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Deborah Smith
Cleveland State University, d.l.smith11@csuohio.edu

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The stock market impact of government interventions on financial services industry groups: Evidence from the 2007–2009 crisis☆

Anita Pennathur[a], Deborah Smith[c], Vijaya Subrahmanyam[b,*]

[a] *Florida Atlantic University, Boca Raton, FL, United States*
[b] *School of Business and Economics, Department of Finance, Mercer University, 3001 Mercer University Dr., Atlanta, GA 30341, United States*
[c] *Finance, Cleveland State University, Cleveland, OH, United States*

1. Introduction

The magnitude and the causes of the financial market crisis of 2007–2009 have been extensively described and debated. Our research adds to the literature and examines the impact of a series of governmental interventions in response to the financial crisis of 2007–2009 on the stockholder returns of banks, Savings and Loans (S&Ls), insurance companies, and REITs. We examine the stock market reaction to nine economic stimulus interventions and financial stability interventions to investigate whether they increase value and reduce risk for financial services firms. These nine events are selected because they are not firm-specific, but contain firm-, industry-, and sector-level impacts, and signify possible linkages between the real estate and financial sectors. We investigate whether these government interventions led to differential changes in abnormal returns and systematic risk among financial institutions. While scholars have researched the impact of particular interventions, chiefly the Troubled Asset Relief Program (TARP), they have not analyzed the impacts of a broader swath of interventions with respect to differential abnormal returns and differential changes in systematic risk. Our paper fills this gap.

The primary contribution of our study is that, to our knowledge, it is the first to examine the impact of interventions in a multi-event framework over the 2007–2009 crisis period. The second important contribution is that, while most studies of the recent financial market crisis focus on banks, we explicitly examine the differential impacts of the interventions on S&Ls, insurance companies, and REITs as well as banks for changes in both returns and risks. The financial crisis is closely linked to the housing market crisis, a link that provides an opportunity to study how various governmental interventions impacted other financial institutions. Third, we test for firm-specific determinants of the differential impact of these interventions.

In response to the financial crisis, the U.S. government intervened by taking various measures, including (a) controversial and expensive economic stimuli, commonly known as the bailout of the U.S. financial system, particularly directed at the banking sector, the insurance industry, and the housing market; and (b) planned financial stability interventions focused on the banking sector and the housing market. A number of recent studies on the financial crisis examine the impact of the TARP intervention on banks. For instance, Veronesi and Zingales (2010) examine the costs and benefits of the U.S. government plan that injected preferred equity into nine of the largest commercial banks in the U.S. Based on a complete wealth analysis using an event study of bonds, preferred stock, and common equity value around the date of the planned infusion, they conclude that, though government intervention reduced enterprise value by 2.5%, it also simultaneously reduced the risk of bankruptcy, which could have resulted in a larger loss of value. In their study of government equity infusions and incentives for banks to participate in the TARP Capital Purchase Program (CPP), Bayazitova and Shivdasani (2012) note that because CPP infusions took the form of preferred equity, common equity became more critical in the bank capital structure. In other words, regulatory interventions in the banking industry may now need to be implemented more quickly because common equity is the only buffer in the bank's capital. Therefore, they argue that TARP may have changed investors' expectations regarding future governmental interventions (Bayazitova & Shivdasani, 2012).

Gaby and Walker (2011) discuss the impact of TARP on financial institutions by modeling stress tests that were applied to major balance sheet items of the four largest banks. They point out that if all four of the banks had failed, the loss to the taxpayers would have been enormous. Li (2012) evaluates the stimulus effects of TARP to examine whether the capital infusions increased the supply of credit in the economy during the financial crisis. Li notes that while loan supplies increased, banks kept a third of the TARP monies to support new loans and used the rest to shore up capital. Black and Hazelwood (2012) examine the impact of TARP on banks' risk-taking. Their results indicate that the average risk of loan originations increased for large TARP banks as opposed to non-TARP banks. Further, they find differences in risk-taking behavior with large and small banks owing to the conflicting objectives given to TARP banks: to increase lending in a riskier economic period while also increasing bank stability and reducing incentives to take on excessive risk.

The impact of governmental interventions on insurance companies and REITs has received relatively less attention with regard to this financial crisis. Schich (2009) notes that while the solvency

of the insurance sector as a whole did not appear to be in jeopardy, the financial crisis had visibly impacted many insurance companies because of their portfolio structure. He also notes that insurance companies, particularly those in the financial guarantee and U.S. mortgage insurance areas, had investment portfolios that were directly exposed to credit and market risks during the crisis period. Kočović, Rakonjac-Antić, and Jovović (2011), in their study of the impact of the global financial crisis on the scale and structure of insurance company investment portfolios, state that the effects of the crisis on these portfolios were not apparent until the end of the crisis. Basse, Friedrich, and Vazquez Bea (2009) find that during the crisis, investing in REITs became riskier than investing in some other financial assets. Devaney (2012) examines the SEC ban on short sales during the crisis to find increased event-induced volatility for his sample of 64 REITs.

While these studies provide us with significant insights about the single intervention events (such as the functioning of TARP), the panoply of interventions over 2007–2009 implies the need for a multi-intervention event study. Reviewing the various governmental interventions, we chose nine events that we believe largely impacted banks, S&Ls, insurance companies, and REITs. We focus on the economic stimuli and planned financial stability interventions that impacted the housing, banking, and insurance industries. Details of each event, reasons for its selection, and the expected market reactions are discussed in the next section of the paper.

The nine interventions studied here have far-reaching implications beyond providing funds for closing and reorganizing insolvent financial institutions because they alter the legal and regulatory landscape for the industry. There has been spirited disagreement about the impact of such measures, particularly the economic stimuli and the regulations that followed.[1] By examining the impact on all four types of institutions, our research adds value to the broader literature on the impact of regulation on return and risk. According to Kaufman (2010) and Griffiths, Kotomin, and Winters (2011), a through forensic analysis of the financial crisis must precede corrective public policy; this paper is a step in that direction and adds value to the literature on the financial market crisis.

Using seemingly unrelated regressions (SUR) methodology and the panel regression method, we examine the stock market reaction of 602 financial services firms as a whole and for each of the four sub-groups. We find that seven of the nine intervention events, on average, have a highly significant negative market reaction. Interestingly, the one event that resulted in a positive market reaction for all sub-groups was the October 3, 2008, legislation that passed TARP. Among the industry groups examined, our results confirm the market perception that the banking industry was the hardest hit during the crisis. Moreover, we find that alphas for our sample of firms decrease significantly in the post-event periods, while betas increase. Thus, overall, the interventions decreased value and increased risk for financial institutions as a whole. On the sub-group level, we find that the governmental interventions result in an increase of systematic risk for banks, insurance companies, and REITs. We also examine the cross-sectional determinants of abnormal stock returns and risk shifts for the financial institutions. The cross-sectional results show that leveraged firms and firms with higher trading volumes earn significantly lower period-abnormal returns, while larger firms that trade on smaller exchanges earn higher abnormal returns. We find that larger firms experience increases in systematic risk, while non-U.S. firms experience lower changes in systematic risk for both the during- and post-crisis periods.

The remainder of the paper is organized as follows: We describe the background and review the literature in Section 2, present the research hypothesis in Section 3, describe data and methods in Section 4, report the empirical results in Section 5, and present our conclusions in Section 6.

[1] In March 1999, Alan Greenspan appeared skeptical that the regulations would alleviate the problems facing the financial institutions industry. He states, "[P]ossibility of increased systemic risk does appear to be an issue that requires fuller understanding," arguing that new regulations "would be a major mistake." ("What created this Monster?" *New York Times*, March 23, 2008). Further, Mr. Nocera notes that support for regulation surprisingly came from folks such as Rep. Barney Frank, Byron Wien of Pequot Capital, Laurence Fink of BlackRock, the economist Alan Blinder, Allan Sinai of Decision Economics, Jamie Dimon of JPMorgan Chase, and "even Larry Kudlow, the archconservative host of Kudlow & Company on CNBC" ("A System Overdue for Reform," Joe Nocera, *New York Times*, March 29, 2008).

2. Background and literature review

2.1. Background

A crisis in the banking sector, such as the failure of Continental in 1984, the failure of The Bank of New England in 1991, the 1989 S&L crisis, or the recent 2007–2009 financial crisis, typically results in loss of public confidence in solvent institutions and loss of liquidity in the troubled bank and the banking industry. These changes then result in a plunge of stock prices and an increase in systematic risk for firms because, as information about the asset quality of banks is uncovered, market prices tend to be revised downward. As in the case of the 1989 S&L crisis, the 2007–2009 financial crises was preceded by overvaluation of the real estate sector, which spread to the banking industry (banks and S&Ls) through the linkages between the real estate sector and the financial sector via mortgage lending and securitization. The introduction of credit default swaps (CDS), issued by insurance companies, also linked in the insurance industry and placed it in the center of the crisis.

In this paper, we focus on four types of financial institutions: banks, S&Ls, insurance firms, and REITs. The rationale for choosing banks and S&Ls is self-evident because they shed light on the impact of economic stimuli and planned financial stability interventions on the banking sector, the major focus of such interventions. Examining banks, S&Ls, and REITs sheds light on the impact of interventions on the housing sector. We chose insurance companies because they offer credit default swaps that made them a catalyst in the financial crisis in general and in the banking and real estate sectors in particular, exposing their portfolios to market and credit risks. A brief discussion follows on the rationale behind including the four types of financial institutions.

2.1.1. Banks and S&Ls

As more information was uncovered about their operations, banks and S&Ls started to be seen as major private-sector catalysts for the credit boom and also precipitators of the recent crisis. Wilmarth (2009) and Kaufman (2010) provide excellent summaries of the role of banks in the financial crisis. Even prior to the crisis, S&Ls were largely losing favor and declining, with many thrifts converting their charters to banks. Although the financial crisis of 2007–2009 is considered largely banking-centered, "five of the seven biggest financial institution failures in 2007 and 2008 were OTS-regulated thrifts" (McCoy, 2009). The collapse of the thrifts was blamed on irresponsible loan decisions and some regulatory mistakes by the Office of Thrift Supervision (OTS) (McCoy, 2009).[2]

With the passage of the 1999 Financial Services Modernization Act, also known as the Gramm Leach Bliley (GLB) Act, consolidation and conglomeration have marked the financial services industry. Whether these changes benefited banks or increased risks is still inconclusive. Mamun, Hassan, and Van Lai (2004) show that, by exploiting the diversification opportunities afforded by the GLB Act of 1999, the financial services industry reduced the exposure of financial services to systematic risk. They further note that the banking industry, especially larger banks, benefited most from the GLB Act deregulations. In contrast, Rajan (2006) discusses the strategy that some banks used of offloading more plain vanilla risks from their balance sheets into the balance sheets of investment managers, insurance companies, and pension funds. In a post-mortem analysis, Wilmarth (2009) notes that while they generated revenue, GLB and the resulting strategy shifts also significantly increased systemic risk in both U.S. and global financial markets.

2.1.2. Insurance companies

The volatility in the markets during the crisis did not impact insurance companies heavily because they had minimal risk exposure from the housing market collapse. Furthermore, their investment focus is largely long-term because they were not originators or major investors of mortgage-based financial instruments (Schich, 2009). These facts may suggest that insurance companies were minimally affected by the crisis. However, financial guarantee companies are involved in activities similar to investment banks, such as the now-infamous credit default swaps. These activities contributed to

[2] "US Thrift Charter May Be Hard To Kill." *Wall Street Journal*, 2009.

increased risk, placing the insurance industry in the epicenter of the crisis, in step with banks and thrifts.

2.1.3. REITs

By the end of 2008, U.S. REITs, deeply burdened with debt and confronted with illiquidity in a falling real estate market, faced both increased cost of capital and difficulty in finding capital.[3] Devaney (2012) examines the risk and return impact of the SEC ban on short selling on a sample of REITs to find that the firms experienced significant event-induced risk. He concludes that the ban induced volatility in both the REITs on the short-sale restriction and on unrestricted REITs as well. Thus, we include REITs in our sample to analyze the impact of interventions in the real estate sector.

2.2. Literature review

The causes of the financial crisis of 2007–2009 are manifold, with a large convergence toward the following: the housing boom in the U.S., low interest rates that fueled the boom, careless lending and investment decision-making, poor earnings management, lack of oversight on the part of the regulators, and the underestimation of systemic risks emerging out of the housing and mortgage market (Basse et al., 2009; Wilmarth, 2009; Kaufman, 2010; Cohen, Cornett, Marcus, & Tehranian, 2012).

This paper relates to two broad strands of literature on financial institutions. The first strand focuses on the stock market reaction to regulatory events. Sundaram, Rangan, and Davidson (1992) use a sample of banks and S&Ls to analyze the stock market perception of the debate and passage of the Financial Institutions Reform, Recovery, and Enforcement Act (FIRREA) of 1989. Their evidence suggests that FIRREA produced positive abnormal returns for both banks and S&Ls, and that the addition of stricter capital standards produced positive returns for S&Ls. They also note the passage of FIRREA increased the risk for both banks and S&Ls, perhaps owing to increased costs of premiums for both groups. In their study of the impact of FIRREA on the risk profiles of savings institutions, Madura and Wiley (2000) find a reduction in interest rate risk and real estate risk. They also find that the results vary across savings institutions, with smaller institutions and institutions with higher levels of capital exhibiting a more marked reduction in risk. Mamun et al. (2004) find that the financial services industry gained from the passing of the GLB Act in 1999, which significantly reduced the exposure to systematic risk. However, risk reduction, they note, was not uniform across the industry, and the banking sector gained the most in terms of reduced risk, followed by the insurance industry. More recently, Veronesi and Zingales (2010) examine the valuation effect of TARP on nine large banks by conducting a complete wealth analysis of the U.S. government intervention on October 14, 2008, via an aggregate event study. They note that the primary beneficiaries were bondholders. In their study of the market's perception of risk associated with deregulation, which uses nine different industries, including financial services, Semaan and Drake (2011) note a decrease in market risk for firms following deregulation, except in the case of insurance brokers. They also find that the security and commodity broker industry and bank holding companies experienced only a short-term increase in industry-specific risk in comparison to industry-systematic risk, and conclude that these industries learned to adapt to deregulation faster.

Elyasiani, Mester, and Pagano (2011) examine whether the market reactions to TARP infusions of capital were similar to capital infusions by investors in the markets. They find that investors reacted positively to the news of TARP injections but negatively to the news of capital injections through non-TARP funding. In a study examining the effect of TARP on increasing bank capitalization and reducing bank risk-taking, Black and Hazelwood (2012) note that size impacts risk-taking by banks. They also argue that TARP banks were given discordant objectives to (1) increase lending in a riskier economic period and (2) increase bank stability and reduce incentives to take on excessive risk. Utilizing a GARCH model, Cheng, Elyasiani, and Lin (2010) test the market reaction to the 2004 Spitzer suit on

[3] Ernst and Young (2010). Against all odds: Global Real Estate Investment Trust Report, http://www.ey.com/Publication/vwLUAssets/Global-REIT-report-2010-Against-all-odds/$FILE/Global_REIT_report_2010_Against_all_odds.pdf

the insurance industry and find the various sectors of the insurance industry are closely integrated, resulting in negative sectoral contagion and positive competitive effects.

The second strand of literature examines characteristics of firms that are subject to government interventions. These studies examine factors that impact the differential effects of regulation, such as size, industry, and geography (Stigler, 1971; Peltzman, 1976; Binder, 1985b; Millon-Cornett & Tehranian, 1989; Cornett & Tehranian, 1990; Goddard, Molyneux, & Wilson, 2009; Cheng et al., 2010). More recently, Bayazitova and Shivdasani (2012) find that banks that received capital infusions under TARP tend to be larger, with lower capital ratios, lower market-to-book ratios, greater derivatives exposure, and weaker funding, and have better quality assets and operate in weaker-performing regions when compared with banks that did not receive TARP funds. Cohen et al. (2012) show that banks with a pattern of earnings management in bank financial statements in pre-crisis periods are more likely to show a larger propensity for downside risk during a crisis period. They also show that stock price crashes in these firms (tail risk) might signal impending problems in operating performance for these firms. Naceur and Omran (2011) use bank-level data from ten countries to assess the impact of financial development, bank regulations, market structure, and institutional factors on bank efficiency and profitability for the 1989–2005 period. They fail to identify any significant relationship between macroeconomic variables and bank performance, and note that banks operating in a well-developed stock market environment tend to have greater profit opportunities. Cornett, McNutt, Strahan, and Tehranian (2011) find that during the financial crisis, banks with more illiquid assets in their portfolios (more loans and securitized assets and less core deposits and capital) had more trouble lending relative to other banks. They find that constrained banks face off-balance sheet liquidity risk in the form of undrawn loan commitments, which largely contributes to diminished lending capacity. Diamond and Rajan (2001) suggest that banks might find equity capital a buffer in times of distress. Berger and Bouwman (2013) find that higher capital levels raise small banks' probability of survival at all times; however, for medium and large banks, they find that capital is especially helpful in times of crisis. This finding is even stronger if governmental interventions are limited. This implies that bank size in terms of holding capital is also an important factor in this study.

2.3. *Selected events and expected industry reaction to the events*

Our analysis requires identification of significant dates surrounding proposed or passed governmental measures during the 2007–2009 crisis period. As Binder (1985a) notes, the complexity of the legislative process and the multiple announcements made often make it difficult to isolate exactly when new information reaches the market. The purpose of this study is not to examine every single event, but to examine the impact of the major interventions for the period October 2007 through May 2009 on the four sub-groups of financial services firms. To identify dates for such measures, we begin by using the timeline of the financial crisis available at the Federal Reserve Bank of St. Louis. We use this timeline to parse out the significant dates when governmental measures were proposed or passed as acts, stimuli, or laws by the SEC, Treasury, or Federal Reserve Board. Because the root causes of the crisis were embedded in the housing markets and linked via mortgage lending and securitization to the banking and insurance sectors, we identify nine events that are not firm-specific, but rather demonstrate possible linkages among the real estate and financial sectors. Table 1 lists these nine dates. While we are aware of many other interventions and relevant events during this period, our intent is to focus on events that are not firm-specific (for instance, the Fannie/Freddie conservatorship, the AIG and Countrywide bailouts, and the Lehman failure). Furthermore, we confine our selection to those dates included in the Timeline of the Crisis posted by the St. Louis Federal Reserve.[4]

We present below a brief discussion of each event and the predicted sign of the coefficient for abnormal returns and risk. We also provide a summary of the predicted signs in Fig. 1. The first event we examine is the HOPE NOW initiative announced by then Treasury Secretary Henry Paulson, along with Housing Secretary Alphonso Jackson. This initiative was the earliest action taken by the government

[4] For instance, in the wake of the Lehman bankruptcy, on September 17, 2008, the SEC announced a temporary emergency ban on short-selling again, but this event is not included in the St. Louis Fed Timeline; therefore, we do not include it.

Table 1
Days of significant news announcements regarding regulations surrounding the financial crisis.

Event number	Event	Date	Description
D_1	HOPE NOW Press Release, Treasury Department Press Release	October 10, 2007	U.S. Treasury Secretary Paulson announces the HOPE NOW initiative, an alliance of investors, servicers, mortgage market participants, and credit and homeowners' counselors encouraged by the Treasury Department and the Department of Housing and Urban Development
D_2	Public Law 110–185	February 13, 2008	President Bush signs the Economic Stimulus Act of 2008 (Public Law 110–185) into law
D_3	SEC Press Release	July 15, 2008	The Securities and Exchange Commission (SEC) issues an emergency order temporarily prohibiting naked short-selling in the securities of Fannie Mae, Freddie Mac, and primary dealers at commercial and investment banks
D_4	Public Law 110–289	July 30, 2008	President Bush signs into law the Housing and Economic Recovery Act of 2008 (Public Law 110–289), which, among other provisions, authorizes the Treasury to purchase GSE obligations and reforms the regulatory supervision of the GSEs under a new Federal Housing Finance Agency
D_5	H.R. 1424, Public Law 110–343	October 3, 2008	Congress passes and President Bush signs into law the Emergency Economic Stabilization Act of 2008 (Public Law 110–343), which establishes the $ 700 billion Troubled Asset Relief Program (TARP)
D_6	Treasury Department Press Release, Fact Sheet	February 10, 2009	U.S. Treasury Secretary Timothy Geithner announces a Financial Stability Plan involving Treasury purchases of convertible preferred stock in eligible banks, the creation of a Public-Private Investment Fund to acquire troubled loans and other assets from financial institutions, expansion of the Federal Reserve's Term Asset-Backed Securities Loan Facility (TALF), and new initiatives to stem residential mortgage foreclosures and to support small-business lending
D_7	American Recovery and Reinvestment Act of 2009	February 17, 2009	President Obama signs into law the "American Recovery and Reinvestment Act of 2009," which includes a variety of spending measures and tax cuts intended to promote economic recovery
D_8	Treasury Department Press Release, Draft Legislation	March 25, 2009	The U.S. Treasury Department proposes legislation that would grant the U.S. government authority to put certain financial institutions into conservatorship or receivership to avert systemic risks posed by the potential insolvency of a significant financial firm. The authority is modeled on the resolution authority that the FDIC has with respect to banks and that the Federal Housing Finance Agency has with regard to the GSEs. The authority would apply to non-bank financial institutions that have the potential to pose systemic risks to the economy but that are not currently subject to the resolution authority of the FDIC or the Federal Housing Finance Agency
D_9	FDIC Press Release	May 20, 2009	President Obama signs the Helping Families Save Their Homes Act of 2009, which temporarily raises FDIC deposit insurance coverage from $ 100,000 per depositor to $ 250,000 per depositor. The new coverage at FDIC-insured institutions will expire on January 1, 2014, when the amount will return to its standard level of $ 100,000 per depositor for all account categories except IRAs and certain other retirement accounts. This action supersedes the October 3, 2008, changes

Event	Expected Sign							
	Banks		S&Ls		Insurance Companies		REITs	
	Returns	Risk	Returns	Risk	Returns	Risk	Returns	Risk
D1 (HOPE NOW)	+	+	+	+	NC	NC	+	+
D2 (Economic Stimulus Act of 2008)	+/-	+	+/-	+	+/-	+	NC	NC
D3 (SEC ban on short sales)	+	+	+	+	+	+	+	+
D4 (HERA)	+/-	+	+/-	+	+	+	+	+
D5 (TARP)	+/-	+/-	+/-	+/-	+	+	+	+
D6 (Financial Stability Plan)	+/-	+/-	+/-	+/-	+	+	+	+
D7 (ARRA)	NC	+/-	NC	+/-	NC	+/-	NC	+/-
D8 (Conservatorship of financial institutions)	-	-	-	-	NC	NC	NC	NC
D9 (Helping Families Save their Home Act of 2009)	+	+	+	+	NC	+	+	+

Fig. 1. Expected Signs of Events on Returns and Risk of Financial Institution.
For Returns: '+' implies an expected increase in abnormal returns; '−' implies an expected decrease in abnormal returns. '+/−' sign not predictable; i.e. return could go up or down; for risk: '+' implies an expected decrease in risk; '−' implies an expected increase in risk; '+/−' sign not predictable, i.e. risk could go up or down; NC: implies NO change is expected in returns (risk).

to stem the rising foreclosures as the subprime crisis began to emerge. The intent was to create an alliance between the banking and housing sectors. We expect to find this initiative to be a positive stock market event for banks, S&Ls, and REITs. To the extent that it reduces claims against credit default risk swaps by banks and S&Ls, it may impact insurance companies; thus, we expect little or no impact on insurance company returns. Because foreclosures decreased under this regulation, we expect to find that systematic risk for the banking and housing industries also decreased, representing a downward shift in beta for banks, S&Ls, and REITs. The second governmental intervention we examine is the Economic Stimulus Act of 2008, signed by President George W. Bush, which included rebate checks and two tax planning opportunities to help businesses and homeowners. The stimulus was intended to ameliorate the effects of an anticipated economic slowdown and, among other provisions, temporarily raise the limitations on the maximum original principal balance of residential mortgages in which Fannie Mae and Freddie Mac could invest. Many states also enacted anti-predatory lending laws, and several jurisdictions set ceilings based on some variation of the Fannie Mae or Freddie Mac conforming loan size limit. Households were expected to reduce their debt or save the monies[5] they received from the stimulus. As a result, it was expected that the banking industry would see lending improve and savings rise, while insurance companies would see fewer policies surrendered. Because rates were already low for lending, and defaults were still a challenge for banks and S&Ls, we expect to find that while banks may have benefited from reduced foreclosures, they may not have been able to lend easily unless the economy recovered concurrently. Therefore, it is difficult to predict whether returns of the financial institutions may have reacted positively or negatively to this news, while their risk may have decreased. Thus, we are unable to predict whether this is a positive or negative event for banks and S&Ls. For REITs, we do not expect any impact because the economic stimulus focused largely on residential mortgages rather than commercial real estate. The third event we examine is the passing of the SEC emergency ban on the naked short-selling of Freddie Mac and Fannie Mae and 799 financial companies. The concern was that short sales of these securities were causing unanticipated and extreme fluctuations of prices, and threatening the financial stability of the markets. We expect

[5] http://www.nber.org/digest/mar09/w14753.html

to find that this event positively affected all four types of financial institutions and led to a reduction in systematic risk owing to expected reduction in price volatility. We also expect to find that this reduction in short sales led to an increase in price and hence positive abnormal returns around this event date.

The fourth event we examine, the passing of the Housing and Economic Recovery Act (HERA) of 2008, authorized the Treasury to purchase GSE obligations; reform the regulatory supervision of the GSEs under a new Federal Housing Finance Agency; provide relief to lenders and borrowers, and take steps to prevent a future housing crisis; and reform regulations related to REITs. The REIT reforms and property development provided by HERA were expected to have the additional consequence of potentially alleviating the blight and property value loss associated with foreclosures. We expect to find that this event had a positive effect on REITs and insurance companies because the government covered the losses incurred by the GSEs. Regarding banks and S&Ls, we expect to find a mixed reaction based on the amount of GSE preferred shares held by the bank. We expect to find a reduction in systematic risk owing to lessened foreclosures and lowered defaults.

The fifth event we examine is the very controversial $ 700 billion Troubled Asset Relief Program (TARP), established by the Emergency Economic Stabilization Act of 2008 signed into law by President Bush. The purpose of the Act was to unfreeze the credit markets and revive the economy. We suspect that the markets were skeptical about such an expensive stimulus package and its effects. Evidence is mixed on whether the banks actually used the government monies to continue lending or instead to repair their own balance sheets (Li, 2012), although Li (2012) shows a positive stimulus effect of TARP on credit supply during the financial crisis. The impact of TARP on risk may be mixed and may be tied to bank size. Black and Hazelwood (2012) note that while loan risk increased for large bank recipients of TARP, the opposite was true for small banks. S&Ls were expected to have a similar reaction to the banks, while REITs and insurance companies were expected to benefit from the economic recovery. We expect to find that TARP reduced systematic risk in banks and S&Ls.

The sixth event we examine is Treasury Secretary Timothy Geithner's announcement of the Financial Stability Plan. The plan involved the Treasury's purchase of convertible preferred stock in eligible banks, the creation of a Public-Private Investment Fund to acquire troubled loans and other assets from financial institutions, the expansion of the Federal Reserve's Term Asset-Backed Securities Loan Facility (TALF), and the implementation of new initiatives to stem residential mortgage foreclosures and support small business lending. This plan was passed to restore confidence in financial markets and institutions, and to improve transparency. While some may have viewed the financial stability as positive, government investment in banks and S&Ls would create discomfort among others, who treated this event with skepticism, thus creating a negative reaction. We expect to find a mixed reaction in the market with respect to banks and S&Ls, but a positive reaction from REITs and insurance companies (those that provided credit risk insurance) owing to reduction in troubled assets on the bank balance sheets and reduced foreclosures. For these same reasons, we also expect to find a reduction in risk.

The seventh event we examine is the American Recovery and Reinvestment Act (ARRA) of 2009, a fiscal stimulus package intended to stabilize the financial markets and the housing sector by increasing aggregate demand[6] via $ 787 billion in tax cuts and government spending. The economic stimulus was expected to help small businesses grow, thereby promoting economic recovery, creating jobs, improving lending from financial institutions, and improving the housing sector. While the intent of the stimulus was to jumpstart the economy, the market perception, while positive, may have been muted because of the number of bailouts that had been witnessed at the time. Owing to uncertainty about the impact of the stimulus on the economy and thus the housing, insurance, and banking sectors, we cannot predict the direction of change in systematic risk.

The eighth event we examine is the proposed legislation to grant the U.S. government authority to move certain financial institutions into conservatorship or receivership. This legislation was proposed in order to avert systemic risks posed by the potential insolvency of a significant financial firm. Further, it may have created the perception in the markets that banks and S&Ls were becoming nationalized

[6] Strobel, Caroline D., American Recovery and Reinvestment Act 2009, Journal of Corporate Accounting & Finance (Wiley); Jul/Aug2009, Vol. 20 Issue 5, p83-85, 3p.

and therefore caused a decline in prices. We expect to find that this reaction was more pronounced in banks and S&Ls than in insurance companies and REITs. We expect to find a reduction in systematic risk owing to fewer foreclosures, lowered defaults, and the fact that the government was taking on the risk.

The last event that we examine is President Obama's signing of the Helping Families Save Their Homes Act of 2009, which temporarily raised FDIC deposit insurance coverage from $ 100,000 per depositor to $ 250,000 per depositor. This Act was expected to help lenders as well as households, resulting in a positive reaction from banks, S&Ls, and REITs; but no reaction was expected in returns for insurance companies. The Act was expected to ease restrictions on refinancing options and underwater mortgages for many borrowers. We expect to find the market react more positively toward S&Ls and REITs; and because it reduces claims against credit defaults, insurance companies may see a reduction in systematic risk.

3. Research hypothesis

Given the recent literature on regulatory interventions in the financial services industry (Bayazitova & Shivdasani, 2012; Gaby & Walker, 2011; Black & Hazelwood, 2012) that largely focuses on a single intervention (TARP) or on a single industry, our study extends existing research by examining how financial service firms reacted to a series of governmental interventions. Our research hypotheses are as follows:

Hypothesis 1. **$H0_1$:** The average excess returns for banks, savings and loans, insurance companies, and REITs during the announcement period are not significantly different from zero.

$H0_1$ is tested using a seemingly unrelated regressions (SUR) model in which we regress the returns for a portfolio of banks, savings and loans, insurance companies, and REITs against market returns, using a series of dummy variables to control for the release of information about the interventions. In this model, the reaction of banks, savings and loans, insurance companies, and REITs to the interventions can be measured separately to determine whether the new measures impacted these different financial institution groups differently. Our next hypothesis further addresses this issue.

Hypothesis 2. **$H0_2$:** The announcement period abnormal returns are not different for the four types of financial institutions.

Typically, the literature has shown that, besides intra-industry effects, the various interventions may not impact the different institutions the same way because of differences in portfolio structure and the nature of their businesses.

Changes in regulation also result in changes in risk for regulated firms. While some recent governmental interventions pervaded the entire industry, the portfolio structure of the firms may have resulted in different risk impacts for different sub-groups within the industry. In order to test for structural shifts in risk, we test the following hypothesis:

Hypothesis 3. **$H0_3$:** The systematic risk remained the same for financial institutions during and after the intervention period.

$H0_3$ can be examined in several ways. We test to determine whether the slope coefficients for the four types of financial institutions changed during the period when the intervention occurred and during the post-intervention period. A significant change in the coefficients represents a shift in beta risk for the firms.

4. Data and methodology

4.1. Data

The sample comprises all firms in the CRSP database with SIC codes from Banks (6020, 6021, 6022, 6029), Savings and Loans (6035, 6036), Insurance (6311–6399), and Real Estate Investment Trusts

Table 2
Sample descriptive statistics (as of October 2011).

Panel A. Firm characteristics						
Variable	*N*	Mean	Median	Std. Dev	Minimum	Maximum
Total assets	593	39,837	1747	202,208	18	1,965,159
Trading volume	593	94,376	9953	371,334	9	6,182,785
ROA	593	0.0180	0.0111	0.0246	−0.0936	0.1944
ROE	593	0.1073	0.1120	0.1476	−2.7586	1.0184
Profit margin	593	0.1392	0.1340	0.1920	−3.0311	1.1753
Debt ratio	593	0.6818	0.8886	0.3392	0.0000	0.9801
Panel B. Number of firms						
Variable	Total	Bank	S&L	Insurance	REIT	
Total firms	593	323	66	104	100	
Other OTC	26	19	5	1	1	
Foreign incorporated	25	24	0	1	0	
Big 8 Auditor	318	132	14	94	78	
Panel C. Banks characteristics						
Total assets	323	60,570	1644	264,554	117	1,965,159
Trading volume	323	84,014	3739	463,349	9	6,182,785
ROA	323	0.0099	0.0097	0.0050	−0.0237	0.0293
ROE	323	0.1146	0.1173	0.0584	−0.2263	0.2662
Profit margin	323	0.1390	0.1396	0.0663	−0.4420	0.3336
Debt ratio	323	0.9075	0.9106	0.0284	0.7652	0.9801
Panel D. S&L characteristics						
Total assets	66	2256	787	4339	174	28,482
Trading volume	66	26,560	1175	90,056	26	581,568
ROA	66	0.0058	0.0058	0.0040	−0.0057	0.0143
ROE	66	0.0565	0.0497	0.0436	−0.0330	0.1907
Profit margin	66	0.0912	0.0936	0.0625	−0.1039	0.1953
Debt ratio	66	0.8675	0.8822	0.0586	0.6645	0.9500
Panel E Insurance characteristics						
Total assets	104	34,207	4322	112,299	114	979,414
Trading volume	104	162,332	35,615	302,531	20	2,129,001
ROA	104	0.0391	0.0369	0.0287	−0.0487	0.1633
ROE	104	0.1389	0.1325	0.0898	−0.1337	0.7796
Profit margin	104	0.1225	0.1083	0.0860	−0.0480	0.4384
Debt ratio	104	0.0544	0.0415	0.0604	0.0000	0.4921
Panel F REIT characteristics						
Total assets	100	3530	2032	4566	18	30,716
Trading volume	100	101,931	72,850	131,837	28	906,919
ROA	100	0.0306	0.0255	0.0415	−0.0936	0.1944
ROE	100	0.0848	0.1070	0.3257	−2.7586	1.0184
Profit margin	100	0.1885	0.1848	0.4376	−3.0311	1.1753
Debt ratio	100	0.4824	0.4977	0.1914	0	0.8353

(6798). A total of 330 Banks, 67 S&Ls, 105 Insurance companies and 100 REITs included results in a total sample of 602 firms. The event period begins on October 10, 2007, and ends on May 20, 2009 (see Table 1), a period of 406 trading days. The sample period extends 100 trading days prior to and after the event period. In order to be included in the final sample, firms must be active for the entire sample period of 606 trading days. We collect return data for all firms in the appropriate SIC code from CRSP. Firms that do not have return data for the entire sample period are removed. The firms with complete returns make up the final sample list for each category. Firms are designated as Banks, S&Ls, Insurance firms, or REITs according to their SIC code in CRSP. Financial data are obtained from Compustat for S&Ls, Insurance firms, and REITs. Banking financial data are obtained from Compustat Bank Annual. For all firms, financial data are taken from the fiscal year end up to, but not exceeding, the month of September 2007, because the first event date is October 10, 2007. Thirteen firms do not have complete cross-sectional data and are omitted from the cross-sectional tests.

Panel A of Table 2 presents some descriptive statistics on key variables for our sample. The average firm size is $ 39.8 million, with an average trading volume of 94.3 million shares outstanding. Average ROE is about 10.73%, with an average profit margin of 13.92%; average ROA is 1.8%. The average debt

ratio for the sample is about 68%. Panel B of Table 2 gives details on the breakdown of firms. For the 593 firms with cross-sectional data, the sample comprises 323 commercial banks, 66 S&Ls, 104 insurance companies, and 100 REITs. Of these firms, 25 are incorporated overseas, while 26 trade on smaller exchanges (Other OTC); 318 firms, including 132 banks, use a Big 8 Auditor. We report the descriptive statistics by sub-group in Panels C through F of Table 2. On average, banks comprise the largest firms in terms of total assets ($ 60.57 million), while insurance firms report the highest mean trading volume (162.3), followed by REITs (101.9). Insurance companies report the highest ROA and ROE (3.91% and 13.89%, respectively), while REITs report the highest profit margin (18.85%). The highest debt ratios are found for banks (90.75%), followed by S&Ls (86.75%).

4.2. Methodology

4.2.1. Announcement effects and risk shifts

One of the difficulties in examining the effect of government intervention is to pinpoint the dates when value-relevant information about the proposed measure became available. To obviate this difficulty, we use the St. Louis Federal Reserve timeline on the financial crisis. The method of analysis is discussed in Binder (1985a, 1985b) and Boardman, Vertinsky, and Whistler (1997). The model is suitable to a regulatory event that includes multiple event dates and is used in a number of studies that examine wealth effects surrounding regulatory changes (Mitchell & Mulherin, 1988; Sundaram et al., 1992; Chhaochharia & Grinstein, 2007). We employ the same procedure, using portfolios, thereby also alleviating the problem of event day clustering. Specifically, our model is as follows:

$$r_{j,t} = a_j + a\prime_j D_P + b_j r_{mt} + b\prime_j D_0 r_{mt} + b''_j D_P r_{mt} + \sum C_{kj} D_{ik} + e_{jt} \tag{1}$$

where $r_{j,t}$ is the portfolio return for day t, a_j is the regression constant, a'_j is the shift in regression constant after the event period, r_{mt} is the S&P 500 Index return, b_j is the coefficient representing beta, b'_j is the coefficient representing a shift in beta during the event period, b''_j is the coefficient representing a shift in beta after the event period, D_0 is the dummy variable equal to 1 during the event period, D_P is the dummy variable equal to 1 after the event period, D_{ik} is the dummy variable equal to 1 on the day prior to and the day of event I, C_{kj} is the coefficient of the information dummy variable k for portfolio j, e_{jt} is the error term for portfolio j

The variable D_{ik} is a dummy variable equal to 1 for each of the dates corresponding to our events and the day prior to each event. Nine dichotomous variables, D_1 through D_9, mark each of the event dates and the date just prior equal to 1. An additional dichotomous variable, D_{10}, is equal to 1 for all the event dates and all the dates just prior to the event date. Thus, D_{10} is used as an alternative in the above equation to examine the cumulative impact of all the event dates. D_1 through D_9 produce the cumulative abnormal return for each event date, while D_{10} represents the cumulative abnormal return for all the event dates combined. Dummy variables are also created equal to 1 for the period from the first event to the last event (DurDummy, or D_0), and for the period immediately after the last event to the end of the sample period (PostDummy, or D_P). The model described above also specifies the systematic risk (beta) and shift in beta (risk shift) during and after the event period via the dummy variable D_0, and estimates the beta coefficient for the pre- and post-event periods.

4.2.2. Cross-sectional analysis

We next examine the impact of firm-specific characteristics on our full sample of firms via the following model:

$$\begin{aligned} D_{10} = {} & \beta_0 + \beta_1 \text{Size}_j + \beta_2 \text{Big 8 Auditor}_j \\ & + \beta_3 \text{Debt Ratio}_j + \beta_4 \text{Other OTC}_j \\ & + \beta_5 \text{ROE}_j + \beta_6 \text{Non US}_j + \beta_7 \text{Ln Volume}_j \\ & + \beta_8 \text{Size} * \text{Other OTC} + \beta_9 \text{Bank}_j + u_j \end{aligned} \tag{2}$$

We measure firm size by the natural log of the total assets of the firm. Big 8 Auditor is a dummy variable equals 1 if the firm uses a Big 8 auditor and is used to measure the reputation effect of the

firm. Debt Ratio is the debt-to-assets ratio of the firm and Other OTC is a dummy variable that equals 1 if the firm is listed as Other OTC (Compustat Exchange 19). ROE is firm Return on Equity, Banker is a dummy variable that equals 1 if the firm is a bank, and non-U.S. is a dummy variable that equals 1 if the firm is a non-U.S. firm. Trading Volume is the natural log of the monthly trading volume from CRSP, and Size*OTC is an interaction variable for firm size and exchange type. All values are for the fiscal year ending prior to September 2007.

Research on bank size and efficiency shows that banks from about $ 100 million to about $ 25 billion in size are the most efficient (Berger, Demsetz, & Strahan, 1999). However, Fok, Chang, & Lee (2004) argue that large banks have larger market shares and better access to capital and information, which should lead to greater profitability; hence, the relationship between size and abnormal return may be ambiguous. Nevertheless, much of the political debate during the financial crisis focused on the twin issues of "moral hazard" and "systemic risk"; and "Too-Big-To-Fail" became a rallying cry for both proponents and critics of the various legislations. We thus expect to see a positive relation between size and abnormal return for this crisis period. Research shows that the presence of a Big 8 accounting firm has a reputation effect. For example, Michaely and Shaw (1995) find that the market perceives IPOs associated with more prestigious auditors (Big 8 firms) as less risky, and that the long-run performance of IPOs is related to the prestige of the auditor used. In his study of the East Asian Crisis of 1997–1998, Mitton (2002) finds that significantly better stock price performance is associated with firms that had indicators of higher disclosure quality in the form of auditors from Big Six accounting firms. Thus, we posit a positive relation between auditor reputation (Big 8 Auditor) and abnormal return. Extant agency theoretic perspectives argue that debt can have a monitoring effect, and hence higher leverage may align managers to act in the interest of shareholders. Jensen and Meckling (1976), Williams (1987), and Berger and Bonaccorsi di Patti (2006) argue that the choice of leverage may be based on the efficient-risk hypothesis or the franchise value hypothesis, as follows: More efficient firms (those with higher profitability or ROE) choose higher leverage because their higher efficiency reduces the costs of bankruptcy and, thus, increased profitability (from increased efficiency) protects them from future crisis. The franchise value hypothesis is more in line with the reputational capital idea and argues that more efficient firms choose lower leverage (and higher capital) to protect their franchise value (reputation) to avoid any possibility of liquidation. Margaritis and Psillaki (2010) find that more leveraged firms have higher abnormal returns. Given the nature of the crisis and the bailouts that ensued, we predict a positive coefficient for more leveraged firms and a positive coefficient for ROE.

We also predict a positive sign for non-U.S. firms because we expect that these firms are somewhat sheltered from the impact of U.S. government interventions. We expect a positive coefficient on trading volume, because research shows that volume increases as a result of informed trading. Research also discusses the role of trading volume as an information variable, and indicates a positive relationship between returns and trading volume (Karpoff, 1987; Stickel & Verrecchia, 1994; Brailsford, 1996; Lee & Rui, 2002). Campbell, Grossman, and Wang (1993) note that volume tends to be higher when stock prices are increasing than when they are falling. We predict a negative coefficient for firms that trade on smaller exchanges (Other OTC); we also interact size and Other OTC and posit that abnormal performance is negatively related to larger firms that trade on smaller exchanges. Hegde, Lin, and Varshney (2010) find that NYSE spreads are smaller than NASDAQ (OTC) spreads and that more orders are placed with NYSE. Besides, NYSE-listed stocks can be traded on other exchanges; while NASDAQ's dual-listing program, which allows companies to list on both the NASDAQ and the NYSE, only began in 2004.

Finally, we estimate the model above for risk shifts in these financial services firms during and after the event. All cross-sectional regressions are estimated with the White heteroskedasticity correction for standard errors.

5. Results

5.1. Announcement period returns

We begin our analysis by examining the overall results for all the regulations and present the regression estimates of our model for each individual event in Table 3. Panel A presents the results

Table 3
Regression estimates for portfolios of all firms and by type of Financial Institution and by event.

						Informational dummy variables								
Constant			BETA			10/10/2007	2/13/2008	7/15/2008	7/30/2008	10/3/2008	2/10/2009	2/17/2009	3/25/2009	5/20/2009
Variable	Intercept	Post alpha	S&P return	Post event	During event	D_1	D_2	D_3	D_4	D_5	D_6	D_7	D_8	D_9
Panel A: all firms														
Coefficient	0.0006	−0.0008	0.7795	0.2167	0.2068	−0.004	−0.0025	−0.0166	−0.0029	0.0078	−0.0003	−0.008	−0.0039	−0.0074
p-value	0	0.0003	0	0	0	0.0053	0.0882	0	0.0445	0	0.8116	0	0.0071	0
Sig	***	***	***	***	***	***	*	***	**	***		***	***	***
R-sq	0.1419	*N*	364,729	Pr > *F*	0.0001	Significance	***							
Panel B: banks														
Coefficient	0.0005	−0.0012	0.6913	0.1807	0.1762	−0.0039	−0.0018	−0.0219	0.0018	0.012	−0.0023	−0.0098	−0.0041	−0.0094
Error	0.0001	0.0003	0.0259	0.035	0.0266	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
t Value	3.73	−3.94	26.66	5.16	6.63	−1.98	−0.91	−11.14	0.94	6.09	−1.16	−4.96	−2.06	−4.77
Pr > |*t*|	0.0002	<.0001	<.0001	<.0001	<.0001	0.048	0.3638	<.0001	0.3491	<.0001	0.2444	<.0001	0.0395	<0001
Sig	***	***	***	***	***	**		***		***		***	**	***
R-sq	0.1109	*N*	331											
Panel C: S&Ls														
Coefficient	0.0002	−0.0005	0.4594	0.0757	0.0725	−0.0042	−0.0011	−0.0208	−0.0052	0.0073	0.0076	−0.0013	−0.0019	−0.0026
Error	0.0003	0.0007	0.0576	0.0777	0.059	0.0044	0.0044	0.0044	0.0044	0.0044	0.0044	0.0044	0.0044	0.0044
t Value	0.63	−0.67	7.98	0.97	1.23	−0.97	−0.24	−4.76	−1.19	1.66	1.74	−0.31	−0.43	−0.59
Pr > |*t*|	0.5278	0.5054	<.0001	0.3301	0.2194	0.3323	0.8102	<.0001	0.2332	0.0967	0.0817	0.7599	0.669	0.5563
Sig			***					***		*	*			
R-sq	0.0467	*N*	67											

Table 3
(*Continued*)

Panel D: insurance companies Variable	Intercept	Post alpha	S&P return	Post event	During event	D_1	D_2	D_3	D_4	D_5	D_6	D_7	D_8	D_9
Coefficient	0.0008	0.0001	0.9676	0.1727	0.1998	−0.0041	−0.0067	−0.0065	−0.0064	0.0072	0.0006	−0.002	−0.0011	−0.0038
Error	0.0002	0.0005	0.04	0.054	0.041	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
t Value	4.19	0.19	24.2	3.2	4.88	−1.36	−2.2	−2.15	−2.11	2.36	0.2	−0.65	−0.36	−1.26
Pr > |*t*|	<.0001	0.8525	<.0001	0.0014	<.0001	0.1729	0.0279	0.0319	0.0346	0.0184	0.8443	0.5146	0.7183	0.2095
Sig	***		***	***	***		**	**	**	**				
R-sq	0.2318	*N*	105											
Panel E: REITs														
Coefficient	0.0013	−0.0006	1.0538	0.4787	0.4074	−0.004	−0.0012	−0.0062	−0.0138	−0.0051	0.0005	−0.0132	−0.0069	−0.0071
Error	0.0002	0.0006	0.0468	0.0632	0.048	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036
t Value	5.67	−1	22.51	7.58	8.49	−1.12	−0.33	−1.75	−3.88	−1.42	0.14	−3.72	−1.93	−1.99
Pr > |*t*|	<.0001	0.3181	<.0001	<.0001	<.0001	0.2646	0.74	0.0804	0.0001	0.1557	0.885	0.0002	0.0539	0.0465
Sig	***		***	***	***			*	***			***	*	**
R-sq	0.2676	*N*	100											
Wald test for comparing coefficients among the four types of financial institutions					Wald	7.52	5.66	151.21	21.16	47.5	4.48	37.73	7.97	27.66
					Pr > Chi Sq	0.1106	0.2258	<.0001	0.0003	<.0001	0.3453	<.0001	0.0926	<.0001
					Sig			***	***	***		***	*	***

This table provides the regression estimates for events. Panel A provides regression estimates for all firms for the event dates D_1–D_9. Panels B, C, D, and E provide estimates for banks, savings and loans (S&Ls), insurance firms, and real estate investment trusts (REITs).

$r_{j,t} = a_j + a'_j\, D_P + b_j\, r_{mt} + b'_j\, D_0\, r_{mt} + b''\, D_P\, r_{mt} + \sum C_{kj}\, D_{ik} + e_{jt}$.

r_{jt} = portfolio return for day t; a_j = constant prior to event period; a'_j = constant after the event period; r_{mt} = S&P 500 Index return; b_j = coefficient representing beta; b'_j = coefficient representing a shift in beta during the event period; b''_j = coefficient representing a shift in beta after the event period; D_0 = dummy variable equal to 1 during the event period; D_P = dummy variable equal to 1 after event period; D_{ik} = dummy variable equal to 1 on the day prior to and the day of event I; C_{kj} = coefficient of the information dummy variable k for portfolio j; e_{jt} = error term for portfolio j.

*** Indicate statistical significance at the 0.01 level.

** Indicate statistical significance at the 0.5 level.

* Indicate statistical significance at the 0.1 level.

for all firms. We find negative and highly significant coefficients for the events D_1, D_3, D_7, D_8, and D_9 for our full sample of firms. Coefficients for D_2 and D_4 are also negative at the 10% and 5% levels of significance. Only one event date, D_5, is positive and highly significant. Thus, our results for the full sample of firms show that the market views the announcements of the various interventions as mostly negative events. We discuss the individual legislations and their impact on the different industry groups in more detail below.

Table 3 also documents the regression estimates for the individual industry groups. For the sub-sample of banks (Panel B of Table 3), events D_1, D_3, D_7, D_8, and D_9 have negative coefficients, of which D_1 and D_8 are significant at the 5% level. All other dates are highly significant at the 1% level. D_5 is the only positive event, and again is significant at the 1% level. The first event date in our timeline, D_1, is the October 10, 2007, HOPE NOW initiative announced by then Treasury Secretary Henry Paulson, along with Housing Secretary Alphonso Jackson. The intent of HOPE NOW was to help homeowners who might not be able to pay their mortgages. The alliance of credit and homeowners' counselors, mortgage services, and mortgage providers was formed to explore ways to reach at-risk homeowners, explain alternatives to at-risk borrowers, and develop standards for mortgage counseling. However, this event results in a marginally negative market reaction for the sub-sample of banks. At the time, there was just a hint of the financial crisis that was to unfold, and it seems that the market did not want any governmental interference. While HOPE NOW was intended to help mortgage owners, it seems the market did not believe this initiative would benefit banks because there were no compulsory measures directed to financial institutions.

The next significant event date for banks, D_3 (7/15/2008), signifies the passing of the SEC emergency ban on the naked short-selling of Freddie Mac and Fannie Mae, along with other extraordinary emergency measures, including the public disclosure of short-selling positions of hedge funds and other institutional money managers. Because of the tenuous confidence in financial companies at this time, the SEC also banned naked short-selling in the stock of 799 financial companies, in an attempt to curtail aggressive short-selling of institutions that were perceived to be especially fragile. While meant to boost the volatile markets during tumultuous times, this legislative announcement is again viewed negatively by the market, as evidenced by the negative and highly significant coefficient for the bank group. The next significant negative events for banks are D_7, D_8, and D_9. D_7 represents February 17, 2009, the day that marked the passing of the American Recovery and Reinvestment Act (ARRA); and D_8 marks the passing of the 3/25/09 legislation allowing troubled financial institutions to be put into conservatorship or receivership by the U.S. government. Finally, D_9 marks the 5/20/09 Helping Families Save their Homes legislation.

The ARRA bill, also known as the Stimulus Act, was one of the first major acts passed by President Barack Obama and the new Democratic Congress. ARRA was the focus of fierce partisan debates in Congress; it ultimately passed the House with no Republican votes and the Senate with merely three Republican votes. This massive economic stimulus bill was estimated to cost $ 787 billion when it finally passed. All of these acts were the subject of bitter wrangling along party lines; and by this time, investors and the general public were also suffering from legislative and "bail-out" fatigue. Because this was widely perceived as mostly a "banking" crisis, it is not surprising to find significantly negative coefficients for the sample of banks.

For banks, D_5 was the only announcement that was met with positive investor reaction, at the 1% level. D_5 marks 10/3/2008, the date when the Emergency Economic Stabilization Act passed. Better known as TARP, this legislation created the Troubled Assets Recovery Program, established to buy troubled assets from financial institutions. Introduced in September 2008 and signed by President George W. Bush in October 2008, TARP allowed the Treasury Department to spend up to $ 700 billion to purchase troubled assets both domestically and internationally. At the time of TARP's passage, the market was reeling from the meltdown of Lehman Brothers. However, the initial attempt to pass TARP failed, as the House rejected the first version of the bill on Monday, September 29. After a four-hour debate, the final vote of 228 to 205 against was 13 votes shy of the 218 votes needed to pass the bill. Stock markets reacted immediately to this news, and the Dow Jones Industrial Average closed 778 points lower for the day. Leaders of both political parties pleaded for the necessary votes, and TARP finally passed on October 3, 2008, to the relief of investors and both political parties. It appears that the markets believed the passage of TARP would stem repercussions from the ongoing financial crisis. Our

results confirm this. Overall, the banking group reports negative coefficients for five of the nine event dates, while only one of the events has a positive coefficient. The market reaction seems to validate the perception that this was very much a "banking" crisis.[7]

For the sub-sample of S&Ls in Table 3, market reaction is more muted than for banks; and only one event, D_3, is strongly negative (Panel C of Table 3). As noted in Section 2.1, large thrifts such as Countrywide, FSB, and Wachovia were in trouble during the crisis and were merged into or owned by banks. Furthermore, from 1998 to 2008, a large number of S&Ls converted their charters to banks (see footnote 2). Thus, the market reaction to the financial stability interventions and the stimulus may not appear distinctly for the S&L group separately from the banks. As mentioned earlier, D_3 marks the date when the SEC announced stringent restrictions in the short-selling of financial company stocks. As with the sample of banks, the market viewed D_5 (the passing of TARP) as good news, albeit at the 10% level. This is also true of D_6 (2/10/2009), the passage of the Financial Stability Act, introduced by Treasury Secretary Timothy Geithner, which created the Public–Private Investment fund. Under this act, the Treasury department, along with the FDIC and the Federal Reserve Board, unveiled the Public–Private Investment Programs (PPIP) to buy troubled mortgage loans and mortgage-backed securities from banks. Despite this plan's possible advance leak, the market still was skeptical of it at announcement, perhaps because it was unprecedented and its success therefore uncertain (cf. Glasserman & Wang, 2011; Kelly, Lustig, & Van Nieuwerburgh, 2011).

As noted in Table 3 (Panel D), we find a significant market reaction for four event dates for insurance companies: Investors view D_2, D_3, and D_4 as negative events by investors (significant at the 5% level). Again, similar to our findings for banks and S&Ls, only one event, D_5, is positive for the sub-group of insurance companies. D_2 (2/13/2008) marks the passage of the Economic Stimulus Act of 2008, one of the first of several economic stimulus attempts to avert a recession and bolster the economy. This act, passed by President George W. Bush, was treated as a catalyst to a weak economy, and largely included tax breaks for businesses and payments to select groups of low- and middle-income taxpayers, who were expected to spend it and help revive the economy. The market perception of the probability of the latter was mixed; hence, the stock market reaction is found to be only marginal in significance. As mentioned earlier, D_3 reflects the date of the SEC ban on short-selling of financial company stock. Unlike the sample of banks, we find no significant reaction in the insurance sector to the passage of either TARP or ARRA, two of the most controversial pieces of legislation during the crisis period. Because these two bills were largely for the benefit of banks, it appears that the market perceived them as minimally beneficial to insurance companies. D_4 marks the passage of the Housing and Economic Recovery Act (HERA), which was intended to address issues relating to the mortgage market, specifically the sub-prime crisis. HERA allowed the Federal Housing Authority (FHA) to work with at-risk borrowers to refinance into more affordable government-insured mortgages. HERA also injected capital into Fannie Mae and Freddie Mac, and led to government conservatorship of these two institutions.

Finally, as reported in Panel E of Table 3, we find a negative market reaction of REITs for five of the nine events: D_3, D_4, D_7, D_8, and D_9. D_3, D_4, D_7, and D_8 are significant at the 1% level, D_9 at the 5% level. The ban on naked short-selling (D_3) is also viewed as a negative event for REITs, albeit less significantly so than for the other sub-groups of firms. The market reaction of REITs is similar to that of banks for the dates D_7, D_8, and D_9. D_4 is significantly negative for REITs. A substantial portion of HERA (D_4) deals with helping families to avoid foreclosure by providing loans wherein lenders take deep discounts (Page, 2008, p. 252). The program was available only to owner-occupants, not to investors; hence, the market did not see this as beneficial for REITs.

In summary, Hypothesis $H0_1$, which posits no abnormal market reaction for the announcement period returns, is not supported. [8] For the overall sample of firms, eight of the nine events have abnormal returns that are significantly different from zero. Three of the sub-groups report more negative

[7] We investigate whether the positive reaction to TARP is simply a compensation to the negative reaction to the attempt to pass TARP on 9/29/08 by examining the event window that date. Both event dates 9/29 and 10/3 result in a positive abnormal return for banks. Thus, it appears that banks reacted less negatively than the overall market to both versions of TARP.

[8] In order to disentangle the market expectation versus the actual market reaction, we examine the run-up prior to the event date, using a run-up window of 10 days for most of our events. We find an opposing run-up for only three events. Overall,

events than positive, and it appears that the markets do not welcome government interventions, despite the intent of these measures to help the firms via economic stimuli. Banks reports the highest number of negative events (six), followed by REITs, which report five negative events. Thus, it appears that the market is penalizing the two segments most closely associated with the crisis: the banking industry and the real estate industry. The passage of HERA, allowing for the government conservatorship of the mortgage finance giants Freddie Mac and Fannie Mae, is viewed as a significantly negative event for REITs. D_3, the date the SEC announced a ban on short-selling of financial company stock, is viewed negatively by our overall sample and by all four of the industry sub-groups. Banks and insurance companies report only one positive event; REITs, as a group, report no significantly positive reaction to any of the government interventions during this period.

We also report the *F*-tests for significance to examine difference in market reaction among the four sub-industry groups in Table 3. A perusal of the *F*-test statistics shows that the market reaction for D_3, D_4, D_5, D_7, and D_9 are significantly different (at the 1% level) among our four groups, while D_8 is marginally different among the industry groups. Thus, we do not find support for Hypothesis $H0_2$, which predicts that the abnormal returns are not different among the four groups of firms. We also examine differences in reaction based on size. We find that the same events are significant for both small and large firms, although the smaller firms show higher significance levels than larger firms for some of these events (not reported in a table).[9]

5.2. Change in systematic risk (risk shifts) during- and post-crisis: Hypothesis $H0_3$

Table 4 reports the overall results for all events as measured by the variable D_{10}, as well as the post-event shift in the alpha and beta for the entire sample and for each group of firms based on Model 1 for announcement effects and risk shifts, as described in the methodology section. Overall, the market viewed the government interventions during the financial crisis of 2008–2009 as bad news. An examination of the alpha (constant) shows that post-event alpha is negative and highly significant for the full sample of 602 firms. Similarly, post-event beta shift is positive and highly significant for all firms. The pre-crisis beta for all firms is 0.7776; beta is higher by 0.2055 during and by 0.2166 after the crisis. Thus, the cumulative effects of the governmental actions are increase in risk and decrease in value for our sample.

On the individual industry group level, we find similar results for our sample of banks. The aggregate event abnormal returns (D_{10}) are negative and highly significant. The alpha for this group changes from positive to negative and is highly significant. The beta increases during the event, as does the post-event beta, indicating that the interventions were not risk-reducing events for banks. We find that the S&Ls, as a group, do not demonstrate much in terms of pre- and post-event shifts, and we find no significant change in alphas or betas, while the cumulative event window return, D_{10}, is negative and marginally significant. For the insurance industry, we do not find a significant shift in the alpha after the crisis, while the cumulative abnormal return, D_{10}, is negative and highly significant. An examination of the shift in beta, during- and post-event, shows that the intervening actions ensuing from the crisis appear to be risk-increasing events for this industry. Finally, we find that for our sample of REITS, both during- and post-event beta increases significantly, while post-event alpha decreases marginally. Once again, the aggregate abnormal return (D_{10}) during the crisis is negative and highly significant. Thus, we do not find support for $H0_3$, that systematic risk remains the same during and after the crisis. We find significant differences in the risk shifts observed during and after the financial market crisis.

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our results suggest that the market views the interventions as negative events and not as negative surprises after positive expectations.

[9] As a robustness check, we re-estimate all the regressions using a 255-day pre-event window. While there is a marginal change in the level of significance of three coefficients (out of the 18 significant coefficients), there is no change in the sign of the coefficient for these dates.

Table 4
Regression estimates for portfolios of all firms and by type of Financial Institution.

Panel A: all firms						
	Constant		BETA			All events
Variable	Intercept	Post alpha	S&P return	Post event	During event	D_{10}
Coefficient	0.0006	−0.0008	0.7796	0.2166	0.2055	−0.0042
p-value	0	0.0003	–	0	0	0
Significance	***	***	***	***	***	***
R-sq = 0.1415		No. of Obs = 364,729	Pr > *F* = 0.0001	Significance ***		
Panel B: banks						
Coefficient	0.0005	−0.0012	0.6916	0.1804	0.1759	−0.0044
Error	0.0001	0.0003	0.0259	0.035	0.0266	0.0007
t Value	3.73	−3.94	26.7	5.16	6.62	−6.53
Pr > |*t*|	0.0002	<.0001	<.0001	<.0001	<.0001	<.0001
Significance	***	***	***	***	***	***
R-sq	0.1101	No. of Obs = 331				
Panel C: S&Ls						
Coefficient	0.0002	−0.0005	0.4581	0.0769	0.0704	−0.0025
Error	0.0003	0.0007	0.0575	0.0777	0.059	0.0015
t Value	0.62	−0.66	7.96	0.99	1.19	−1.68
Pr > |*t*|	0.533	0.5077	<.0001	0.3221	0.2329	0.0936
Significance			***			*
R-sq	0.0456	No. of Obs = 67				
Panel D: insurance companies						
Coefficient	0.0008	0.0001	0.9665	0.1738	0.1972	−0.0026
Error	0.0002	0.0005	0.0399	0.0539	0.0409	0.001
t Value	4.18	0.19	24.2	3.22	4.84	−2.49
Pr > |*t*|	<.0001	0.8486	<.0001	0.0013	<.0001	0.0127
Significance	***		***	***	***	**
R-sq	0.2317	No. of Obs = 105				
Panel E: REITs						
Coefficient	0.0013	−0.0006	1.0555	0.4771	0.4049	−0.0063
Error	0.0002	0.0006	0.0468	0.0631	0.0479	0.0012
t Value	5.67	−1	22.57	7.56	8.45	−5.25
Pr > |*t*|	<.0001	0.3186	<.0001	<.0001	<.0001	<.0001
Significance	***		***	***	***	***
R-sq	0.2675	No. of Obs = 100				
F-test for comparing coefficients among the four types of financial institutions			Wald	75.39	Pr > Chi Sq	<.0001
					Significance	***

r_{jt} = portfolio return for day t; a_j = constant prior to event period; a'_j = constant prior to event period; r_{mt} = S&P 500 Index return; b_j = coefficient representing beta; b'_j = coefficient representing a shift in beta during the event period; b''_j = coefficient representing a shift in beta after the event period; D_0 = dummy variable equal to 1 during the event period; D_P = dummy variable equal to 1 after event period; D_{ik} = dummy variable equal to 1 on the day prior to and the day of event I; C_{kj} = coefficient of the information dummy variable k for portfolio j; e_{jt} = error term for portfolio j.

$r_{j,t} = a_j + a'_j\, D_P + b_j\, r_{mt} + b'_j\, D_0\, r_{mt} + b''\, D_P\, r_{mt} + C_{kj}\, D_{ik} + e_{jt}$

*** Indicate statistical significance at the 0.01 level.

** Indicate statistical significance at the 0.05 level.

* Indicate statistical significance at the 0.1 level.

5.3. Cross-sectional results

We examine the determinants of D_{10} (cumulative abnormal returns for all events) and report cross-sectional results for our sample in Table 5.

We had hypothesized that firm size, auditor quality (Big 8 auditor), ROE, non-U.S. firms, and trading volume would be positively related to abnormal returns for the event windows. Our cross-sectional results show that non-U.S. firms earn marginally significantly higher abnormal returns over the crisis

Table 5
Cross-sectional regressions of determinants of abnormal returns.

Dependent variable: all event abnormal returns (D_{10})					
Independent variable	Coefficient	Standard error	t Value	Pr > |t|	Significance
Intercept	0.0074	0.0021	3.52	0.0005	***
Ln Size	0.0001	0.0003	0.32	0.7468	
Big8	−0.0017	0.0010	−1.65	0.0996	*
Debt Ratio	−0.0051	0.0017	−3.02	0.0026	***
Other OTC	−0.0461	0.0114	−4.03	<.0001	***
ROE	0.0013	0.0026	0.49	0.6251	
Banker	−0.0008	0.0011	−0.75	0.4536	
Non US	0.0053	0.0021	2.49	0.0131	**
Lnvol	−0.0010	0.0002	−3.94	<.0001	***
Size*OTC	0.0067	0.0016	4.29	<.0001	***
R-sq	Adj R-sq	F-Value	Pr > F	Significance	
0.1008	0.0869	7.26	<.0001	***	

This table provides the cross-sectional regression estimates. The dependent variable, D_{10}, is the total of the abnormal returns for all events, estimated for the event period. Ln Size is the total assets of the firm, Big 8 Auditor is a dummy variable that equals 1 if the firm uses a Big 8 Auditor, Debt Ratio is the debt-to-assets ratio of the firm, Other OTC is a dummy variable that equals 1 if the firm is listed as Other OTC (Compustat Exchange 19), ROE is firm Return on Equity, Banker is a dummy variable that equals 1 if the firm is a bank, non-U.S. is a dummy variable that equals 1 if the firm is a non-U.S. firm, Ln Trading Volume is monthly trading volume from CRSP, Size*OTC is an interaction variable for firm size and exchange type. All values are for the fiscal year ending prior to September, 2007.

$D_{10} = \beta_0 + \beta_1 \text{Size}_j + \beta_2 \text{BigAuditor}_j + \beta_3 \text{DebtRatio}_j + \beta_4 \text{OtherOTC}_j + \beta_5 \text{ROE}_j + \beta_6 \text{NonUS}_j + \beta_7 \text{LnVolume}_j + \beta_8 \text{Size*OtherOTC}_j + \beta_9 \text{Bank}_j + u_1$

*** Indicate statistical significance at the 0.01 level.
** Indicate statistical significance at the 0.05 level.
* Indicate statistical significance at the 0.1 level.

period. While we believed that the presence of a Big 8 audit firm would positively impact abnormal returns, we find that such a presence leads to marginally lower abnormal returns for the firms. We had also predicted a positive relation between firm leverage and abnormal returns; but we do not find this for the sample. However, we may have obtained this result in part because we use of only balance sheet items to measure debt, and we do not use off-balance sheet derivatives information in our calculation of leverage. We find that firms with higher debt-to-total-assets ratio earn significantly lower abnormal returns (at the 1% level), in line with the franchise value argument of Berger and Bonaccorsi di Patti (2006): that more efficient firms choose lower leverage (higher capital) to protect their value and any hint of liquidation. Our results do not show that firm size or firm performance, as measured by ROE, impacts the event-period abnormal returns in any significant manner. We had predicted that firms that trade on smaller exchanges (other OTC) will earn significantly lower abnormal returns over the crisis legislative events; our results verify this prediction.

Although we had hypothesized a positive relation between trading volume and abnormal return, our results document the opposite. Firms with higher trading volume earn significantly lower abnormal returns over our event windows. We had also hypothesized that larger firms that trade on smaller exchanges (Size*Non OTC) would earn significantly lower abnormal returns. However, we report a positive coefficient for this interaction variable. It appears that larger firms on the smaller exchanges are relatively sheltered from the effects of the crisis.

Panel A of Table 6 reports the results for the cross-sectional determinants of risk shift during the period of the governmental interventions (Beta Shift During Event).

We had hypothesized a positive relation between size, debt to total assets, other OTC, banking firms, and Size*Other OTC. We find that risk shift during the crisis period is very significantly related to firm size, and bigger firms experienced significantly higher increases in systematic risk, as measured by the beta. This result is consistent with Black and Hazelwood (2012), who note increases in loan risk for large bank recipients of TARP. We also find that more leveraged firms experienced marginal increases in risk during the crisis. We had also posited non-U.S. firms and firms with higher trading volume would be less risky. Our results show this to be true for non-U.S. firms, and we find that the change in

Table 6
Cross-sectional determinants of risk shift This table provides the cross-sectional regression estimates.

Dependent variable	Panel A: beta shift during event			Panel B: beta shift post event		
Independent variable	Coefficient	*p*-value	Significance	Coefficient	*p*-value	Significance
Intercept	−0.3795	0.0002	***	−0.2430	0.0761	*
Ln Size	0.0734	<.0001	***	0.0505	0.0239	**
Big 8 Auditor	0.0531	0.2812		0.1033	0.1191	
Debt Ratio	0.1442	0.0789	*	0.2068	0.0611	*
OtherOTC	0.0400	0.9423		0.0791	0.9153	
ROE	−0.1054	0.4020		−0.1811	0.2846	
NonUS	−0.3832	0.0002	***	−0.3778	0.0065	***
LnVol	−0.0028	0.8163		−0.0017	0.9162	
Size*OTC	−0.0042	0.9553		−0.0258	0.7993	
Bank	−0.1137	0.0356	**	−0.1363	0.0611	*
	R-sq = 0.0756			*R*-sq = 0.0303		

The dependent variable, D_{10}, is the total of the abnormal returns for all events, estimated for the event period. Ln Size is the total assets of the firm, Big 8 Auditor is a dummy variable that equals 1 if the firm uses a Big 8 Auditor, Debt Ratio is the debt-to-assets ratio of the firm, Other OTC is a dummy variable that equals 1 if the firm is listed as Other OTC (Compustat Exchange 19), ROE is firm Return on Equity, Banker is a dummy variable that equals 1 if the firm is a bank, Non-U.S. is a dummy variable that equals 1 if the firm is a non-U.S. firm, Ln Trading Volume is monthly trading volume from CRSP, Size*OTC is an interaction variable for firm size and exchange type. All values are for the fiscal year ending prior to September 2007.

Beta shift (during/post) = $\beta_0 + \beta_1 \text{Size}_j + \beta_2 \text{Big8Auditor}_j + \beta_3 \text{DebtRatio}_j + \beta_4 \text{OtherOTC}_j + \beta_5 \text{ROE}_j + \beta_6 \text{NonUS}_j + \beta_7 \text{TradingVolume}_j + \beta_8 \text{Size*OtherOTC} + \beta_9 \text{Bank}_j + u_j$

*** Indicates statistical significance at the 0.01 level.
** Indicates statistical significance at the 0.05 level.
* Indicates statistical significance at the 0.1 level.

systematic risk during the event windows is significantly lower for non-U.S. firms (at the 1% level). The coefficient for the banking firm dummy (Banks) shows that banks had a lower shift in systematic risk during the crisis event period. As documented in the business press, the focus in the initial days of the crisis was around TBTF, and specifically large banks and the riskiness of their operations. We therefore divide our banks into quintiles based on bank size to examine the impact of size on the shift of risk, controlling for the other industry sub-groups (not shown in a table). Our results show that banks in the top quintile show significantly higher increases in risk during this period, demonstrating the higher risk profiles of the larger banks. Thus, the cross-sectional results reported in Table 6—that banks have a lower increase in risk–appears to be driven by the smaller banks in our sample, controlling for size, leverage, etc.

We report the cross-sectional impacts on risk shift after the crisis (Beta Shift Post-Event) in Panel B of Table 6. Our results are similar to those reported for the determinants of risk shift during the crisis; we find that larger firms and more leveraged firms experience increases in systematic risk, while non-U.S. firms and banks experience lower shifts in beta. Our results do not find any significant relation between auditor quality, other OTC, trading volume, ROE, and changes in systematic risk. While we could not show that banking firms earned significantly lower abnormal returns during the event windows, our analysis of the shift in beta shows that banking firms do have a smaller increase in systematic risk compared with the other groups in the sample.

6. Conclusion

We examine the differential market reaction of financial services firms to a series of government interventions passed in response to the financial market crisis of 2007–2009. While recent research examines the impact of a single event, to the best of our knowledge, our study is the first to examine the impact of interventions in a multi-event framework over the 2007–2009 crisis period. Furthermore, while most of the research focuses on banks, our study is wider in scope and investigates the differential impacts of the nine chosen governmental interventions on banks as well as on S&Ls, insurance companies, and REITS, for changes in both returns and risks. Our inclusion of these industry groups is driven by the fact that the financial crisis was closely linked to the housing market crisis, thus providing

a framework in which to investigate how other financial institutions were differentially impacted by various governmental interventions. We also examine the cross-sectional determinants of both the abnormal returns and risk shifts around the crisis period.

Using SUR estimations, we investigate market reaction in aggregate and separately for banks, S&Ls, insurance companies, and REITs for economic stimuli and financial stability intervention events. In addition, we examine pre- and post-event shifts in alphas and betas for the firms in our sample. We find that, on average, the event date market reaction is negative and significant for all firms in our sample for seven of the nine government intervention events. The aggregate event-date abnormal returns, D_{10}, are significantly negative for our overall sample. For the overall sample, we find that only one date – October 3, 2008 (passage of the TARP Act) – results in a positive market reaction. Parsing down by industry sub-group, we find that crisis hits the banking industry the hardest; investor reaction for event dates is negative for five of the nine event dates for our sample of banks. Interestingly, we find that D_5, marking the passage of TARP, is a positive event for all sub-groups except for REITs. Our results also demonstrate a negative post-event shift in alpha for the firms in our sample, along with an overall increased shift in beta. Upon further parsing, we find that the interventions are systematic risk-increasing events for banks, insurance companies, and REITs.

Our cross-sectional analysis of the determinants of the abnormal returns for all event windows shows that leveraged firms and firms with higher trading volumes earn significantly lower event-period abnormal returns. We also find that non-U.S. firms appear to be relatively sheltered from the impact of the intervening events, perhaps because of diversification. Turning to the determinants of systematic risk shifts during- and post-crisis, we document that larger firms experience significantly higher increases in beta, while non-U.S. firms report lower changes in systematic risk.

References

Basse, T., Friedrich, M., & Vazquez Bea, E. (2009). REITs and the financial crisis: Empirical evidence from the US. *International Journal of Business and Management*, *4*, 3–10.

Bayazitova, D., & Shivdasani, A. (2012). Assessing TARP. *Review of Financial Studies*, *25*, 377–407.

Berger, A. N., & Bonaccorsi di Patti, E. (2006). Capital structure and firm performance: A new approach to testing agency theory and an application to the banking industry. *Journal of Banking & Finance*, *30*, 1065–1102.

Berger, A. N., & Bouwman, C. H. S. (2013). How does capital affect bank performance during financial crisis? *Journal of Financial Economics*, *109*, 146–176.

Berger, A. N., Demsetz, R. S., & Strahan, P. E. (1999). The consolidation of the financial services industry: Causes, consequences, and implications for the future. *Journal of Banking & Finance*, *23*, 135–194.

Binder, J. J. (1985a). On the use of the multivariate regression model in event studies. *Journal of Accounting Research*, *23*, 370–383.

Binder, J. J. (1985b). Measuring the effects of regulation with stock price data. *The RAND Journal of Economics*, 167–183.

Black, L. K., & Hazelwood, L. N. (2012). The effect of TARP on bank risk-taking. *Journal of Financial Stability*,

Boardman, A., Vertinsky, I., & Whistler, D. (1997). Using information diffusion models to estimate the impacts of regulatory events on publicly traded firms. *Journal of Public Economics*, *63*, 283–300.

Brailsford, T. J. (1996). The empirical relationship between trading volume, returns and volatility. *Accounting & Finance*, *36*, 89–111.

Campbell, J. Y., Grossman, S. J., & Wang, J. (1993). Trading volume and serial correlation in stock returns. *The Quarterly Journal of Economics*, *108*, 905–939.

Cheng, J., Elyasiani, E., & Lin, T. T. (2010). Market reaction to regulatory action in the insurance industry: The case of contingent commission. *Journal of Risk and Insurance*, *77*, 347–368.

Chhaochharia, V., & Grinstein, Y. (2007). Corporate governance and firm value: The impact of the 2002 governance rules. *The Journal of Finance*, *62*, 1789–1825.

Cohen, L., Cornett, M. M., Marcus, A. J., & Tehranian, H. (2012). *Bank earnings management and tail risk during the financial crisis*. Boston College. Working paper.

Cornett, M. M., McNutt, J. J., Strahan, P. E., & Tehranian, H. (2011). Liquidity risk management and credit supply in the financial crisis. *Journal of Financial Economics*, *101*, 297–312.

Cornett, M. M., & Tehranian, H. (1990). An examination of the impact of the Garn-St. Germain Depository Institutions Act of 1982 on commercial banks and savings and loans. *Journal of Finance*, 95–111.

Devaney, M. (2012). Financial crisis, REIT short-sell restrictions and event induced volatility. *The Quarterly Review of Economics and Finance*, *52*, 219–266.

Diamond, D. W., & Rajan, R. G. (2001). *Banks, short-term debt and financial crises: Theory, policy implications and applications. In Carnegie-Rochester conference series on public policy, North-Holland* (vol. 54).

Elyasiani, E., Mester, L., & Pagano, M. (2011). *Large capital infusions, investor reactions, and the return and risk performance of financial institutions over the business cycle and recent financial crisis*. Research Department, Federal Reserve Bank of Philadelphia. Working Paper.

Fok, R. C. W., Chang, Y. C., & Lee, W. T. (2004). Bank relationships and their effects on firm performance around the Asian financial crisis: Evidence from Taiwan. *Financial Management*, *33*, 89–112.

Gaby, M., & Walker, D. A. (2011). Impacts of TARP on Financial Institutions. *Journal of Applied Finance*, *21*, 73.
Glasserman, P., & Wang, Z. (2011). Valuing the Treasury's Capital Assistance Program. *Management Science*, *57*, 1195–1211.
Goddard, J., Molyneux, P., & Wilson, J. O. S. (2009). The crisis in UK banking. *Public Money & Management*, *29*, 277–284.
Griffiths, M. D., Kotomin, V., & Winters, D. B. (2011). The Federal Reserve and the 2007–2009 financial crisis: Treating a virus with antibiotics? Evidence from the commercial paper market. *Financial Review*, *46*, 541–567.
Hegde, S., Lin, H., & Varshney, S. (2010). Competitive stock markets: Evidence from companies' dual listing on the NYSE and NASDAQ. *Financial Analyst Journal*, *66*, 77–87.
Kočović, J., Rakonjac-Antić, T., & Jovović, M. (2011). The impact of the global financial crisis on the structure of investment portfolios of insurance companies. *Economic Annals*, *56*, 143–161.
Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, *3*, 305–360.
Karpoff, J. M. (1987). The relation between price changes and trading volume: A survey. *Journal of Financial and Quantitative Analysis*, *22*, 109–126.
Kaufman, G. (2010). The financial turmoil of 2007–09: Sinners and their sins. *Networks Financial Institute Policy Brief*, 01.
Kelly, B. T., Lustig, H., & Van Nieuwerburgh, S. (2011). *Too-systemic-to-fail: What option markets imply about sector-wide government guarantees (No. w17149)*. National Bureau of Economic Research.
Lee, B. S., & Rui, O. M. (2002). The dynamic relationship between stock returns and trading volume: Domestic and cross-country evidence. *Journal of Banking & Finance*, *26*, 51–78.
Li, L. (2012). *TARP funds distribution and bank loan supply*. Available at SSRN: http://ssrn.com/abstract=1515349 or http://dx.doi.org/10.2139/ssrn.1515349
Madura, J., & Wiley, M. K. (2000). The impact of the financial institutions reform, recovery and enforcement act on the risk of savings institutions. *Financial Review*, *35*, 145–168.
Mamun, A. A., Hassan, M. K., & Van Lai, S. (2004). The impact of the Gramm–Leach–Bliley Act on the financial services industry. *Journal of Economics and Finance*, *28*, 333–347.
Margaritis, D., & Psillaki, M. (2010). Capital structure, equity ownership and firm performance. *Journal of Banking & Finance*, *34*, 621–632.
McCoy, P. (2009). *Prepared Statement of Patricia A. McCoy Before the US Senate Committee on Banking, Housing, and Urban Affairs, Hearing on "Consumer Protections in Financial Services,"*. March, 3.
Michaely, R., & Shaw, W. H. (1995). Does the choice of auditor convey quality in an initial public offering? *Financial Management*, *24*, 15–30.
Millon-Cornett, M. H., & Tehranian, H. (1989). Stock market reactions to the depository institutions deregulation and monetary control act of 1980. *Journal of Banking & Finance*, *13*, 81–100.
Mitchell, M. L., & Mulherin, J. H. (1988). Finessing the political system: The cigarette advertising ban. *Southern Economic Journal*, *54*, 855–862.
Mitton, T. (2002). A cross-firm analysis of the impact of corporate governance on the East Asian financial crisis. *Journal of Financial Economics*, *64*, 215–241.
Naceur, S. B., & Omran, M. (2011). The effects of bank regulations, competition, and financial reforms on banks' performance. *Emerging Markets Review*, *12*, 1–20.
Page, E. (2008). Federal housing help falls short: The Housing and Economic Recovery Act of 2008. *Loyola Consumer Law Review*, *21*, 249.
Peltzman, S. (1976). Toward a more general theory of regulation. *Journal of Law and Economics*, *19*, 211–240.
Rajan, R. G. (2006). Has finance made the world riskier? *European Financial Management*, *12*, 499–533.
Schich, S. (2009). Insurance companies and the financial crisis. *OECD Journal Financial Market Trends*, *2009*(2). ISSN 1995-2864.
Semaan, E., & Drake, P. P. (2011). Deregulation and risk. *Financial Management*, *40*, 295–329.
Stickel, S. E., & Verrecchia, R. E. (1994). Evidence that trading volume sustains stock price changes. *Financial Analysts Journal*, *50*, 57–67.
Stigler, G. J. (1971). The theory of economic regulation. *The Bell Journal of Economics and Management Science*, *2*, 3–21.
Sundaram, S., Rangan, N., & Davidson, W. N. (1992). The market valuation effects of the Financial Institutions Reform, Recovery and Enforcement Act of 1989. *Journal of Banking & Finance*, *16*, 1097–1122.
Veronesi, P., & Zingales, L. (2010). Paulson's gift. *Journal of Financial Economics*, *97*, 339–368.
Williams, J. (1987). Perquisites, risk, and capital structure. *Journal of Finance*, 29–48.
Wilmarth, A. (2009). The dark side of universal banking: Financial conglomerates and the origins of the subprime financial crisis. *Connecticut Law Review*, 41.