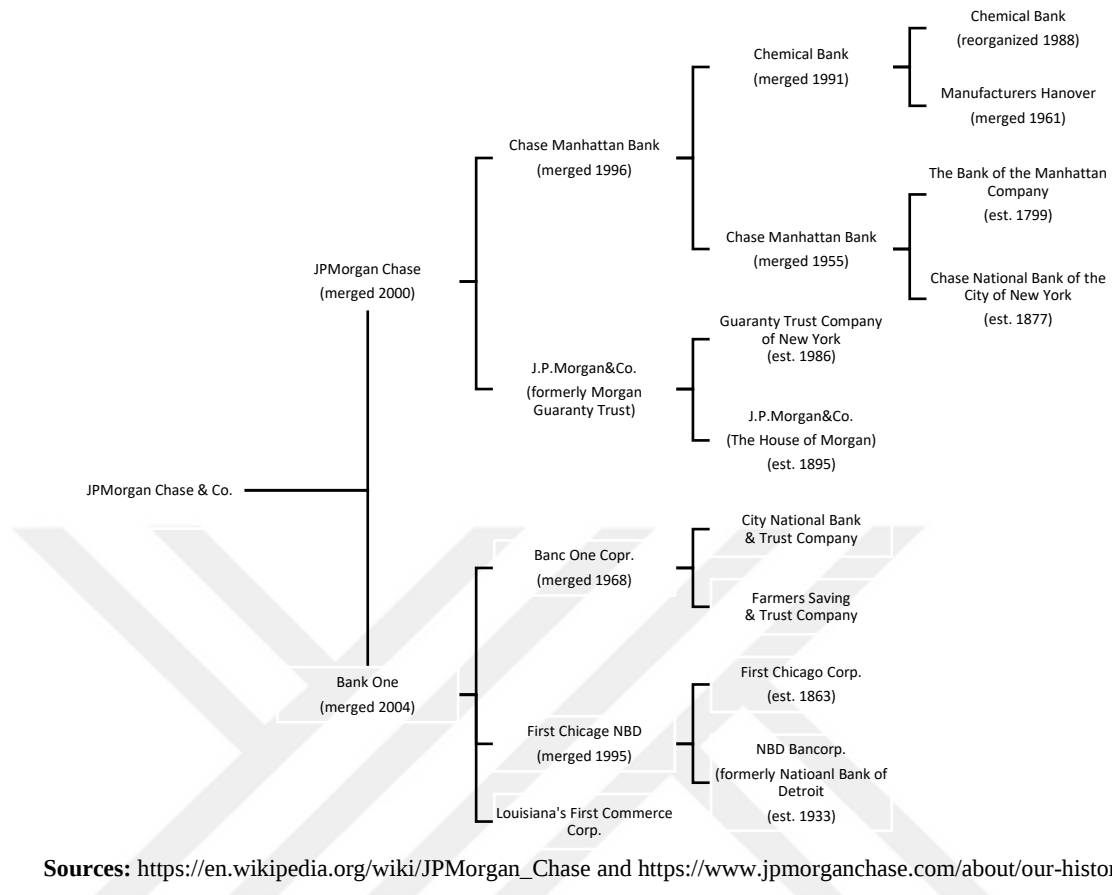


Figure 3.2: J&P Morgan Chase Merger Activity

The figure displays a brief merger activity of JP Morgan Chase from 1823 to 2006



Sources: https://en.wikipedia.org/wiki/JPMorgan_Chase and <https://www.jpmorganchase.com/about/our-history>

Figure 3.3: Event Study Timeline

The figure displays the event timeline used to calculate abnormal returns.

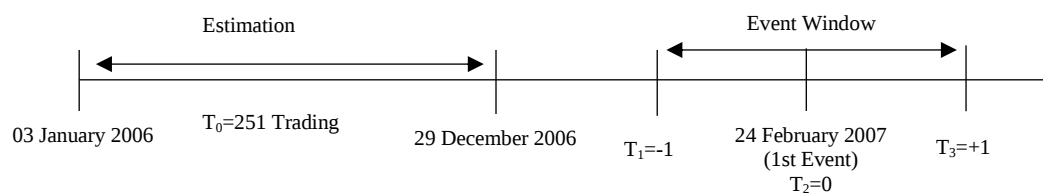


Table 3.1: Bank Holding Companies classified as “too big to fail” in the Sample

The table shows classification of Bank Holding Companies in the sample as ‘too big to fail’ (TBTF) or global systemically important financial institutions.

Bank Holding Company	TBTF	G-SIFI
B.B. and T Corp.	Yes	No
BBVA USA	No	No
Bank of America Corp.	Yes	Yes
Bank of NY Mellon	Yes	Yes
Citigroup Inc.	Yes	Yes
Comerica Inc.	Yes	No
Fifth Third Bancorp	Yes	No
First Horizon National	No	No
Huntington Bancshares	No	No
JPMorgan Chase and Co.	Yes	Yes
Keycorp	Yes	No
M and T Bank Corp.	Yes	No
Marshall and Ilsley Corp.	Yes	No
National City Corp.	Yes	No
Northern Trust Corp.	Yes	No
PNC Financial Services	Yes	No
Peoples United Financial	No	No
Regions Financial Corp.	Yes	No
Santander Bancorp	No	No
Suntrust Banks Inc.	Yes	No
Synovus Financial Corp.	No	No
Toronto Dominion Bank	No	No
US Bancorp	Yes	No
Wachovia Corp.	Yes	No
Wells Fargo	Yes	Yes
Zions Bancorporation	No	No

Table 3.2: Bank Holding Companies in the Sample

The table reports the market share and total asset values (in billions of \$) 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
B.B. 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
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

Table 3.3: Target Institutions Not Included in the Sample

The table reports the institutions excluded from the sample and their FDIC classifications.

BHC Name	Target Name	Year of Merger	FDIC's* Institution Type of Target
Bank of America Corp.	Boatmens Svc Co	1997	Data Processing Servicer
Bank of America Corp.	Nationsbanc Mortgage Capital	1998	Domestic Entity other
Bank of America Corp.	Nationsbanc Mrtg Corp of Ga	2000	Domestic Entity other
Bank of America Corp.	Employee Relocation Consultant	2000	Domestic Entity other
Bank of America Corp.	Bankamerica Fncl	2001	Domestic Entity other
Bank of America Corp.	Banc Of Amer Retirement Mgmt	2003	Domestic Entity other
Bank of America Corp.	C&S Premises	2003	Domestic Entity other
Bank of NY Mellon	Xyz Acquisition Corp	1988	Domestic Entity other
Bank of NY Mellon	Shearson Venture Capital	1997	Domestic Entity other
Bank of NY Mellon	Shearson Summit Euromanagement	1997	Domestic Entity other
BBVA USA	Compass Equitable Tx	1997	Domestic Entity other
Comerica Inc	Lytton Corp	1997	Domestic Entity other
Fifth Third Bancorp	Cumberland Bancorp	1994	Savings & Loan Holding Company
Fifth Third Bancorp	Falls Fncl	1995	Savings & Loan Holding Company
Fifth Third Bancorp	Kentucky Ent Bc	1996	Savings & Loan Holding Company
Fifth Third Bancorp	Suburban Bc	1997	Savings & Loan Holding Company
Fifth Third Bancorp	Citfed Bc	1998	Savings & Loan Holding Company
Fifth Third Bancorp	Ottawa Fc	2000	Domestic Entity other
JPMorgan Chase and Co.	Chemical Nj Hold	1989	Domestic Entity other
JPMorgan Chase and Co.	Texas Cmrc Operating Svc	2004	Domestic Entity other
Keycorp	Mcdonald Co Inv Inc	1998	Domestic Entity other
Marshall and Ilsley Corp.	M&I Software Development	1995	Data Processing Servicer
Marshall and Ilsley Corp.	Gold Ihc I Llc	2006	Domestic Entity other
National City Corp.	Integra Life Ins Co	1996	Domestic Entity other
National City Corp.	Sterling Acquisition Co	1998	Domestic Entity other
Northern Trust Corp.	Napsub Corporation	1991	Domestic Entity other
PNC Financial Services	Bod Depository	1990	Domestic Entity other
Suntrust Banks Inc.	Sunbank Mtg Co	1986	Domestic Entity other
US Bancorp	Pegasus Inv Co	1997	Domestic Entity other
US Bancorp	Colorado Nat Premises	1997	Domestic Entity other
US Bancorp	Cnb Properties	1997	Domestic Entity other
US Bancorp	Nova Corp	2004	Data Processing Servicer
Wachovia Corp.	First Union Transportation Svc	1996	Domestic Entity other
Wachovia Corp.	First Pa Intl Cap Corp	1998	Domestic Entity other
Wachovia Corp.	Westcorp	2006	Domestic Entity other
Wells Fargo	All Time Atm	2001	Data Processing Servicer
Wells Fargo	Elleven Corp	2002	Domestic Entity other
Wells Fargo	Tejas Force	2003	Domestic Entity other
Wells Fargo	Fidelity Bc	2003	Domestic Entity other
Wells Fargo	First Scty Inv Svc	2004	Securities Broker/Dealer

* Federal Deposit Insurance Corporation.

Table 3.4: Summary Statistics of BHC Mergers in the Sample

Table reports assets, merger values (in billions of \$), merger index (as percent) and number of mergers of Bank Holding Companies in the sample as of December 31, 2006.

Bank Holding Company	2006-Assets (\$)	2006- Merger (\$)	Merger Index (%)	Number of mergers
B.B. and T Corp.	121	69.7	57	22
BBVA USA	34	5.7	17	17
Bank of NY Mellon	103	62.3	60	9
Bank of America Corp.	1,463	1052.4	72	24
Citigroup Inc.	1,884	1002.8	53	2
Comerica Inc.	58	37.6	65	11
Fifth Third Bancorp	100	48.5	48	12
First Horizon National	37	1.1	3	4
Huntington Bancshares	35	17.4	49	11
JPMorgan Chase and Co.	1,351	902.6	67	6
Keycorp	92	80.9	88	15
M and T Bank Corp.	57	34.4	60	6
Marshall and Ilsley Corp.	56	22.2	40	14
National City Corp.	140	97.4	69	10
Northern Trust Corp.	60	1.6	3	2
PNC Financial Services	101	56.2	55	12
Peoples United Financial	10	0.9	9	1
Regions Financial Corp.	143	111.8	78	4
Santander Bancorp	9	0.1	1	6
Suntrust Banks Inc.	182	104.0	57	9
Synovus Financial Corp.	31	10.7	34	16
Toronto Dominion Bank	40	2.8	7	11
U.S. Bancorp	219	161.1	74	23
Wachovia Corp.	520	377.0	73	25
Wells Fargo	481	281.8	58	70
Zions Bancorporation	42	11.5	25	27
Total	7,369	4,554	-	369
Mean	283	175	47	14
Median	96	52	56	11
Min	9	0.1	1	1
Max	1,884	1,052	88	70

Table 3.5: Market Events in the Sample

Table reports market events, market adjusted and mean abnormal returns (in percent) calculated using the market adjusted and mean adjusted models

Date	Event	Abnormal return (SP500 adjusted) $R_{i,t} - R_{m,t}$	Abnormal return (mean adjusted) $R_{i,t} - \bar{R}_i$
24-Feb-07	Freddie Mac announces that it will no longer buy the riskiest subprime mortgages and mortgage-related securities	0.09	0.56
2-Apr-07	New Century Financial Corporation files for Chapter 11 bankruptcy protection	-0.23	-0.04
1-Jun-07	Standard and Poor's and Moody's downgrade over 100 bonds	0.05	0.36
7-Jun-07	Bear Stearns suspends redemptions	-0.20	-2.02
11-Jul-07	Standard and Poor's places 612 securities on a credit watch	-0.18	0.33
24-Jul-07	Countrywide Financial Corporation warns of "difficult conditions."	0.26	-1.79
31-Jul-07	Bear Stearns liquidates two hedge funds that invested in various types of mortgage-backed securities	-1.14	-2.48
6-Aug-07	American Home Mortgage Investment Corporation files for Chapter 11 bankruptcy protection.	2.58	4.93
9-Aug-07	BNP Paribas, France's largest bank, halts redemptions on three investment funds.	-2.86	-5.90
16-Aug-07	Fitch Ratings downgrades Countrywide Financial Corporation	5.35	5.61
15-Oct-07	Citigroup, Bank of America, and JPMorgan Chase announce plans for an \$80 billion Master Liquidity Enhancement Conduit	1.06	0.15
21-Dec-07	Citigroup, JPMorgan Chase, and Bank of America abandon plans for the Master Liquidity Enhancement Conduit	1.81	3.41
11-Jan-08	Bank of America announces that it will purchase Countrywide Financial	2.30	0.87
18-Jan-08	Fitch Ratings downgrades Ambac Financial Group's insurance	0.51	-0.16
19-Feb-08	Northern Rock is taken into state ownership by the Treasury of the United Kingdom.	-1.75	-1.90
5-Mar-08	Carlyle Capital Corporation receives a default notice after failing to meet margin calls on its mortgage bond fund.	-2.09	-1.64
5-Jun-08	Standard and Poor's downgrades monoline bond insurers AMBAC and MBIA from AAA to AA.	-2.31	-0.43
11-Jul-08	The Office of Thrift Supervision closes IndyMac Bank.	3.48	2.30
8-Sep-08	The Federal Housing Finance Agency (FHFA) places Fannie Mae and Freddie Mac in government conservatorship.	5.63	7.62
15-Sep-08	Lehman Brothers Holdings Incorporated files for Chapter 11 bankruptcy protection	2.75	-2.03

Note: Event Synopsis are taken from <https://fraser.stlouisfed.org/timeline/financial-crisis>

Table 3.5 (cont'd)

Date	Event	Abnormal return (SP500 adjusted) $R_{i,t} - R_{m,t}$	Abnormal return (mean adjusted) $R_{i,t} - \bar{R}_i$
25-Sep-08	The Office of Thrift Supervision closes Washington Mutual Bank.	4.95	6.84
29-Sep-08	The FDIC announces that Citigroup will purchase the banking operations of Wachovia Corporation.	0.72	-8.14
24-Oct-08	PNC Financial Services Group Inc. purchases National City Corporation, creating the fifth largest U.S. bank	1.72	-1.80
17-Nov-08	Lincoln National, Hartford Financial Services Group, and Genworth Financial request TARP funding.	2.07	-0.57
18-Nov-08	Executives of Ford, General Motors, and Chrysler testify before Congress, requesting access to the TARP for federal loans.	-1.75	-0.83
20-Nov-08	Fannie Mae and Freddie Mac announce that they will suspend mortgage foreclosures until January 2009.	2.00	-4.78
26-Nov-08	The FED announces approval of the notice of Bank of America Corporation to acquire Merrill Lynch and Company	-1.17	2.30
15-Dec-08	The FED announces that it has approved the application of PNC Financial Services to acquire National City Corporation.	1.96	0.62
8-Jan-09	Moody's issues a report suggesting that the Federal Home Loan Banks are facing significant accounting write-downs.	-1.34	-1.07
13-Jan-09	The Federal Home Loan Bank of Seattle reports that it will likely report a risk-based capital deficiency and suspend its dividend.	-1.39	-1.28
26-Feb-09	Fannie Mae reports a loss of \$25.2 billion in the fourth quarter of 2008, and a full year 2008 loss of \$58.7 billion	18.93	17.28
11-Mar-09	Freddie Mac announces that it had a net loss of \$23.9 billion in the fourth quarter of 2008.	0.08	0.26
31-Mar-09	Four bank holding companies announced that they had redeemed all of the preferred shares that they had issued to the U.S.	12.32	13.57
7-May-09	The Federal Reserve releases the results of the stress test of the 19 largest U.S. bank holding companies.	-10.36	-11.75
8-May-09	Fannie Mae requests \$19 billion from the U.S. Treasury Department.	20.61	22.95
12-May-09	Freddie Mac reports a first quarter 2009 loss of \$9.9 billion, and a net worth deficit of \$6.0 billion as of March 31, 2009	-6.32	-6.49

Note: Event Synopsis are taken from <https://fraser.stlouisfed.org/timeline/financial-crisis>

Table 3.5 (cont'd)

Date	Event	Abnormal return (SP500 adjusted) $R_{i,t} - R_{m,t}$	Abnormal return (mean adjusted) $R_{i,t} - \bar{R}_i$
21-May-09	Standard and Poor's lowers its outlook on the United Kingdom government debt from stable to negative	-7.39	-9.13
1-Jun-09	General Motors Corporation and three domestic subsidiaries announce that they have filed for relief under Chapter 11	0.78	3.30
9-Jun-09	10 of the largest U.S. financial institutions participating in the Capital Purchase Program have met the requirements.	-2.32	-2.04
25-Jun-09	AIG announces that it has entered into an agreement with the Federal Reserve Bank of New York to reduce the debt.	1.12	3.20
23-Jul-09	Citigroup announces that it completed a previously announced exchange offer with private investors.	11.79	14.05
27-Jul-09	Citigroup announces the preliminary results of its offers to exchange its publicly held securities.	14.98	15.21
6-Aug-09	Fannie Mae reports a loss of \$14.8 billion in the second quarter of 2009.	0.82	0.19
2-Nov-09	CIT Group, Inc., files for bankruptcy protection under Chapter 11 of the bankruptcy code.	-3.80	-3.22
5-Nov-09	Fannie Mae reports a net loss of \$18.9 billion in the third quarter of 2009.	-0.92	0.94
1-Dec-09	AIG announces that it has closed two transactions with the Federal Reserve Bank of New York.	-4.80	-3.66
2-Dec-09	Bank of America announces that it will repurchase the entire \$45 billion of cumulative preferred.	-0.03	-0.07
14-Dec-09	Wells Fargo announces that it will redeem the \$25 billion of preferred stock	3.04	3.67
19-Jan-10	The New York Fed extended credit to Maiden Lane III to purchase multi-sector collateralized debt obligations.	-0.12	1.06
24-Feb-10	Freddie Mac reports a net loss of \$6.5 billion in the fourth quarter of 2009	1.09	1.99
26-Feb-10	Fannie Mae reports a net loss of \$15.2 billion in the fourth quarter of 2009 and a full-year 2009 loss of \$72.0 billion.	-1.18	-1.11
5-May-10	Freddie Mac reports a net loss of \$6.7 billion in the first quarter of 2010.	2.39	1.66
10-May-10	Fannie Mae reports a net loss of \$11.5 billion in the first quarter of 2010.	3.16	7.49
16-Jun-10	Freddie Mac intends to delist its common stock and the 20 listed classes of its preferred stock.	0.59	0.46
1-Oct-10	Freddie Mac releases a statement that there may be affidavits that were improperly executed in connection with foreclosures.	0.37	0.75

Note: Event Synopsis are taken from <https://fraser.stlouisfed.org/timeline/financial-crisis>

Table 3.6: Control Variables

Table illustrates and describes control variables.

Variables	Definition	Data Source
Main Independent Var.		
Merger_Index	Ratio of sum of all targets' total book values from 1980 to 2006 (adjusted to 2006 prices) to change in total assets from 1980 to 2006.	Mergers Detail: Chicago FED's BHC merger data, Targets' Assets: WRDS Bank Regulatory Data
Risk and Opacity		
Capital_Ratio	Ratio of equity capital to total assets	Total Assets: WRDS Bank Regulatory Data (BHCK2170), Equity Capital: WRDS Bank Regulatory (BHCK3210)
Credit_Risk	Basel, I risk-weighted Assets/ Total Assets	Risk Weighted Assets: WRDS Bank Regulatory Data (BHCKG641)
Loan_Concentration	Bank level HHI index of six loan categories. (Commercial real estate, residential real estate, construction and industrial, consumer, agriculture and other)	Loan Categories: WRDS Bank Regulatory Data: BHCK1766, BHCK2746, BHKB538, BHCK1415, BHCK1590, BHCK1564
Commercial_real_estate	Commercial Real Estate/ Total Assets	Commercial Real Estate: WRDS Bank Regulatory Data: BHCK3656
Brokered_Deposits	Brokered Deposits/ Total Assets	Brokered Deposits: WRDS Bank Regulatory Data: BHDMA164+BHDMA243
Trading_Assets	Trading Assets/ Total Assets	Trading Assets: WRDS Bank Regulatory Data: BHCK3545
Cash_Holdings	Cash+Marketable Securities/Total Assets	Cash and Marketable Securities: WRDS Bank Regulatory Data: BHCK0010
Size and Safety Net Protection		
Size	Natural log of Total Assets	Total Assets: WRDS Bank Regulatory Data (BHCK2170)
Core_Deposits	Core Deposits (sum of transaction deposits, saving deposits, small (denominations less than \$100,000) time deposits) / Total Assets	WRDS Bank Regulatory Data: BHCB2389+BHOD2389+BHCB2604+BHCB6648
Ownership		
Foreign_Ownership	Dummy variable if foreign origin=1, otherwise=0	WRDS Bank Regulatory Data: RSSD9329
Organizational Structure and Strategy		
HQ_Deposits	The fraction of deposits in headquarters (defined as the office with highest amount of deposits). HQ deposits/Total deposits	FDIC's the Summary of Deposits data
Nr_States	Natural log number of states in which the bank has branches	FDIC's the Summary of Deposits data

Table 3.6 (cont'd)

Variables	Definition	Data Source
Main Independent Var.		
Competition		
Local_Mkt_Power	Bank level HHI Index of deposit concentration for the local markets. Local Markets are defined based on CBSA and non CBSA county.	FDIC's the Summary of Deposits data
Location		
Metro_Mkts	the number of metropolitan markets (MSAs and CBSAs) as a fraction of all markets in which a bank is active is included in the regressions	FDIC's the Summary of Deposits data
House_Price_Index_Growth	Created an index for each state. For each bank House price index growth is growth in a state level HPI * the fraction of the bank's deposits	Purchase Index: Federal Housing Finance Agency's database, Deposits by State: FDIC's the Summary of Deposits data
Profitability		
ROE	Net Income/Stockholders' Equity	WRDS Bank Regulatory Data: BHCK4340/BHCKC245

Table 3.7: Summary Statistics

Table displays summary statistics of dependent variable (Mean-adjusted AR), main independent variable (Merger_Index) and bank characteristics as control variables.

Variables	Mean	Median	Sd.	Min	Max
Mean-adjusted AR	-0.001	0.002	0.002	-0.817	0.588
Merger_Index	0.450	0.571	0.265	0.011	0.876
Capital_Ratio	0.098	0.097	0.029	0.063	0.208
Credit_Risk	0.839	0.853	0.137	0.561	0.923
Loan_Concentration	0.073	0.059	0.047	0.023	0.251
Commercial_real_estate	0.001	0.000	0.002	0.000	0.009
Brokered_Deposits	0.002	0.000	0.006	0.000	0.025
Trading_Assets	0.036	0.009	0.066	0.000	0.271
Cash_Holdings	0.068	0.044	0.073	0.014	0.358
Size	18.430	18.338	1.353	16.030	21.360
Core_Deposits	0.506	0.553	0.127	0.188	0.767
Foreign_Ownership	6.576	0.000	20.150	0.000	88.000
HQ_Deposits	0.213	0.166	0.161	0.047	0.660
Nr_States	2.258	2.303	0.824	0.000	3.434
Local_Mkt_Power	0.348	0.275	0.263	0.000	1.000
Metro_Mkts	0.907	0.895	0.075	0.750	1.000
House_Price_Index_Growth	0.029	0.028	0.025	-0.030	0.068
ROE	0.145	0.151	0.065	0.029	0.339

Notes: Mean_adj AR is the mean-adjusted abnormal return. Merger_Index is the ratio of sum of all targets' total book values from 1980 to 2006 (adjusted to 2006 prices) to change in total assets from 1980 to 2006. Capital_Ratio, ratio of equity capital to total assets. Credit_Risk is Basel, I risk-weighted Assets/ Total Assets. Loan_Concentration is HHI index of six loan categories (Commercial real estate, residential real estate, construction and industrial, consumer, agriculture and other). Commercial_Real_Estate is commercial real estate divided by Total Assets. Brokered-Deposits is Brokered Deposits/ Total Assets. Trading_Assets is trading assets divided by Total Assets. Cash_Holdings is cash and marketable securities divided by Total Assets. Size is the log of Total Assets. Core_Deposits Core Deposits is the sum of transaction deposits, saving deposits, small (denominations less than \$100,000) time deposits) / Total Assets. Foreign_Ownership Percentage of foreign ownership. HQ_Deposits is the fraction of deposits in headquarters (defined as the office with highest amount of deposits). Nr_States is the log of the number of states in which the bank has branches. Local_Mkt_Power is a bank-level Herfindahl-Hirschman Index based on bank deposits. Metro_Mkts is the number of metropolitan markets (as a fraction of all markets). House_Price_Index_Growth is an index for each state. For each bank house price index growth is growth in a state level is HPI * the fraction of the bank's deposits. ROE is return on equity is Net Income/Stockholders' Equity

Table 3.8: Correlation Matrix of Variables

Table displays correlation among variables (control variables and main independent variable [Merger_Index]).

	<i>Merger_Index</i>	<i>Capital_Ratio</i>	<i>Credit_Risk</i>	<i>Loan_Concent.</i>	<i>Com_real_est.</i>	<i>Brkd_Dep.</i>	<i>Tr_Assets</i>	<i>Cash_Holds</i>	<i>Size</i>	<i>Core_Deposits</i>	<i>Foreign_Own.</i>	<i>HQ_Deposits</i>	<i>Nr_States</i>	<i>Loc_Mkt_Pow.</i>	<i>Metro_Mkts</i>	<i>HPI_Growth</i>	<i>ROE</i>
Merger_Index	1.00																
Capital_Ratio	0.10	1.00															
Credit_Risk	0.29	0.02	1.00														
Loan_Concentration	0.01	-0.07	0.65	1.00													
Commercial_real_estate	0.39	0.05	0.21	-0.08	1.00												
Brokered_Deposits	0.09	-0.18	-0.40	-0.21	0.11	1.00											
Trading_Assets	0.23	-0.26	-0.52	-0.21	0.04	0.45	1.00										
Cash_Holdings	-0.15	-0.10	-0.35	0.00	-0.06	-0.15	0.18	1.00									
Size	0.62	-0.04	-0.33	-0.26	0.18	0.52	0.72	0.09	1.00								
Core_Deposits	0.00	0.22	0.54	0.13	0.05	-0.15	-0.48	-0.65	-0.36	1.00							
Foreign_Ownership	-0.42	0.23	-0.21	-0.27	0.00	-0.10	-0.15	-0.11	-0.40	0.10	1.00						
HQ_Deposits	-0.26	-0.22	-0.41	-0.18	-0.12	0.13	0.32	0.42	-0.04	-0.62	0.26	1.00					
Nr_States	0.51	0.10	-0.17	-0.11	0.20	0.20	0.42	0.25	0.79	-0.49	-0.51	-0.01	1.00				
Local_Mkt_Power	-0.61	-0.48	-0.06	0.06	-0.21	-0.08	-0.06	-0.14	-0.58	0.15	0.38	0.27	-0.67	1.00			
Metro_Mkts	-0.42	-0.45	-0.19	0.18	-0.17	0.17	0.32	0.41	-0.06	-0.25	0.14	0.52	-0.25	0.42	1.00		
House_Price_Index_Growth	-0.30	-0.05	-0.25	-0.20	0.01	-0.02	-0.05	-0.15	-0.12	-0.13	0.17	0.01	0.06	0.04	-0.08	1.00	
ROE	0.28	-0.17	0.08	0.21	-0.13	-0.01	0.10	0.32	0.23	-0.48	-0.37	0.41	0.33	-0.29	0.23	-0.22	1.00

Table 3.9: Heteroskedasticity Test Results in Full Sample and Subsamples

Table reports Breusch Pagan test results in full sample and subsample models.

Panel A				
Full Sample				
	Model 1	Model 2	Model 3	Model 4
Dependent Variable	Mean-adjusted AR	Market-Adjusted AR	Mean-adjusted AR	Market-Adjusted AR
Heteroscedasticity Test (p-value)	0.000**	0.000**	0.000**	0.000**
Fixed-Effect	No	No	Yes	Yes
Panel B				
Before Lehman Brothers				
	Model 5	Model 6	Model 7	Model 8
Dependent Variable	Mean-adjusted AR	Market-Adjusted AR	Mean-adjusted AR	Market-Adjusted AR
Heteroscedasticity Test (p-value)	0.0006**	0.0000**	0.0000**	0.000**
Fixed-Effect	No	No	Yes	Yes
Panel C				
After Lehman Brothers				
	Model 9	Model 10	Model 11	Model 12
Dependent Variable	Mean-adjusted AR	Market-Adjusted AR	Mean-adjusted AR	Market-Adjusted AR
Heteroscedasticity Test (p-value)	0.000**	0.000**	0.000**	0.000**
Fixed-Effect	No	No	Yes	Yes

Note: **and* denote significance level at 1% and 5%, respectively.

Table 3.10: Pooled OLS Regression Results for US domestic BHCs

Table displays Pooled OLS analysis of dependent variable (mean-adjusted and market-adjusted abnormal returns) on main independent variable (merger index) and control variables.

Variables	Panel A-Full Sample			
	(1) Mean-adjusted AR	(2) Market-adjusted AR	(3) Mean-adjusted AR	(4) Market-adjusted AR
Merger_Index	-0.0467* (0.100)	-0.0414* (0.087)	-0.0364* (0.052)	-0.0359* (0.055)
Capital_Ratio	-0.0941 (0.685)	-0.0997 (0.603)	-0.0963 (0.504)	-0.101 (0.484)
Credit_Risk	-0.160* (0.059)	-0.132* (0.067)	-0.103* (0.073)	-0.101* (0.077)
Loan_Concentration	0.205 (0.101)	0.170 (0.114)	0.138 (0.115)	0.134 (0.124)
Commercial_real_estate	3.297 (0.110)	2.717 (0.112)	2.091 (0.119)	2.073 (0.122)
Brokered_Deposits	-1.400 (0.228)	-1.166 (0.249)	-0.878 (0.276)	-0.887 (0.272)
Trading_Assets	0.125 (0.151)	0.112 (0.124)	0.0969* (0.071)	0.0966* (0.072)
Cash_Holdings	-0.217* (0.065)	-0.182* (0.065)	-0.149* (0.051)	-0.146* (0.056)
Size	-0.0214* (0.098)	-0.0181* (0.099)	-0.0151* (0.072)	-0.0148* (0.079)
Core_Deposits	0.0772 (0.114)	0.0659 (0.102)	0.0550* (0.081)	0.0541* (0.086)
HQ_Deposits	0.00993 (0.715)	0.00522 (0.816)	0.00196 (0.918)	0.000969 (0.959)
Nr_States	0.0266 (0.129)	0.0214 (0.154)	0.0171 (0.140)	0.0164 (0.158)
Local_Mkt_Power	-0.0866** (0.022)	-0.0760** (0.018)	-0.0659*** (0.006)	-0.0649*** (0.007)
Metro_Mkts	0.0672 (0.417)	0.0546 (0.424)	0.0408 (0.418)	0.0405 (0.422)
House_Price_Index_Growth	-0.563 (0.100)	-0.455 (0.125)	-0.357 (0.120)	-0.345 (0.133)
ROE	-0.0365 (0.557)	-0.0214 (0.681)	-0.0108 (0.785)	-0.00765 (0.846)
_cons	0.445** (0.036)	0.382** (0.034)	0.323** (0.019)	0.312** (0.023)
Event Fixed Effect	No	No	Yes	Yes
N	1211	1211	1211	1211
R-sq	0.017	0.020	0.607	0.424
adj. R-sq	0.004	0.007	0.583	0.389

Note: p-values in parentheses. ***, **and* denote significance level at 1%, 5%, and 10%, respectively.

Table 3.10. (cont'd)

Variables	Panel B-Before Lehman Brothers' Collapse			
	(5) Mean-adjusted AR	(6) Market-adjusted AR	(7) Mean-adjusted AR	(8) Market-adjusted AR
Merger_Index	-0.000643 (0.976)	-0.000321 (0.984)	-0.000643 (0.950)	-0.000321 (0.975)
Capital_Ratio	-0.120 (0.552)	-0.125 (0.421)	-0.120 (0.226)	-0.125 (0.210)
Credit_Risk	-0.0227 (0.665)	-0.0220 (0.596)	-0.0227 (0.401)	-0.0220 (0.414)
Loan_Concentration	0.101 (0.211)	0.0988 (0.119)	0.101** (0.017)	0.0988** (0.020)
Commercial_real_estate	0.0420 (0.978)	0.0442 (0.970)	0.0420 (0.954)	0.0442 (0.952)
Brokered_Deposits	-0.292 (0.614)	-0.306 (0.520)	-0.292 (0.380)	-0.306 (0.358)
Trading_Assets	-0.0428 (0.525)	-0.0424 (0.402)	-0.0428 (0.173)	-0.0424 (0.177)
Cash_Holdings	-0.0287 (0.705)	-0.0268 (0.646)	-0.0287 (0.447)	-0.0268 (0.477)
Size	0.00199 (0.816)	0.00222 (0.740)	0.00199 (0.648)	0.00222 (0.610)
Core_Deposits	0.0158 (0.700)	0.0153 (0.626)	0.0158 (0.424)	0.0153 (0.439)
HQ_Deposits	0.0169 (0.470)	0.0159 (0.351)	0.0169 (0.126)	0.0159 (0.148)
Nr_States	-0.000748 (0.943)	-0.00132 (0.876)	-0.000748 (0.895)	-0.00132 (0.817)
Local_Mkt_Power	-0.0152 (0.549)	-0.0146 (0.466)	-0.0152 (0.236)	-0.0146 (0.255)
Metro_Mkts	-0.00321 (0.961)	-0.00287 (0.954)	-0.00321 (0.916)	-0.00287 (0.925)
House_Price_Index_Growth	0.0219 (0.912)	0.0307 (0.848)	0.0219 (0.846)	0.0307 (0.786)
ROE	-0.0159 (0.754)	-0.0132 (0.731)	-0.0159 (0.501)	-0.0132 (0.574)
_cons	-0.00767 (0.958)	-0.0102 (0.928)	-0.00655 (0.925)	-0.0151 (0.829)
Event Fixed Effect	No	No	Yes	Yes
N	437	437	437	437
R-sq	0.010	0.016	0.766	0.610
adj. R-sq	-0.027	-0.021	0.747	0.578

Note: p-values in parentheses. ***, **and* denote significance level at 1%, 5%, and 10%, respectively.

Table 3.10. (cont'd)

Variables	Panel C-After Lehman Brothers' Collapse			
	(9) Mean-adjusted AR	(10) Market-adjusted AR	(11) Mean-adjusted AR	(12) Market-adjusted AR
Merger_Index	-0.0953* (0.051)	-0.0834** (0.049)	-0.0697** (0.035)	-0.0691** (0.037)
Capital_Ratio	-0.134 (0.718)	-0.131 (0.672)	-0.118 (0.622)	-0.123 (0.608)
Credit_Risk	-0.352** (0.036)	-0.289** (0.047)	-0.215* (0.062)	-0.212* (0.066)
Loan_Concentration	0.417* (0.087)	0.339 (0.112)	0.251 (0.145)	0.246 (0.153)
Commercial_real_estate	7.481* (0.051)	6.184* (0.058)	4.631* (0.072)	4.593* (0.075)
Brokered_Deposits	-3.509 (0.162)	-2.892 (0.191)	-2.109 (0.238)	-2.111 (0.238)
Trading_Assets	0.253* (0.068)	0.226* (0.053)	0.193** (0.028)	0.192** (0.028)
Cash_Holdings	-0.465** (0.041)	-0.388** (0.047)	-0.301** (0.050)	-0.297* (0.053)
Size	-0.0427* (0.052)	-0.0363* (0.053)	-0.0293** (0.044)	-0.0288** (0.048)
Core_Deposits	0.147* (0.068)	0.124* (0.067)	0.0975* (0.066)	0.0961* (0.071)
HQ_Deposits	0.0291 (0.543)	0.0186 (0.648)	0.00789 (0.818)	0.00678 (0.843)
Nr_States	0.0552* (0.070)	0.0452* (0.084)	0.0348* (0.090)	0.0338* (0.099)
Local_Mkt_Power	-0.167** (0.016)	-0.144** (0.016)	-0.118*** (0.010)	-0.116** (0.011)
Metro_Mkts	0.137 (0.302)	0.112 (0.311)	0.0821 (0.325)	0.0813 (0.331)
House_Price_Index_Growth	-1.278** (0.045)	-1.050* (0.060)	-0.797* (0.068)	-0.782* (0.074)
ROE	-0.0924 (0.359)	-0.0632 (0.460)	-0.0344 (0.604)	-0.0309 (0.642)
_cons	0.911** (0.017)	0.778** (0.017)	0.556** (0.028)	0.595** (0.019)
Event Fixed Effect	No	No	Yes	Yes
N	774	774	774	774
R-sq	0.037	0.040	0.599	0.419
adj. R-sq	0.017	0.020	0.571	0.378

Note: p-values in parentheses. ***, ** and * denote significance level at 1%, 5%, and 10%, respectively.

Table 3.11: Cross-Sectional Regression Results before Lehman Brothers Failure'

Table displays Cross-Sectional analysis of dependent variable (mean-adjusted and market-adjusted abnormal returns) on main independent variable (merger index) and control variables.

Variable / Event Dates	24-Feb-07	2-Apr-07	1-Jun-07	7-Jun-07	11-Jul-07	24-Jul-07	31-Jul-07	6-Aug-07	9-Aug-07	16-Aug-07
Merger_Index	-0.00396 (-0.53)	-0.0465 (-0.80)	-0.0211 (-1.48)	-0.000275 (-0.01)	-0.00665 (-0.32)	0.00766 (0.22)	0.00121 (0.06)	0.0195 (0.43)	-0.00429 (-0.08)	0.111* (2.29)
Capital_Ratio	-0.119 (-2.10)	-0.0159 (-0.06)	0.0666 (0.95)	0.0113 (0.11)	-0.0907 (-0.95)	-0.0490 (-0.29)	-0.136 (-1.61)	-0.342 (-1.66)	-0.0783 (-0.21)	-0.278 (-1.42)
Credit_Risk	-0.00481 (-0.27)	0.0112 (0.12)	0.0396 (2.10)	0.0463 (1.49)	0.00182 (0.07)	-0.00216 (-0.05)	-0.0914* (-2.90)	0.0238 (0.22)	-0.00600 (-0.05)	0.00996 (0.10)
Loan_Concentration	0.0549 (1.60)	0.0360 (0.37)	0.0205 (0.53)	-0.0361 (-0.83)	0.0166 (0.36)	-0.0566 (-0.69)	0.0836 (1.53)	0.155 (0.74)	0.0348 (0.16)	0.343 (1.82)
Commercial_real_estate	0.0872 (0.25)	0.729 (0.20)	0.936 (1.35)	-0.645 (-0.80)	0.112 (0.09)	1.357 (1.05)	2.058* (2.36)	-1.545 (-0.75)	-1.367 (-0.54)	-2.222 (-0.96)
Brokered_Deposits	-0.453* (-3.21)	-0.131 (-0.23)	0.261 (0.95)	0.491 (1.29)	-0.223 (-0.53)	0.584 (1.06)	-0.699* (-2.50)	0.645 (0.73)	-0.865 (-0.77)	0.0165 (0.02)
Trading_Assets	-0.0298 (-1.41)	0.108 (1.06)	0.0143 (0.40)	0.0299 (0.45)	0.00696 (0.12)	0.00518 (0.05)	0.0156 (0.40)	-0.0945 (-0.83)	-0.195 (-1.25)	-0.169 (-1.49)
Cash_Holdings	-0.0482* (-2.82)	-0.0205 (-0.27)	0.0244 (0.84)	0.0746 (1.02)	-0.0717 (-1.37)	-0.0793 (-0.78)	-0.109* (-2.33)	0.0922 (0.85)	0.0594 (0.47)	0.309** (3.70)
Size	0.00216 (0.81)	-0.00208 (-0.01)	0.00261 (0.61)	0.00272 (0.33)	0.0000998 (0.01)	-0.00835 (-0.65)	-0.00590 (-1.37)	0.00431 (0.28)	0.0235 (1.52)	0.0232 (2.04)
Core_Deposits	-0.0211 (-1.71)	-0.0471 (-0.52)	0.0158 (0.77)	0.0245 (0.59)	0.00556 (0.21)	-0.0407 (-0.76)	0.00993 (0.32)	0.0774 (1.21)	0.00498 (0.06)	0.0737 (0.98)
Foreign_Ownership	0.000106* (3.21)	0.0000430 (0.11)	0.0000930 (1.49)	0.000196 (2.20)	-0.0000237 (-0.19)	0.000347* (2.43)	0.000186 (2.17)	0.0000914 (0.59)	0.000763* (2.46)	0.000811*** (5.35)
HQ_Deposits	0.00978 (1.36)	-0.00749 (-0.14)	0.0182 (1.51)	-0.0177 (-0.77)	0.0194 (0.74)	-0.0492 (-1.48)	-0.0113 (-0.67)	0.0635 (1.70)	-0.0192 (-0.35)	0.0834* (2.35)
Nr_States	-0.00414 (-1.98)	-0.00911 (-0.48)	-0.000658 (-0.17)	-0.000171 (-0.03)	0.00376 (0.61)	0.00494 (0.52)	0.00523 (1.04)	-0.00184 (-0.15)	-0.0193 (-1.12)	-0.0223 (-2.02)
Local_Mkt_Power	-0.0241** (-3.68)	-0.0476 (-1.78)	0.00112 (0.18)	0.0143 (0.74)	-0.0175 (-1.26)	-0.0309 (-1.10)	-0.0279 (-1.74)	-0.0181 (-0.48)	0.0330 (0.78)	0.144** (4.59)
Metro_Mkts	0.0401* (2.76)	-0.0201 (-0.21)	-0.0801* (-2.70)	-0.0539 (-0.69)	0.0366 (0.71)	0.0985 (0.93)	0.0835 (1.99)	-0.112 (-1.19)	0.0182 (0.15)	-0.283** (-3.49)
House_Price_Index_Growth	-0.0262 (-0.64)	-0.178 (-1.04)	-0.0557 (-0.81)	0.0687 (0.72)	0.0501 (0.69)	-0.0282 (-0.19)	-0.113 (-1.24)	0.204 (0.74)	0.393 (1.47)	0.985** (3.82)
ROE	-0.0643** (-4.06)	-0.0320 (-0.25)	-0.0162 (-0.71)	0.0463 (0.97)	-0.0171 (-0.37)	0.00316 (0.05)	-0.0115 (-0.22)	0.0269 (0.33)	0.0979 (0.60)	0.143 (1.28)
_cons	-0.0182 (-0.35)	0.0881 (0.29)	-0.0113 (-0.16)	-0.0829 (-0.65)	-0.0247 (-0.20)	0.0759 (0.36)	0.103 (1.54)	0.0107 (0.04)	-0.470 (-1.56)	-0.301 (-1.52)
N	26	26	26	26	26	26	26	26	26	26
R-sq	0.926	0.268	0.854	0.587	0.691	0.732	0.791	0.675	0.709	0.927
adj. R-sq	0.769	-1.287	0.544	-0.291	0.033	0.164	0.347	-0.014	0.091	0.771

Note: t-statistics are in parentheses. ** and * denote significance level at 1% and 5%, respectively.

Table 3.11 (cont'd)

Variable / Event Dates	15-Oct-07	21-Dec-07	11-Jan-08	18-Jan-08	19-Feb-08	5-Mar-08	5-Jun-08	11-Jul-08	8-Sep-08	15-Sep-08
Merger_Index	-0.0105 (-0.28)	0.0445 (0.73)	-0.0236 (-0.58)	0.0242 (0.42)	0.0130 (0.24)	-0.00663 (-0.17)	0.0140 (0.60)	-0.126 (-1.23)	0.00357 (0.04)	0.0540 (0.49)
Capital_Ratio	0.0880 (0.48)	-0.0755 (-0.18)	0.278 (1.22)	-0.285 (-0.78)	-0.205 (-0.92)	-0.306 (-1.10)	-0.382* (-2.31)	-0.558 (-0.98)	0.380 (1.02)	-0.491 (-0.54)
Credit_Risk	0.0269 (0.50)	0.169 (1.71)	0.0889 (1.02)	-0.238* (-1.96)	-0.118 (-1.16)	-0.227** (-3.20)	-0.0738 (-1.95)	-0.0863 (-0.37)	0.228 (1.72)	-0.270 (-0.95)
Loan_Concentration	-0.0522 (-0.60)	-0.204 (-1.24)	0.0757 (0.48)	0.413 (1.54)	0.0864 (0.47)	0.372** (2.74)	0.162 (1.92)	0.0297 (0.71)	0.0851 (0.31)	0.606 (1.25)
Commercial_real_estate	-0.926 (-0.72)	-1.683 (-0.45)	-1.866 (-0.96)	3.108 (0.91)	0.177 (0.09)	2.891 (1.06)	-1.282 (-0.89)	1.511 (0.41)	-4.711 (-0.86)	-5.838 (-0.76)
Brokered_Deposits	-0.201 (-0.38)	1.342 (1.13)	0.616 (0.86)	-2.132 (-1.87)	-0.627 (-0.73)	-1.606 (-1.65)	-0.0763 (-0.16)	-2.743 (-1.66)	1.062 (0.51)	-3.221 (-0.78)
Trading_Assets	-0.0348 (-0.36)	0.177 (0.86)	-0.192 (-1.65)	-0.00707 (-0.04)	-0.104 (-0.70)	-0.129 (-1.15)	-0.00249 (-0.03)	0.0583 (0.25)	-0.415 (-1.49)	0.153 (0.39)
Cash_Holdings	-0.00984 (-0.13)	0.0269 (0.18)	0.00837 (0.10)	-0.128 (-0.96)	-0.171 (-1.26)	-0.123 (-1.29)	0.146** (3.06)	-0.269 (-0.93)	0.154 (0.66)	-0.00983 (-0.02)
Size	0.000631 (0.07)	-0.0205 (-0.69)	0.0212 (1.23)	-0.00419 (-0.17)	-0.00285 (-0.15)	0.000120 (0.01)	-0.00143 (-0.13)	-0.00398 (-0.13)	0.0503 (1.69)	-0.0496 (-1.44)
Core_Deposits	-0.0200 (-0.37)	-0.0356 (-0.31)	-0.0160 (-0.25)	0.102 (1.20)	-0.00941 (-0.12)	0.0826 (1.35)	0.103** (2.73)	0.0652 (0.46)	-0.0988 (-0.75)	0.269* (2.04)
Foreign_Ownership	-0.000111 (-0.79)	-0.000190 (-0.46)	-0.000510** (-2.95)	0.000175 (0.65)	0.0000306 (0.23)	-0.000106 (-0.46)	0.000305 (1.71)	0.00118** (3.89)	-0.000626* (-2.23)	-0.0000641 (-0.09)
HQ_Deposits	-0.0240 (-0.95)	0.0177 (0.24)	0.0743 (1.92)	0.000107 (0.00)	-0.0274 (-0.56)	0.0530 (1.06)	0.0235 (0.84)	0.0311 (0.35)	0.153 (1.95)	0.129 (0.77)
Nr_States	0.00506 (0.54)	0.0183 (0.60)	-0.0103 (-0.60)	-0.000778 (-0.04)	0.0109 (1.02)	-0.000631 (-0.05)	-0.00399 (-0.36)	0.0146 (0.57)	-0.0482* (-2.17)	0.0437 (1.32)
Local_Mkt_Power	-0.00316 (-0.16)	0.0432 (0.88)	0.0247 (0.77)	-0.0225 (-0.53)	-0.0422 (-1.03)	-0.95** (-2.99)	-0.0443* (-2.31)	-0.0817 (-0.85)	0.0302 (0.57)	-0.0417 (-0.36)
Metro_Mkts	0.0364 (0.43)	-0.0846 (-0.58)	-0.103 (-1.13)	-0.0201 (-0.18)	0.156 (1.11)	0.0178 (0.21)	-0.0828 (-1.60)	0.00509 (0.02)	-0.0760 (-0.31)	-0.286 (-0.80)
House_Price_Index_Growth	-0.0393 (-0.22)	-0.0536 (-0.19)	0.130 (0.62)	0.121 (0.33)	-0.170 (-0.71)	-0.216 (-1.07)	-0.00377 (-0.03)	-0.873 (-1.61)	0.913 (1.93)	-0.140 (-0.23)
ROE	-0.0433 (-0.70)	-0.0387 (-0.32)	-0.133 (-1.49)	0.0647 (0.71)	-0.0551 (-0.73)	-0.111 (-1.34)	0.0249 (0.44)	0.116 (0.57)	-0.257 (-1.89)	-0.0486 (-0.13)
_cons	-0.0670 (-0.44)	0.300 (0.62)	-0.360 (-1.26)	0.222 (0.49)	0.0288 (0.09)	0.186 (0.64)	0.144 (0.75)	0.198 (0.38)	-0.891 (-1.68)	1.077 (1.46)
N	26	26	26	26	26	26	26	26	26	26
R-sq	0.594	0.647	0.749	0.611	0.627	0.791	0.805	0.769	0.714	0.806
adj. R-sq	-0.268	-0.104	0.215	-0.217	-0.167	0.346	0.391	0.278	0.107	0.395

Note: t-statistics are in parentheses. ** and * denote significance level at 1% and 5%, respectively.

Table 3.12: Cross-Sectional Regression Results after Lehman Brothers Failure'

Table displays cross-sectional analysis of dependent variable (mean-adjusted and market-adjusted abnormal returns) on main independent variable (merger index) and control variables.

Variable / Event Dates	25-Sep-08	29-Sep-08	24-Oct-08	17-Nov-08	18-Nov-08	20-Nov-08	26-Nov-08	15-Dec-08	8-Jan-09	13-Jan-09
Merger_Index	-0.0382 (-0.68)	-0.214 (-0.50)	0.286 (1.57)	0.00249 (0.02)	0.0333 (0.54)	0.0313 (0.32)	-0.00533 (-0.11)	-0.0652 (-0.76)	0.0267 (0.64)	0.0123 (0.10)
Capital_Ratio	0.198 (0.56)	-4.338 (-1.30)	-2.209 (-1.66)	0.163 (0.36)	0.346 (0.82)	-0.717 (-0.90)	-0.418 (-0.99)	0.0635 (0.19)	-0.0297 (-0.09)	0.280 (0.39)
Credit_Risk	0.160 (1.84)	-2.333* (-2.44)	-0.915* (-2.23)	0.101 (0.88)	0.238* (2.03)	0.0380 (0.14)	-0.105 (-0.84)	-0.236 (-1.93)	-0.0276 (-0.20)	0.140 (0.56)
Loan_Concentration	-0.110 (-0.69)	0.372* (2.56)	0.168* (2.49)	0.0265 (0.15)	-0.475* (-2.30)	-0.334 (-0.79)	0.410* (2.07)	0.311 (1.66)	-0.0166 (-0.07)	0.251 (0.53)
Commercial_real_estate	2.882 (0.79)	28.59 (1.42)	7.335 (0.79)	-0.930 (-0.18)	-2.204 (-0.48)	-2.303 (-0.39)	0.722 (0.26)	8.164** (2.95)	0.343 (0.13)	-0.799 (-0.10)
Brokered_Deposits	-0.534 (-0.51)	-23.12* (-2.42)	1.346 (0.30)	1.137 (0.68)	-0.0883 (-0.05)	-0.0578 (-0.02)	2.118 (1.40)	-1.847 (-1.37)	0.776 (0.46)	3.461 (0.68)
Trading_Assets	0.417* (2.48)	0.770 (0.60)	-0.0601 (-0.08)	-0.00563 (-0.02)	-0.146 (-0.58)	-0.00910 (-0.03)	-0.347* (-2.44)	-0.331 (-1.62)	-0.218* (-2.12)	0.203 (0.63)
Cash_Holdings	0.111 (0.90)	-1.596 (-1.56)	0.594 (0.97)	0.0899 (0.42)	-0.0497 (-0.24)	0.441 (1.47)	-0.0332 (-0.22)	-0.352* (-1.99)	-0.0240 (-0.18)	0.376 (0.90)
Size	0.00700 (0.28)	-0.105 (-0.60)	-0.0456 (-0.53)	0.00566 (0.20)	-0.0103 (-0.48)	-0.0115 (-0.39)	0.0260 (1.74)	0.000444 (0.02)	-0.000639 (-0.05)	0.0124 (0.36)
Core_Deposits	-0.181* (-2.05)	1.093 (1.72)	0.786* (2.42)	-0.0269 (-0.16)	-0.336* (-2.74)	0.205 (1.29)	-0.0562 (-0.70)	-0.0215 (-0.16)	0.0375 (0.59)	0.189 (1.24)
Foreign_Ownership	0.000178 (0.38)	0.00519* (2.10)	0.00170 (1.53)	0.000447 (0.95)	-0.000473 (-1.08)	0.000457 (0.91)	0.000352 (1.20)	-0.00112** (-4.17)	0.000263 (1.38)	-0.000353 (-0.67)
HQ_Deposits	-0.0245 (-0.33)	-0.0504 (-0.10)	0.0197 (0.10)	-0.0608 (-0.71)	0.0436 (0.51)	-0.0816 (-0.71)	0.0770 (1.31)	0.127 (1.91)	0.0284 (0.54)	0.149 (1.29)
Nr_States	-0.0505 (-1.79)	0.152 (0.82)	0.0363 (0.40)	-0.00840 (-0.33)	0.0104 (0.43)	-0.0433 (-1.29)	-0.00515 (-0.29)	-0.00705 (-0.36)	0.0101 (0.88)	-0.0116 (-0.34)
Local_Mkt_Power	-0.0393 (-0.91)	-0.530 (-1.44)	-0.0418 (-0.22)	0.0780 (1.74)	0.0553 (0.93)	-0.0364 (-0.37)	0.00395 (0.08)	-0.0898 (-1.85)	0.0226 (0.51)	0.0683 (0.88)
Metro_Mkts	-0.212* (-2.06)	0.0794 (0.07)	-0.522 (-0.89)	-0.111 (-0.47)	0.153 (0.79)	-0.332 (-1.49)	-0.164 (-1.50)	0.202 (1.05)	0.159* (2.00)	-0.445* (-2.17)
House_Price_Index_Growth	0.711** (2.81)	-4.448** (-2.34)	1.368 (1.31)	0.00497 (0.01)	0.238 (0.80)	1.061 (1.91)	-0.304 (-1.09)	-0.333 (-0.91)	0.0167 (0.06)	0.615 (0.70)
ROE	0.121 (0.90)	0.624 (0.54)	0.435 (0.84)	0.0444 (0.27)	-0.308 (-1.53)	0.409 (1.44)	-0.214 (-1.53)	-0.172 (-1.08)	-0.126 (-1.24)	0.0244 (0.11)
_cons	0.123 (0.30)	3.259 (1.07)	1.356 (0.95)	-0.150 (-0.34)	0.00575 (0.02)	0.369 (0.62)	-0.124 (-0.42)	0.0800 (0.22)	-0.148 (-0.52)	-0.162 (-0.26)
N	26	26	26	26	26	26	26	26	24	24
R-sq	0.817	0.748	0.667	0.584	0.791	0.848	0.901	0.767	0.828	0.669
adj. R-sq	0.429	0.213	-0.041	-0.299	0.346	0.524	0.690	0.273	0.342	-0.269

Note: t-statistics are in parentheses. ** and * denote significance level at 1% and 5%, respectively

Table 3.12 (cont'd)

Variable / Event Dates	26-Feb-09	11-Mar-09	31-Mar-09	7-May-09	8-May-09	12-May-09	21-May-09	1-Jun-09	9-Jun-09	25-Jun-09
Merger_Index	0.0138 (0.07)	-0.133 (-0.62)	-0.0762 (-0.46)	-0.119 (-0.51)	-0.471 (-0.80)	-0.104 (-0.77)	-0.0188 (-0.12)	-0.122 (-1.31)	-0.0184 (-0.43)	-0.00981 (-0.15)
Capital_Ratio	0.639 (0.37)	-0.617 (-0.63)	0.966 (0.92)	-0.819 (-0.78)	4.303 (1.80)	-0.0946 (-0.12)	-1.580** (-2.72)	-0.00740 (-0.01)	-0.400 (-1.36)	0.0547 (0.20)
Credit_Risk	0.941 (1.85)	-0.463 (-1.47)	0.486 (1.43)	0.0384 (0.12)	2.126* (1.96)	-0.00478 (-0.02)	-0.663** (-3.83)	-0.00640 (-0.03)	-0.158 (-1.79)	0.109 (0.93)
Loan_Concentration	-0.160* (-2.08)	0.0132* (2.03)	-0.988 (-1.60)	-0.110 (-1.69)	-0.355 (-1.59)	-0.102 (-0.23)	0.112** (2.73)	-0.0260 (-0.09)	0.288* (2.12)	-0.0126 (-0.06)
Commercial_real_estate	-26.29* (-2.00)	10.44 (0.92)	-3.242 (-0.36)	-1.817 (-0.12)	-33.11 (-1.04)	4.912 (0.62)	10.35 (1.24)	-1.530 (-0.26)	5.640* (2.37)	-3.624 (-0.82)
Brokered_Deposits	8.477 (1.28)	-5.226 (-0.90)	2.913 (0.56)	0.530 (0.07)	17.41 (0.96)	0.345 (0.09)	-8.070 (-1.91)	-1.709 (-0.62)	-1.219 (-1.00)	-0.418 (-0.24)
Trading_Assets	0.704 (1.14)	0.171 (0.39)	0.188 (0.55)	0.683 (0.96)	1.310 (1.44)	0.398 (0.87)	-0.252 (-0.76)	0.0421 (0.15)	0.00371 (0.04)	-0.0557 (-0.42)
Cash_Holdings	0.448 (0.65)	-0.356 (-0.72)	-0.0573 (-0.12)	-0.265 (-0.42)	0.968 (0.63)	0.138 (0.34)	-0.465 (-1.12)	-0.329 (-1.06)	-0.0157 (-0.14)	0.101 (0.68)
Size	-0.0392 (-0.53)	0.000234 (0.00)	0.0107 (0.21)	-0.0567 (-0.71)	0.0225 (0.16)	-0.0243 (-0.47)	-0.00245 (-0.05)	-0.00469 (-0.13)	-0.00657 (-0.67)	0.0171 (0.97)
Core_Deposits	-0.0349 (-0.11)	0.210 (0.86)	-0.378 (-1.83)	-0.0453 (-0.15)	-0.576 (-0.83)	0.109 (0.61)	0.370* (2.07)	0.0374 (0.28)	0.133* (2.24)	-0.0439 (-0.49)
Foreign_Ownership	0.000501 (0.43)	0.000593 (0.53)	-0.000231 (-0.28)	0.00108 (1.09)	-0.00173 (-0.68)	0.000998 (1.50)	0.000932 (1.28)	0.000365 (0.80)	-0.0000296 (-0.13)	0.000879* (2.16)
HQ_Deposits	-0.236 (-1.23)	0.152 (0.62)	-0.160 (-0.80)	-0.213 (-0.95)	-0.419 (-0.60)	-0.0959 (-0.74)	0.228 (1.31)	0.0626 (0.73)	0.0656 (1.57)	0.0188 (0.27)
Nr_States	0.0426 (0.54)	0.0148 (0.25)	-0.0286 (-0.56)	0.0338 (0.56)	-0.0684 (-0.48)	0.0329 (0.86)	0.0546 (1.32)	0.0210 (0.69)	0.0126 (0.92)	-0.0245 (-1.32)
Local_Mkt_Power	0.0387 (0.18)	-0.162 (-1.14)	0.0321 (0.20)	-0.191 (-1.43)	0.107 (0.22)	-0.0075 (-0.07)	-0.121 (-0.99)	-0.0816 (-0.89)	-0.0368 (-0.97)	0.0291 (0.65)
Metro_Mkts	-0.0158 (-0.03)	-0.250 (-0.66)	0.104 (0.39)	0.231 (0.47)	-0.652 (-0.87)	0.0350 (0.08)	0.300 (1.00)	0.0888 (0.30)	-0.100 (-1.07)	-0.117 (-0.94)
House_Price_Index_Growth	0.636 (0.36)	-0.740 (-0.67)	-0.130 (-0.12)	-1.644 (-1.06)	0.601 (0.19)	-0.394 (-0.42)	-1.156 (-1.30)	-0.443 (-0.64)	-0.0397 (-0.13)	0.430 (1.27)
ROE	0.0686 (0.14)	0.288 (0.61)	0.137 (0.32)	0.118 (0.31)	0.450 (0.32)	0.229 (0.77)	0.00406 (0.01)	-0.0639 (-0.32)	0.0261 (0.25)	0.0115 (0.07)
_cons	-0.0632 (-0.04)	0.536 (0.56)	-0.343 (-0.36)	1.047 (0.72)	-1.097 (-0.49)	0.282 (0.27)	0.131 (0.16)	0.0640 (0.09)	0.272 (1.38)	-0.234 (-0.80)
N	24	24	24	24	24	24	24	24	24	24
R-sq	0.722	0.654	0.539	0.661	0.697	0.615	0.827	0.649	0.796	0.772
adj. R-sq	-0.064	-0.326	-0.767	-0.301	-0.163	-0.475	0.337	-0.347	0.217	0.125

Note: t-statistics are in parentheses. ** and * denote significance level at 1% and 5%, respectively.

Table 3.12 (cont'd)

Variable / Event Dates	23-Jul-09	27-Jul-09	6-Aug-09	2-Nov-09	5-Nov-09	1-Dec-09	2-Dec-09	14-Dec-09	19-Jan-10	24-Feb-10
Merger_Index	-0.153 (-0.92)	-0.169 (-1.63)	-0.0529* (-1.96)	0.102 (1.29)	0.0395 (1.29)	-0.0107 (-0.29)	0.0496 (1.14)	-0.0330 (-0.75)	-0.0597 (-1.05)	0.00541 (0.08)
Capital_Ratio	1.230 (0.81)	1.239 (1.73)	-0.454** (-4.40)	-0.611 (-0.95)	0.0278 (0.18)	-0.716 (-2.20)	-0.123 (-0.33)	-0.226 (-0.87)	0.0228 (0.10)	0.0575 (0.17)
Credit_Risk	0.398 (0.74)	0.220 (1.00)	-0.220** (-5.54)	-0.137 (-0.51)	0.0596 (1.15)	-0.183 (-1.72)	0.105 (0.65)	0.0252 (0.46)	-0.0683 (-0.93)	0.0663 (0.52)
Loan_Concentration	-0.296 (-0.33)	0.232 (0.58)	0.622** (13.70)	0.0901 (0.18)	-0.265** (-2.65)	0.183 (0.98)	-0.163 (-0.58)	0.0373 (0.32)	0.216 (1.89)	0.00277 (0.01)
Commercial_real_estate	2.000 (0.22)	5.853 (0.87)	9.170** (6.98)	-1.563 (-0.29)	-1.588 (-1.02)	3.180 (1.36)	-2.928 (-1.16)	-1.003 (-0.44)	1.011 (0.37)	1.760 (0.48)
Brokered_Deposits	0.400 (0.06)	-1.520 (-0.50)	-0.0462 (-0.07)	-1.326 (-0.39)	0.906 (0.84)	-2.171 (-1.71)	2.308 (1.18)	-3.893** (-3.55)	1.210 (0.85)	0.264 (0.11)
Trading_Assets	0.0540 (0.13)	-0.0732 (-0.20)	-0.129 (-1.80)	-0.0935 (-0.39)	0.128 (1.87)	0.0430 (0.32)	0.0724 (0.53)	0.133 (1.38)	0.0227 (0.18)	-0.0370 (-0.21)
Cash_Holdings	-0.0937 (-0.16)	0.0568 (0.18)	-0.0692 (-1.00)	-0.0155 (-0.06)	0.0184 (0.19)	-0.261* (-2.37)	0.121 (0.75)	-0.0627 (-0.60)	0.0773 (0.55)	0.0273 (0.11)
Size	0.0253 (0.48)	0.0507 (1.18)	0.0202* (2.52)	-0.0161 (-0.53)	-0.0135 (-1.41)	-0.0207 (-1.73)	-0.0174 (-1.15)	-0.000193 (-0.01)	0.00507 (0.31)	0.0118 (0.50)
Core_Deposits	-0.294 (-1.11)	-0.131 (-0.99)	0.107* (2.71)	0.151 (1.34)	0.00269 (0.07)	0.0445 (0.93)	-0.00985 (-0.14)	-0.0416 (-0.83)	0.104 (1.39)	0.00280 (0.03)
Foreign_Ownership	-0.000922 (-1.21)	-0.000926 (-1.59)	0.000344** (3.11)	0.000125 (0.41)	-0.000145 (-1.42)	0.000574* (2.31)	-0.000143 (-1.09)	0.000597* (2.45)	0.000173 (0.75)	-0.000201 (-0.75)
HQ_Deposits	-0.0462 (-0.25)	0.0177 (0.17)	0.0800** (3.82)	0.0374 (0.41)	-0.0348 (-1.43)	0.0517 (1.25)	0.0190 (0.32)	0.00302 (0.06)	0.00899 (0.17)	0.0388 (0.60)
Nr_States	-0.0298 (-0.54)	-0.0648 (-1.85)	-0.0209** (-3.38)	0.0310 (1.32)	0.0107 (1.27)	0.0245 (1.71)	0.00958 (0.91)	-0.0119 (-0.78)	-0.00802 (-0.58)	-0.0120 (-0.72)
Local_Mkt_Power	-0.0291 (-0.16)	0.0493 (0.52)	-0.0336* (-2.18)	-0.0484 (-0.68)	-0.00336 (-0.19)	-0.10** (-2.98)	0.00217 (0.00)	-0.0142 (-0.41)	-0.0429 (-1.38)	0.00936 (0.14)
Metro_Mkts	0.0903 (0.24)	-0.441 (-1.30)	-0.225** (-3.41)	0.232 (1.55)	0.103 (1.67)	0.0223 (0.20)	-0.00231 (-0.02)	-0.121 (-1.88)	-0.138 (-1.03)	-0.0622 (-0.31)
House_Price_Index_Growth	0.0747 (0.06)	0.618 (0.77)	0.177 (1.33)	0.211 (0.33)	0.176 (0.85)	-0.604* (-2.02)	0.189 (0.74)	-0.0794 (-0.26)	-0.000754 (-0.00)	0.113 (0.26)
ROE	-0.352 (-0.97)	0.100 (0.41)	0.109* (2.26)	-0.133 (-0.84)	0.0222 (0.51)	-0.0929 (-0.86)	-0.0992 (-0.93)	0.0325 (0.31)	0.115 (1.20)	-0.0333 (-0.28)
_cons	-0.584 (-0.50)	-0.572 (-0.65)	0.00237 (0.02)	0.0913 (0.14)	0.0984 (0.65)	0.567* (2.01)	0.217 (0.71)	0.190 (0.70)	0.0590 (0.23)	-0.190 (-0.49)
N	24	24	24	24	24	24	24	24	24	24
R-sq	0.602	0.788	0.962	0.658	0.826	0.731	0.684	0.916	0.754	0.593
adj. R-sq	-0.525	0.186	0.856	-0.311	0.333	-0.033	-0.210	0.677	0.056	-0.559

Note: t-statistics are in parentheses. ** and * denote significance level at 1% and 5%, respectively.

Table 3.12 (cont'd)

Variable / Event Dates	26-Feb-10	5-May-10	10-May-10	16-Jun-10	1-Oct-10
Merger_Index	0.0499 (1.70)	0.0126 (0.20)	-0.143 (-1.36)	-0.0163 (-0.38)	-0.0134 (-0.42)
Capital_Ratio	-0.00748 (-0.03)	0.558 (1.71)	-0.508 (-0.68)	0.0695 (0.23)	-0.117 (-0.60)
Credit_Risk	0.0228 (0.30)	0.155 (1.16)	-0.179 (-0.71)	-0.00214 (-0.02)	-0.162* (-2.06)
Loan_Concentration	-0.0360 (-0.30)	0.00816 (0.03)	0.140 (0.35)	0.0343 (0.19)	0.257 (2.44)
Commercial_real_estate	-0.952 (-0.55)	-3.037 (-0.96)	6.413 (1.02)	2.973 (1.23)	4.363 (1.86)
Brokered_Deposits	-0.0402 (-0.03)	-0.0355 (-0.02)	-3.332 (-0.86)	0.169 (0.13)	-0.646 (-0.61)
Trading_Assets	0.0678 (0.96)	-0.144 (-0.97)	0.00191 (0.01)	-0.00949 (-0.09)	-0.0185 (-0.20)
Cash_Holdings	0.0198 (0.18)	0.230 (1.05)	-0.709 (-1.89)	0.179 (1.47)	-0.121 (-1.18)
Size	-0.00551 (-0.64)	0.0322 (1.45)	-0.0221 (-0.58)	0.0111 (0.76)	-0.000149 (-0.02)
Core_Deposits	-0.0468 (-1.12)	-0.0590 (-0.63)	-0.183 (-1.14)	0.117 (1.79)	0.0740 (1.36)
Foreign_Ownership	-0.000121 (-0.97)	-0.000148 (-0.66)	0.000108 (0.23)	0.000115 (0.54)	-0.000245 (-0.54)
HQ_Deposits	-0.00403 (-0.15)	0.0229 (0.37)	-0.0902 (-0.71)	0.00607 (0.14)	0.0472 (1.81)
Nr_States	0.00119 (0.11)	-0.0337 (-2.19)	0.0107 (0.33)	-0.00517 (-0.38)	0.0108 (0.75)
Local_Mkt_Power	0.0113 (0.46)	0.0913 (1.49)	-0.0212 (-1.79)	0.0377 (0.94)	-0.0211 (-0.83)
Metro_Mkts	0.00708 (0.12)	-0.133 (-0.76)	0.268 (1.02)	-0.0567 (-0.72)	0.000315 (0.00)
House_Price_Index_Growth	0.122 (0.51)	0.577 (1.54)	-0.972 (-1.35)	0.175 (0.55)	-0.299 (-0.99)
ROE	-0.0894 (-1.63)	0.0996 (0.95)	-0.0468 (-0.22)	0.0811 (0.88)	0.0155 (0.23)
_cons	0.0880 (0.54)	-0.633 (-1.73)	0.732 (1.09)	-0.247 (-0.84)	0.0928 (0.53)
N	24	24	24	24	23
R-sq	0.759	0.722	0.793	0.601	0.848
adj. R-sq	0.074	-0.066	0.205	-0.531	0.333

Note: t-statistics are in parentheses. ** and * denote significance level at 1% and 5%, respectively.

Table 3.13: Pooled OLS Regression Results including foreign banks

Table displays Pooled OLS analysis of dependent variable (mean-adjusted and market adjusted abnormal returns) on main independent variable (merger index) and control variables.

Variables	Panel A-Full Sample			
	(1) Mean-adjusted AR	(2) Market-adjusted AR	(3) Mean-adjusted AR	(4) Market-adjusted AR
Merger_Index	-0.0350 (0.183)	-0.0320 (0.153)	-0.0281* (0.981)	-0.0284* (0.100)
Capital_Ratio	-0.0886 (0.592)	-0.0743 (0.590)	-0.0579 (0.603)	-0.0583 (0.600)
Credit_Risk	-0.0839 (0.234)	-0.0677 (0.259)	-0.0442 (0.370)	-0.0471 (0.339)
Loan_Concentration	0.153 (0.206)	0.129 (0.218)	0.103 (0.232)	0.103 (0.232)
Commercial_real_estate	2.031 (0.255)	1.700 (0.247)	1.203 (0.304)	1.270 (0.278)
Brokered_Deposits	-1.485 (0.198)	-1.223 (0.224)	-0.934 (0.257)	-0.936 (0.256)
Trading_Assets	0.0284 (0.660)	0.0294 (0.571)	0.0199 (0.621)	0.0250 (0.533)
Cash_Holdings	-0.130 (0.197)	-0.104 (0.220)	-0.0739 (0.277)	-0.0749 (0.270)
Size	-0.00417 (0.624)	-0.00333 (0.638)	-0.00126 (0.826)	-0.00183 (0.751)
Core_Deposits	0.0283 (0.389)	0.0277 (0.301)	0.0220 (0.303)	0.0245 (0.250)
Foreign_Ownership	-0.0235 (0.487)	-0.0185 (0.509)	-0.0114 (0.625)	-0.0123 (0.599)
HQ_Deposits	0.0302 (0.245)	0.0244 (0.257)	0.0216 (0.225)	0.0200 (0.262)
Nr_States	0.00325 (0.734)	0.00197 (0.807)	-0.000683 (0.918)	-0.000632 (0.992)
Local_Mkt_Power	-0.0458* (0.096)	-0.0400* (0.085)	-0.0315* (0.093)	-0.0326* (0.083)
Metro_Mkts	-0.00438 (0.951)	-0.0100 (0.863)	-0.0221 (0.619)	-0.0192 (0.665)
House_Price_Index_Growth	-0.230 (0.322)	-0.181 (0.368)	-0.110 (0.500)	-0.118 (0.468)
ROE	-0.0351 (0.558)	-0.0213 (0.671)	-0.0120 (0.753)	-0.00922 (0.809)
_cons	0.174 (0.236)	0.148 (0.229)	0.103 (0.302)	0.107 (0.285)
Event Fixed Effect	No	No	Yes	Yes
N	1375	1375	1375	1375
R-sq	0.012	0.014	0.576	0.375
adj. R-sq	-0.001	0.001	0.553	0.341

Note: p-values in parentheses. ** and * denote significance level at 5% and 10%.

Table 3.13 (cont'd)

Variables	Panel B-Before Lehman Brothers' Collapse			
	(5) Mean-adjusted AR	(6) Market-adjusted AR	(7) Mean-adjusted AR	(8) Market-adjusted AR
Merger_Index	0.00235 (0.908)	0.00202 (0.897)	0.00235 (0.818)	0.00202 (0.843)
Capital_Ratio	-0.102 (0.443)	-0.102 (0.307)	-0.102 (0.165)	-0.102 (0.162)
Credit_Risk	-0.00285 (0.952)	-0.00564 (0.882)	-0.00285 (0.914)	-0.00564 (0.830)
Loan_Concentration	0.0909 (0.236)	0.0910 (0.132)	0.0909** (0.034)	0.0910** (0.034)
Commercial_real_estate	-0.232 (0.871)	-0.168 (0.878)	-0.232 (0.737)	-0.168 (0.808)
Brokered_Deposits	-0.333 (0.555)	-0.336 (0.471)	-0.333 (0.324)	-0.336 (0.319)
Trading_Assets	-0.0721 (0.230)	-0.0671 (0.139)	-0.0721** (0.015)	-0.0671** (0.024)
Cash_Holdings	-0.00285 (0.966)	-0.00365 (0.944)	-0.00285 (0.937)	-0.00365 (0.919)
Size	0.00706 (0.333)	0.00653 (0.266)	0.00706 (0.090)	0.00653 (0.116)
Core_Deposits	0.00357 (0.908)	0.00609 (0.804)	0.00357 (0.839)	0.00609 (0.728)
Foreign_Ownership	0.0135 (0.640)	0.0128 (0.578)	0.0135 (0.448)	0.0128 (0.472)
HQ_Deposits	0.0255 (0.213)	0.0238 (0.119)	0.0255** (0.016)	0.0238** (0.023)
Nr_States	-0.00721 (0.376)	-0.00664 (0.344)	-0.00721 (0.157)	-0.00664 (0.192)
Local_Mkt_Power	-0.00247 (0.904)	-0.00347 (0.830)	-0.00247 (0.831)	-0.00347 (0.764)
Metro_Mkts	-0.0252 (0.667)	-0.0226 (0.617)	-0.0252 (0.392)	-0.0226 (0.441)
House_Price_Index_Growth	0.110 (0.477)	0.102 (0.425)	0.110 (0.256)	0.102 (0.291)
ROE	-0.0200 (0.690)	-0.0170 (0.657)	-0.0200 (0.402)	-0.0170 (0.476)
_cons	-0.0880 (0.474)	-0.0790 (0.418)	-0.0864 (0.202)	-0.0835 (0.218)
Event Fixed Effect	No	No	Yes	Yes
N	494	494	494	494
R-sq	0.011	0.017	0.711	0.536
adj. R-sq	-0.024	-0.018	0.689	0.501

Note: p-values in parentheses. ** and * denote significance level at 5% and 10%.

Table 3.13 (cont'd)

Variables	Panel C-After Lehman Brothers' Collapse			
	(9) Mean-adjusted AR	(10) Market-adjusted AR	(11) Mean-adjusted AR	(12) Market-adjusted AR
,Merger_Index	-0.0717 (0.104)	-0.0641* (0.093)	-0.0544* (0.074)	-0.0547* (0.073)
Capital_Ratio	-0.172 (0.530)	-0.135 (0.563)	-0.0897 (0.635)	-0.0900 (0.634)
Credit_Risk	-0.200 (0.140)	-0.161 (0.170)	-0.109 (0.259)	-0.112 (0.247)
Loan_Concentration	0.302 (0.191)	0.246 (0.226)	0.179 (0.286)	0.179 (0.286)
Commercial_real_estate	4.769 (0.135)	3.969 (0.142)	2.870 (0.190)	2.938 (0.180)
Brokered_Deposits	-3.516 (0.160)	-2.876 (0.193)	-2.113 (0.249)	-2.113 (0.249)
Trading_Assets	0.0820 (0.390)	0.0808 (0.296)	0.0679 (0.265)	0.0732 (0.230)
Cash_Holdings	-0.301 (0.116)	-0.244 (0.140)	-0.173 (0.199)	-0.174 (0.196)
Size	-0.0115 (0.384)	-0.00968 (0.380)	-0.00624 (0.493)	-0.00684 (0.452)
Core_Deposits	0.0520 (0.294)	0.0481 (0.239)	0.0379 (0.246)	0.0405 (0.216)
Foreign_Ownership	-0.0540 (0.299)	-0.0441 (0.309)	-0.0304 (0.406)	-0.0313 (0.391)
HQ_Deposits	0.0556 (0.249)	0.0438 (0.289)	0.0335 (0.331)	0.0318 (0.356)
Nr_States	0.0117 (0.435)	0.00894 (0.478)	0.00425 (0.687)	0.00490 (0.642)
Local_Mkt_Power	-0.0935* (0.058)	-0.0799* (0.059)	-0.0614* (0.077)	-0.0624* (0.072)
Metro_Mkts	0.00839 (0.939)	-0.00206 (0.982)	-0.0212 (0.765)	-0.0181 (0.799)
House_Price_Index_Growth	-0.633 (0.141)	-0.516 (0.169)	-0.358 (0.245)	-0.366 (0.234)
ROE	-0.0720 (0.444)	-0.0474 (0.550)	-0.0240 (0.698)	-0.0213 (0.730)
_cons	0.416* (0.089)	0.353* (0.088)	0.187 (0.273)	0.243 (0.153)
Event Fixed Effect	No	No	Yes	Yes
N	881	881	881	881
R-sq	0.025	0.028	0.567	0.368
adj. R-sq	0.006	0.009	0.540	0.328

Note: p-values in parentheses. **and* denote significance level at 5% and 10%.

Table 3.14: Pooled OLS Regression Results with different performance measures.

Table displays Pooled OLS analysis of dependent variable (mean-adjusted absolute and market-adjusted absolute abnormal returns) on main independent variable (merger index) and control variables.

Variables	Panel A-Full Sample			
	(1) Mean-adjusted AR	(2) Market-adjusted AR	(3) Mean-adjusted AR	(4) Market-adjusted AR
Merger_Index	-0.00447 (0.831)	-0.00543 (0.766)	-0.00529 (0.731)	-0.00485 (0.744)
Capital_Ratio	0.243** (0.046)	0.260** (0.013)	0.234*** (0.009)	0.266*** (0.002)
Credit_Risk	0.194*** (0.001)	0.187*** (0.000)	0.189*** (0.000)	0.191*** (0.000)
Loan_Concentration	-0.264** (0.014)	-0.249*** (0.009)	-0.256*** (0.002)	-0.255*** (0.001)
Commercial_real_estate	-3.048** (0.032)	-2.823** (0.018)	-2.957*** (0.003)	-2.891*** (0.003)
Brokered_Deposits	1.915* (0.071)	1.834** (0.049)	1.842** (0.022)	1.897** (0.016)
Trading_Assets	0.0666 (0.177)	0.0609 (0.133)	0.0682* (0.048)	0.0607 (0.063)
Cash_Holdings	0.0907 (0.217)	0.0932 (0.138)	0.0847 (0.127)	0.0982* (0.068)
Size	0.00333 (0.547)	0.00444 (0.345)	0.00302 (0.464)	0.00456 (0.251)
Core_Deposits	-0.0788** (0.003)	-0.0709** (0.001)	-0.0776*** (0.000)	-0.0712*** (0.000)
HQ_Deposits	-0.0216 (0.331)	-0.0235 (0.216)	-0.0207 (0.220)	-0.0245 (0.132)
Nr_States	-0.00646 (0.269)	-0.00803 (0.105)	-0.00598 (0.178)	-0.00819** (0.048)
Local_Mkt_Power	0.0223 (0.257)	0.0269 (0.106)	0.0206 (0.159)	0.0281** (0.047)
Metro_Mkts	-0.0460 (0.272)	-0.0478 (0.167)	-0.0454 (0.134)	-0.0484* (0.093)
House_Price_Index_Growth	0.206 (0.206)	0.233 (0.102)	0.192 (0.117)	0.242** (0.041)
ROE	-0.00231 (0.949)	0.0162 (0.594)	-0.00399 (0.879)	0.0181 (0.472)
_cons	-0.112 (0.290)	-0.141 (0.122)	-0.135* (0.085)	-0.172** (0.024)
Event Fixed Effect	No	No	Yes	Yes
N	1375	1375	1375	1375
R-sq	0.029	0.035	0.484	0.349
adj. R-sq	0.017	0.024	0.457	0.314

Note: p-values in parentheses. ***, **and* denote significance level at 1%, 5%, and 10%, respectively

Table 3.14 (cont'd)

Variables	Panel B-Before Lehman Brothers' Collapse			
	(5) Mean-adjusted AR	(6) Market-adjusted AR	(7) Mean-adjusted AR	(8) Market-adjusted AR
Merger_Index	0.0133 (0.337)	0.00957 (0.400)	0.0133 (0.105)	0.00957 (0.225)
Capital_Ratio	0.00950 (0.902)	0.0672 (0.299)	0.00950 (0.839)	0.0672 (0.150)
Credit_Risk	0.0672** (0.013)	0.0745** (0.002)	0.0672*** (0.000)	0.0745*** (0.000)
Loan_Concentration	-0.0480 (0.346)	-0.0590 (0.180)	-0.0480 (0.140)	-0.0590 (0.068)
Commercial_real_estate	-1.418 (0.119)	-1.195 (0.102)	-1.418** (0.012)	-1.195** (0.022)
Brokered_Deposits	0.528 (0.197)	0.571 (0.107)	0.528* (0.074)	0.571** (0.038)
Trading_Assets	-0.0141 (0.725)	-0.0319 (0.337)	-0.0141 (0.559)	-0.0319 (0.174)
Cash_Holdings	0.0619* (0.092)	0.0513* (0.082)	0.0619** (0.020)	0.0513** (0.039)
Size	0.00303 (0.454)	0.00454 (0.177)	0.00303 (0.284)	0.00454 (0.094)
Core_Deposits	-0.0124 (0.556)	-0.0219 (0.226)	-0.0124 (0.361)	-0.0219 (0.097)
HQ_Deposits	0.0209 (0.141)	0.0160 (0.172)	0.0209** (0.021)	0.0160* (0.063)
Nr_States	-0.00404 (0.353)	-0.00480 (0.222)	-0.00404 (0.187)	-0.00480 (0.117)
Local_Mkt_Power	0.0194* (0.086)	0.0254*** (0.008)	0.0194** (0.019)	0.0254*** (0.001)
Metro_Mkts	-0.0449 (0.158)	-0.0325 (0.198)	-0.0449* (0.031)	-0.0325 (0.103)
House_Price_Index_Growth	0.148 (0.068)	0.167** (0.016)	0.148*** (0.010)	0.167*** (0.003)
ROE	-0.0200 (0.505)	-0.0104 (0.677)	-0.0200 (0.252)	-0.0104 (0.539)
_cons	-0.0516 (0.479)	-0.102 (0.096)	-0.0715 (0.152)	-0.116** (0.017)
Event Fixed Effect	No	No	Yes	Yes
N	494	494	494	494
R-sq	0.044	0.067	0.593	0.487
adj. R-sq	0.012	0.036	0.563	0.448

Note: p-values in parentheses. ***, **and* denote significance level at 1%, 5%, and 10%, respectively.

Table 3.14. (cont'd)

Variables	Panel C-After Lehman Brothers' Collapse			
	(9) Mean-adjusted AR	(10) Market-adjusted AR	(11) Mean-adjusted AR	(12) Market-adjusted AR
Merger_Index	0.00269 (0.941)	0.000760 (0.981)	-0.00474 (0.863)	-0.00241 (0.928)
Capital_Ratio	0.495** (0.025)	0.473** (0.014)	0.424*** (0.010)	0.443*** (0.006)
Credit_Risk	0.333*** (0.004)	0.309*** (0.003)	0.295*** (0.001)	0.292*** (0.001)
Loan_Concentration	-0.500*** (0.017)	-0.455*** (0.015)	-0.439*** (0.007)	-0.429*** (0.006)
Commercial_real_estate	-5.377** (0.039)	-4.944** (0.028)	-4.624** (0.017)	-4.624** (0.014)
Brokered_Deposits	4.141* (0.074)	3.776* (0.066)	3.455* (0.054)	3.489** (0.047)
Trading_Assets	0.109 (0.131)	0.109* (0.064)	0.115** (0.028)	0.112** (0.023)
Cash_Holdings	0.206 (0.170)	0.201 (0.124)	0.155 (0.178)	0.180 (0.108)
Size	0.00418 (0.621)	0.00507 (0.479)	0.00273 (0.671)	0.00441 (0.477)
Core_Deposits	-0.125*** (0.002)	-0.106*** (0.002)	-0.118*** (0.000)	-0.103*** (0.000)
HQ_Deposits	-0.0674 (0.115)	-0.0642 (0.085)	-0.0572 (0.084)	-0.0600* (0.062)
Nr_States	-0.00987 (0.269)	-0.0117 (0.119)	-0.00749 (0.276)	-0.0106 (0.097)
Local_Mkt_Power	0.0475 (0.202)	0.0482 (0.134)	0.0346 (0.220)	0.0427 (0.120)
Metro_Mkts	-0.0380 (0.559)	-0.0492 (0.365)	-0.0368 (0.449)	-0.0487 (0.294)
House_Price_Index_Growth	0.444 (0.171)	0.447 (0.119)	0.337 (0.175)	0.400 (0.097)
ROE	0.0308 (0.579)	0.0511 (0.278)	0.0164 (0.693)	0.0452 (0.258)
_cons	-0.246 (0.171)	-0.250 (0.108)	-0.152 (0.258)	-0.218 (0.097)
Event Fixed Effect	No	No	Yes	Yes
N	881	881	881	881
R-sq	0.053	0.060	0.476	0.337
adj. R-sq	0.035	0.042	0.443	0.297

Note: p-values in parentheses. ***, **and* denote significance level at 1%, 5%, and 10%, respectively.

Table 3.15: Cross-Sectional Regression Results on Bank Profitability (US BHCs)

Table displays cross-sectional analysis of dependent variable (ROE) on main independent variable (merger index) and control variables.

Variables	(1) ΔROE_{2007}	(2) ΔROE_{2008}	(3) ΔROE_{2009}	(4) ΔROE_{2010}
Merger_Index	-8.291 (0.617)	75.48 (0.101)	47.57 (0.614)	40.61 (0.366)
Capital_Ratio	-75.74 (0.621)	-747.2* (0.084)	98.04 (0.904)	-163.5 (0.667)
Credit_Risk	59.35 (0.129)	-47.55 (0.603)	69.20 (0.780)	-6.324 (0.956)
Loan_Concentration	-42.70 (0.459)	19.10 (0.893)	-73.30 (0.844)	-59.80 (0.729)
Commercial_real_estate	-545.5 (0.639)	-4174.9 (0.182)	-2388.9 (0.735)	-1475.6 (0.652)
Brokered_Deposits	-5.978 (0.986)	-674.8 (0.453)	918.5 (0.786)	632.5 (0.686)
Trading_Assets	-8.682 (0.861)	-112.4 (0.384)	-186.6 (0.523)	29.44 (0.824)
Cash_Holdings	88.22 (0.116)	117.1 (0.378)	321.4 (0.347)	161.4 (0.310)
Size	8.726 (0.189)	1.154 (0.941)	23.93 (0.537)	-3.767 (0.830)
Core_Deposits	-12.85 (0.699)	39.91 (0.636)	61.42 (0.743)	99.61 (0.278)
HQ_Deposits	-19.20 (0.308)	-14.24 (0.757)	-7.104 (0.943)	17.79 (0.703)
Nr_States	-12.84 (0.115)	-8.491 (0.652)	-6.134 (0.898)	10.59 (0.636)
Local_Mkt_Power	2.810 (0.862)	4.290 (0.916)	107.0 (0.302)	31.80 (0.493)
Metro_Mkts	-54.87 (0.249)	9.102 (0.937)	-62.56 (0.799)	-75.74 (0.512)
House_Price_Index_Growth	158.5 (0.232)	398.8 (0.234)	381.4 (0.653)	-19.14 (0.961)
_cons	-124.5 (0.250)	16.44 (0.950)	-573.3 (0.387)	28.24 (0.923)
N	23	23	21	21
R-sq	0.745	0.669	0.496	0.671
adj. R-sq	0.199	-0.039	-1.018	-0.315

Note: p-values in parentheses. ***, ** and * denote significance level at 1%, 5%, and 10%, respectively.

Table 3.16: Cross-Sectional Regression Results on Bank Profitability including Foreign Banks

Table displays cross-sectional analysis of dependent variable (ROE) on main independent variable (merger index) and control variables.

Variables	(1) ΔROE_{2007}	(2) ΔROE_{2008}	(3) ΔROE_{2009}	(4) ΔROE_{2010}
Merger_Index	-12.67 (0.426)	69.35* (0.088)	58.16 (0.448)	52.48 (0.184)
Capital_Ratio	66.99 (0.527)	-504.5* (0.068)	-125.0 (0.798)	-351.9 (0.172)
Credit_Risk	51.94 (0.124)	-51.87 (0.496)	106.4 (0.545)	42.02 (0.625)
Loan_Concentration	-20.90 (0.689)	50.50 (0.686)	-124.0 (0.674)	-116.0 (0.430)
Commercial_real_estate	-103.8 (0.922)	-3551.5 (0.183)	-3574.7 (0.505)	-2801.4 (0.300)
Brokered_Deposits	119.1 (0.718)	-478.4 (0.546)	714.2 (0.799)	494.4 (0.721)
Trading_Assets	-2.832 (0.949)	-113.2 (0.304)	-228.4 (0.283)	-24.76 (0.805)
Cash_Holdings	119.3** (0.016)	179.1* (0.097)	301.6 (0.214)	163.1 (0.177)
Size	9.121* (0.098)	3.742 (0.759)	28.93 (0.253)	3.670 (0.758)
Core_Deposits	13.90 (0.555)	79.62 (0.176)	4.695 (0.964)	41.67 (0.433)
Foreign_Ownership	15.87 (0.431)	76.95 (0.129)	110.3 (0.242)	73.35 (0.128)
HQ_Deposits	-7.747 (0.611)	7.566 (0.834)	-18.76 (0.806)	10.71 (0.775)
Nr_States	-9.472* (0.077)	-5.425 (0.644)	-18.69 (0.437)	-4.408 (0.705)
Local_Mkt_Power	11.40 (0.358)	23.50 (0.424)	106.0 (0.115)	38.50 (0.226)
Metro_Mkts	-81.93* (0.051)	-44.55 (0.621)	-44.40 (0.801)	-72.69 (0.413)
House_Price_Index_Growth	92.80 (0.315)	325.6 (0.152)	582.0 (0.260)	217.4 (0.383)
_cons	-142.2 (0.122)	-43.58 (0.832)	-634.0 (0.152)	-76.24 (0.706)
N	26	26	24	24
R-sq	0.725	0.653	0.526	0.663
adj. R-sq	0.236	0.035	-0.558	-0.107

Note: p-values in parentheses. ***, ** and * denote significance level at 1%, 5%, and 10%, respectively.

Table 3.17: Cross-Sectional Regression Results on Bank Profitability (US BHCs)

Table displays cross-sectional analysis of dependent variable (ROA) on main independent variable (merger index) and control variables.

Variables	(1) ΔROA_{2007}	(2) ΔROA_{2008}	(3) ΔROA_{2009}	(4) ΔROA_{2010}
Merger_Index	-1.118 (0.556)	7.332* (0.053)	1.864 (0.819)	2.801 (0.352)
Capital_Ratio	-0.620 (0.971)	-97.15** (0.013)	37.08 (0.608)	-0.106 (0.997)
Credit_Risk	8.899* (0.059)	-3.310 (0.646)	13.31 (0.545)	4.005 (0.604)
Loan_Concentration	-7.220 (0.283)	-0.586 (0.959)	-14.20 (0.665)	-12.20 (0.314)
Commercial_real_estate	-73.77 (0.580)	-411.9 (0.106)	-173.7 (0.778)	-108.1 (0.622)
Brokered_Deposits	16.03 (0.688)	-41.20 (0.558)	164.2 (0.583)	129.4 (0.247)
Trading_Assets	-4.898 (0.399)	-8.709 (0.392)	-17.02 (0.505)	3.855 (0.665)
Cash_Holdings	9.078 (0.150)	12.09 (0.258)	34.00 (0.264)	18.33 (0.113)
Size	1.453* (0.071)	0.197 (0.874)	2.751 (0.423)	-0.292 (0.804)
Core_Deposits	-4.923 (0.218)	6.271 (0.357)	2.790 (0.864)	7.755 (0.216)
HQ_Deposits	-2.384 (0.271)	-0.851 (0.814)	-2.144 (0.807)	0.307 (0.921)
Nr_States	-1.899* (0.052)	-0.845 (0.572)	-0.911 (0.828)	1.201 (0.431)
Local_Mkt_Power	2.610 (0.184)	0.123 (0.970)	11.50 (0.219)	4.620 (0.170)
Metro_Mkts	-6.873 (0.210)	0.678 (0.940)	-2.833 (0.894)	-5.225 (0.499)
House_Price_Index_Growth	21.65 (0.161)	40.64 (0.136)	39.65 (0.594)	-2.186 (0.933)
_cons	-22.06* (0.093)	0.209 (0.992)	-70.91 (0.238)	-4.798 (0.808)
N	23	23	21	21
R-sq	0.710	0.812	0.564	0.814
adj. R-sq	0.088	0.409	-0.743	0.257

Note: p-values in parentheses. ***, ** and * denote significance level at 1%, 5%, and 10%, respectively.

Table 3.18: Cross-Sectional Regression Results on Bank Profitability including Foreign Banks

Table displays cross-sectional analysis of dependent variable (ROA) on main independent variable (merger index) and control variables.

Variables	(1) ΔROA_{2007}	(2) ΔROA_{2008}	(3) ΔROA_{2009}	(4) ΔROA_{2010}
Merger_Index	-1.769 (0.339)	6.590* (0.061)	2.830 (0.667)	4.001 (0.171)
Capital_Ratio	12.32 (0.321)	-67.58*** (0.010)	23.96 (0.576)	-20.70 (0.263)
Credit_Risk	6.635* (0.093)	-3.806 (0.555)	17.49 (0.269)	8.727 (0.193)
Loan_Concentration	-4.170 (0.494)	3.210 (0.762)	-18.80 (0.470)	-17.90 (0.124)
Commercial_real_estate	-9.211 (0.940)	-336.5 (0.142)	-281.5 (0.545)	-242.3 (0.230)
Brokered_Deposits	30.48 (0.429)	-17.33 (0.795)	156.2 (0.527)	113.2 (0.285)
Trading_Assets	-2.308 (0.656)	-8.844 (0.342)	-21.70 (0.245)	-1.441 (0.845)
Cash_Holdings	10.14* (0.058)	19.68** (0.040)	35.01 (0.111)	17.90* (0.060)
Size	1.121* (0.081)	0.519 (0.618)	3.422 (0.134)	0.414 (0.638)
Core_Deposits	-1.390 (0.608)	11.09** (0.039)	-1.723 (0.851)	1.755 (0.648)
Foreign_Ownership	1.545 (0.504)	9.981** (0.031)	7.205 (0.369)	6.015* (0.096)
HQ_Deposits	-1.795 (0.318)	1.815 (0.558)	-2.505 (0.707)	-0.558 (0.840)
Nr_States	-1.083* (0.080)	-0.481 (0.630)	-2.164 (0.309)	-0.292 (0.733)
Local_Mkt_Power	2.50* (0.098)	2.48 (0.325)	12.30** (0.048)	5.080** (0.049)
Metro_Mkts	-7.859* (0.095)	-5.887 (0.447)	-3.207 (0.834)	-4.483 (0.490)
House_Price_Index_Growth	8.299 (0.431)	31.86 (0.105)	59.33 (0.194)	21.44 (0.253)
_cons	-17.92* (0.095)	-7.214 (0.680)	-80.73* (0.051)	-14.45 (0.345)
N	26	26	24	24
R-sq	0.648	0.766	0.608	0.770
adj. R-sq	0.023	0.350	-0.288	0.244

Note: p-values in parentheses. ***, **and* denote significance level at 1%, 5%, and 10%, respectively.

Table 3.19: Pooled-OLS Regression Results for Profitability

Table reports the Pooled-OLS regressions results of profitability performance measures (ROE and ROA) on merger index and control variables

	PANEL A		PANEL B	
	ROE		ROA	
Variables	(1)	(2)	(3)	(4)
Merger Index	0.959 (0.841)	-2.832 (0.572)	0.697 (0.251)	0.344 (0.605)
CapitalRatio	0.386 (0.274)	0.288 (0.404)	0.0805* (0.043)	0.0689 (0.100)
NPLRatio	-4.161** (0.000)	-4.821** (0.000)	-0.416** (0.000)	-0.485** (0.000)
LoansDeposits	0.0747 (0.272)	0.141 (0.073)	0.00871 (0.401)	0.0149 (0.197)
AssetStructure	-0.193 (0.395)	-0.138 (0.561)	-0.0110 (0.652)	-0.00731 (0.764)
Size	0.665 (0.489)	1.408 (0.152)	-0.0897 (0.456)	-0.0220 (0.866)
Constant	-13.64 (0.631)	-31.04 (0.289)	1.660 (0.638)	0.0353 (0.993)
Year Fixed Effects	No	Yes	No	Yes
Obs.	124	124	124	124
adj. R-sq	0.334	0.421	0.382	0.445

Notes: ROA= Return on assets; ROE = Return on equity; NPLRatio = Nonperforming loan ratio; LoansDeposits = Loan-to-deposit ratio; p-values are given in parenthesis. p values are in parenthesis.

** and * denote significance levels at %1 and 5%, respectively

CHAPTER 4

EUROPEAN MARKET REACTIONS TO MAJOR EVENTS IN THE SUBPRIME MORTGAGE CRISIS

4.1. Introduction

The global financial crisis (GFC) that occurred between 2007 and 2010 was the most severe since the Great Depression. It had far-reaching consequences for the economy. When the housing market crashed, banks had to write down \$4.1 trillion due to rising mortgage defaults (Hodson & Quaglia, 2009). Stock market valuations of the largest banks fell by twice as much over the same period. There was a severe reduction in the economy's access to cash and credit since key financial intermediaries either collapsed or had to be bailed out. The collapse of the housing market led to the financial crisis, causing many people to lose their homes (Brunnermeier, 2009; Duffie, 2019).

The subprime mortgage market was initially a relatively small segment of the US lending market, while it contributed to the overall spread of the crisis. Although the GFC originated in the US, it quickly spread to other countries. It affected emerging and advanced economies and equity markets worldwide (Bekaert, Ehrmann, Fratzscher & Mehl, 2014). The rapid spread of the crisis through various financial channels revealed the vulnerability of the global financial system. In the fall of 2008, the collapse of the US financial market and the subsequent failure of various financial institutions severely strained the global financial system.

The worldwide interconnectedness of economic systems is a weakness that was exposed during crisis times. As soon as the GFC hit the US in the fall of 2008, it spread like wildfire to other markets and institutions throughout the globe (Lindblom & Willeson, 2013; Olbrys, 2021).

The GFC has not spared Europe. Despite the measures taken by the European Union to address the financial crisis, the impact of the crisis on the European financial system was severe. The banks in the region wrote down about \$649 billion worth of loans and securities. In 2009, the European Union suffered its first recession since the 1990s. The region's GDP contracted by four percent (Hodson & Quaglia, 2009).

Similarly, the GFC brought back the topic of 'systemic risk,' which affects not just banks and other financial institutions but also their clients and the public and unfolded the systemic weaknesses which led to higher credit and refinancing transactions for European banks (Chen, Lee, & Lee, 2022; Lindblom & Willeson, 2013; Matousek, Rughoo, Sarantis, & George Assaf, 2015). Since the start of the global financial crisis in August 2007, regulators bailed out significant banks at the heart of financial systems in the name of contagion and systemic risk. In the United States, for instance, the government chose to rescue systemically significant financial companies like Bear Stearns, Fannie Mae, Freddie Mac, American Insurance Group, and Citigroup. But in the instance of Lehman, the result was quite different: the government permitted the collapse of the country's fourth-largest investment bank (Dumontaux & Pop, 2013). The fall of Lehman Brothers ushered in a period of widespread financial uncertainty and market panic. The collapse of Lehman Brothers is a prime illustration of systemic risk. Because of the "substantial systemic risk" embedded in Lehman, "the near collapse of the financial system" came close to happening (Acharya, Philippon, Richardson & Roubini, 2009). The crisis was limited to US subprime mortgage markets until Lehman's collapse. Yet, Lehman's failure ignited unanticipated and tumultuous global economic events, particularly in Europe (Allen & Gale, 2000; Baur, 2012a; Bekaert et al., 2014; Eichengreen et al., 2012; Kenourgios & Dimitriou, 2015). Hence, an analysis of the effects of the crisis on the European banking system's functioning before and during the GFC would provide valuable insight into the literature. We examine how investor perceptions about the financial health of fifty-four banks that owned seventy-seven percent of European banking assets at year-end 2006 from 17 European countries changed before the Lehman Brothers' bankruptcy as the welfare of a market depends on the stability of its financial system and, by extension, its financial institutions (Mitchell, 2022). We apply the event study method to see whether investors priced important events before Lehman's collapse.

The failure of Lehman Brothers in September 2008 marked the beginning of the most significant and distinctive stage of the financial crisis (Cukierman, 2019; Griffith-Jones et al., 2010; Zhu et al., 2015). It resulted in a series of sudden and significant economic credit cost increases. In addition, the collapse of Lehman Brothers caused the international financial markets to reassess their risk appetite leading to a series of withdrawals from the financial markets. Investors retreated from the markets, and liquidity dried up due to their re-evaluation of risks (Allen, Babus & Carletti, 2009; Duffie, 2019; Olbrys, 2021; Strahan & Tanyeri, 2015). Therefore, we date the GFC's beginning to Lehman Brothers' collapse. Guillen 2009 of the Lauder Institute at Wharton provides a comprehensive global timeline for the GFC (Aït-Sahalia, Andritzky, Jobst, Nowak & Tamirisa, 2012; Baur, 2012a; Guillen, 2009). The timeline's pre-crisis period covers the period from HSBC's announcing losses on February 7, 2007, to the bankruptcy of Lehman Brothers on September 15, 2008. Our sample covers firm-specific events such as bankruptcies, rating announcements, and bailouts which are important to investors and can provide insight into the potential impact of the global financial crisis. We exclude policy measures taken by authorities (Günsür & Bulut, 2022).

This study analyzes how European banks' returns react to firm-specific events in the pre-crisis period (including Lehman Brothers' collapse) in the GFC. Results indicate that using a mean-adjusted model, abnormal returns on the event days range from -4.32 percent to 5.03 percent. When Nationwide announced its mergers with Derbyshire and Cheshire Building Societies on 7 September 2008, sample banks average the highest abnormal returns of 5.03 percent. When Lehman Brothers went bankrupt on 15 September 2008, abnormal returns average the lowest at -4.32 percent. Lehman Brothers' collapse is a turning point since, before then, European investors react significantly to the pre-crisis events.

Our study makes several contributions to the literature. First, we provide evidence of whether European markets respond to certain pre-crisis events as possible early warning signs of an impending crisis. Second, we extend previous literature which mainly focuses on US markets (Allen et al., 2009; Berger & Bouwman, 2013; Chen et al., 2022; Gorton, 2018; Günsür & Bulut, 2022; Lang & Jagtiani, 2010; Markman & Venzin, 2014; Spokeviciute, Keasey & Vallascas, 2019) by analyzing the

European banking market. Third, by examining investors' reactions to specific events, this study helps to understand the enigmatic and confounding European dimension of the financial crisis. Fourth, our new methodology allows us to distinguish how an event impacts the market (measured using the Euro Stoxx 600 index and individual indices of each country in the sample) and how it affects an individual bank. The rest of the study proceeds as follows: Section 4.2 describes the sample and research method. Section 4.3 tabulates and discusses the results. Section 4.4 concludes.

4.2. Sampling Framework, Timeline of Events, and the Event Study Method

Investors' assessment of the contagion risk of financial turmoil across the commercial banking and shadow banking sectors plays a central role during the GFC. (Acharya et al., 2010; Akhigbe et al., 2012; Qian & Tanyeri, 2017; Strahan & Tanyeri, 2015)

The failure of Lehman Brothers unveiled the fragility and interconnectedness of the financial system, and it marked the beginning of the financial crisis. (Bordalo et al., 2018; Cukierman, 2019; Griffith-Jones et al., 2010; Zhu et al., 2015). Furthermore, Lehman Brothers' collapse is a warning of possible insolvency for other systemically important institutions in the USA and worldwide (Carey et al., 2012; Ivashina & Scharfstein, 2010; Longstaff, 2010). Therefore, we take the bankruptcy filing of Lehman Brothers as the start of the global crisis.

We identify key information events using the Lauder Institute's Global Economic and Financial Crisis Timeline at Wharton University (Aït-Sahalia et al., 2012; Baur, 2012b, 2012a; Guillen, 2009). There are 514 event days in the crisis timeline and 68 events in the pre-crisis period. Following New York FED's database⁵, we divide events into three categories: 1) Federal Reserve Board Policy Actions (including the introduction of new policy instruments, redesign of existing tools, and changes in monetary policy), 2) Market Events (including rating, bankruptcy, and firm-related announcements), and 3) Other Policy Actions (such as fiscal policy actions by Congress and Treasury). We concentrate on market events, and Table 4.1 depicts the

⁵ Available at https://www.newyorkfed.org/medialibrary/media/research/global_economy/Crisis_Timeline.pdf.

chronology of 32 market (firm-specific) events prior to the collapse of Lehman Brothers.

We analyze fifty-four banks listed on Euro Stoxx 600 index. Most banks in our sample are listed in the Financial Stability Board's (FSB) Global Systemically Important Financial Institutions (G-SIFIs)⁶ or Domestic Systemically Important Banks (D-SIBs)⁷. According to the list, the systemic risk seems to originate mainly in Europe and the United States (Acharya et al., 2010; Bostandzic & Weiß, 2018; Carmassi & Herring, 2016; Moshirian, 2012). The demise of these institutions is likely to have ramifications for the global financial system (Edey, 2009; Hildebrand, 2008). Table 4.2 reports the countries of banks, major stock indices, whether the banks are G-SIFIs or D-SIB, and state aid amount provided. Accordingly, Switzerland has the highest presence, with seven banks, and Finland, Netherlands, and Portugal have the lowest presence, with only one bank in the sample. Twenty-six banks are classified as D-SIBs, and eleven banks are G-SIFIs. Notice that all sample banks from France and Germany are G-SIFIs. In total, 37 of the 54 banks in our sample are G-SIFIs or D-SIBs. In addition, a sum of €143.3 billion. ING (Netherlands, €21.4 bn), AIB (Ireland, €20.7 bn), and Lloyds Bank (UK, €19 bn) got the highest amount of state aid from regulatory authorities, respectively. A word of caution here is that since there is no systematic individual list of state aid to financial institutions in the Euro area, we attempt to compile state aid data from European Commission decisions⁸ and studies on the European banking bailouts (Gerhardt & Vennet, 2017; Petrovic & Tutsch, 2009; Policy Studies, 2010).

We obtain the daily adjusted returns of banks and returns of the Euro Stoxx 600 index from Bloomberg. Table 4.3 lists sample banks, 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 banks combined market share averages 77 percent (as a percent of commercial banking industry assets). Their

⁶ Available at <https://www.eba.europa.eu/risk-analysis-and-data/global-systemically-important-institutions>.

⁷ Available at https://tools.eba.europa.eu/interactive-tools/2020/o-siis/os19_visualisation_page.html.

⁸ Available at https://webgate.ec.europa.eu/comp/redisstat/databrowser/explore/all/all_themes.

combined market capitalization is 24 percent of the total market capitalization of the Euro Stoxx 600 Index⁹.

To assess how important events leading up to the crisis influenced investors' perceptions of the value of banks, we use the event study method of Brown and Warner (1985). The estimation window covers 259 trading days from 3rd January to 29th December 2006. Following Günsür and Bulut (2022), we utilize the same estimation window to estimate all events, keeping away any disturbing effects of the crisis period that may indicate an impending crisis. Abnormal returns are the difference between realized returns and expected returns. The Euro Stoxx 600 index is also severely impacted by GFC. Therefore, to examine the impact on the market index and the banks, we break down the market-adjusted model into three components.

$$A_{i,t} = R_{i,t} - R_{m,t} = (R_{i,t} - \bar{R}_i) - (R_{m,t} - \bar{R}_m) + (\bar{R}_i - \bar{R}_m) \quad (4.1)$$

where $A_{i,t}$ is the abnormal return using the market-adjusted model, $R_{i,t}$ is the return of bank i on day t , $R_{m,t}$ is the return on the market index (Euro Stoxx 600) on day t , $\bar{R}_m$ is the mean return of the index in the estimation window and $\bar{R}_i$ is the mean return of BHC i in the estimation window. The first component displays how the event impacts the bank's returns when compared to its typical returns in a time when the event has no effect (the estimation window). This first component is referred to as the abnormal returns estimated using the mean adjusted return model by Brown and Warner (1985). The second component shows how the event affected the index benchmarked against the index mean returns in a period where the event has no effect. The third component indicates how much the bank's mean returns outperformed (or underperformed) the index at a time when the event had no effect. Thus, we disaggregate the impact of the event on the BHC and the effect on the index. We examine the significance of abnormal returns for the 54 banks on each of

⁹ The STOXX Europe 600 Index has become a well-known and extensively watched indicator. Its broad coverage provides diverse geographic and sector allocation to Europe's developed economies. Almost 90% of the market is replicated by the Euro STOXX 600 index. Hence, it is called as a near European equivalent to Standard & Poor's 500 Index (S&P 500).

the 32 event days (determined using market-adjusted and mean-adjusted models) using the t-statistic:

$$t = \frac{\bar{A}_t}{\hat{S}(\bar{A}_t)} \text{ where } \hat{S}(\bar{A}_t) = \sqrt{\sum_{t=3 \text{ Jan } 2006}^{t=29 \text{ Dec } 2006} \frac{(\bar{A}_t - \bar{\bar{A}})^2}{258}}, \bar{A}_t = \frac{1}{54} \sum_{i=1}^{i=54} A_{i,t},$$

$$\bar{\bar{A}} = \frac{1}{259} \sum_{t=3 \text{ Jan } 2006}^{t=29 \text{ Dec } 2006} \bar{A}_t \quad (4.2)$$

Figure 4.1 plots the Euro Stoxx 50 Volatility Index (VSTOXX) from January 2006 to January 2010. The "European VIX," or Euro Stoxx 50 Volatility Index, is Europe's most closely followed volatility index. It calculates the implied volatility of near-term EuroStoxx 50 options traded on the Eurex market (Shu & Chang, 2019). The VSTOXX index, which measures actual and projected volatility on the European stock market, serves as a standard for measuring volatility (Guterding, 2021). VSTOXX index was below 30 percent from January 2006 to September 2008. The timing of the onset of the major crisis in the equity markets is evident. While volatility was minimal in August 2008, it began to spike on September 15, 2008, when Lehman Brothers declared bankruptcy. This, together with the subsequent events over the following 30-35 days, plainly defines a global crisis (Bartram & Bodnar, 2009). Volatility increased to about four times its 2006 level and three times greater than the previous 18-month peak. Until September 2008, VSTOXX was traded between 15 and 31 percent. Yet, after September 15, 2008 (Lehman Brothers' Bankruptcy), VSTOXX made a 20 percent increase and stayed above 35 percent, a sign of high volatility and uncertainty in the market. Aftermath, the index reached its ever-since highest value (87.5 percent) on October 16, 2008.

4.3. Results

Table 4.4 reports the average abnormal returns on the 32 event dates and the t-statistics calculated using the market-adjusted and mean-adjusted models. The results show that investors react significantly to 7 of the 32 events. Our results show that European investors respond to the firm-specific pre-crisis events until September 2008. Lehman Brothers' collapse indicates the most traumatic event in the pre-crisis period for European investors. On August 9, 2007, when BNP Paribas stopped redemptions to clients, fears and concerns arose in the markets. Yet, European

Central Bank (ECB) responded quickly and provided liquidity to markets. While the US was experiencing the subprime phase of the crisis, ECB settled markets by injecting enough liquidity into European markets. On March 16, 2008, and July 11, 2008, Bear Stearns was bought by JP Morgan, and IndyMac Bank failed, respectively. Investors reacted significantly to Bear Stearns since it had over 150 million deals with multiple counterparties. As a result, it was deemed "too interconnected" with other markets (Brunnermeier, 2009). When IndyMac Bank failed, the risk became uncertain for European investors. Until then, the markets saw the event as to be handled, but in September 2008, the risk converted to uncertainty, and investors in Europe started to panic. On September 15, 2008, when Lehman Brothers went bankrupt, the panic was at its zenith. Until the collapse of Lehman Brothers' collapse, the US and European banks reacted to some events differently. When New Century went bankrupt on April 3, 2007, it had a significant negative impact on the US market, but an insignificant effect on the European markets since the bankruptcy was perceived as a local market event (Duffie, 2019). On February 17, 2008, the bankruptcy of Northern Rock caused panic in the US market. Still, the European market did not react to the event significantly, as the rumors that a structural change and a smooth management transition covered up negative perceptions in the Euro market.

On the other hand, as the crisis loomed, two markets began to react to events similarly. For instance, when Indymac failed on July 11, 2008, both markets had a negative and significant reaction (-3.42 t-test for the US and -3.22 t-test for the European markets). As the crisis drew closer, both markets' reactions to events got more significant, proving the interconnectedness of markets and the severity of the crisis. Finally, when Lehman Brothers failed on September 15, 2008, both markets had highly negative reactions (-19.11 for the US and -4.05 for the Europe markets).

The event study methodology assumes that the information related to an event does not leak before the event occurs. It also assumes that there are no confounding factors on the same day. These two assumptions prevent the method from properly measuring investors' reaction to an announcement (Cornett et al., 2011; Fescioglu-Unver & Tanyeri, 2013; Mulherin & Aziz Simsir, 2015; Tunyi, 2021; Yilmaz & Tanyeri, 2016). The sample period from February 2007 to September 2008 is

turbulent. The period from February 2007 to September 2008 is characterized by volatility. Some sample events have overlapping information releases. This violation of the study's methodology can explain the surprising results of the analysis in two days. On February 17, 2008, Northern Rock went bankrupt. Although it was the first bank run since the nineteenth century on a British bank of any significance to the system, investors did not react significantly. The reason was that there was a leakage of information that authorities planned to transition to a new structure, and the incident was entirely limited to one institution. It did not spread to other banks (Mizen, 2008).

Furthermore, on July 21, 2008, only 8% of the Halifax Bank of Scotland (HBOS) investors agreed to buy the new shares offered as they were more expensive than the existing shares. However, HBOS got the £4 bn that it demanded, which turned a positive reaction to the markets (Guillen, 2009). On August 9, 2008, although BNP Paribas would not be able to pay out two of its funds as it could not value the assets in them, the European Central Bank (ECB) injected €95 million into the market to enhance the liquidity. This action by the ECB exhilarated markets (Guillen, 2009).

4.4. Country-Level Analysis

For the sake of robustness and a clear-cut picture of how investors react to the crisis events, we conduct a country-specific analysis with the same methodology explained in section 4.2. Table 4.5 summarizes the results. Although the countries responded differently to events until September 2008, all countries reacted significantly to events in September 2008. Before then, on March 16, 2008, and on July 11, 2008, JP Morgan's buying of Bear Stearns and IndyMac Bank's failure had a significant negative impact on thirteen and fourteen of the countries' markets in the sample, respectively. On September 7, 2008, Nationwide's announcing merger had a highly positive significant impact on all countries' markets (except for Norway). Finally, without exception, on September 15, 2008, Lehman Brothers' failure had a negative impact on all countries' markets, proving the major turning point of the GFC.

Looking at the country-level reactions, fourteen events significantly and negatively affected Spain and UK markets, while only 3 events had a negative and significant

impact on Swiss counterparts. Similarly, eight events had a positive and significant impact on the Spain market, and only one affected Denmark, Finland, and Norway markets positively and significantly. In addition, UK and Switzerland (- 5.91 % and - 1.49% abnormal returns, respectively) are the most and least affected countries by the collapse of Lehman Brothers. To sum up, the results from Table 4.5 suggest that European investors significantly reacted to events during the crisis period. As the Lehman Brothers collapse drew closer, investor reactions became more significant. These results are very similar to the investor reactions to events in the US markets, suggesting that markets gave a signal that the crisis was coming.

4.5. Regression Analysis

In this section, we use Pooled-OLS regression to determine whether country and bank characteristics have an impact on the investor reactions to significant events during the GFC.

$$AR_{it} = \alpha + \sum_{k=1}^{k=n} \beta_k XDet_{kt} + \varepsilon_{it} \quad (4.3)$$

where AR_{it} is the mean-adjusted return or market-adjusted return of bank i and Det_{kt} is a $k \times i$ matrix of independent variables. Independent variables include bank characteristics and macroeconomic factors.

4.5.1. Dependent Variables

In line with the literature (Aït-Sahalia et al., 2012; Miyajima & Yafeh, 2007; Ricci, 2015), we use market-adjusted and mean-adjusted returns to gauge investor reactions to cross-sectional variations in bank performance. Abnormal return is the difference between the realized and the expected return calculated in section 4.2. Both variables are expressed as percentages.

4.5.2. Bank Characteristics

Bank characteristics involve variables derived from balance sheets and income statements that help explain the performance of banks during the crisis (Beltratti and Stulz, 2012).

Banks with greater capital-to-asset ratios are safer and less hazardous than banks with lower capital ratios. Furthermore, banks with larger equity-to-asset ratios often have a lower need for external borrowing, which benefits profitability (Berger & Bouwman, 2013; Dietrich & Wanzenried, 2010). On the other hand, some studies find that banks with more capital ratios experienced more severe stock price declines during the crisis (Akhigbe et al., 2012). Hence, we add *Capital Ratio* as a bank characteristic determinant to our models. Capital ratio is equity divided by total assets.

Nonperforming loan ratio is a common metric of credit risk management, based on the notion that banks with a high nonperforming loan ratio manage credit risk poorly and are hence less lucrative than their counterparts (Cornett & Tehranian, 2004; Dietrich & Wanzenried, 2010; Kumar, Thrikawala & Acharya, 2022).

Nonperforming Loans Ratio is nonperforming loans divided by total loans.

A higher degree of intangibility of assets provides weaker collateral and has a lower liquidation value, reducing a company's debt capacity (Chang, Lee & Lee, 2009; Flannery & Rangan, 2006; Rajan et al., 1995). *Asset Structure* is the ratio of intangible assets to total assets.

LoanstoDeposit is a gauge for assessing liquidity. The literature has a mixed view on the impact of the loans-to-deposit ratio on the bank performance. While some argue that it has a positive effect (Heffernan & Fu, 2010), others claim that the effect is negative (Akhigbe et al., 2012; Tan & Floros, 2012). Higher ratios may indicate stronger bank performance as interest income grows. However, a high ratio might decrease liquidity and increase the likelihood of defaults. *LoanstoDeposit* is the ratio of deposits to loans (Heffernan & Fu, 2010).

The literature suggests that larger banks have a better chance of survival than smaller ones (Akhigbe et al., 2012). In addition, an optimal regulatory bank size reduces bankruptcy risk (Berger & Bouwman, 2013; Lall, 2014). On the other hand, smaller firms might be more profitable and have better performance (Heffernan & Fu, 2010). *Size* is the natural logarithm of total assets

Furthermore, *Return on Equity (ROE)* is one of the most common profitability measures in the literature. Banks with higher ROE are more profitable. Therefore, higher ROE increases resilience to bad conditions. (Ayadi et al., 2019; Cornett & Tehranian, 2004; Deng et al., 2013; Lall, 2014). However, some studies argue that a higher return on equity motivates financial institutions to take more risks. While this behavior may not hurt wealth creation in good times, it might have a negative impact on shareholders during financial crises. A typical argument against return on equity is that it encourages banks to take on excessive amounts of debt (Goodhart & Charles, 2013; Thakor, 2014). *ROE* is net income divided by equity).

4.5.3. Macroeconomic Factors

GDP growth represents a factor that may affect profitability as well. GDP has either a statistically significant positive influence on bank profitability (low-income countries) or a statistically significant negative effect (high-income countries) (Dietrich & Wanzenried, 2010). In this respect, higher GDP nations are expected to have a banking sector that functions in a mature setting, resulting in more competitive interest and profit margins (Goldberg & Anoop, 1996). *GDP growth* is the yearly GDP growth rate.

Inflation is often correlated with increased profitability if the bank's management properly anticipates it in interest rate adjustments (Perry, 1992). Yet, Boyd et al. (2001) claim that inflation negatively impacts bank performance as banks might not alter their interest rates, causing bank expenditures to rise faster than bank income. We retrieve bank characteristics data from the Bloomberg database and macroeconomic variables data from the World Bank database.

Table 4.6 displays the summary statistics of dependent variables (mean-adjusted return and market-adjusted return), bank characteristics and macroeconomic factors. On average, sample banks have a mean of -.4% of mean-adjusted returns, 6.2% capital ratio, 2.5% nonperforming loans ratio, and 18% return on equity ratio. Sample banks have a maximum of 11% mean-adjusted return, 13% capital ratio, 12% nonperforming loans ratio and 45% return on equity ratio. On the other hand, we observe a minimum of -10 % mean-adjusted returns, 2.1% of capital ratio, 0.1 of nonperforming loan ratio, and 4.5% of return on equity ratio. Besides, countries that sample banks operate in have a mean of 2% inflation rate and 2.9% GDP growth.

4.5.4 Pooled-OLS Regression

We construct regression models based on the bank characteristics and macroeconomic factors explained in the previous section. The models are as follows:

$$AR_{it} = \alpha_{it} + \beta_1 capitalratio_{it} + \beta_2 NPLratio_{it} + \beta_3 loanstodeposits_{it} + \beta_4 assetstructure_{it} + \beta_5 ROE_{it} + \beta_6 Size_{it} + \varepsilon_{it} \quad (4.4)$$

$$AR_{it} = \alpha_{it} + \beta_1 capitalratio_{it} + \beta_2 NPLratio_{it} + \beta_3 loanstodeposits_{it} + \beta_4 assetstructure_{it} + \beta_5 ROE_{it} + \beta_6 Size_{it} + \beta_7 Inflation + \beta_8 GDPgrowth + \varepsilon_{it} \quad (4.5)$$

$$AR_{it} = \alpha_{it} + \beta_1 capitalratio_{it} + \beta_2 NPLratio_{it} + \beta_3 loanstodeposits_{it} + \beta_4 assetstructure_{it} + \beta_5 ROE_{it} + \beta_6 Size_{it} + \sum_{l=1}^{l=16} \beta_l Country_Fixed_Effect_l + \varepsilon_{it} \quad (4.6)$$

In equation (4.4), the dependent variable is the mean-adjusted or market-adjusted abnormal return of bank i on the event day t . The independent variables are bank characteristics. Capital ratio, nonperforming loans (NPL) ratio, loans to deposits ratio, asset structure, ROE, and size are bank characteristics.

In equation (4.5). We use the same dependent variables and bank characteristics of equation (4.4). However, now we add macroeconomic factors to explore whether country-specific variations have an impact on investor reactions to significant events during the crisis. Inflation and GDP growth are macroeconomic factors.

Equation (4.6), again, uses the same dependent variables and bank characteristics as in Eq. (4.4) and Eq. (4.5). But we now use country-fixed effect to eliminate any unobservable country-specific heterogeneity.

Before running regressions, we test for heteroscedasticity suggested by Breusch-Pagan (1979).

Table 4.7 displays the heteroscedasticity test results for the full sample and subsamples. The results suggest that there is heteroscedasticity in model specifications of 1,2,3, and 6. Hence, clustering by banks, we apply robust standard errors to eliminate heteroscedasticity from our regression models (White, 1980).

4.6. Results

Table 4.8 shows the pooled-OLS regression results. In Panel A, the dependent variable is the mean-adjusted return; in Panel B, the dependent variable is the market-adjusted return. Each panel shows three sets of results. In models 1 and 4, we used only bank characteristics variables. Models 2 and 5 introduce macroeconomic variables. In models 3 and 6, we applied country-fixed effects. Since we use our macroeconomic variables in models 2 and 4, we do not control for country-fixed effects. ROE is negative and significant at 5% in model specifications of 2 and 5. Also, it is negative and significant at 10% in model specifications of 1 and 4. In addition, capital ratio is only significant at 5% in model 4. Other bank characteristics and macroeconomic factors do not seem to have an impact on cross-sectional variations of investor reactions to significant events during the crisis. The results indicate that ROE and capital ratio seem to have an impact on cross-sectional variations of investor reactions.

Introducing the country-fixed effects does not help to improve the explanatory power of the regression since all variables are insignificant in models 3 and 6. We use nonperforming loans ratio (NPL ratio) to measure credit risk management. There is weak evidence to suggest that the NPL ratio has an effect on cross-sectional variations of investor reactions. The coefficient of the NPL ratio is barely negative and significant at 10% only in one model specification (model 5).

In the literature, the results related to the impact of ROE on bank performance are mixed. In our case, a higher ROE encourages banks to take more risks, making them vulnerable to shocks (Goodhart & Charles, 2013; Thakor, 2014). In addition, the capital ratio is positive and significant in one model specification (5). In line with Berger & Bouwman (2013), more capital helps banks perform well during the crisis.

Turning to the macroeconomic variables, we find no support for any significance of inflation rate and GDP growth as the literature has mixed results for both of them (Boyd, Levine & Ssmith, 2001; Dietrich & Wanzenried, 2010; Goldberg & Anoop, 1996; Perry, 1992).

We conclude that ROE, and capital ratio seem to have an effect on cross-sectional variations of investor reactions to significant events during the crisis period.

4.7. Conclusion

In the summer of 2007, when the US subprime mortgage crisis broke out, few predicted that it would have an immediate and far-reaching impact on global economies. By the following year, it was clear that a worldwide financial crisis was unfolding, one that would have far-reaching macroeconomic and social repercussions for many nations. The failure of Lehman Brothers in the middle of September 2008 was the last straw. This shocking occurrence created a domino effect of financial disintermediation and contagion around the globe. One question about the crisis is whether Lehman Brothers' failure was the turning point, transforming into a Global Liquidity Crisis from a regional subprime mortgage crisis. To investigate this question, we would like to measure the impact of pre-crisis events with and without investor anticipation in Europe. This paper does show that investors' reactions in

Europe to crisis events are significant. In September 2008, the risk becomes uncertainty, and the reactions to events get more significant. These results indicate that investors' perception of the financial health of the largest 54 banks in Europe changed significantly as Lehman Brothers' failure draws closer. We also show that ROE and capital ratio have an effect on cross sectional variations of investor reactions to significant events till September 2008.

On September 15, 2008, Lehman Brothers' collapse proves the peak point of European investors' fear and the turning point of the GFC. Market response to Lehman's fall was selected and informed rather than arbitrary and indiscriminate, despite the widespread belief that financial corporations were especially opaque throughout the current financial crisis. Overall, this paper's findings add to our knowledge of how European financial markets responded to pre-crisis events, including the greatest collapse in US history and how the subprime mortgage crisis became a Global Financial Crisis.

Figure 4.1: Plot of Euro STOXX50- Volatility Index

The figure plots daily closing levels and the Volatility Index (STOXX50), estimation period, and numbers of events in the analysis. The sample period is January 1, 2006 – January 1, 2010.

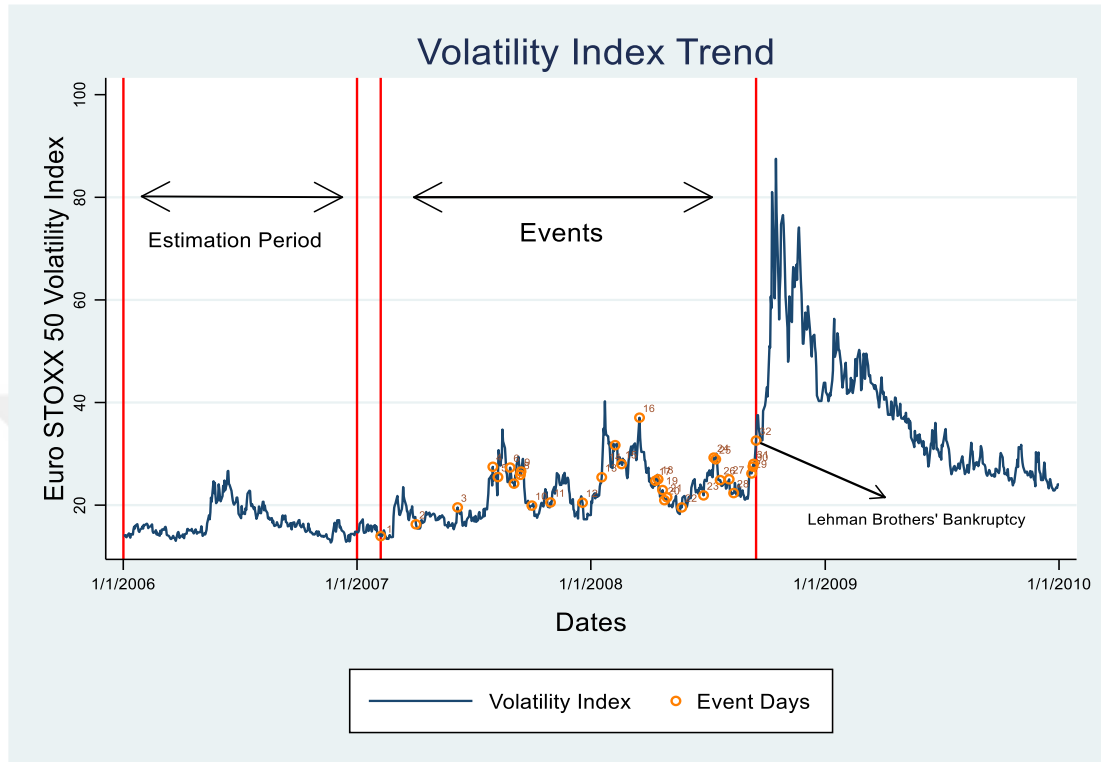


Table 4.1: Timeline of Events

No	Date	Event	Synopsis
1	7-Feb-07	HSBC announces loss	HSBC announces losses linked to US subprime mortgages.
2	2-Apr-07	New Century bankrupts	New Century Financial, which specializes in sub-prime mortgages, files for Chapter 11 bankruptcy protection and cuts half of its workforce.
3	7-Jun-07	Bear Stearns suspends redemptions from its fund	Two Bear Stearns-run hedge funds with large holdings of subprime mortgages run into large losses and are forced to dump assets.
4	31-Jul-07	Bear Stearns liquidates two hedge funds.	Investment bank Bear Stearns tells investors they will get little, if any, of the money invested in two of its hedge funds after rival banks refuse to help it bail them out.
5	9-Aug-07	BNP Paribas halts redemptions	BNP Paribas, France's largest bank, halts redemptions on three investment funds.
6	28-Aug-07	German Sachsen fails	German Sachsen Landesbank faces collapse after investing in the sub-prime market. The bank is rescued by its competitor Baden-Wuerttemberg Landesbank
7	3-Sep-07	IKB announces loss	German corporate lender IKB announces a \$1bn loss on investments linked to the US sub-prime market
8	13-Sep-07	Northern Rock asks for emergency support	The BBC reveals Northern Rock has asked for and been granted emergency financial support from the Bank of England, in the latter's role as lender of last resort
9	14-Sep-07	Bank of England is authorized to support Northern Rock	Depositors withdraw £1bn from Northern Rock in what is the biggest run on a British bank for more than a century.
10	1-Oct-07	UBS announces loss	Swiss bank UBS is the world's first top-flight bank to announce losses - \$3.4bn - from sub-prime related investments.
11	30-Oct-07	Merill Lynch's CEO resigns	Merrill Lynch's chief resigns.
12	19-Dec-07	S&P downgrades monoline insurers	Ratings agency Standard and Poors downgrades its investment rating of a number of so-called monoline insurers, which specialise in insuring bonds
13	18-Jan-08	Fitch downgrades Ambac and S&P places credit watch on Ambac	A rush to withdraw money from its commercial property funds forces Scottish Equitable to introduce delays of up to 12 months for investors wanting to take their money out.
14	8-Feb-08	The number of house possession rises to its highest level in the UK	In the UK, the latest CML figures show the number of homes reposessed in the UK rose to 27,100 in 2007, its highest level since 1999.
15	17-Feb-08	Northern Rock bankrupts	British government nationalizes Northern Rock
16	24-Mar-08	JP Morgan buys Bear Stearns	Bear Stearns is bought by J.P. Morgan Chase in a deal orchestrated by and backed by the US government, following a sharp decline in shares and a collapse in the confidence in the company.
17	11-Apr-08	CML warns	A warning is issued by the CML that the amount of funding available for mortgages in the UK could be cut in half this year
18	15-Apr-08	UK housing market's confidence falls	Confidence in the UK housing market falls to its lowest point in 30 years in March, according to the Royal Institution of Chartered Surveyors, because of the "unique liquidity blight.
19	22-Apr-08	RBS plans to raise money	Royal Bank of Scotland announces a plan to raise money from its shareholders with a £12bn rights issue - the biggest in UK corporate history

Note: Event Synopsis are taken from Guillen (2009)

Table 4.1 (cont'd)

No	Date	Event	Synopsis
20	25-Apr-08	Persimmon announces major cutbacks	Persimmon becomes the first UK house builder to announce major cutbacks, citing the lack of affordable mortgages and a fall in consumer confidence
21	29-Apr-08	CML reports a huge slip on newly approved mortgages	The CML says the number of new mortgages approved in March slipped 44% to 64, the lowest monthly number since records began in 1999
22	22-May-08	Swiss bank issues rights to cover some loss	Swiss bank UBS, one of the worst affected by the credit crunch, launches a \$15.5bn rights issue to cover some of the \$37bn it lost on assets linked to US mortgage debt.
23	25-Jun-08	Barclays plans to raise £4.5bn in a share	Barclays announces plans to raise £4.5bn in a share issue to bolster its balance sheet.
24	11-Jul-08	IndyMac Bank fails	American Federal regulators seize IndyMac Bank after it succumbs to the pressure of tighter credit, tumbling home prices and rising foreclosures.
25	13-Jul-08	FED New York is authorized to lend Fannie Mae and Freddie Mac	Financial authorities step in to assist America's two largest lenders, Fannie Mae and Freddie Mac.
26	21-Jul-08	Just 8% of HBOS investors agree to take up the new shares	Just 8% of HBOS investors agree to take up the new shares offered in its £4bn rights issue, because they are priced higher than existing shares trading on the stock market
27	4-Aug-08	HSBC warns off bad conditions	Global banking giant HSBC warns that conditions in financial markets are at their toughest "for several decades" after suffering a 28% fall in half-year profits
28	9-Aug-08	BNP Paribas is unable to value assets in its funds.	Investment bank BNP Paribas tells investors they will not be able to take money out of two of its funds because it cannot value the assets in them.
29	7-Sep-08	the Nationwide announces merge	In the UK, the Nationwide announces it will merge with two smaller rivals, the Derbyshire and Cheshire Building Societies.
30	10-Sep-08	Fannie Mae and Freddie Mac fails	The US government seizes Fannie Mae and Freddie Mac, putting the liability of more than \$5 trillion of mortgages onto the backs of American taxpayers
31	11-Sep-08	Lehman Brothers announces loss and looks to be sold	Lehman Brothers announces it is actively looking to be sold after reporting \$4 billion in losses.
32	15-Sep-08	Lehman Brothers' bankruptcy	Bank of America agrees to a \$50 billion rescue package for Merrill Lynch. Lehman files for bankruptcy and thousands of its employees are told it's all over.

Table 4.2: Bank and country specifications

The table reports countries, major stock indices, whether the banks are G-SIFI or D-SIB, and state aid amount (in billions of €) of banks in the sample.

No	Bank	Country	Major Stock Index	G-SIFI or D-SIB	State Aid (€bn)
1	Erste Bank	Austria	FTSE Austria	D-SIB	5
2	Oberbank AG	Austria	FTSE Austria	-	-
3	Raiffeisen Bank International	Austria	FTSE Austria	D-SIB	5.75
4	KBC Groep NV	Belgium	BEL 20	D-SIB	7
5	KBC Ancora	Belgium	BEL 20	D-SIB	-
6	Danske Bank	Denmark	OMX Copenhagen	D-SIB	-
7	Jyske Bank A/S	Denmark	OMX Copenhagen	D-SIB	-
8	Ringkjøbing Landbobank A/S	Denmark	OMX Copenhagen	-	-
9	Spar Nord Bank A/S	Denmark	OMX Copenhagen	D-SIB	-
10	Sydbank AS	Denmark	OMX Copenhagen	D-SIB	-
11	Nordea Bank	Finland	OMX Helsinki	D-SIB	-
12	Crédit Agricole	France	CAC 40	G-SIFI	3
13	BNP Paribas	France	CAC 40	G-SIFI	2.55
14	Société Générale	France	CAC 40	G-SIFI	1.7
15	Commerzbank AG	Germany	DAX	G-SIFI	33
16	Deutsche Bank AG	Germany	DAX	G-SIFI	-
17	AIB Group plc	Ireland	FTSE Ireland	D-SIB	20.7
18	Bank of Ireland Group plc	Ireland	FTSE Ireland	D-SIB	4.8
19	Investec PLC	Ireland	FTSE Ireland	D-SIB	-
20	BPER Banca	Italy	Italy 40	-	-
21	Banca Popolare di Sondrio SPA	Italy	Italy 40	-	0.3
22	Intesa Sanpaolo	Italy	Italy 40	D-SIB	-
23	UniCredit Group	Italy	Italy 40	G-SIFI	4
24	ING Group	Netherlands	AEX	G-SIFI	21.4
25	DNB Bank ASA	Norway	Oslo OBX	D-SIB	-
26	SpareBank 1 SMN	Norway	Oslo OBX	-	-
27	SpareBank 1 Nord Norge	Norway	Oslo OBX	-	-
28	SpareBank 1 SR-Bank ASA	Norway	Oslo OBX	-	-
29	ING Bank Śląski SA	Poland	WIG	D-SIB	-
30	Bank Polska Kasa Opieki SA	Poland	WIG	D-SIB	-
31	PKO Bank Polski	Poland	WIG	D-SIB	-
32	Santander Bank Polska Sa	Poland	WIG	D-SIB	-
33	Banco Comercial Portugues	Portugal	PSI	D-SIB	1.1
34	BBVA	Spain	IBEX 35	D-SIB	-
35	Bankinter SA	Spain	IBEX 35	-	-
36	Banco de Sabadell SA	Spain	IBEX 35	D-SIB	-
37	Banco Santander SA	Spain	IBEX 35	G-SIFI	-
38	Avanza Bank Holding AB	Sweden	OMX Stockholm	-	-
39	Skandinaviska Enskilda Banken	Sweden	OMX Stockholm	D-SIB	-
40	Svenska Handelsbanken AB	Sweden	OMX Stockholm	D-SIB	-
41	Swedbank AB	Sweden	OMX Stockholm	D-SIB	-
42	Banque Cantonale Vaudoise	Switzerland	SMI	-	-
43	Berner Kantonalbank AG	Switzerland	SMI	-	-
44	Luzerner Kantonalbank AG	Switzerland	SMI	-	-
45	St Galler Kantonalbank AG	Switzerland	SMI	-	-
46	Valiant Holding AG	Switzerland	SMI	-	-
47	Vontobel Holding AG	Switzerland	SMI	-	-
48	Zuger Kantonalbank AG	Switzerland	SMI	D-SIB	-
49	Barclays PLC	UK	FTSE 100	G-SIFI	5
50	Close Brothers Group PLC	UK	FTSE 101	-	-
51	HSBC Holdings PLC	UK	FTSE 102	G-SIFI	5
52	Standard Chartered PLC	UK	FTSE 103	G-SIFI	4
53	Lloyds Banking Group PLC	UK	FTSE 104	G-SIFI	19
54	NatWest Group PLC	UK	FTSE 105	D-SIB	-

Table 4.3: Banks in the Sample

The table reports the market share (in billions of \$ and as a percent of total banking assets) of Banks in the sample.

Bank	2006		2007		2008		2009		2010	
	Assets	Market Cap.	Assets	Market Cap.	Assets	Market Cap.	Assets	Market Cap.	Assets	Market Cap.
Crédit Agricole	1261	47	1414	38	1653	18	1557	29	1594	23
AIB Group plc	159	21	178	14	182	2	174	1	145	1
Avanza Bank Holding AB	9	3	14	4	16	2	28	5	40	7
Barclays PLC	997	48	1227	33	2053	13	1379	31	1490	32
BBVA	412	65	502	63	543	32	535	48	553	34
Banco Comercial Portugues	79	10	88	11	94	4	95	4	99	3
Banque Cantonale Vaudoise	33	7	35	4	35	3	36	4	36	4
Berner Kantonalbank AG	20	2	21	2	23	2	24	2	24	2
Bank of Ireland Group	162	13	189	15	197	9	194	1	167	2
Bankinter SA	46	5	50	5	53	3	54	3	54	2
BNP Paribas	1440	73	1694	67	2076	27	2058	66	1998	57
BPER Banca	45	4	49	4	53	2	60	3	58	2
Banca Popolare di Sondrio SPA	16	3	19	3	22	2	23	2	26	2
Close Brothers Group PLC	5	1	5	1	6	1	6	1	6	1
Commerzbank AG	608	19	616	17	625	5	844	7	754	7
Danske Bank	2739	172	3350	137	3544	36	3098	81	3214	99
Deutsche Bank AG	1584	51	2020	45	2202	16	1501	31	1906	36
DNB Bank ASA	1320	118	1474	111	1832	36	1823	102	1862	133
Erste Bank	182	18	263	14	201	5	202	9	206	13
Société Générale	957	56	1072	42	1130	20	1024	36	1132	30
HSBC Holdings PLC	1861	211	2354	197	2527	117	2364	199	2455	180
ING Bank Slaski SA	48	10	52	9	70	6	60	10	65	12
ING Group	1226	74	1313	56	1332	15	1164	26	1247	28
Investec PLC	24	3	26	4	34	2	37	2	47	4
Intesa Sanpaolo	577	75	573	67	636	32	625	40	659	26
Jyske Bank A/S	161	23	214	21	237	6	225	13	244	17
KBC Groep NV	325	32	356	33	355	7	324	10	321	9
KBC Ancora	3	6	3	7	4	4	3	1	3	1
Lloyds Banking Group PLC	344	32	353	27	436	8	1027	32	992	46
Luzerner Kantonalbank AG	19	2	20	2	23	2	24	2	26	3
SpareBank 1 SMN	63	4	72	4	85	2	85	4	98	5
Nordea Bank	347	30	389	30	474	13	508	29	581	33
SpareBank 1 Nord Norge	55	2	61	2	66	1	64	2	69	2

Table 4.3 (cont'd)

Bank	2006		2007		2008		Bank	2009		2010	
	Assets	Market Cap.	Assets	Market Cap.	Assets			Assets	Market Cap.	Assets	Market Cap.
NatWest Group PLC	871	63	1841	44	2379	19		1696	18	1454	25
Oberbank AG	13	1	14	1	15	1		16	1	17	1
Bank Polska Kasa Opieki SA	68	38	124	59	132	33		131	42	134	47
PKO BANK POLSKI	102	47	109	53	135	36		156	48	170	54
Raiffeisen Bank International AG	56	16	73	16	85	3		76	6	131	8
Ringkjoebing Landbobank A/S	17	6	20	4	18	2		18	3	18	4
Banco de Sabadell SA	73	10	77	9	80	6		83	5	97	4
Banco Santander SA	663	88	913	92	1050	56		1111	93	1218	66
Skandinaviska Enskilda Banken AB	1947	148	2344	114	2511	42		2308	97	2180	123
St Galler Kantonalbank AG	20	3	20	3	23	2		24	3	24	3
Svenska Handelsbanken AB	1790	131	1859	129	2159	79		2123	127	2154	134
Santander Bank Polska Sa	33	16	41	18	57	8		54	14	53	16
Spar Nord Bank A/S	59	8	63	6	69	2		65	3	67	3
SpareBank 1 SR-Bank ASA	85	4	103	5	126	2		125	6	135	7
Standard Chartered PLC	266	40	330	69	431	24		437	52	517	63
Swedbank AB	1353	128	1608	94	1812	23		1795	82	1716	108
Sydbank AS	115	19	135	14	156	4		158	10	151	11
UniCredit Group	823	69	1022	75	1046	23		929	39	929	30
Valiant Holding AG	17	2	18	3	20	3		23	3	24	2
Vontobel Holding AG	15	3	18	3	16	1		18	2	18	2
Zuger Kantonalbank AG	9	1	9	1	10	1		10	1	11	1
Total	25522	2081	30807	1901	35149	823		32581	1491	33389	1568

Table 4.4: 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 percent, respectively.

Date	Event	Abnormal return (STOXX600 adjusted) ($R_{i,t} - R_{m,t}$)	Abnormal return (mean adjusted) ($R_{i,t} - \bar{R}_i$)	STOXX600 Return (mean adjusted) ($R_{m,t} - \bar{R}_{m,t}$)	Relative performance (estimation period) ($\bar{R}_i - \bar{R}_m$)	Market (STOXX 600) adjusted T-test	Mean adjusted T-test
7-Feb-07	HSBC announces loss	0.15	0.34	0.22	0.03	0.14	0.32
2-Apr-07	New Century bankrupts	-0.15	0.81	0.99	0.03	-0.14	0.76
7-Jun-07	Bear Stearns suspends redemptions from its fund	-0.20	-1.48	-1.24	0.03	-0.19	-1.38
31-Jul-07	Bear Stearns liquidates two hedge funds	0.13	-1.51	-1.61	0.03	0.13	-1.41
9-Aug-07	BNP Paribas halts redemptions	-0.45	-2.32	-1.84	0.03	-0.42	-2.17*
28-Aug-07	German Sachsen fails	-0.10	-1.92	-1.79	0.03	-0.09	-1.80
3-Sep-07	IKB announces loss	0.20	0.39	0.22	0.03	0.19	0.36
13-Sep-07	Northern Rock asks for emergency support	-0.29	0.42	0.75	0.03	-0.27	0.40
14-Sep-07	Bank of England is authorized to support Northern Rock	-0.28	-1.57	-1.26	0.03	-0.26	-1.47
1-Oct-07	UBS announces loss	-0.15	0.54	0.73	0.03	-0.14	0.51
30-Oct-07	Merrill Lynch's CEO resigns	0.90	0.37	-0.50	0.03	0.84	0.34
19-Dec-07	S&P downgrades monoline insurers	0.18	-0.38	-0.53	0.03	0.17	-0.36
18-Jan-08	Fitch downgrades Ambac and S&P places credit watch on Ambac	0.00	-1.17	-1.13	0.03	0.00	-1.09
8-Feb-08	The number of house possession rises to its highest level in the UK	-1.14	-0.81	0.37	0.03	-1.07	-0.76
17-Feb-08	Northern Rock bankrupts	-0.09	1.75	1.88	0.03	-0.09	1.64
24-Mar-08	JP Morgan buys Bear Stearns	0.82	-3.84	-4.63	0.03	0.77	-3.60**
11-Apr-08	CML warns	0.41	-1.12	-1.49	0.03	0.38	-1.04
15-Apr-08	UK housing market's confidence falls	-0.25	0.08	0.37	0.03	-0.24	0.08
22-Apr-08	RBS plans to raise money	-0.37	-0.93	-0.52	0.03	-0.35	-0.87
25-Apr-08	Persimmon announces major cutbacks	-0.12	1.06	1.21	0.03	-0.11	0.99
29-Apr-08	CML reports a huge slip on newly approved mortgages	-0.06	-1.07	-0.97	0.03	-0.08	-1.00
22-May-08	Swiss bank issues rights to cover some loss	-0.34	-0.05	0.33	0.03	-0.32	-0.04
25-Jun-08	Barclays plans to raise £4.5bn in a share	0.78	1.91	1.16	0.03	0.73	1.79
11-Jul-08	IndyMac Bank fails	-0.62	-3.44	-2.79	0.03	-0.58	-3.22**
13-Jul-08	FED New York is authorized to lend Fannie Mae and Freddie Mac	-0.07	0.62	0.72	0.03	-0.06	0.58
21-Jul-08	Just 8% of HBOS investors agree to take up the new shares	0.83	1.32	0.53	0.03	0.78	1.24
4-Aug-08	HSBC warns of bad conditions	0.44	-0.61	-1.01	0.03	0.41	-0.57

Table 4.4 (cont'd)

Date	Event	Abnormal return (STOXX600 adjusted) ($R_{i,t} - R_{m,t}$)	Abnormal return (mean adjusted) ($R_{i,t} - \bar{R}_i$)	STOXX600 Return (mean adjusted) ($R_{m,t} - \bar{R}_{m,t}$)	Relative performance (estimation period) ($\bar{R}_i - \bar{R}_m$)	Market (STOXX 600) adjusted T-test	Mean adjusted T-test
9-Aug-08	BNP Paribas is unable to value assets in its funds.	0.48	1.70	1.25	0.03	0.45	1.59
7-Sep-08	Nationwide announces merge	1.80	5.03	3.27	0.03	1.68	4.71**
10-Sep-08	Fannie Mae and Freddie Mac fails and nationalized	-1.53	-2.42	-0.86	0.03	-1.43	-2.27*
11-Sep-08	Lehman Brothers announces loss and looks to be sold	-1.41	-2.11	-0.67	0.03	-1.32	-1.98*
15-Sep-08	Lehman Brothers' bankruptcy	-0.76	-4.32	-3.53	0.03	-0.71	-4.05**

Table 4.5: Abnormal Returns on Event Day

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

Country		Austria		Belgium		Denmark		Finland		France	
Date	Event	Abnormal return	T-test	Abnormal return	T-test	Abnormal return	T-test	Abnormal return	T-test	Abnormal return	T-test
7-Feb-07	HSBC announces loss	1.53	2.04*	-0.48	-0.57	1.19	1.23	0.72	0.57	0.68	0.43
2-Apr-07	New Century bankrupts	-0.03	-0.05	0.77	0.90	0.04	0.04	1.24	0.97	1.23	0.77
7-Jun-07	Bear Stearns suspends redemptions from its fund	-1.18	-1.57	-1.36	-1.60	-2.78	-2.85**	-3.64	-2.85**	-1.19	-0.75
31-Jul-07	Bear Stearns liquidates two hedge funds	-1.08	-1.44	-1.70	-2.00*	-1.19	-1.22	-2.46	-1.93	-2.02	-1.27
9-Aug-07	BNP Paribas halts redemptions	-1.04	-1.39	-4.75	-5.58**	-3.01	-3.10**	-1.82	-1.42	-3.97	-2.49*
28-Aug-07	German Sachsen fails	-1.03	-1.37	-2.74	-3.22**	-2.43	-2.49*	-2.62	-2.05*	-3.09	-1.93
3-Sep-07	IKB announces loss	0.68	0.90	1.97	2.31*	-0.64	-0.65	0.19	0.15	-0.08	-0.05
13-Sep-07	Northern Rock asks for emergency support	0.52	0.69	2.35	2.76**	-0.06	-0.06	0.00	0.00	0.66	0.41
14-Sep-07	Bank of England is authorized to support Northern Rock	-1.08	-1.44	-1.26	-1.48	-2.24	-2.30*	-1.26	-0.99	-1.64	-1.03
1-Oct-07	UBS announces loss	-0.08	-0.10	0.21	0.25	0.21	0.22	-0.09	-0.07	1.39	0.87
30-Oct-07	Merrill Lynch's CEO resigns	-1.00	-1.34	0.46	0.54	1.02	1.04	2.28	1.79	0.37	0.23
19-Dec-07	S&P downgrades monoline insurers	-1.23	-1.63	-0.13	-0.15	0.33	0.34	-0.28	-0.22	-0.71	-0.45
18-Jan-08	Fitch downgrades Ambac and S&P places credit watch on Ambac	0.58	0.77	0.07	0.09	-1.11	-1.14	-2.04	-1.60	-5.94	-3.72**
8-Feb-08	The number of house possession rises to its highest level in the UK	-1.57	-2.09*	-1.60	-1.88	-0.64	-0.66	1.54	1.21	-3.27	-2.05*
17-Feb-08	Northern Rock bankrupts	0.76	1.01	0.54	0.63	0.32	0.33	2.36	1.85	1.49	0.93
24-Mar-08	JP Morgan buys Bear Stearns	-3.84	-5.12**	-4.33	-5.08**	-3.74	-3.84**	-3.03	-2.37*	-5.96	-3.73**
11-Apr-08	CML warns	-0.63	-0.84	-1.73	-2.04*	-1.07	-1.10	0.84	0.66	-1.00	-0.63
15-Apr-08	UK housing market's confidence falls	0.96	1.28	0.35	0.42	-0.14	-0.14	1.38	1.08	-0.25	-0.16
22-Apr-08	RBS plans to raise money	-0.13	-0.17	-0.14	-0.17	-1.41	-1.45	-1.93	-1.52	-1.08	-0.68
25-Apr-08	Persimmon announces major cutbacks	0.57	0.76	0.89	1.05	0.79	0.81	1.46	1.14	1.95	1.22
29-Apr-08	CML reports a huge slip on newly approved mortgages	0.25	0.33	-0.90	-1.06	-0.92	-0.95	2.25	1.76	-0.98	-0.62
22-May-08	Swiss bank issues rights to cover some loss	-0.97	-1.29	-0.45	-0.52	-0.28	-0.29	1.99	1.56	1.73	1.08
25-Jun-08	Barclays plans to raise £4.5bn in a share	1.15	1.53	2.71	3.18**	1.69	1.73	1.89	1.48	4.53	2.84**
11-Jul-08	IndyMac Bank fails	-4.53	-6.04**	-5.16	-6.06**	-4.74	-4.86**	-2.52	-1.98*	-6.97	-4.37**
13-Jul-08	FED New York is authorized to lend Fannie Mae and Freddie Mac	1.03	1.37	1.05	1.23	-0.94	-0.96	1.65	1.29	1.75	1.10
21-Jul-08	Just 8% of HBOS investors agree to take up the new shares	-0.03	-0.04	-0.07	-0.08	0.97	0.99	0.70	0.55	1.13	0.71
4-Aug-08	HSBC warns off bad conditions	-0.94	-1.26	-1.35	-1.58	-0.76	-0.78	0.02	0.02	-1.08	-0.67
9-Aug-08	BNP Paribas is unable to value assets in its funds.	0.45	0.61	2.18	2.56*	1.52	1.56	1.19	0.93	1.94	1.22
7-Sep-08	Nationwide announces merge	4.21	5.61**	8.75	10.27**	3.24	3.33**	7.21	5.65**	7.19	4.51**
10-Sep-08	Fannie Mae and Freddie Mac fails and nationalized	-2.28	-3.04**	-3.52	-4.13**	-2.11	-2.17*	-2.66	-2.08*	-3.72	-2.33*
11-Sep-08	Lehman Brothers announces loss and looks to be sold	-3.56	-4.74**	-2.01	-2.35*	-2.52	-2.59**	-2.04	-1.60	-2.00	-1.25
15-Sep-08	Lehman Brothers' bankruptcy	-2.12	-2.83**	-4.58	-5.38**	-2.70	-2.77**	-4.57	-3.58**	-8.74	-5.47**

Table 4.5 (cont'd)

Country		Germany		Ireland		Italy		Netherlands		Norway	
Date	Event	Abnormal return	T-test	Abnormal return	T-test	Abnormal return	T-test	Abnormal return	T-test	Abnormal return	T-test
7-Feb-07	HSBC announces loss	-0.47	-0.54	-0.02	-0.03	0.33	0.70	0.33	0.49	0.76	0.53
2-Apr-07	New Century bankrupts	1.34	1.56	0.54	0.79	0.74	1.54	1.19	1.73	0.85	0.60
7-Jun-07	Bear Stearns suspends redemptions from its fund	-2.54	-2.96**	-0.87	-1.28	-1.48	-3.08**	-1.16	-1.70	-0.59	-0.42
31-Jul-07	Bear Stearns liquidates two hedge funds	-3.09	-3.60**	-0.90	-1.31	-1.47	-3.06**	-3.30	-4.81**	-1.54	-1.08
9-Aug-07	BNP Paribas halts redemptions	-4.77	-5.56**	-5.23	-7.65**	-0.86	-1.79	-3.51	-5.12**	-1.82	-1.28
28-Aug-07	German Sachsen fails	-1.45	-1.69	-3.16	-4.63**	-1.78	-3.71**	-2.10	-3.06**	-0.31	-0.22
3-Sep-07	IKB announces loss	0.63	0.74	0.76	1.11	0.04	0.08	0.64	0.93	-1.26	-0.88
13-Sep-07	Northern Rock asks for emergency support	1.06	1.23	-0.16	-0.24	0.27	0.56	1.78	2.60**	0.04	0.03
14-Sep-07	Bank of England is authorized to support Northern Rock	-2.70	-3.14**	-3.11	-4.55**	-0.84	-1.76	-0.64	-0.93	-1.11	-0.78
1-Oct-07	UBS announces loss	1.58	1.84	-0.20	-0.29	1.03	2.15*	1.50	2.19*	1.25	0.88
30-Oct-07	Merrill Lynch's CEO resigns	1.03	1.20	0.13	0.19	0.34	0.71	-0.01	-0.01	1.22	0.86
19-Dec-07	S&P downgrades monoline insurers	-0.79	-0.92	-1.58	-2.31*	-0.65	-1.35	-1.48	-2.16*	0.20	0.14
18-Jan-08	Fitch downgrades Ambac and S&P places credit watch on Ambac	-2.90	-3.38**	1.01	1.47	-1.55	-3.23**	-5.71	-8.33**	-0.88	-0.62
8-Feb-08	The number of house possession rises to its highest level in the UK	-1.71	-1.99*	0.72	1.05	-1.00	-2.08*	-1.75	-2.56*	-1.56	-1.10
17-Feb-08	Northern Rock bankrupts	2.61	3.04**	2.00	2.92**	1.03	2.14*	5.41	7.89**	1.50	1.05
24-Mar-08	JP Morgan buys Bear Stearns	-4.89	-5.70**	-6.44	-9.43**	-3.36	-7.00**	-4.48	-6.53**	0.31	0.22
11-Apr-08	CML warns	-2.80	-3.26**	-1.63	-2.39*	-0.45	-0.93	-1.14	-1.66	-1.06	-0.75
15-Apr-08	UK housing market's confidence falls	-0.21	-0.24	-0.93	-1.35	-0.73	-1.53	0.21	0.30	0.97	0.69
22-Apr-08	RBS plans to raise money	-1.36	-1.58	-1.70	-2.49*	-1.10	-2.29*	-2.41	-3.52**	1.29	0.91
25-Apr-08	Persimmon announces major cutbacks	0.37	0.44	0.85	1.24	0.63	1.32	0.93	1.35	1.62	1.14
29-Apr-08	CML reports a huge slip on newly approved mortgages	-1.90	-2.21*	-1.45	-2.13*	-0.10	-0.20	-1.31	-1.92	-3.19	-2.24*
22-May-08	Swiss bank issues rights to cover some loss	1.84	2.15*	-0.45	-0.66	0.84	1.75	-1.21	-1.76	0.23	0.16
25-Jun-08	Barclays plans to raise £4.5bn in a share	2.37	2.76**	2.86	4.18**	0.38	0.80	0.93	1.35	1.42	1.00
11-Jul-08	IndyMac Bank fails	-1.85	-2.16*	-6.63	-9.70**	-2.14	-4.45**	-4.38	-6.38**	-1.14	-0.80
13-Jul-08	FED New York is authorized to lend Fannie Mae and Freddie Mac	-0.53	-0.62	3.94	5.76**	-0.21	-0.43	0.37	0.55	-0.54	-0.38
21-Jul-08	Just 8% of HBOS investors agree to take up the new shares	1.19	1.38	2.58	3.78**	0.43	0.89	3.44	5.01**	2.92	2.05*
4-Aug-08	HSBC warns off bad conditions	-0.37	-0.43	0.58	0.84	-0.58	-1.20	0.05	0.08	-0.44	-0.31
9-Aug-08	BNP Paribas is unable to value assets in its funds.	1.79	2.09*	5.00	7.32**	0.69	1.44	1.14	1.66	0.55	0.38
7-Sep-08	Nationwide announces merge	2.72	3.17**	10.26	15.02**	2.74	5.72**	5.59	8.15**	1.35	0.95
10-Sep-08	Fannie Mae and Freddie Mac fails and nationalized	0.29	0.34	-5.34	-7.82**	-1.40	-2.92**	-1.53	-2.24*	-6.55	-4.60**
11-Sep-08	Lehman Brothers announces loss and looks to be sold	-2.00	-2.33*	-5.38	-7.88**	-0.66	-1.37	-2.21	-3.22**	-3.11	-2.19*
15-Sep-08	Lehman Brothers' bankruptcy	-8.67	-10.10**	-6.48	-9.48**	-3.43	-7.14**	-6.72	-9.79**	-3.11	-2.18*

Table 4.5 (cont'd)

Country		Poland		Portugal		Spain		Sweden		Switzerland		UK	
Date	Event	Abnormal return	T-test	Abnormal return	T-test	Abnormal return	T-test	Abnormal return	T-test	Abnormal return	T-test	Abnormal return	T-test
7-Feb-07	HSBC announces loss	0.01	0.02	0.28	0.27	0.41	0.92	0.24	0.24	-0.04	-0.05	-0.06	-0.11
2-Apr-07	New Century bankrupts	1.30	1.60	0.66	0.63	1.40	3.16**	1.11	1.13	1.05	1.48	0.33	0.55
7-Jun-07	Bear Stearns suspends redemptions from its fund	-2.60	-3.19**	-0.35	-0.34	-1.85	-4.17**	-3.38	-3.44**	-0.12	-0.17	-0.44	-0.75
31-Jul-07	Bear Stearns liquidates two hedge funds	-2.63	-3.23**	-2.73	-2.59**	-2.07	-4.66**	-2.30	-2.34*	1.05	1.49	-2.14	-3.64**
9-Aug-07	BNP Paribas halts redemptions	-1.28	-1.58	-0.85	-0.80	-1.25	-2.82**	-2.68	-2.72**	-0.93	-1.32	-2.70	-4.58**
28-Aug-07	German Sachsen fails	-1.16	-1.43	-2.82	-2.68**	-1.76	-3.97**	-2.87	-2.91**	-1.10	-1.56	-2.43	-4.13**
3-Sep-07	IKB announces loss	-0.25	-0.31	1.39	1.32	0.60	1.36	2.08	2.11*	-0.09	-0.12	1.40	2.39*
13-Sep-07	Northern Rock asks for emergency support	1.24	1.53	-1.61	-1.53	1.33	3.00**	0.65	0.66	-0.23	-0.33	0.10	0.17
14-Sep-07	Bank of England is authorized to support Northern Rock	-0.81	-1.00	-2.27	-2.15*	-2.23	-5.03**	-2.65	-2.69**	-0.57	-0.81	-1.56	-2.66**
1-Oct-07	UBS announces loss	0.52	0.64	0.28	0.26	0.51	1.15	1.39	1.42	0.18	0.26	-0.09	-0.16
30-Oct-07	Merrill Lynch's CEO resigns	-0.09	-0.11	-0.07	-0.06	1.07	2.41*	0.65	0.66	-0.07	-0.10	-0.22	-0.37
19-Dec-07	S&P downgrades monoline insurers	1.05	1.29	-0.74	-0.70	-1.06	-2.40*	-0.82	-0.83	-0.28	-0.40	-0.07	-0.12
18-Jan-08	Fitch downgrades and S&P places credit watch on Ambac	1.46	1.80	-1.73	-1.64	-2.37	-5.34**	-2.01	-2.04*	0.28	0.39	-1.65	-2.80**
8-Feb-08	House possession rises to its highest level in the UK	-0.65	-0.80	-3.65	-3.46**	-0.52	-1.18	-0.62	-0.63	-0.29	-0.41	0.31	0.53
17-Feb-08	Northern Rock bankrupts	1.54	1.90	-0.59	-0.56	1.91	4.31**	2.39	2.43*	0.71	1.00	4.74	8.05**
24-Mar-08	JP Morgan buys Bear Stearns	-2.88	-3.54**	-1.48	-1.41	-2.90	-6.54**	-4.91	-4.99**	-2.30	-3.26**	-6.93	-11.78**
11-Apr-08	CML warns	-2.85	-3.50**	3.77	3.58**	-1.40	-3.17**	-2.02	-2.05*	-0.12	-0.17	-1.27	-2.15*
15-Apr-08	UK housing market's confidence falls	0.89	1.10	-2.31	-2.19*	1.04	2.34*	-0.42	-0.43	-0.19	-0.28	0.10	0.17
22-Apr-08	RBS plans to raise money	-1.94	-2.38*	-0.86	-0.82	-1.39	-3.14**	-1.89	-1.92	0.53	0.75	-1.60	-2.72**
25-Apr-08	Persimmon announces major cutbacks	0.99	1.22	1.29	1.22	0.70	1.59	1.45	1.48	0.71	1.00	1.71	2.90**
29-Apr-08	CML reports a huge slip on newly approved mortgages	-2.11	-2.60**	-2.46	-2.33*	-0.70	-1.57	-1.05	-1.07	-0.32	-0.45	-1.42	-2.42*
22-May-08	Swiss bank issues rights to cover some loss	-0.97	-1.20	1.40	1.33	-0.84	-1.90	0.99	1.01	-0.26	-0.37	-1.02	-1.73
25-Jun-08	Barclays plans to raise £4.5bn in a share	-0.31	-0.38	1.91	1.82	2.19	4.95**	2.79	2.83**	0.67	0.95	3.93	6.67**
11-Jul-08	IndyMac Bank fails	-1.58	-1.94	-3.72	-3.54**	-3.44	-7.76**	-2.49	-2.53*	-0.59	-0.83	-6.01	-10.20**
13-Jul-08	FED New York is to lend Fannie Mae and Freddie Mac	0.78	0.96	-3.86	-3.67**	0.07	0.15	4.02	4.08**	-0.73	-1.03	1.23	2.10*
21-Jul-08	Just 8% of HBOS investors agree to take up the new shares	2.94	3.62**	-0.07	-0.06	-0.28	-0.64	0.24	0.24	2.57	3.64**	1.07	1.81
4-Aug-08	HSBC warns off bad conditions	-0.50	-0.62	-1.39	-1.32	-1.35	-3.05**	0.63	0.64	-0.20	-0.28	-1.58	-2.68**
9-Aug-08	BNP Paribas is unable to value assets in its funds.	0.94	1.16	3.90	3.70**	3.13	7.06**	2.31	2.35*	0.28	0.39	2.54	4.32**
7-Sep-08	Nationwide announces merge	5.18	6.38**	3.75	3.56**	5.38	12.14**	6.63	6.74**	1.79	2.53*	8.91	15.14**
10-Sep-08	Fannie Mae and Freddie Mac fails and nationalized	-2.38	-2.93**	0.01	0.01	-1.58	-3.57**	-2.25	-2.28*	0.03	0.04	-3.19	-5.41**
11-Sep-08	Lehman Brothers announces loss and looks to be sold	-1.39	-1.71	-2.40	-2.28*	-0.83	-1.87	-1.59	-1.61	-1.50	-2.13*	-2.18	-3.70**
15-Sep-08	Lehman Brothers' bankruptcy	-4.01	-4.94**	-3.55	-3.37**	-4.71	-10.64**	-4.90	-4.98**	-1.49	-2.12*	-5.91	-10.03**

Table 4.6: Summary Statistics

Table displays summary statistics of dependent variables (Mean-adjusted AR and Market-adjusted AR), bank characteristics and macroeconomic factors

Variables	Mean	Median	Sd.	Min	Max
Mean-adjusted AR	-0.46	-0.28	0.062	-10.57	11.88
Market-adjusted AR	-0.08	-0.08	0.045	-9.599	11.61
Capital Ratio	6.27	5.95	0.064	2.100	13.13
NPL Ratio	2.54	1.51	0.065	0.100	12.47
LoanstoDeposits	90.71	89.29	0.772	0.030	178.92
Assetstructure	0.76	0.58	0.021	0.004	4.20
Size	25.12	25.33	0.054	19.33	28.36
ROE	18.32	18.14	0.174	4.460	45.42
Inflation	2.03	1.86	0.019	1.060	3.93

Table 4.7: Heteroskedasticity Test

Table reports Breusch Pagan test results

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Dependent Variable	Mean-adjusted AR	Market-Adjusted AR	Mean-adjusted AR	Market-Adjusted AR	Market-Adjusted AR	Market-Adjusted AR
Heteroscedasticity Test (p-value)	0.000**	0.000**	0.000**	0.134	0.909	0.043
Type of Standard Errors	White SE	White SE	White SE	-	-	White SE
Country Fixed-Effect	No	No	Yes	No	No	Yes

Note: **and* denote significance level at 1% and 5%, respectively.

Table 4.8: Pooled-OLS Regression Results

Table reports the Pooled-OLS regressions results of dependent variable (mean-adjusted and market-adjusted abnormal returns) on bank characteristics and macroeconomic factors

Variables	PANEL A			PANEL B		
	Mean-adjusted AR			Market-adjusted AR		
	(1)	(2)	(3)	(4)	(5)	(6)
ROE	-0.0153*	-0.0174**	-0.0149	-0.0121*	-0.0148**	-0.0102
	(0.062)	(0.046)	(0.240)	(0.082)	(0.044)	(0.255)
CapitalRatio	0.0343	0.0220	0.00925	0.0594**	0.0440	0.0109
	(0.331)	(0.557)	(0.875)	(0.024)	(0.113)	(0.805)
NPLRatio	-0.0255	-0.0298	-0.0206	-0.0279	-0.0332	-0.0233
	(0.318)	(0.248)	(0.514)	(0.168)	(0.105)	(0.302)
LoansDeposits	-0.000518	0.00000267	-0.00169	-0.00151	-0.000859	-0.00161
	(0.811)	(0.999)	(0.627)	(0.325)	(0.588)	(0.500)
AssetStructure	-0.0248	0.00159	-0.0539	-0.0615	-0.0283	-0.0467
	(0.772)	(0.986)	(0.630)	(0.337)	(0.671)	(0.564)
Size	-0.0149	-0.0184	-0.00130	-0.00411	-0.00848	-0.00921
	(0.730)	(0.673)	(0.984)	(0.899)	(0.795)	(0.843)
Inflation		-0.0213			-0.0253	
		(0.860)			(0.735)	
GDPgrowth		0.0509			0.0643	
		(0.436)			(0.176)	
Constant	0.109	0.149	0.0384	0.130	0.177	0.687
	(0.926)	(0.901)	(0.981)	(0.884)	(0.846)	(0.557)
Country Fixed Effects	No	No	Yes	No	No	Yes
Obs.	1728	1728	1728	1728	1728	1728
adj. R-sq	0.000	-0.000	-0.003	0.007	0.007	0.009

Notes: Mean-Adjusted AR= Mean-adjusted abnormal return; Mean-Adjusted AR= Market-adjusted abnormal return; ROE = Return on equity; NPLRatio = Nonperforming loan ratio; LoansDeposits = Loan-to-deposit ratio; Inflation = Inflation rate; and GDPgrowth = Gross domestic product growth. p-values are given in parenthesis. t-statistics are in parenthesis. ** and * denote significance levels at %5 and *10%, respectively

CHAPTER 5

CONCLUSIONS

The global financial crisis had tremendous adverse economic effects on economies around the globe. Although the crisis erupted in the US as a subprime mortgage crisis, it turned into a liquidity crisis with the collapse of the Lehman Brothers. The failure of Lehman Brothers is a turning point that proves large banks' contribution to global financial instability. This thesis explores how and to what extent investors reacted to the growth strategy of bank holding companies and significant market events during the Global Financial Crisis.

In the second chapter of the thesis, using the event study methodology, we analyze how bank holding companies' returns react to firm-specific events in the pre-crisis period (including Lehman Brothers' collapse) in the 2007-2008 financial crisis. We show that investors react significantly to 19 of the 23 events in the sample. As the crisis drew closer, investors reacted more significantly to the information released in sample events.

In the third chapter, we analyze how the growth strategy of a bank affects investors' reactions to significant events during the crisis. To analyze this effect, we construct a merger index and determine market events during the crisis. By applying pooled-OLS regression, we also control for several bank characteristic variables. Our results suggest that growing through mergers has a negative effect on investors' reactions to significant events after the Lehman Brothers' collapse but not before. Our interpretation of the results is that growing through mergers increases the likelihood of being bailed out by regulators and helps large banks to overcome difficult conditions. However, bailing out costs lead to a fiscal burden on society and might cause negative investor reactions during the crisis.

In the final chapter, we examine how European banks' returns react to firm-specific events in the pre-crisis period (including Lehman Brothers' collapse) in the GFC. We use the event study methodology to find abnormal returns of 54 banks from 16 countries in Europe. We also applied pooled-OLS regression to determine bank characteristics and macroeconomic factors that might have an effect on cross-sectional variations of investor reactions to significant events. Our results suggest that the Lehman Brothers' collapse is a turning point of the GFC, and European investors react significantly to the pre-crisis events. As the crisis drew closer, investor reactions in Europe markets became more significant. In addition, we find that return on equity and capital ratio might have an effect on cross-sectional variations of investor reactions to significant events.

5.1. Social and Political Implications

The thesis has some policy implications. First, by pointing out the severity of the crisis, the thesis stresses the need for individuals, communities, and governments to engage in proactive risk management to reduce the negative effects of financial shocks. In order to mitigate any adverse social and economic effects of a crisis, regulators should put in place appropriate contingency planning systems and improve our ability to understand interconnected financial, sovereign, real, and social risks. Second, the global financial crisis has shown that too-big-to-fail banks pose a systemic risk and the failure of a large bank cause unexpected harm to the economy. As a result, a failure requires regulators to bail out large banks. However, the economic and social cost of bailouts might create unbearable fiscal burdens and costs to society. In addition, Garmaise and Moskowitz (2006) point out that there is a correlation between bank mergers and negative outcomes, such as weaker lending conditions, less development and investment, lower real estate values, an influx of poorer families, and more property crime in the areas most impacted by the mergers. Hence policymakers should design an optimal strategy which balances the cost of social and economic impacts of bailouts. Furthermore, as merging is a strategy for large banks to grow when evaluating a proposed merger, authorities should consider competition concerns, as well as the needs of the community and potential threats to the financial system. Throughout the merger assessment process, the regulators should define and follow clear guidelines, such as analyzing whether combined

banks would be professionally managed and sufficiently financed and whether a merger would jeopardize financial stability. Furthermore, banks should be required to produce quantitative assessments of how planned mergers would influence their communities.

The thesis has a few limitations. For the first and third chapters, our sample only covers large banks in developed economies; further research might expand the study into different sizes of banks and emerging economies. For the third chapter, the sample database includes only FDIC insured target banks' asset values. In addition, we do not divide our sample by type of mergers (such as FDIC or government-assisted or not, etc.). Further studies might look into different countries with broad databases and different types of merges.

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