Banking System Shocks and REIT Performance

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Abstract

The purpose of this study is to contrast the REIT market's stock return response to bank failures versus bank bailouts. The non-negativity constraints of the GARCH model measuring risk dynamics are mitigated by the use of the EGARCH model. EGARCH accounts for non-symmetrical effects of risk adjustments in response to return shocks. Previous research shows that, for REITs, bank failures cause a positive abnormal return effect, confirming the expectation that during crisis market participants perceive REITs as safe haven investment. Bank bailouts cause diametrical effects on REIT performance, manifesting in negative abnormal returns. Applying EGARCH, increased beta levels for both types of bank events are found, variance driven in the case of bank failures, correlation driven in the case of bank bailouts. Results from previous studies for abnormal returns are confirmed. The results of the total REIT sample is clearly driven by the equity REITs, as mortgage REITs show no significant reaction concerning risk and return. Retail and residential REITs are representative for the Equity REIT sample. Especially lodging and specialty REITs stick out a from the equity REITs sample, as they show unique characteristics.

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1 Introduction

The broad public largely identifies an overheated real estate economy and its' actors speculative behavior as the trigger for the great financial crisis that started in 2007. Enormous non-fundamental growth, especially in the US subprime market, let to a flooding of innumerous portfolios of mortgage backed securities, traded between banks and other financial institutions. As the first market participants started to be precisely curious about creditworthiness of the underlying borrowers, they set the ball rolling and the downward spiral dragged many strongly invested banks into a severe solvency crisis (see Demyanyk and Hemert, 2011; Harrington, 2009; and Reinhard and Rogoff, 2008 & 2009). The bankruptcy of Lehman Brother on September 19th 2008 represents the defining moment of the financial crisis, as it baldly revealed the disadvantages of a strongly integrated financial sector. Spillover and contagion effects shifted the banking system to the edge of a meltdown, threatening to drag along the entire financial system and the economy as a whole (see also Iyer and Pedro, 2011).

The overwhelming rapidness of the dramatic events on the financial markets put unprecedented pressure on policy makers who were confronted with the challenge to immediately find persistent measures to stabilize the market and prevent it from disintegrating. As a countermeasure the US Government signed into law the USD 700 billion Troubled Asset Relief Program (TARP) on October 3rd 2008, allowing the purchase of assets and equity capital from financial institutions. The intention of the program was to cut off the vicious circle of asset prices falling far below fundamentals, paralleled by high market volatility. By restoring liquidity, to calm down the markets, the financial system was to be stabilized, preventing oncoming and potentially cataclysmic spillover effects to the real economy (see Paulson, 2008 and Carlson, King, and Lewis, 2011).

In a previous study Raudszus and Schiereck (2012) analyze the effects of bank bailouts and bank failures on first and second moments of mean stock returns of the Financial Services Industry (FSI). Investigating the question whether policy makers' intention to calm the markets was accomplished, they find that, in the case of bank bailouts, reduced variance is bought dearly with significantly increased correlation levels. The effect even outweighs the reduced variance, as significantly increased beta levels, as a measure of systematic risk, prove. This is interpreted as a strong sign for moral hazard.

The aim of this study is to investigate the real estate industry, which is seen as the origin of the still ongoing financial crises, in more detail. This study contrasts the effects, which bank bailouts and bank failures have on the REIT industry. Special attention is given to the detailed investigation of the different REIT types, as we are eager to identify differences and similarities in their reaction towards bank events. We are keen to shed light on the unique characteristics of the different REIT types and therefore analyze 10 different REIT categories, distinguished by investment style (Equity, Mortgage, and Diversified[1] REITs) and within the Equity REIT sample by property focus (Office, Industrial, Lodging, Retail, Residential, Healthcare and Specialty REITs). REITs are generally seen as a sub-category of the Financial Services Industry along with banks, brokers, insurances, and asset managers. This study also investigates whether the classification scheme is justified, as it contrasts REITs to a sample composed of all FSI sub-categories except REITs.[2]

Already Acharya et al. (2011) discuss how financial intermediaries and their regulatory equity capital have been affected by the crisis, and Simon and Ng (2009) focus their analysis on the recent financial crises and the link between REITs and the stock market, thus underlining the genuine interest in this topic.

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[1] Diversified REITs are primarily compared to Equity REITs and Mortgage REITs and are not accounted for as one of the property type REITs, as Diversified REITs potentially do not only diversify in property type investment but also in equity or mortgage investments.

[2] In the course of this study a *FSI sample* will be compared to the results of REITs. This *FSI sample* is composed of banks, brokers, insurances, and asset manager and does not include REITs.

In the present study we analyze both, first and second moments of mean stock returns. We focus on 7 major bank bailout dates, as well as 7 major bank failure dates and investigate the impact they display on standard mean returns, abnormal returns, variance rates, correlation coefficients and beta estimates of the REIT industry including its sub-categories, other financial stocks and the general equity market (S&P 500). As the rapid progress of the financial crisis led to a high frequency of bailout and failure dates in short time intervals, interference effects are minimized by focusing on short-term effects from two days before to two days after the events. Event study methodology (see Corrado, 2011) is applied to scrutinize for abnormal mean returns. Average mean returns around the bank events are used as a reference point to more clearly interpret abnormal returns. In sum, average and abnormal returns represent the events' induced return shock to the focused asset type. In contrast to the standard GARCH model, the application of the EGARCH (1,1) model (see Engle and Ng, 1993 and Nelson, 1991) enables us to observe daily positive or negative variance adjustments in response to return shocks. As asset-to-market correlation is also measured, short-term changes in the systematic risk estimator beta can finally be determined.

Overall, significantly negative mean returns are found for REITs around both, bank failures as well as bank bailouts. A clear difference in reaction to the two different types of bank events becomes evident when turning the view on abnormal returns, which are determined in the subsequent event study. While significantly negative REIT abnormal returns manifest around bank bailouts, REITs show significantly positive abnormal returns around bank failures. This is well in line with previous evidence by Raudszus, Olliges and Mueller (2012) and Olliges, Raudszus and Muller (2013).

The risk analysis consists of three parts. First we investigate variance rates, second correlation coefficients and third beta estimates. The first of our three risk analyses produces no significant results for variance changes of the all-REITs sample, neither for bank bailouts nor for bank failures. When concentrating on Equity REITs however, which account for 75%

of the total REIT sample, the picture is more pronounced in either way. Around bank bailouts the results show a negative trend with some event windows displaying significant results. On the contrary, we observe significant increases in variance levels around bank failure dates.

Correlation coefficients strongly increase around bank bailouts, whereas around bank failures we observe ambiguous results, with partly increasing and partly decreasing correlation coefficients.

Finally beta, as the systematic risk estimator, shows strongly increasing estimates around both bank event types for the Equity REIT sub-sample. The fact, that Mortgage REITs' beta levels remain unchanged, explains why the results for the all-REITs sample also show increased beta levels, but results are not as strong as for the Equity REIT sample.

Generally, we find that Equity REITs are much more affected in first and second moments of mean stock returns than Mortgage or Diversified REITs. Especially Mortgage REITs remain rather unaffected by bank events concerning return, as well as risk behavior. Across the Equity REIT sub-categories we find a relatively uniform behavior in general, especially Retail and Residential REITs are representative for the results of the Equity REIT sample, and are certainly a main driver of the Equity REITs sample's results, as they account for over 40% of the Equity REITs. Foremost Specialty and Lodging REITs show distinct characteristics. Lodging REITs react negatively to both types of bank events, which contrasts the positive abnormal returns around bank failures across almost all other Equity REITs. This is well in line with Jackson's (2009) findings, identifying the Lodging REIT sector to be less resilient as other Equity REITs. Specialty REITs stick out, as they remain generally unaffected by both bank events, potentially providing hedging options to investors.

While previous research by Raudszus and Schiereck (2012) found evidence of a significant *calm-before-the-storm effect*[3] for the Financial Services Industry in the case of both types of bank events, we cannot quite confirm this for REITs. Just before bank failures we do not observe this effect at all and in the case of bank bailouts we find only minor evidence of an anticipation of the government intervention.

Although the implementation of a generous bailout program aims at the rather medium to long term objective to calm the markets and reconstitute a functioning financial sector, having investigated REIT returns, the short term effects of government intervention through bank bailouts have to be evaluated critically. With respect to the REIT market, on a short term view, the markets are hardly calmed, as significant variance decreases cannot be observed. At least an increase, as it occurs for Equity REITs around bank failures, can be prevented. Furthermore it must be highlighted, that bank bailouts trigger a strong increase of asset-to-market correlation. Bank failures have no such impact on correlation coefficients.

FSIs display a significant different behavior compared to REITs. Variance rates decrease significantly around bailouts, delivering evidence for a short term calming effect on the financial sector through bank bailouts. Correlation coefficients show diametrically opposing behavior, as they increase significantly around bank bailouts and decrease significantly around bank failures.

All in all, both types of bank events cause a significant increase of the systematic risk estimator beta when focusing on REITs. This effect is more pronounced around bank bailouts and in this case clearly driven by the correlation adjustments. FSIs show a different behavior. Beta estimates decrease around bank failures, driven by decreasing correlation coefficients. Around bank bailouts, beta estimates increase, again apparently correlation driven, as this time correlation coefficients increase while variance rates remains unchanged.

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[3] A *calm-before-the-storm effect* describes the anticipation of a considerable negative announcement referenced to as “the storm” which is manifested through zero returns and decreasing volatilities the day before an event.

The paper is structured as follows: In part 2 we review the literature; in part 3 we explain our data selection and the empirical methodology; in part 4 we discuss our results; part 5 concludes.

2 Literature Review

2.1 Financial Crisis and Government Intervention

The 2007 initiated financial crisis was characterized by such a rapid and severe development, that the banking system slid into a serious liquidity crises, resulting not least in multiple bank failures. The applied countermeasures of the government to prevent the system from a collapse comprised also bank bailouts. Failures and bailouts, as two potential events during banking crises, are within the focus of our econometric analysis. Regarding theory we review literature discussing the response of the market to financial crises and government intervention. Also literature discussing REITs' return and risk behavior and the connection of REITs and other asset classes is of special interest to this study. As it is one of the primary goals of this study to give insights on the specific characteristics of the different REIT types, we also draw out attention to literature with focus on REIT sub-categories and the comparison of these.

We base our analysis on two previous studies by Raudszus, Olliges and Mueller (2012) and Olliges, Raudszus and Mueller (2013), which analyze how REITs are affected by bank failures and bank bailouts separately. In the study on bank failures, REITs generally show positive abnormal returns, while beta estimates remained rather unaffected. The consecutive study on bank bailouts uncovered negative abnormal returns for REITs. A comparison with the other sub-sectors of the Financial Services Industry (FSI) brought about, that REITs differ substantially in their behavior compared to other sub-sectors which are, along with REITs, considered to belong to the Financial Services Industry. Both studies applied standard event study methodology for the mean return analysis and the generalized

autoregressive conditional heteroscedasticity (GARCH) model for the risk event study, testing for short term shifts in beta estimates. In this study the non-negativity constraints of the GARCH model are overcome by applying the exponential generalized autoregressive conditional heteroscedasticity (EGARCH) model.

The recent financial crises[4], starting in 2007, has a substantial influence on the real economy, and especially on the real estate industry, which is considered to be at the nucleus of this crisis, as the real estate sub-prime crisis set the stone rolling.

Generally the behavior of REITs is strongly influenced by stock market volatility in the short term[5]; long term return however is derived from direct real estate growth (see Ghosh, Miles, and Sirmans, 1996). The dependency on the general stock market shows an augmenting tendency (see Young, 2000) and has especially increased since REITs have recently been added to three S&P general market indices. Ambrose, Lee and Peek (2007) show in their analysis of spillover effects across asset classes, that REITs co-move more with common equities than their real estate fundaments justify. Finally, Basse and Friedrich (2009) also find, that the current financial crisis has caused a structural change in the relationship of REITs and common equities, and that the investment in REITs has generally become more risky in times of crises. Also Clayton and MacKinnon (2001) find evidence, that REIT returns are strongly driven by market sentiment during crises. Nonetheless Simon and Ng (2009) state that the discussed crisis seems to have little impact on REITs potential to provide protection against severe stock market losses and thereby support findings by Mueller and Mueller (2003) who identify real estate to be a preferred safe-haven for investors in times of market uncertainty.[6]

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4 For a characterization of financial crises see Reinhard and Rogoff (2009).

5 Also see Ghosh, Guttery, and Sirmans (1998) for REIT returns and contagion effects in times of financial crisis.

6 The connection of securitized real estate (in particular REITs) and the stock market has been analyzed by several authors. For further information also see, for instance Ling and Naranjo (1999); Knight, Lizieri, and Satchell (2005); Westerheide (2006); and references therein.

Payne (2006-I & 2006-II) investigates the transmission and influence of different unexpected market shocks, analyzing REIT sub-categories and furthermore, Ro and Ziobrowski (2011) may be considered for a performance study of property-focused REITs versus Diversified REITs.[7] Jackson's (2009) study on the performance of Lodging REITs over a 13 years period showed, that they generally underperform other Equity REITs. Zietz, Sirmans, and Friday (2003) investigate the performance of more traditional Equity REIT sub-sectors such as e.g. Office and Retail REITs. In their analysis of Residential REITs, Newell and Fischer (2009) find, that this REIT class might benefit during economic crises. Newell and Peng (2006) provide information on less traditional REIT classes such as Healthcare and Specialty REITs.

There has been substantial research on the determinants of REIT performance. A major groups is formed by the analysis of REIT behavior in relation to the underlying direct real estate market (see e.g. Webb, 1988; Capozza and Lee, 1995; Ghosh, Miles, and Sirmans, 1996; Gyourko and Nelling, 1996; Liang and McIntosh, 1998; and Seiler, Webb, and Myer, 2001) and a second group focuses on the correlation of REITs and other financial assets (see e.g. Ling and Naranjo, 1999; Peterson and Hseih, 1997; Karolyi and Sanders, 1998; Allen, Madura, and Springer, 2000; Knight, Lizieri, and Satchell, 2005; Cotter and Stevenson, 2006; Sun and Yung, 2009; Kang and Choi, 2011; and Case, Yang, and Yildirim, 2012). As a result also an intense discussion on the comparison of influencing factors, the change of determinants over time, and other possible influencing factors is going on (see e.g. Liang, McIntosh and, Webb, 1995; Han and Liang, 1995; Clayton and MacKinnon, 2001; Chiang, Lee, and Wisen, 2005; Basse and Friedrich, 2009; Simon and Ng, 2009; Vogel, 2009; Fei, Ding, and Deng, 2010; Su, Huang, and Pai, 2010; and Anderson and Beracha, 2011).

[7] For further information on REITs please see Zietz, Sirmans, and Friday (2003), who provide a brought overview on relevant REIT literature, summarizing the results of 240 corresponding studies.

Evidence on the relationship between the banking sector and the real economy is provided by Carlson, King, and Lewis (2011). When banks' capital base erodes and interbank lending is increasingly limited, financial intermediaries reduce their lending activity and retain funds in an attempt to strengthen or at least conserve their liquidity. This vicious circle fuels itself[8] and contagion effects throw the entire banking system into a crises potentially dragging along the entire economy.[9] Many banks' exposure to toxic ABS (Asset Backed Securities)[10] erodes their capital base and put the banks into the urgent need for fresh capital. This brought the Federal Reserve into to a very difficult situation, as it exceeded the standard tools of the Fed to provide liquidity (see Cecchetti, 2009). As a result the government decided to initiate the USD 700 billion Troubled Asset Relieve Program (TARP) and the Federal Reserve took less traditional actions such as making loans to individual borrowers.[11]

The introduction of TARP and the decision to bailout distressed banks was accompanied by a fierce public debate about the possible consequences and whether it represents the appropriate approach to face the crisis. Studies by Gropp, Hakenes, and Schnabel (2011), as well as by Hakenes and Schnabel (2010), who investigate the competitive effects of bank bailout policies, show, that the bailout of a bank can lead to significantly increased risk taking among the competitors of the protected bank. Cordella and Yeyanti (2003) additionally argue that ex-ante commitment to assist troubled institutions motivates

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[8] In their analysis of the financial crises during the years 2007 to 2009 Acharya et al. (2009) identify the existence of a credit boom and asset bubble as one of the core characteristics of an upcoming financial crisis. A decline in collateral assets' can trigger a vicious circle of collapsing asset prices. When the decline in asset prices causes the margin to drop below the minimum margin requirement, margin calls are issued. Investors now have two options at hand, either they increase the margin they have deposited or they close the position by selling. Increased divestments lead to an excess supply causing prices to drop further, initiating another round of margin calls, setting of a downward spiral with fire sales. The deep integration of global financial markets comes at the cost of a higher vulnerability of the system, as the risk of spillover and contagion effect rises.

[9] For further evidence on contagion effects, interbank linkage and market liquidity see e.g. Kaufman (1994), Gorton and Huang (2004), Diamond and Rajan (2005), Iyer and Peydro (2011), and Haldane and May (2011).

[10] The term "Toxic Asset" commonly refers to an asset that becomes illiquid as its secondary market disappears, caused by the fact, that it is almost certain to lose money.

[11] The Fed's concern for system-wide financial stability let them invoke Article 13(3) of the Federal Reserve Act. By this, the Board of Governors can authorize to make loans to individual borrowers that are unable to obtain credit from a banking institution. For a further discussion on the lender of last resort see also Kaufman (1991) and Goodhart and Huang (2005).

institutions to excessive risk taking behavior. They conclude that bank bailouts trigger moral hazard and potentially provoke higher risk levels. This should be avoided. For further insight on the social cost-moral hazard trade off consult also Goodhart and Haung (2005).

Klingebiel et al. (2001) come to interesting results in their investigation of stock market responses to bank restructuring programs[12]. On the one hand they discover that bank stocks as well as non-financial stocks react positive to the announcement of government guarantees for bank liabilities. On the other hand a negative reaction of non-financial stocks is observed when restructuring programs aim at the banks' capital base and generous liquidity support programs are announced.

Gorton and Huang (2004) prove that bailout programs nonetheless are an effective measure to restore and strengthen market liquidity and positive value effects can at least be observed for the direct customers of the recapitalized financial institution as Giannetti and Simonov (2009) discover.

A further consequence of banking crises is a generally increased loan rate level, which, in combination with the reduced lending activity, hinders the financing of the real economy and hence economic growth. Also Dell'Ariccia, Detragiache, and Rajan (2008) find evidence for spillover effects to the real economy, especially compromising capital intensive industries which rely heavily on external financing, such as e.g. the real estate industry. Also Bredin, O'Reilly, and Stevenson (2007) investigate the influence of system shocks, in their case, changes in the federal fund rate, on REIT performance.

2.2 Contribution to the Literature and Basic Hypotheses

The literature review shows the interest of financial economists in the respective financial crisis and its effects on the economy. Especially the banking industry and the real estate sector have been in the center of attention. The two key events of the banking crisis, bank failures

[12] For further evidence on the market response to policy initiatives during the recent global financial crisis see Aït-Sahalia et al. (2012).

and bank bailouts, are of special interest and have been one of the most important topics in recent times. As the literature has yet given relatively little attention to question whether bank failures and bank bailouts are truly perceived differently by the market and since this study additionally provides further insight on the behavior of REITs compared to Financial Services Industry and the broader market, we believe this study adds well to current literature.

An analysis of the presented literature enables us to derive general arguments that serve as a framework for more precise hypotheses which are to be formulated in the respective results' sections. First, concerning mean returns, we expect to observe rather negative valuation effects around bank failures and rather positive returns for bank bailouts as the bank events represent negative, respectively positive signaling effects in times of a financial crisis. For abnormal returns, as the second point, we expect to confirm findings of earlier research on REITs by Raudszus, Olliges, and Mueller (2012) and Olliges, Raudszus, and Mueller (2013), who found evidence for significantly positive abnormal returns around bank failures and negative abnormal returns around bank bailouts. Third, we expect to observe a *calm-before-the-storm effect* as it could be observed before Federal Reserve policy announcements (see Bonfim, 2003) and also around bank events for the Financial Services Industry (see Raudszus and Schiereck, 2011). Fourth, bailouts are an effective tool to restore market liquidity (see Gorton and Huang, 2004), and under certain circumstances, proof to be able to restore market confidence (see Klingebiel et al., 2001). Thus one could expect to observe reduced variance levels, around bank bailouts. Nonetheless, as they also promote a Moral Hazard problem (see Goodhart and Huang, 2005; Cordella and Yeyanti, 2003; Hakenes and Schnabel, 2010; and Gropp, Hakenes, and Schnabel, 2011), one could also argue for increased risk levels. Finally we expect to confirm previous evidence (see Olliges, Raudszus, and Mueller, 2013 and Raudszus and Schiereck, 2012) on differences in the behavior of REITs compared the other Financial Services Industry.

3. Data and Methodology

3.1 Data Selection and Descriptive Statistics

We focus our investigation on the U.S. banking and U.S. REIT market. Bank failures and bank bailouts represent the two key events of the recent financial crisis. This study investigates what effects these two types of bank events have on the risk return behavior of REITs and how they compare to the Financial Services Industry. Our data on bank failures is obtained by the Federal Deposit Insurance Cooperation (FDIC, 2010) which provides a Failed Bank List. Data on bank bailouts is provided by the U.S. Department of the Treasury (2011), listing the financial services institutions that where supported via the Troubled Asset Relief Program (TARP). The total return data in USD for the S&P 500 Composite as general market index, the Financial Services Industry index and Financial Services Industry single stock data, as well as the REIT indices and the single REIT stock data, is obtained from Thomson Datastream.

Raudszus, Olliges, and Mueller (2012) analyze the effect of bank failures on U.S. REITs returns in a previous study. They examine 130 bank failure dates in the time period from 1999 until 2010 and find evidence of positive abnormal returns for REITs in the event of bank failures. In a consecutive study Olliges, Raudszus, and Mueller (2013) investigate bank bailouts and their effects on REIT returns and other financial stocks for the U.S. For this study, rather negative abnormal returns are observable. Concluding, bank bailouts and bank failures show reverse effects on REIT returns.

The same methodological approach is used in both studies. Standard event study methodology is used to investigate abnormal returns. For the return risk part, an beta aligned risk event study, based on a GARCH (1,1) model, is used to scrutinize abnormal systematic risk shifts.

Building upon these two studies, we are now directly comparing both key-event-types of the recent financial crisis, bank failures and bank bailouts, at once. The detailed analysis of various REIT sub-samples might shed some light on the behavior of different REIT types in the course of financial crises.[13] Cross checking bank failure dates and bank bailouts dates, to eliminate possible overlapping, leaves us with 7 bank bailout dates, where no bank failures occurred. In order to eliminate potentially biasing effects through different size of samples (amount of failure vs. bailout dates under analysis) we decide to contrast these 7 bank bailout dates with the 7 major bank failure dates[14]. Table 1 provides details on our financial crisis key-event date sample.

Table 1: Event Date Sample Overview: Bank Failures and Bank Bailouts

Bank failures				Bank bailouts			
Event date	Day of week	Nr. of banks	Assets at default (USD bil.)	Event date	Day of week	Nr. of banks	Bailout capital (USD bil.)
07/11/2008	Monday	1	32.010	10/28/2008	Tuesday	8	115.000
07/25/2008	Friday	2	3.654	11/17/2008	Monday	21	33.561
09/15/2008[1]	Tuesday	1	16,000.000	12/19/2008	Friday	49	2.792
09/25/2008[2]	Thursday	1	307.000	12/23/2008	Tuesday	42	1.900
01/29/2010	Friday	6	5.531	12/31/2008	Wednesday	7	15.079
02/19/2010	Friday	4	4.171	01/09/2009	Friday	43	14.772
04/30/2010	Friday	7	25.825	03/13/2009	Friday	19	1.455

[1]) Failure of Lehman Brothers; [2]) Failure of Washington Mutual; Assets at default: cumulated bil. USD assets of respective banks that defaulted on a single date; Bailout capital: cumulated bil. USD bailout capital that was injected into respective banks, that where bailed out on a single date.

For our empirical analysis we consider total return data for a 3 year period from January 2007 to December 2010. The S&P 500 Composite serves as general market index. Within the descriptive statistics sector, the FTSE NA Financials index represents the Financial Services Industry and the FTSE NA REIT index represents the REIT industry.

[13] We also contribute to the literature in that we advance and broaden our methodological approach measuring risk adjustments as we build upon an EGARCH (1,1) model. Methodological details will be elucidated some paragraphs below where we discuss our methodology as a whole.

[14] These 7 bank failures dates are also free of overlapping with bank bailouts; that means on these 7 bank failures dates no bank bailouts occurred.

The risk and return behavior of the REIT industry is analyzed on a single stock level in order to increase statistical validity of results. Therefore we analyze the return data of 119 single REITs, composed of 14 Mortgage REITs, 16 Diversified REITs, and 89 Equity REITs, consisting of 12 Office REITs, 9 Industrial REITs, 11 Lodging REITs, 22 Retail REITs, 14 Residential REITs, 11 Healthcare REITs, and 10 Specialty REITs.

Appendix 1.1 and 1.2 provide descriptive statistics on mean return behavior of the market in general, the FTSE NA Financials index[15], the FTSE NA REIT index, as well as the REIT sub-indices throughout the time period of the financial crisis under investigation. Overall, mean returns are statistically not different from zero and skewness is low. However, we observe typical stylized facts of financial return data such as fat tails and squared stock returns show strong serial correlation (Ljung-Box-test) and significant heteroscedasticity (ARCH-test).

3.2 Methodology for Measuring Stock Return Risk

The valuation of a stock consists majorly of two dimensions. After having investigated the first dimension stock return, we now focus our attention on the second dimension risk. Return risk is represented by return variance, by the asset-to-market correlation and hence also by the combination of these two factors, by beta as the systematic risk measure.

The previously mentioned studies by Raudszus, Olliges, and Mueller (2012) on bank failures an REIT returns and by Olliges, Raudszus, and Mueller (2013) on the effects of bank bailouts and their effects on REIT returns and other financial stock returns, which we build our study upon, conduct a GARCH (1,1) model to measure daily variance adjustments. The standard GARCH model by Bollerslev (1990) accounts for one important fact of financial

[15] It has to be noted, that the FTSE NA Financials index includes all sub-sectors of the Financial Services Industry. Therefore, besides banks, insurances, asset managers and brokers also REITs are included. Therefore the FTSE NA Financials index cannot be contrasted to the FTSE NA REIT index, as it practically includes this index. The risk and return analysis in the following chapters is conducted on single stock level nonetheless. Consequently the later results allow for a comparison of REITs to the other Financial Services Industry.

stock data, called volatility clustering. This phenomenon describes the serial correlation of squared returns. The GARCH (1,1) model considers variance as a partially autoregressive process.

Yet, another prevalent stylized fact in stock return data, asymmetry in volatility reaction to positive and negative return shocks, is not incorporated.

A methodological overview on the different GARCH-models is provides by Hentschel (1995). He also illuminates the so called leverage effect, which describes the fact that volatility increases more in response to negative return shocks, as it does to comparable positive return shocks. When investigating the forecasting performance of volatility models, Hansen und Lunde (2005) found that the standard GARCH (1,1) is inferior to models that consider a leverage effect. By verifying whether a return series generally shows a leverage effect the exponential GARCH (EGARCH) by Nelson (1991) incorporates this asymmetry in its variance model. Through these characteristics be believe the basic EGARCH (1,1) to be suitable for variance modeling in this study, as previous evidence yet shows reverse abnormal return effects on REITs.

The earlier studies by Raudszus, Olliges, and Mueller (2012) and Olliges, Raudszus, and Mueller (2013) show abnormal return effects for REITs, positive in the case of failures and negative for bailouts. Yet no clear evidence for beta shifts is found around these events. By applying the EGARCH model, on the one hand we aim to prove that REITs generally show a leverage effects, and on the other hand, we are keen to analyze whether an asymmetry in the effect on volatility is observable. This means, whether negative abnormal returns are followed by larger volatility increases relative to comparable positive abnormal returns.

EGARCH methodology has been widely applied in recent research. Among others recent studies that apply EGARCH Methodology are Adrian and Rosenberg (2008); McAleer, Chan, and Marinova (2007); Poon and Granger (2003); Darrat, Rahmann, and Zhong (2003); and Chen and Kuan (2002). In our research we mainly build upon Ederington and Guan

(2010) who analyze volatility adjustments of the S&P 500 with respect to return shocks. In their research they use an EGARCH (1,1) model for conditional volatility estimates and find that this asymmetric GARCH model achieves a higher log-likelihood value than the standard GARCH (1,1) model describing time-series estimates of conditional volatility. Their results show that negative return shocks have a large positive impact on volatility, zero and small positive returns have a negative impact on volatility, and large positive return shocks have again a positive, but compared to negative return shocks of comparable magnitude, much weaker impact on volatility.

The EGARCH (1,1) model to determine daily variance estimates, σ_t^2, takes the following form:

$$\log \sigma_t^2 = \gamma_1 + \gamma_2 \log \sigma_{t-1}^2 + \gamma_3 \left(\frac{|\varepsilon_{t-1}|}{\sigma_{t-1}} - \sqrt{\frac{2}{\Pi}} \right) + \gamma_4 \left(\frac{\varepsilon_{t-1}}{\sigma_{t-1}} \right) \qquad (1)$$

Where γ_1 is a constant, γ_2 the coefficient for persistency in volatility, γ_3 the coefficient for the return shock (ε) absorption, and γ_4 the coefficient for the leverage effect.

Throughout the years 2007 to 2010 we estimate EGARCH (1,1) models for the S&P 500 Composite, the FTSE NA Financials index, the FTSE NA REIT index, as well as for the sub-indices of the REIT sector. Estimations of equation (1) for the previously mentioned indices are reported in Tables 2.1 and 2.2. We find all coefficients to be highly significant and by this, a negative γ_4 clearly supports the existence of a leverage effect for the indices. This does also hold true for almost all single stocks. The fact that some stocks do not show a leverage effect, in contrast to all indices showing it, is well established. Bekaert and Wu (2000) argue that firm returns are more correlated in downturns, impacting index volatility positively, as covariance levels rise, while single stock volatility stays unchanged.

Table 2.1: EGARCH (1,1) Estimation of Market and REIT Industry Indices for 2007-2010

	S&P500		FTSE NA Financials		FTSE NA REIT		US-DS Mortgage REITs		DJ EQUITY ALL REIT		FTSE NAREIT DEV	
γ_1	-0.20	***	-0.14	***	-0.09	***	-0.39	***	-0.10	***	-0.17	***
	-5.3		-3.9		-2.8		-7.4		-2.8		-2.9	
γ_2	0.98	***	0.98	***	0.99	***	0.94	***	0.99	***	0.98	***
	212.9		206.9		212.3		134.1		209.3		134.6	
γ_3	0.15	***	0.24	***	0.18	***	0.40	***	0.19	***	0.18	***
	5.0		7.2		5.8		12.4		5.9		5.6	
γ_4	-0.15	***	-0.09	***	-0.08	***	-0.18	***	-0.08	***	-0.11	***
	-6.6		-4.9		-3.5		-9.4		-3.5		-6.1	

γ_1 is a constant, γ_2 the coefficient for persistency in volatility, γ_3 the coefficient for return shock (ε) absorption, and γ_4 the coefficient for the leverage effect; t-values in parentheses; *** denotes significance at the 1% level.

Table 2.2: EGARCH (1,1) Estimation of REIT Industry Indices for 2007-2010

	S&P1500 OFFICE REITS		MSCI US INDUS. REIT		US-DS Hotel, Ldg REITs		S&P1500 RETAIL REITS		S&P1500 RESID. REITS		FTSE NAREIT HEALTH.		NA-DS Specialty REITs	
γ_1	-0.08	***	-0.08	***	-0.10	***	-0.08	**	-0.09	***	-0.08	**	-0.09	***
	-2.8		-3.1		-3.2		-2.4		-2.6		-2.4		-2.5	
γ_2	0.99	***	0.99	***	0.98	***	0.99	***	0.99	***	0.99	***	0.99	***
	239.2		276.4		209.1		199.7		195.7		220.4		217.3	
γ_3	0.18	***	0.15	***	0.23	***	0.18	***	0.20	***	0.16	***	0.18	***
	5.7		4.7		8.5		5.2		8.2		6.9		6.6	
γ_4	-0.07	***	-0.10	***	-0.07	***	-0.07	***	-0.04	**	-0.09	***	-0.09	***
	-3.3		-4.5		-3.0		-3.3		-2.0		-3.9		-3.6	

γ_1 is a constant, γ_2 the coefficient for persistency in volatility, γ_3 the coefficient for return shock (ε) absorption, and γ_4 the coefficient for the leverage effect; t-values in parentheses; *** denotes significance at the 1% level.

Now, we can provide descriptive statistics on average variance estimates throughout the time period of the financial crisis under investigation (07/2008-07/2010). Appendix 2.1 provides evidence that the FTSE NA Financials' as well as the FTSE NA REIT's average variance rate is significantly higher than that of the general market. The REIT sub-indices are tested for difference from the FTSE NA REIT index. Not surprisingly the Equity REIT sub-index is no different from the FTSE NA REIT index, as the FTSE NA index is mainly composed of Equity REITs. The other REIT sub-indices show significant difference from the FTSE NA REIT index, however.

As Appendix 2.1 and 2.2 show, EGARCH estimation obviously leads to a rather skewed variance distribution and kurtosis is generally on a comparable level as for the daily

return distribution. Testing standardized squared returns, $\frac{u^2}{\sigma^2}$ for serial correlation and heteroscedasticity we find that both earlier prevalent characteristics in squared returns could be reduced strongly. This approves the appropriateness of applying an EGARCH model to estimate return variances in the present case.

Calculating simple one-year rolling asset-to-market correlation coefficients we obtain a further risk measure that is potentially subject to considerable adjustments throughout the financial crisis and around its key-events. Furthermore, daily variance and correlation estimates allow us to determine daily betas as systematic risk measure and by this a third stock return risk indicator. Appendix 3.1 and 3.2 provide a descriptive overview on correlation and beta characteristics throughout the two years under close investigation. We may report that correlation coefficients of the FTSE NA Financials as well as of the FTSE NA REIT indices to the S&P 500 are rather high with a value of 0.90 and 0.84 respectively. When testing the REIT sub-indices for difference from the FTSE NA REIT index, again not-surprisingly the Equity REIT index does not show a significantly different correlation, as it is the main component of the FTSE NA REIT index. All other sub-indices show significant difference from the FTSE NA REIT index, although the values are on a comparable level. The Mortgage REIT index and especially the Diversified REIT index show considerably lower correlation coefficients to the S&P 500 than the FTSE NA REIT index does. The FTSE NA REIT index does not show a significant difference to the FTSE NA Financials index regarding correlation coefficients and beta estimates.

We generally observe rather high beta estimates of around 1.8 for the FTSE NA REIT index and comparable beta estimates for most sub-indices with values between 1.5 and 2.3. Again the Mortgage REIT index and the Diversified REIT index show considerably lower beta estimates with values of 1.2 and 0.3 respectively. Across all sub-indices the beta estimates are significantly different from the FTSE NA REIT index.

Beta skewness is generally below an absolute value of one and mostly below zero across industries for correlation estimates. Kurtosis measures are much closer around three than for the return and variance distributions and thus indicate that correlation and beta estimates are closer to a normal distribution.

3.3 Structure of the Return and Risk Analysis

Bank failures and bank bailouts represent the key-events of the recent financial crisis. Only the combined view on risk and return at once, provides a comprehensive insight on the valuation effects of REITs around bank events. Our methodology for the combined analysis of risk and return around these events consists of six consecutive steps.

The first five analyses observe return and risk adjustments from two trading days prior to two trading days post bank events, where we concentrate on the immediate valuation effect of bank bailouts versus bank failures. We also analyze the day before the event by itself, to investigate a potential information leakage or anticipation effects just before the bank events, displayed by a *calm-before-the-storm effect*. The sixth analysis is a multivariate regression that aims to support and add to our then obtained insights on return and risk effects.

First, we observe average returns of the S&P 500 Composite, the FSI sample and the all-REITs sample around the key-events. We also focus on REIT sub-category behavior individually by conducting the analysis, also on a single stock level. Second, we perform event study methodology similar to Corrado (2011) to scrutinize for abnormal returns around bank failures and bank bailouts. We do this for the same data selection as before, except for the S&P 500, as it serves as the general market index to the FSI sample, the all-REITs sample and the REIT sub-categories.

Third, we turn to stock return risk and measure respective shifts in the variance factor, σ^2. This is followed by a measurement of adjustments in the asset-to-market correlation

coefficient, ρ_{im}, as fourth step. As the fifth step, we determine the implications on beta as systematic risk factor applying Equation (2).

$$\beta_{it} = \frac{\rho_{im}\sigma_{it}}{\sigma_{mt}} \quad (2)$$

Last but not least multivariate regressions on REIT returns and variance estimates around bank failure and bank bailout dates are performed to identify potential drivers.

4 Results and Discussion

4.1 Average Stock Returns around Bank Events

The first analysis of our study focuses on standard average returns from two days prior to two days post bank failures and bank bailouts respectively. This analysis is carried out to investigate how REIT mean returns behave in absolute terms around bank events, which also enables us to put the abnormal returns, investigated later on in this study, into perspective. Serving as a reference point the mean returns facilitate the interpretation of observed abnormal returns.

In line with previous studies by Raudszus, Olliges, and Mueller (2012) and Olliges, Raudszus, and Mueller (2013) we expect bank failures to have a limiting effect on market liquidity, comparable to federal fund rate increases. As Bredin, O'Reilly, and Stevenson (2007) observed negative valuation effects for fund rate increases, we expect to observe comparable effects around bank Failures. Nonetheless we believe them to be only of minor magnitude as positive abnormal returns were found by Raudszus, Olliges, and Mueller (2012).

Around bank bailouts we expect generally more positive mean returns compared to bank failures, as bank bailouts represent a rather positive market signal in times of a financial crisis, strengthening the market's liquidity pool. The capital injection is, in its effect to market liquidity, comparable to the decrease of federal fund rates. Therefore one could argue for positive mean returns of the market. Furthermore, restored market liquidity could be

especially favorable for capital intensive industries like REITs. Nonetheless, fund rate decreases may not truly be comparable to bank bailouts. While fund rate decreases represent a rather standard tool of the central bank to initiate economic thrust in times of low economic growth, bank bailouts are the tool of last resort to prevent the economic system from a total meltdown.

Table 3 provides an overview on the FSI sample's, the all-REITs sample's, and the Equity, Mortgage and Diversified REIT sub-samples' average returns with respect to the analyzed 7 failure and the 7 bailout dates.

The analysis of the FSI sample shows highly significant negative means around bank failure dates. Around bank bailout dates, results are mixed. Significantly positive mean returns are observable for the (1,0) event window and the event day itself. The (-2,2) event window shows significant negative mean returns while the other event windows show no significant results. The analysis of the all-REITs sample shows negative means for almost all event windows, both for bank failures as well as for bank bailouts. In the case of bank failures all results are on highly significant level, with the exception of the day before the actual event (1,-1). For bank bailouts the symmetric event windows show high significance, the asymmetric ones do not. It is noticeable that, in contrast to generally negative mean returns, the event day itself produces a positive mean return in the case of bank bailouts. Concluding it can be stated that regarding mean returns, FSIs and REITs generally show a comparable behavior around both types of bank events.

While Equity REITs directly own equity stakes in properties, Mortgage REITs invest in loans backed by real estate and their returns are affected more by interest rates. This indirect real estate investment could cause negative valuation effects during crises.[16] We expect a negative valuation effect for Equity REITs based on the results for the all-REITs sample.

[16] See Liang and McIntosh (1998) for further insight on Equity and Mortgage REIT performance.

Mortgage REITs invest into loans backed by real estate and therefore only indirectly into real estate. For this REIT sub-category we also expect a rather negative valuation in the case of bank failures due to their proximity to the loan industry. Bank bailouts on the other hand should trigger a neutral or potentially slightly positive valuation effect.

Diversified REITs, potentially diversified not only by property type but also by equity and mortgage investment, should show a rather stable performance for both bank events with slightly negative tendencies for bank Failures and slightly positive ones for bank bailouts.

The results of our analysis, displayed in Table 3, show highly significant negative average returns around bank failures for Equity and Mortgage REITs. For Equity REITs this is also observable around bank bailouts while Mortgage REITs show basically zero mean returns. Diversified REITs show minor evidence of negative returns around failures dates and no significant average returns around bailouts.

Table 3: Average Returns of REIT Industry around Bank Failures and Bank Bailouts

	Event window		FSIs (nobs=1603)				REITs (nobs=833)				Mortgage (n=98)				Equity (n=623)				Diversified (n=112)			
	[-x ;	+x]	Mean		Median		Mean		Median		Mean		Median		Mean		Median		Mean		Median	
Bank Failures	0	0	-0.84%	***	-0.32%	***	-0.87%	***	-0.18%	***	-0.84%		-0.53%		-0.95%	***	-0.18%	***	-0.42%		0.00%	
	1	1	-0.45%	***	-0.14%	***	-0.18%	**	0.02%		-0.84%	***	-0.58%	**	-0.10%		0.03%		-0.05%		0.01%	
	2	2	-0.77%	***	-0.28%	***	-0.54%	***	-0.22%	***	-1.18%	***	-0.52%	***	-0.44%	***	-0.16%	***	-0.53%	***	-0.23%	***
	1	-1[a]	-0.39%	***	0.00%	***	-0.20%		0.17%		-1.54%	***	-0.60%	***	-0.06%		0.33%	*	0.20%		0.17%	
	1	0	-0.61%	***	-0.33%	***	-0.53%	***	-0.34%	***	-1.19%	***	-0.74%	***	-0.51%	***	-0.34%	***	-0.11%		-0.30%	
	2	0	-0.50%	***	-0.17%	***	-0.52%	***	-0.31%	***	-0.97%	***	-0.62%	***	-0.49%	***	-0.27%	***	-0.31%	*	-0.23%	**
	0	1	-0.47%	***	-0.16%	***	-0.17%	*	0.00%	*	-0.48%		-0.30%		-0.12%		0.00%		-0.17%		-0.08%	
	0	2	-1.07%	***	-0.51%	***	-0.66%	***	-0.40%	***	-1.27%	***	-0.70%	***	-0.56%	***	-0.35%	***	-0.72%	***	-0.26%	***
Bank Bailouts	0	0	0.59%	***	0.00%	***	1.40%	***	0.09%	***	1.36%	*	0.54%		1.48%	***	0.09%	***	1.01%		0.00%	
	1	1	-0.13%		-0.17%	**	-0.68%	***	-0.70%	***	-0.11%		0.02%		-0.89%	***	-0.83%	***	0.03%		-0.32%	
	2	2	-0.12%	**	-0.11%	**	-0.43%	***	-0.16%	***	0.04%		0.20%		-0.61%	***	-0.18%	***	0.14%		0.21%	
	1	-1[a]	-0.14%		0.00%	**	-1.67%	***	-1.44%	***	-1.60%		-1.88%	**	-1.92%	***	-1.66%	***	-0.30%		0.00%	
	1	0	0.22%	**	0.00%	*	-0.13%		0.00%		-0.12%		0.04%		-0.22%		-0.10%		0.35%		0.25%	
	2	0	0.06%		0.00%		-0.16%		-0.04%		-0.04%		-0.39%		-0.24%	*	-0.02%		0.23%		0.35%	
	0	1	-0.12%		0.00%		-0.18%		-0.14%		0.63%		0.41%		-0.38%	**	-0.26%	**	0.19%		0.24%	
	0	2	-0.06%		0.00%		-0.10%		-0.12%		0.56%		0.45%		-0.28%		-0.29%	**	0.35%		0.34%	

Nobs: number of observations for each sample, failures and bailouts - calculated as number of stocks multiplied each by 7 failure and 7 bailout dates; ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively; applied test statistics are the Wilcoxen signed rank test as non-parametric median test and the standard t-test as parametric mean test; [a]) the event window [1,-1] comprises solely the day before the actual event date.

Next we examine the different property type REIT sub-categories. Thereby we also build on previous findings by Payne (2006-II) who analyses the transmission of shocks by an examination of REIT sub-sectors. Ro and Ziobrowski (2011) provide additional evidence on the differences of the REIT sub-categories in their performance study of property-focused REITs versus Diversified REITs. We formulate the following expectations:

Office REITs invest in, e.g., commercial downtown properties obtaining their income on the basis of medium-term leases. Their proximity to the tertiary sector should affect Office REITs rather strongly in both directions, negative in the case of bank failures and positive in the case of bailouts. Zietz, Sirmans, and Friday (2003) provide a relevant performance analysis on more traditional REIT sub-sectors as, e.g., Office and Retail REITs.

Industrial REITs invest in warehouse buildings, which generally provide them with steady cash flows, secured by long-term leases in multiuser properties. These stable and crisis resistant characteristics should result in only minor negative average returns in the case of bank failures. As an especially capital intensive REIT class, Industrial REITs may especially benefit from bank bailouts with their positive effect on market liquidity.

Lodging REITs invest in hotel properties. Hotels cater to business and leisure travelers to generate their cash flows. As travelling represents generally one among the first expense categories affected by budget restrictions during crises, but certainly also rises strongly in boom times, we expect Lodging REITs to react rather negative to bank failures and relatively positive to bank bailouts. Also a generally negative performance is thinkable, as Jackson's (2009) findings suggest that Lodging REITs are generally less resilient than other property-focused REIT types.

Retail REITs invest in shopping centers and malls. Their cash flows depend on household spending. Bank crises do not directly impact households, nonetheless spending levels

should be negatively affected during times of financial crises and uncertainty, which leads us to expect relatively negative performance for Retail REITs in both cases, bank bailouts as well as bank failures.

Residential REITs mostly invest in rental apartment housing. They should undergo comparable risks to Retail REITs which would lead to negative return expectations for bank failures and bank bailouts. However, stable demand should benefit their valuation during crisis and the negative effect of the banking crisis should be more moderate for Residential REITs. Even positive valuation effects are thinkable, as Newell and Fischer (2009) state, that this asset class benefits, as home ownership decreases while people move into rental accommodations which receive special attention by institutional investors. They provide evidence on the recent performance of Residential REITs before and after the subprime and financial crisis.

Healthcare REITs invest in seniors housing and medical offices and their income therefore depends mainly on insurance and retirement payments that should be recession resistant. Therefore, bank failures and bank bailouts should not impact Healthcare REITs as a stable and crises resistant asset class and their values may actually strengthen during recessions.

Specialized REITs invest in a variety of smaller specialized property segments such as e.g. public storage or timber. Their performance relies on the unique demand in their segments. Therefore Specialized REITs may operate at either low or high risk levels and experience either positive or negative valuation effects. Newell and Peng (2006) should be considered for further evidence on the performance of rather non-traditional REIT sub-sectors such as healthcare and specialty.

Appendix 4.1 and 4.2 provide an overview on the REIT sub-samples' average returns with respect to the analyzed 7 failure and the 7 bailout dates. The analysis of the sub-samples displays a well heterogeneous picture. For bank failures strong evidence of negative average mean returns is observable for Office, Lodging and Residential REITs. Industrial and Retail REITs show the same tendency but on a lower significance level, respectively in fewer event windows. Specialty REITs basically show zero average returns while Healthcare REITs show mixed results with evidence both for positive as well as negative average returns.

Focusing on bank bailouts, we find clear evidence of negative average returns for Lodging and Residential REITs. Minor evidence for negative average returns is found for Office, Retail and Healthcare REITs. Industrial and Specialty REITs basically show zero average returns. An interesting fact, that has to be pointed out is, that the bailout day itself (event window 0,0) produces positive average mean returns for all 10 sub-samples, being significant or highly significant for 7 of the 10 sub-samples.

4.2 Abnormal Stock Returns around Bank Events

In the second part of our analysis we conduct an event study, following the objective to observe abnormal returns for FSIs and REITs around bank events. The estimation period of the event study comprises 250 trading days (one calendar year). In order to minimize a potential biasing effect on the regression parameters through the event under analysis, the regression keeps a distance to the actual event date of 30 trading days. By applying event study methodology, we are able to determine whether the mean returns of analyzed FSIs and REITs significantly differ from its previous relationship to the S&P 500 around a certain event.

In line with previous evidence by Raudszus, Olliges, and Mueller (2012) and Olliges, Raudszus, and Mueller (2013) generally positive abnormal returns are expected for REITs in

the event of bank Failures and respectively rather negative ones for bank bailouts. Although the evidence of Raudszus, Olliges and Mueller (2012) on bank failures was based on 130 event dates and REIT indices contrasting the 7 event dates on single REIT level in this study, the outcome is believed to be comparable.

Table 4 displays the findings on the FSI sample, the all-REITs sample and on the Mortgage, Equity, and Diversified REIT sub-samples. On the all-REITs level we observe strong evidence for positive abnormal returns in the case of bank failures, as 8 out of 10 event windows show positive abnormal returns, 5 of them on a (highly) significant level. This is in line with the expectations based on previous evidence by Raudszus, Olliges, and Mueller (2012), and supports the save haven theory of real estate in times of market uncertainty, as REITs outperform the general market index. Nonetheless it has to be noted, that these positive abnormal returns are accompanied by negative mean returns (compare Table 3).

Drawing our attention to bank bailouts we find evidence for negative abnormal returns, 9 out of 10 event windows show negative abnormal returns, 3 on a highly significant level. Again this is in line with our expectations and evidence from previous studies by Olliges, Raudszus, and Mueller (2013). Noticeable is the fact, that the event day itself shows significant positive abnormal returns, just like the analysis of the mean returns.

Comparing these results to the FSIs sample, it can be noted, that around bank failures no clear tendency can be observed regarding abnormal return behavior. The day before the event and the (1,1) event window show significant positive negative returns, the event day itself a positive one. Bank bailouts produce mostly negative abnormal results, while the day before the actual event shows a positive abnormal return. Concluding, FSIs and REITs show rather differing behavior around Bank Failures, while behavior around bank bailouts is more similar.

Mortgage REITs show basically no evidence of abnormal returns, neither for bank failures, nor for bank bailouts. Equity REITs on the other hand show strong evidence for

positive abnormal returns for bank failures and respectively negative abnormal returns for bank bailouts, and thereby prove to be the main drivers of the all-REITs sample's abnormal returns. The Diversified REIT sample shows only minor evidence of positive abnormal returns around bank Failures and no significant abnormal returns for bank bailouts.

Table 4: Abnormal Returns of REIT Industry around Bank Failures and Bank Bailouts

	Event window		FSIs (nobs=1603)				REITs (nobs=833)				Mortgage (n=98)		Equity (n=623)				Diversified (n=112)			
	[-x ;	+x]	Mean		Median		Mean		Median		Mean	Median	Mean		Median		Mean		Median	
Bank Failures	0	0	0,24%	***	0,25%	***	0.37%	***	0.35%	***	0.64%	0.62%	0.27%	**	0.32%	***	0.68%	**	0.36%	*
	1	1	-0,40%	***	-0,19%	*	0.33%		0.52%	***	-1.05%[b]	-0.96%[b]	0.48%	**	0.59%	***	0.69%		0.44%	
	2	2	-0,30%		0,27%		0.88%	***	1.09%	***	-0.70%	-1.23%	1.18%	***	1.28%	***	0.59%[b]		0.70%[b]	
	1	-1[a]	-0,21%	***	-0,11%	***	-0.08%		0.16%		-1.21%	***	-0.38%	**	0.03%		0.32%	**	0.34%		0.15%	
	1	0	0,03%		0,25%	**	0.29%	*	0.36%	***	-0.58%[b]	-0.19%[b]	0.30%	*	0.36%	***	1.02%	**	0.62%	**
	2	0	-0,17%		0,17%		-0.22%		0.07%		-0.94%[b]	-0.36%[b]	-0.20%		0.10%		0.31%		-0.21%	
	0	1	-0,19%		-0,11%		0.40%	**	0.35%	***	0.17%	-0.50%	0.45%	**	0.43%	***	0.35%		0.23%	
	0	2	0,11%		0,47%	**	1.46%	***	1.50%	***	0.88%	-0.29%	1.65%	***	1.73%	***	0.96%[b]		1.50%[b]	**
Bank Bailouts	0	0	-0.39%	***	-0.06%	*	0.47%	**	-0.06%		0.31%	0.28%	0.56%	**	0.04%		0.20%[b]		-0.45%[b]	
	1	1	0.23%		0.32%		-1.22%	***	-1.69%	***	1.16%	-0.12%	-1.97%	***	-2.23%	***	0.94%		-0.55%	
	2	2	0.10%		0.39%		-1.09%	**	-1.49%	***	2.40%	1.15%	-2.14%	***	-2.04%	***	1.79%		1.16%	
	1	-1[a]	0.78%	***	0.51%	***	-0.75%	***	-0.56%	***	-0.20%	-0.78%	*	-1.09%	***	-0.74%	***	0.59%		0.43%	
	1	0	0.40%		0.55%	***	-0.29%		-0.66%	**	0.11%	-0.29%	-0.53%	*	-0.80%	***	0.79%[b]		0.50%[b]	
	2	0	0.27%		0.36%		-0.11%		-0.47%		0.89%	-0.21%	-0.46%		-0.48%	*	1.06%[b]		-0.42%[b]	
	0	1	-0.56%	***	-0.16%	***	-0.46%		-0.48%	***	1.36%	1.25%	-0.87%	***	-0.75%	***	0.35%[b]		-0.38%[b]	
	0	2	-0.56%	***	-0.22%	***	-0.51%		-0.85%	***	1.82%	1.75%	-1.11%	***	-1.37%	***	0.93%[b]		0.30%[b]	

Nobs: number of observations for each sample, failures and bailouts - calculated as number of stocks multiplied each by 7 failure and 7 bailout dates; ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively; applied test statistics are the Wilcoxen signed rank test as non-parametric median test and the standard t-test as parametric mean test; [a]) the event window [1,-1] comprises solely the day before the actual event date; [b]) Kolmogorow-Smirnow-Test indicates that at a 10% significance level a normal distribution is not on hand and hence the median should be considered instead of the mean.

Appendix 5.1 and 5.2 report the results for the REIT sub-categories regarding abnormal returns in case of bank events.

Residential and Retail EITs support the evidence of the all-REITs sample with highly significant positive abnormal returns for bank failures and equally highly significant negative returns for bank bailouts. Retail, Healthcare and Specialty REITs are in line with these results yet on lower significance levels and fewer significant event windows.

Industrial REITs with significant positive abnormal returns for failures and basically no abnormal returns for bailouts, and Office REITs with no abnormal returns and mostly significant negative abnormal returns for bailouts, both only support the evidence for one or the other event. Lodging REITs however constitute an exception, as we can observe highly significant negative abnormal returns for both event types, supporting previous evidence by Jackson (2009). Office REITs show no evidence of abnormal returns for bank failures and Industrial non for bank bailouts. Specialty REITs show significantly positive results for bank failures and basically no abnormal returns for bailouts.

In sum we must note that the property type sub-samples support the evidence on the all-REITs sample behavior on a rather uniform level. Lodging REITs however show especially noticeable characteristics. Concluding, we can confirm pervious evidence by Raudszus, Olliges and Mueller (2012) and Olliges, Raudszus, and Mueller (2013).

4.3 Stock Variance Adjustments around Bank Events

In third part of our analysis we focus our attention the first time on the second dimension of stock returns, on the risk part. In this step of our analysis we examine the adjustments of EGARCH variance rates around bank events. As we mentioned before, daily index and stock variance estimates are determined applying the EGARCH (1,1) model. We now calculate daily changes in variance rates and cumulate these along the different sized event windows.

By performing this analysis we are able to investigate three things: First, the government often argues that bailouts are performed to calm down the market and prevent contagion effects and a possible meltdown of the system. This analysis brings about whether a calming effect on the REIT market is achieved and variance actually decreases around bank bailout dates. Second we investigate if we can observe a so called leverage effect, that is, a stronger variance increase through negative effects than though comparable positive effects, which would be manifested through asymmetric variance adjustments to the yet observed positive and negative abnormal returns around bank events. Thirdly we are eager to uncover any anticipation effect of bank events in a *calm-before-the-storm effect*, showing variance decreases before the respective events.

In order to determine hypotheses regarding the variance adjustments around bank events, we put our attention to the analysis by Ederington and Guan (2010) and compare their results on the S&P 500 to the mean returns of our analysis, displayed in the Tables 3 and Appendix 4.1 and 4.2. Ederington and Guan's (2010) study shows the EGARCH estimated volatility to react immediately positive to negative return shocks with an increasing tendency regarding the amplitude of the return shock. Zero up to 2.5 % positive returns cause a decrease in EGARCH variance estimates. Positive return shocks of more than 3 % again induce an increase in variance estimates, which however proofs to be far smaller than the negative return shock of the same magnitude.

In line with the findings of Ederington and Guan (2010) we expect the significantly negative average returns around bank failures to be accompanied by significant variance increases. Nonetheless, the observed positive abnormal returns around bank failures, deliver arguments for only minor or no variance adjustments. When focusing on REITs, for the day before the event (event window 1,-1), we mostly do not find significant average returns around bank failures, which implies zero returns, and thus, should be accompanied by decreasing variances. This *calm-before-the-storm effect* was already observed in previous

studies by Bonfirm (2003) for broader equity markets before changes in federal fund rates, and by Raudszus and Schiereck (2012) for the Financial Services Industry around bank events. As the mean returns show negative results around bank bailouts, though less pronounces then around bank failures, we expect no or only minor variance increases. Furthermore the calming effect of bank bailouts for Financial Services Industry might also be observable for REITs, even leading to decreases variances. Observing significantly negative average returns on the day before bank bailouts for the all-REITs sample, as well as for almost all REIT sub-categories, we expect increasing variances and hence no *calm-before-the-storm effect* for bank bailouts.

Table 5 displays the results for the analysis of variance adjustments for the FSI sample, the all-REITs sample as well as the Mortgage, Equity, and Diversified REIT sub-samples.

The all-REITs sample, as well as the Mortgage REIT sub-sample, do not show signs of significant variance changes around bank events. The picture changes when looking at the Equity and Diversified REIT sub-samples. Both show evidence of increasing variance levels around bank failures and some evidence of decreasing variance levels around bank bailouts. These findings are widely in line with our expectations and confirm findings of Ederington and Guan (2010) observing asymmetric variance reaction, and provide evidence for the existence of a leverage effect.

Compared to REITs, FSIs show a different behavior. Bank failures do not induce a change in variance rates, while a highly significant decrease is observable across almost all event windows in the case of bank bailouts. This shows that policy makers' goal to calm markets by bailing out banks is successful with regard to the Financial Services Industry. Against expectation bank failures do not induce a higher volatility for FSIs. For FSIs we observe a *calm-before-the-storm effect* around bank bailouts confirming the findings by Raudszus and Schiereck (2012).

Table 5: Variance Adjustments of REIT Industry around Bank Failures and Bank Bailouts

	Event window [-x ; +x]		FSIs (nobs=1603)			REITs (nobs=833)			Mortgage (n=98)			Equity (n=623)			Diversified (n=112)		
			Mean	Median		Mean	Median		Mean	Median		Mean	Median		Mean	Median	
Bank Failures	0	0	.00001	-.00002	***	-.00013	-.00001	***	-.00120	-.00003	**	.00002	-.00001	*	.00000	-.00002	
	1	1	-.00003	-.00001		-.00015	.00005	***	-.00207	.00007	*	.00011	*** .00005	***	.00007	.00003	***
	2	2	.00007	.00006	***	.00008	.00011	***	-.00116	.00018	***	.00026	*** .00011	***	.00020	*** .00010	***
	1	-1[a]	-.00009	-.00002	***	-.00004	-.00003	***	-.00059	-.00002		.00004	-.00003	***	.00002	-.00003	*
	1	0	-.00009	-.00002	***	-.00016	-.00001		-.00179	.00000		.00006	*** -.00001		.00002	-.00001	
	2	0	.00001	.00002	***	.00007	.00005	***	-.00063	.00006	***	.00017	*** .00006	***	.00009	** .00002	**
	0	1	.00006	-.00001		-.00011	.00001	***	-.00148	.00001		.00007	** .00001	***	.00005	.00000	
	0	2	.00006	.00001	***	-.00011	.00002	***	-.00173	.00000		.00011	** .00002	***	.00011	* .00002	**
Bank Bailouts	0	0	-.00003	-.00006	***	.00015	-.00008		-.00102	-.00010		.00033	-.00007		.00017	-.00011	
	1	1	-.00017	*** -.00012	***	-.00006	-.00020	***	.00121	-.00014		-.00024	** -.00021	***	-.00021	-.00020	**
	2	2	-.00042	*** -.00023	***	-.00033	-.00023	***	-.00038	-.00033	***	-.00028	-.00023	***	-.00053	*** -.00016	***
	1	-1[a]	-.00007	** -.00009	***	.00017	-.00012	***	.00250	-.00014		-.00015	*** -.00011	***	-.00010	-.00012	**
	1	0	-.00010	** -.00008	***	.00031	-.00011	***	.00148	.00001		.00017	-.00012	***	.00008	-.00009	
	2	0	-.00014	*** -.00013	***	.00033	-.00020	***	.00136	-.00017		.00021	-.00019	***	.00007	-.00030	**
	0	1	-.00010	* -.00009	***	-.00023	-.00017	***	-.00130	-.00025	**	-.00008	-.00017	***	-.00011	-.00012	**
	0	2	-.00031	*** -.00017	***	-.00051	* -.00023	***	-.00276	-.00038	***	-.00017	-.00019	***	-.00043	*** -.00042	***

Nobs: number of observations for each sample, failures and bailouts - calculated as number of stocks multiplied each by 7 failure and 7 bailout dates; ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively; applied test statistics are the Wilcoxen signed rank test as non-parametric median test and the standard t-test as parametric mean test; [a]) the event window [1,-1] comprises solely the day before the actual event date.

Around bank failures only Mortgage REITs show the results like the all-REITs sample with no significant variance adjustments. Equity REITs show a strong increase in variance rates, Diversified REITs confirm this trend. Also for bank bailouts Mortgage REITs are in line with the all-REITs sample, again showing no significant variance adjustments. This time Equity REITs and Diversified REITs show negative variance adjustments.

The overall picture for Equity REITs is widely supported by the other 7 Equity REIT sub-categories. Appendix 6.1 and 6.2 provide an overview of the results on the variance analysis for the property type REIT sub-samples. For bank failures we find strong evidence of increasing variance levels for Office, Industrial, Lodging, Residential and Healthcare REITs, also Retail REITs show evidence of increasing variance levels, however in fewer event windows. Specialty REITs' variance levels remain uninfluenced and show no significant adjustments. A *calm-before-the-storm effect* is not observable. Also the finding of variance rate increases for the Equity REIT sub-samples is in line with our expectations, based upon the negative average returns.

Focusing on bank bailouts, the picture is not as uniform. Office, Industrial, Lodging, and Specialty REITs show no significant variance adjustments. Retail REITs show very strong evidence of negative variance adjustments which is especially surprising as their significant negative average returns made us expect the opposite. Residential and Healthcare REITs also provide some evidence of generally negative variance level adjustments, however in fewer event windows. Also worth mentioning is the fact, that Residential and Healthcare REITs even show significant variance increases on the event day itself.

4.4 Shifts in Asset-to-Market Correlation around Bank Events

In the fourth step of our analysis of the effects of bank events, we focus on the second dimension of return risk, namely asset-to-market correlation. Hence we investigate how bank failures and bank bailouts affect the correlation coefficient of the FSI sample, the all-REITs

sample, and the REIT sub-samples to the market, in our case represented by the S&P 500 composite. We compute daily rolling correlation coefficients over 250 trading days (one calendar year). In previous research Bekaert and Wu (2000) showed that firm correlation increases in times of economic downturns. We are now eager to investigate how bank events, which generally occur during a market downturn, affect the asset-to-market correlation of FSIs and REITs.

As literature does not show any corresponding studies on the changes of market correlation with respect to REITs, it is difficult to derive hypotheses regarding the outcome of our analysis. In line with previous evidence by Bekaert and Wu (2000) we would expect bank failures with negative average returns across most REIT sub-samples, representing a market downturn, to trigger increased correlation coefficients. Previous research by Raudszus and Schiereck (2012) showed that bank bailouts trigger significant correlation increases for the Financial Services Industry. We expect comparable results for REITs.

Table 6 provides us with interesting results on the FSI sample, the all-REITs sample as well as the Mortgage, Equity and Diversified REIT sub-samples. Although we found stronger evidence for negative average returns for bank failures than for bank bailouts, we now observe far stronger signs of correlation increases in the case of bank bailouts, which is well in line with the findings by Raudszus and Schiereck (2012). We find highly significant correlation increases across most of the event windows for the all-REITs sample as well as for the Mortgage and Equity REIT sub-samples. Looking at bank failures the picture is ambiguous. The all-REITs sample even shows some evidence of correlation coefficient decreases, accompanied by one event window with significant correlation increases. Mortgage REITs show no correlation changes for bank failures, while Equity REITs show a very mixed pattern with both, significant correlation increases as well as significant decreases. Diversified REITs show only minor signs of correlation decreases in the event of bank

failures and no evidence for correlation changes in the case of bank bailouts, with the exception of the event day itself, showing a highly significant correlation increase.

In line with the results for the all-REITs sample, for the FSI sample correlation coefficient increases can be observed for bank bailouts. This confirms the findings of Raudszus and Schiereck (2012) on FSIs. Around Bank Failures however, highly significant correlation decreases are observable.

As Appendix 7.1 and 7.2 show, the phenomenon of increasing correlation in the event of bank bailouts is supported by most of the sub-samples. Office, Retail, Residential, Healthcare, and Specialty REITs show highly significant correlation increases. Industrial and Diversified REITs remain unaffected while Lodging REITs show ambiguous results with one event window significantly positive and one negative.

When looking at bank failures the picture is not as uniform. Lodging REITs stick out as they show a clear decrease in correlation. Diversified REITs also show some evidence for this tendency. Office and Industrial show a mixed profile. Retail, Healthcare and Specialty REITs show a rather strong correlation increase. Residential REITs' correlation coefficients remain, like Mortgage REITs, unaffected. Noticeable again is the significant decrease in correlation the day before the event for most of the REIT sub-samples in the case of bank failures, while for bank bailouts this effect is not observable.

The analysis of adjustments in correlation coefficients has shown that bailouts trigger a considerable increase in correlation of REITs to the general market. Failures show an ambiguous picture with significant increases as well as decreases for different REIT types and event windows. A clear pattern is not observable.

Table 6: Correlation Adjustments of REIT Industry around Bank Failures and Bank Bailouts

	Event window [-x ; +x]		FSIs (nobs=1603)				REITs (nobs=833)				Mortgage (n=98)				Equity (n=623)				Diversified (n=112)			
			Mean		Median		Mean		Median		Mean		Median		Mean		Median		Mean		Median	
Bank Failures	0	0	-.0014	***	-.0002	***	.0002		.0001	*	-.0006		.0001		.0005	*	.0001	**	-.0005		.0000	
	1	1	-.0011	***	-.0011	***	.0003		-.0001		-.0008		-.0007		.0007		.0000		-.0007		.0002	
	2	2	-.0013	***	-.0019	***	.0008		.0016	***	-.0006		.0013		.0012	**	.0019	***	-.0002		.0001	
	1	-1[a]	-.0007	***	-.0004	***	-.0013	***	-.0006	***	-.0010		-.0005		-.0014	***	-.0006	***	-.0012	***	-.0007	***
	1	0	-.0021	***	-.0009	***	-.0011	***	-.0003	***	-.0016		-.0008	*	-.0009	**	-.0002	**	-.0017	**	-.0008	*
	2	0	-.0014	***	-.0013	***	.0003		-.0002		.0001		-.0001		.0004		-.0001		.0002		-.0010	
	0	1	-.0004		-.0006	***	.0016	***	.0006	***	.0001		.0000		.0021	***	.0008	***	.0005		.0001	
	0	2	-.0012	***	-.0017	***	.0007		-.0002		-.0014		-.0006		.0013	***	-.0001	*	-.0009		-.0006	
Bank Bailouts	0	0	.0008	***	.0006	***	.0012	***	.0010	***	.0012	***	.0009	***	.0012	***	.0010	***	.0013	***	.0010	***
	1	1	.0014	***	.0006	***	.0018	***	.0004	***	.0022	**	.0004	**	.0020	***	.0005	***	.0002		-.0002	
	2	2	.0017	***	.0018	***	.0018	***	.0018	***	.0025	**	.0023	**	.0021	***	.0018	***	-.0005		.0004	
	1	-1[a]	.0003	*	-.0001		.0001		-.0003	**	.0005		-.0003		.0001		-.0002		-.0004		-.0006	*
	1	0	.0011	***	.0006	***	.0013	***	.0006	***	.0017	**	.0003	**	.0013	***	.0006	***	.0009		.0005	
	2	0	.0019	***	.0014	***	.0021	***	.0015	***	.0031	***	.0022	***	.0021	***	.0015	***	.0015		.0013	**
	0	1	.0011	***	.0008	***	.0017	***	.0010	***	.0017	**	.0012	**	.0020	***	.0010	***	.0006		.0009	*
	0	2	.0007	***	.0006	***	.0008	*	.0008	***	.0006		.0013		.0012	**	.0008	***	-.0007		.0005	

Nobs: number of observations for each sample, failures and bailouts - calculated as number of stocks multiplied each by 7 failure and 7 bailout dates; ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively; applied test statistics are the Wilcoxen signed rank test as non-parametric median test and the standard t-test as parametric mean test; [a]) the event window [1,-1] comprises solely the day before the actual event date.

4.5 Beta Shifts around Bank Events

In the fifth part of our analysis we focus our attention on beta as systematic risk factor, which we derive from the variance rates and correlation coefficients. One of the basic principles of the Capital Asset Pricing Model (CAPM) by Sharpe (1964) and Lintner (1965) is the stablility of beta throughout time. In spite of this, many financial economists like Chiang, Lee and Wisen (2005), Jagannathan and Wang (1996), Collins, Ledolter, and Rayburn (1987), Bos and Newbold (1984), Sunder (1980) and Fabozzi and Francis (1978) have argued against beta stability, by showing that beta follows a statistical process and is thus conditional. In line with previous research by Raudszus, Olliges, and Mueller (2012), by Olliges, Raudszus and Mueller (2013) and by Raudszus and Schiereck (2012) we are keen to find evidence for short-term beta changes around bank events, seeking to provide evidence that beta adjustments are significant and thus should not be ignored.

As Equation (2) shows, beta estimates are determined directly from daily variances and correlation coefficients which have yet been analyzed and discussed in chapters 4.3 and 4.4. As Table 7 shows, we find evidence of beta estimate increases for the all-REITs sample around bank failures. This is noticeable as we do not observe significant variance levels shifts and ambiguous results on low significance level for correlation coefficient shifts. In the case of bank bailouts we find strong evidence for beta estimate increases for the all-REITs sample, which are clearly correlation driven, as variance shows no significant changes. While Mortgage REITs show no significant beta adjustments, the Equity REIT sub-sample shows highly significant beta increases for both bank events, which in the case of bank bailouts are again clearly correlation driven and for bank failures mostly variance driven. Diversified REITs show practically no evidence of beta changes for failures and only minor signs of beta increases for bailouts.

Like REITs, around bank bailouts, FSIs show significant beta estimate increases. Around bank failures FSIs clearly differ from REIT behavior, as they show significant decreases for beta estimates.

These results partly deviate from previous results by Raudszus, Olliges, and Mueller (2012) and Olliges, Raudszus, and Mueller (2013) who did not find evidence on significant beta shifts for bank events. This is attributable to the circumstance that this study uses a EGARCH (1,1) model, contrasting the simple GARCH (1,1) model used in the previously mentioned studies.

When looking at the results for the 7 property type sub-samples in Appendix 8.1 and 8.2 we find a rather homogeneous picture. For bank failures we find scattered evidence of significant beta increases for almost all sub-samples; only Lodging REITs show ambiguous results. Also for bank bailouts we find comparable results, with Lodging, Retail and Residential REITs showing rather strong signs of beta increases. Healthcare REITs show the same tendency while Office, Industrial, and Specialty REITs remain unaffected.

Concluding we can state that Mortgage REITs' valuation generally is not majorly affected in relation to the market, around none of the bank events, as we observe neither abnormal returns nor significant beta adjustment. The negative mean returns around bank failures are in line with market behavior. When looking at Equity REITs we can state, that we observe a clearly negative valuation in absolute and relative terms around bank bailouts with negative mean returns, negative abnormal returns and increased beta estimates. For bank failures we are not able to make a final statement regarding the valuation effect, as it remains unclear whether the positive valuation effect of positive abnormal returns or the negative valuation effects of negative mean returns and increased beta levels prevail.

Table 7: Beta Adjustments of REIT Industry around Bank Failures and Bank Bailouts

	Event window [-x ; +x]	FSIs (nobs=1603) Mean		FSIs (nobs=1603) Median		REITs (nobs=833) Mean		REITs (nobs=833) Median		Mortgage (n=98) Mean		Mortgage (n=98) Median		Equity (n=623) Mean		Equity (n=623) Median		Diversified (n=112) Mean		Diversified (n=112) Median	
Bank Failures	0 0	-0.005		0.004	**	0.011	*	0.014	***	-0.046		0.005		0.022	***	0.016	***	0.004		0.011	**
	1 1	-0.036	***	-0.027	***	-0.007		0.009	*	-0.136		0.016		0.012	**	0.010	*	-0.001		-0.004	
	2 2	-0.020	**	-0.005		0.009		0.020	***	-0.066		0.038		0.018	**	0.018	***	0.020		0.019	
	1 -1[a]	0.005	*	0.007	***	0.013		0.011	***	-0.032		0.004		0.020	***	0.012	***	0.017	*	0.007	**
	1 0	0.001		0.008	*	0.025	*	0.029	***	-0.078		0.028	**	0.041	***	0.031	***	0.021		0.012	**
	2 0	-0.006		0.012	**	0.026	*	0.029	***	0.009		0.016		0.029	***	0.034	***	0.025		0.014	
	0 1	-0.041	***	-0.027	***	-0.020	**	-0.003	***	-0.104		-0.003		-0.008		-0.003	***	-0.017		-0.002	
	0 2	-0.019	***	-0.010	***	-0.006		0.002		-0.121		0.002		0.011	*	0.001		0.000		0.007	
Bank Bailouts	0 0	0.009	***	0.003	**	0.018	***	0.019	***	-0.018		0.010		0.022	***	0.024	***	0.025	*	0.005	
	1 1	0.025	***	0.015	***	0.025	*	0.034	***	0.093		0.033		0.017		0.042	***	0.011		0.009	
	2 2	0.047	***	0.023	***	0.064	***	0.032	***	0.071		0.030		0.067	***	0.036	***	0.041		0.012	
	1 -1[a]	-0.003		0.003		-0.005		0.013	**	0.093		0.004		-0.018	**	0.015	*	-0.017		0.009	
	1 0	0.006		0.000		0.013		0.011	*	0.076		0.011		0.004		0.013	*	0.008		0.000	
	2 0	0.036	***	0.006	***	0.061	***	0.033	***	0.117		0.025	*	0.055	***	0.042	***	0.047	*	0.006	
	0 1	0.028	***	0.012	***	0.030	***	0.024	***	0.000		0.004		0.035	***	0.032	***	0.029	*	0.008	*
	0 2	0.020	***	0.009	***	0.020	*	0.013	***	-0.064		-0.010		0.034	***	0.022	***	0.019		-0.002	

Nobs: number of observations for each sample, failures and bailouts - calculated as number of stocks multiplied each by 7 failure and 7 bailout dates; ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively; applied test statistics are the Wilcoxen signed rank test as non-parametric median test and the standard t-test as parametric mean test; [a]) the event window [1,-1] comprises solely the day before the actual event date.

4.6 Determinants of Variance Adjustments and Daily Returns

The sixth and final analysis is the execution of several multivariate regressions on daily returns and daily variance shifts of the REIT industry compared with the S&P 500 Composite index. Hereby, we analyze the three daily returns and three daily variance shifts of the day before, the bank event day itself and the day after, as dependent variables. Independent variables and potential determinants are USD failure assets and USD bailout capital, dummy variables, D, for the days t-1, t, t+1 and the day of the week effect, the S&P 500 daily return/variance shift[17] and the test for autoregressive returns and variances with FSI_{t-1} and $S\&P_{t-1}$ respectively. Equations (3) and (4) illustrate the models for daily returns, u_t, and daily variance shifts, $\Delta\sigma_t^2$:

$$u_t = \delta_1 + \delta_2 USD_{failure} + \delta_3 USD_{bailout} + \delta_4 D_{t-1} + \delta_5 D_t + \delta_6 D_{t+1} + \delta_7 D_{day} [+ \delta_8 u_{S\&P}] + \delta_9 u_{t-1} \quad (3)$$

$$\Delta\sigma_t^2 = \delta_1 + \delta_2 USD_{failure} + \delta_3 USD_{bailout} + \delta_4 D_{t-1} + \delta_5 D_t + \delta_6 D_{t+1} + \delta_7 D_{day} [+ \delta_8 \Delta\sigma_{S\&P}^2] + \delta_9 \Delta\sigma_{t-1}^2 \quad (4)$$

In our first analysis on average returns around bank events we found, that REIT returns react negatively to both bank failures as well as bank bailouts. We expect to confirm these observations on δ_1, δ_2 and δ_3 in Table 8.1 and hope to gain insight, which event has stronger negative effects on mean returns.

Our third analysis has shown evidence for generally positive variance shifts around failures and mainly decreasing variances around bank bailouts. Therefore we expect to confirm these observations on δ_{11} and δ_{12} in Table 8.2. As we do not observe a *calm-before-the-storm effect* for bank failures and only minor signs of this effect for bank bailouts we do

[17] Only applicable when analyzing REIT returns and variance shifts.

not expect a significantly negative δ_{13} in Table 8.2 We do also not expect to observe a general bank event effect (δ_{14}) nor a significant general day-after effect (δ_{15}) in Table 8.2.

Table 8.1 provides the results for our multivariate regressions on REIT and S&P 500 returns around bank failures and bank bailouts. We performed four regression models, each to test all dependent variables avoiding autocorrelation. Models 2 and 3 and models 6 and 7 show that REIT and S&P 500 returns respond in direct comparison negatively to failures and positively to bailouts. Hence the negative effect on mean returns is stronger in the case of bank failures. Negative δ_1 in Model 1, 2, and 3 confirm the generally negative effect on mean returns of bank events.

It has to be noted that interestingly we find significantly negative results for δ_4 significantly positive results for δ_5. Furthermore, REIT returns show strong dependence on S&P returns (δ_8) and high adj. R^2 of Model 1, 2, and 4. The S&P 500 return (δ_8) is affected negatively by the weekday Monday (δ_7) around bank events and it appears negatively autoregressive (δ_9) at low significance, while REIT returns show strong evidence of autoregressiveness. These results are in line with the findings of Friday and Higgins (2000), who also observed significant autocorrelation patterns for REITs and a strong dependency on the precious day's market return.

Turning our attention to REITs' and S&P's daily variance shifts as dependent variable in multivariate regressions, supporting evidence for our previous analyses is less easily identified. First of all it must be noted, that we observe generally low adj. R^2 values for the multivariate regression of variances. Table 8.2 shows significant negative variance responses of REITs and the S&P 500 to failures (δ_{11}). This opposes our expectation after our previous research showed increased variance rates. The reaction towards bailouts is insignificant for both, REITs and the S&P 500 (δ_{12}).

Insignificant δ_{13} is in line with our expectation as also before no clear evidence of a *calm-before-the-storm effect* has been met. Model 11 regarding S&P 500 variance finds a negative effect through failures which does not really fit ambiguous previous evidence. Else, we observe a negative mid-of-the-week effect *(Wednesday effect, δ_{16})* on REIT variance shifts and strong positive dependence on S&P 500 variance shifts (δ_{17}). For REIT variance shifts autoregressiveness there is mixed evidence (δ_{18}); Model 8 shows no significant auto-regressiveness while Model 9 and 10 display highly significant negative autoregressivness. Also S&P 500 variance shifts display significant negative autoregressiveness.[18]

Table 8.1: Multivariate Regressions on Returns around Bank Events

		REITs								S&P 500 Composite							
Coefficients		Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7			
Intercept	δ_1	(0.60)	***	(0.61)	***	(0.81)	***	0.00		0.53		(0.50)	*	(0.51)			
USD failure assets	δ_2			(0.99)	***	(0.00)	***					(0.00)	***	(0.00)	***		
USD bailout capital	δ_3			1.30	***	0.00	***					0.00	***	0.00	***		
t-1	δ_4							(0.01)	***			0.26					
t	δ_5	1.14	***							(0.20)							
t+1	δ_6					(0.10)								0.28			
Monday	δ_7									(2.12)	***						
S&P500	δ_8	162.13	***	161.31	***			162.78	***								
$REIT_{t-1}$, $S\&P_{t-1}$	δ_9	(8.15)	**	(8.06)	**	(16.42)	***	(0.10)	***	(27.01)	*	(4.90)		(5.82)			
Nobs.		410		410		410		410		41		41		41			
F (p.-Val.)		0.00	***	0.00	***	0.00	***	0.00	***	0.11		0.00	***	0.00	***		
adj. R^2		0.65		0.65		0.24		0.65		0.11		0.40		0.40			
DW		2.05		2.04		1.96		2.06		2.02		1.88		1.88			

(x) values in parentheses are negative, Nobs: number of observations - 3 trading days (*t-1, t, t+1*) per event (7 failures and 7 bailouts); ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

[18] For further insight on multivariate modeling of daily REIT variances consult Cotter and Stevenson (2006).

Table 8.2: Multivariate Regressions on Variance around Bank Events

		REITs						S&P 500 Composite					
Coefficients		Model 8		Model 9		Model 10		Model 11		Model 12			
Intercept	δ_{10}	1.92		3.33		6.25	***	1.81		1.96			
USD failure assets	δ_{11}			(5.98)	***	(8.09)	***			(9.25)	***		
USD bailout capital	δ_{12}			13.61		(25.09)				39.17			
t-1	δ_{13}			1.83									
t	δ_{14}	4.86						(0.58)					
t+1	δ_{15}					(6.86)	***			(0.10)			
Wednesday	δ_{16}	(8.72)	***	(9.29)	***	(8.18)	***	(8.34)		(8.67)			
S&P500	δ_{17}	88.00	***	84.68	***	86.14	***						
$REIT_{t-1}$, $S\&P_{t-1}$	δ_{18}	(6.57)		(7.69)	***	(7.60)	***	(12.69)	**	(13.31)	**		
Nobs.		410		410		410		41		41			
F (p.-Val.)		0.00	***	0.00	***	0.00	***	0.72		0.84			
adj. R^2		0.05		0.04		0.06		-0.01		-0.05			
DW		1.88		1.89		1.87		2.14		2.18			

(x) values in parentheses are negative, Nobs: number of observations - 3 trading days (*t-1, t, t+1*) per event (7 failures and 7 bailouts); ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

5. Conclusion

Our study has the objective to analyze how the REIT industry's and especially its sub-categories' risk-return profiles react to the current financial crisis. We investigate stock performance by scrutinizing shifts in returns (mean returns and abnormal returns) and adjustments in three risk measures (variance, correlation and beta), around two types of bank events, bank failures and bank bailouts. As we compare the REIT industry to other financial stocks, as well as to the market (S&P 500) and investigate 10 REIT sub-categories in detail, we gain a deeper understanding in the behavior and the characteristics of the REIT industry.

Tables 9.1 and 9.2 provide an abstract aggregated overview of the study's results and the implications on the valuation effect in absolute terms and relative to the market. Concluding we can generally state, that in the case of bank bailouts, REITs experience a negative valuation effect, relative to the market and also in absolute terms, as we find negative mean returns, negative abnormal returns and increased betas. For bank failures the picture is not quite as clear. In absolute terms we observe negative valuation effects with generally negative mean returns and increased beta levels. In relative terms this question has to remain

unanswered, as it is not clear, whether the negative valuation effect of increased risk levels outweighs the positive valuation effect of positive abnormal returns. We find clear evidence that REITs react differently with respect to the type of bank event, namely bank failures or bank bailouts. REITs positive abnormal returns around failures supports the save haven-theory of Mueller and Mueller (2003) that see real estate as hard asset and thus preferred investment option during times of high market uncertainty.

As we look at the different REIT sub-categories the clearest differences are not surprisingly observable between Equity, Mortgage and Diversified REITs, while in comparison the 7 different property type REITs are more homogenous in their behavior. It becomes evident, that the results of total REIT sample are driven by the equity REITs, which is attributable to fact that equity REITs account for around 75% of total sample. Mean returns are mostly negative for all analyzed REIT samples. Differences become evident when looking at abnormal returns. Equity REITs show significantly negative abnormal returns around bank bailouts and significantly positive abnormal reaction around failures. Diversified REITs follow this trend in the case of failures. In the case of bailouts however, they are in line with results for mortgage REITs. Which show no significant abnormal returns for neither of the bank events. Generally beta levels increase throughout the Equity REITs around both types of bank events, around bank failures predominately variance driven, around bank bailouts clearly correlation induced.

Main drivers for the equity REIT results appear to be retail and residential REITs which, combined account for over 40 percent of the Equity REITs. Lodging REITs show interesting characteristics as they are generally outperformed by the other equity REITs, confirming previous findings by Jackson (2009).

Specialty REITs remain quite unaffected by bank events, or even show slightly positive valuation tendencies, which could provide a hedging potential. The same holds true for mortgage REITs, which show little reaction to bank events.

Table 9.1: Abstract Aggregation of Results for Bank Failures

	Reaction to bank failures					Valuation effect[1]	
	Mean Returns	Abnormal Returns	Variance	Correlation	Beta levels	Absolute	Relative to Market
All-FSI	-	(~)	0	-	-	~	(~)
All-REIT	-	+	0	(~)	(+)	-	~
Equity	-	+	+	~	+	-	~
Mortgage	-	0	0	0	0	-	0
Diversified	(-)	(+)	(+)	(-)	0	(-)	(+)
Office	-	0	+	(~)	(+)	-	(-)
Industrial	(-)	+	+	(~)	(+)	(-)	(~)
Lodging	-	-	+	-	(~)	(-)	(-)
Retail	-	(+)	(+)	+	+	-	~
Residential	-	+	+	0	(+)	-	~
Healthcare	~	+	+	+	(+)	(~)	~
Specialty	0	+	0	+	(+)	(-)	~

+ / - indicate significant increases / decreases in the respective value, ~ indicates mixed results, signs in ( ) indicate that the repective change was only observable in fewer event windows and / or on lower significance levels; 0 indicates no significant changes; [1]) Valuation effect is based on beta changes and mean returns for the absolute valuation effect and on beta and abnormal returns for the valuation effect relative to the S&P 500.

Table 9.2: Abstract Aggregation of Results for Bank Bailouts

	Reaction to bank bailouts					Valuation effect[1]	
	Mean Returns	Abnormal Returns	Variance	Correlation	Beta levels	Absolute	Relative to Market
All-FSI	(~)	~	-	+	+	(~)	~
All-REIT	(-)	(-)	0	+	+	-	-
Equity	-	-	(-)	+	+	-	-
Mortgage	0	0	0	+	0	0	0
Diversified	0	0	(-)	0	(+)	(-)	(-)
Office	(-)	(-)	0	+	0	(-)	(-)
Industrial	(~)	0	0	0	0	(~)	0
Lodging	-	-	0	(~)	+	-	-
Retail	(-)	(-)	-	+	+	-	-
Residential	-	-	(~)	+	+	-	-
Healthcare	(-)	(-)	(~)	+	(+)	-	-
Specialty	(~)	0	0	+	0	0	0

+ / - indicate significant increases / decreases in the respective value, ~ indicates mixed results, signs in ( ) indicate that the repective change was only observable in fewer event windows and / or on lower significance levels; 0 indicates no significant changes; [1]) Valuation effect is based on beta changes and mean returns for the absolute valuation effect and on beta and abnormal returns for the valuation effect relative to the S&P 500.

When looking at the results for changes in variance, the application of the EGARCH model has proven to be appropriate in describing the analyzed FSIs' and REITs' stock market variance in the present study. The behavior of the investigated stocks' variance is well described by the asymmetric response of volatility to return shocks, a stylized fact of stock return data. We found strong variance increases around the negative return shocks induced by bank failures and mostly zero or minor variance descents around bank bailouts. This adds well to recent evidence by Ederington and Guan (2010) modeling S&P 500 variance with an EGARCH model. A significant *calm-before-the-storm effect* implying that markets anticipate bank failures or bank bailouts was not observable for REITs. This is somewhat surprising as REITs are considered part of the Financial Services Industry and we expected to find similar results to earlier research by Raudszus and Schiereck (2011) who found a significant *calm-before-the-storm effect* for the Financial Services Industry around bank events. Also Bomfim (2003) shows comparable evidence on the anticipation of federal fund rate adjustments by the market.

Raudszus and Schiereck (2012) state that governments should be concerned by the consequences their bank bailout programs have. For the Financial Services Industry a short term calming of the markets in the form of decreasing variances is bought dearly by significantly increased correlation levels which even offset the effect, as increased beta estimates, as a product of these two factors, show (see Raudszus and Schiereck, 2012). In the case of REITs, considered a sub-category of the Financial Services Industry, there is generally only little evidence of declining variance levels, while significantly increased correlation and resulting, significantly increased betas are observable. This increased level of risk in the economy as a whole and especially the higher risk of spillover and contagion effects through increased correlations, threaten the stability, which is particularly critical within a financial crisis as well as in the aftermath of it, which is often characterized by a government debt crisis (see Reinhart and Rogoff, 2009).

Concluding, we contribute to the literature in five major parts:

One, we provide detailed insight in the different reaction to of the various REIT classes to the two different types of bank events. We identify unique characteristics of the divers REITs and find interesting similarities and differences of the investment styles of Equity, Mortgage, and Diversified REITs as well as for the different property investment classes of the Equity REITs: Office, Industrial, Lodging, Retail, Residential, Healthcare and Specialty REITs.

Two, while earlier research by Raudszus and Schiereck (2012) found that government bailouts achieve a short-term decrease in market volatility for the Financial Services Industry[19] in general, we cannot quite confirm these findings for REITs industry and its sub-categories, which show only little evidence of decreasing volatility. Therefore, while we find evidence that government bailouts do calm the Financial Services Industry, manifested through decreasing volatility, a calming effect on the REIT industry is not as evident. One could argue however, that bailouts prevent the variance increase, observable around bank failures, though at the cost of significantly increased correlation coefficients.

Three, we provide detailed information on variance, correlation and beta behavior and therefore allow for a deeper understanding of the unequal consequences of bank failures and bank bailout. We observe generally increased beta estimates which are clearly correlation driven around bank bailouts and predominately variance driven around bank failures.

[19] REITs are considered one of five subclasses of the Financial Services Industry (FSI), besides banks, insurances, asset managers and brokers.

The increasing beta estimated around bank bailouts could be a sign for the moral hazard theory and are in line with findings by Gropp, Hakenes, and Schnabel (2011) who found a strong decrease in risk adversity of competitor banks in response to bank bailouts and guarantees, and also confirm previous finding on the Financial Services Industry by Raudszus and Schiereck (2012). Nonetheless it has to be noted, that increasing beta levels can also be observed around bank failures, in that case though, mostly variance driven and less correlation driven.

Four, we confirm the results of previous studies on REIT returns around bank events, as we observe generally negative abnormal returns in the case of bank bailouts and generally positive abnormal returns around bank failures. Also we do not find evidence that bailouts distribute wealth to REIT shareholders as we observe both, generally negative mean returns as well as generally negative abnormal returns. So rather the opposite is the case.

Five, the application of the EGARCH (1,1) model to estimate variance enables us to show that variance indeed reacts asymmetrically to positive and negative return shocks and differently to the two types of bank events, and thus proves the existence of the so called leverage effect.

We like to point out three recommendations for further research to overcome limitations of the present study. First, future research could extend the analysis to other financial crises in order to verify of the findings are robust over time. Second, the extension of the investigation to other markets and REIT regimes provides evidence on geographical similarities or differences. And third, researcher could advance our methodological approach. The limitation to one return factor would enable to investigate that factor in even more detailed. Thus e.g. focusing only on variance shifts, diverse sets of GARCH models and competing approaches could be applied, in order to validate the consistency of the findings and enhance the general

robustness of results. Other factors which can have biasing effects on the results and are hence object to further discussion, are the identification and selection of the event date[20] and the discussion about different reactions to expected and unexpected events.[21]

[20] See e.g. Jensen and Ruback (1983) for a discussion that absence of abnormal returns might stem from the fact that the execution date was equated to the announcement date.

[21] The study at hand does not differentiate whether a bank event is potentially expected or unexpected by the market, although it is likely, that the market develops a certain expectation regarding the state of a financial institutions and the behavior of policy makers, and the circumstance that a institution and / or policy makers react according to or divergent from that expectation, has a significant influence on the reaction of the market. See e.g. Chang (2009) on the nonlinear effects of expected and unexpected components of monetary policy on the dynamics of REIT returns and Bernanke and Kuttner (2005) who investigate the influence of federal fund rate changes on equity markets. Bernanke and Kuttner (2005) e.g. find that an unanticipated 25-basis-point cut in the fund rate, leads to a 1% increase in the stock market index. They specify that the major effect on the stock price is attributable to the surprise fraction of the adjustment. Also the find event induced variance, as equity returns show a 10% increase in volatility announcement at the date of the adjustment in monetary policy.

Appendix

Appendix 1.1: Descriptive Statistics on Market and REIT Industry Daily Returns

07/2008 - 07/2010[1]	S&P500	FTSE NA Financials	FTSE NA REIT[3]	US-DS Mortgage REITs	DJ EQUITY ALL REIT	FTSE NAREIT DEV
Mean[2]	-0.03%	-0.05%	-0.03%	0.03%	-0.03%	-0.06%
Median[2]	0.10%	0.00%	0.00%	0.08% **	0.00%	-0.04%
Skewness	-0.15	-0.12	-0.09	0.41	-0.06	-0.35
Kurtosis	7.59	6.19	5.66	11.22	5.67	5.55
StD	0.02	0.04	0.04	0.04	0.04	0.02
Q_{10}	338[a]	216[a]	354[a]	174[a]	344[a]	414[a]
Q_{100}	881[a]	901[a]	1164[a]	559[a]	1145[a]	887[a]
$ARCH_{10}$	81[a]	44[a]	83[a]	33[a]	81[a]	134[a]
$ARCH_{100}$	375[a]	168[a]	151[a]	400[a]	155[a]	158[a]

[1]) Descriptive mean return statistics on the basis of 504 trading days throughout the period of the financial crisis under investigation; [2]) Means and Medians are tested for difference from zero, ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively; applied test statistics are the Wilcoxen signed rank test as non-parametric median test and the standard t-test as parametric mean test; [3]) Mean and Median of the FTSE NA REIT are not significantly different from zero nor from the S&P 500; Squared stock returns are tested by Ljung-Box test (see Ljung and Box, 1978) for serial correlation (Q10/100) and by ARCH test (see Engle, 1982) for heteroscedasticity for 10 and 100 lags; [a]) indicates test result is positive for serial correlation or heteroscedasticity at the 5% significance level, [b]) indicates the opposite.

Appendix 1.2: Descriptive Statistics on REIT Industry Daily Returns

07/2008 - 07/2010[1]	S&P1500 OFFICE REITS	MSCI US INDUS. REIT	US-DS Hotel, Ldg REITs	S&P1500 RETAIL REITS	S&P1500 RESIDENTIAL REITS	FTSE NAREIT HEALTH.	NA-DS Specialty REITs
Mean[2]	-0.04%	-0.19%	0.01%	-0.06%	0.02%	0.08%	0.02%
Median[2]	0.00%	0.00%	0.03%	0.00%	0.00%	0.08% *	0.02% *
Skewness	-0.13	-0.43	0.06	0.05	-0.07	-0.11	0.11
Kurtosis	6.04	7.02	5.40	5.81	5.68	5.78	5.98
StD	0.05	0.06	0.06	0.05	0.05	0.04	0.04
Q_{10}	287[a]	454[a]	296[a]	335[a]	327[a]	333[a]	281[a]
Q_{100}	973[a]	1237[a]	976[a]	1101[a]	1036[a]	1261[a]	1096[a]
$ARCH_{10}$	68[a]	81[a]	56[a]	77[a]	91[a]	96[a]	63[a]
$ARCH_{100}$	126[a]	182[a]	234[a]	250[a]	154[a]	169[a]	193[a]

[1]) Descriptive mean return statistics on the basis of 504 trading days throughout the period of the financial crisis under investigation; [2]) Means and Medians are tested for difference from zero, ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively; applied test statistics are the Wilcoxen signed rank test as non-parametric median test and the standard t-test as parametric mean test; Squared stock returns are tested by Ljung-Box test (see Ljung and Box, 1978) for serial correlation (Q10/100) and by ARCH test (see Engle, 1982) for heteroscedasticity for 10 and 100 lags; [a]) indicates test result is positive for serial correlation or heteroscedasticity at the 5% significance level, [b]) indicates the opposite.

Appendix 2.1: Descriptive Statistics on Market and REIT Industry Daily EGARCH (1,1) Variance Estimates

07/2008 - 07/2010[1]	S&P500	FTSE NA Financials[3]	FTSE NA REIT[3]	US-DS Mortgage REITs	DJ EQUITY ALL REIT	FTSE NAREIT DEV
Mean[2]	.0004	.0012 ***	.0019 ***	.0014 ***	.0018	.0004 ***
Median[2]	.0002	.0006 ***	.0008 ***	.0007 ***	.0008 ***	.0003 ***
Skewness	2.28	1.40	1.42	2.89	1.43	2.53
Kurtosis	8.03	4.48	4.41	14.12	4.44	9.56
StD	.0005	.0012	.0020	.0018	.0019	.0005
Q_{10}	28[a]	19[a]	10[b]	20[a]	10[b]	7[b]
Q_{100}	94[b]	85[b]	91[b]	131[a]	91[b]	75[b]
$ARCH_{10}$	26[a]	27[b]	10[b]	20[a]	11[b]	9[b]
$ARCH_{100}$	106[b]	80[a]	128[a]	95[b]	127[a]	75[b]

[1]) Descriptive mean variance statistics on the basis of 504 trading days throughout the period of the financial crisis under investigation; [2]) Means and Medians are tested for difference from FTSE NA REIT, ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively; applied test statistics are the Wilcoxen signed rank test as non-parametric median test and the standard t-test as parametric mean test; [3]) FTSE NA REIT and FTSE NA Financials mean and median are tested for difference from S&P 500; Squared stock returns are tested by the Ljung-Box test (see Ljung and Box, 1978) for serial correlation (Q10/100) and by ARCH test (see Engle, 1982) for heteroscedasticity for 10 and 100 lags; [a]) indicates test result is positive for serial correlation or heteroscedasticity at the 5% significance level, [b]) indicates the opposite.

Appendix 2.2: Descriptive Statistics on REIT Industry Daily EGARCH (1,1) Variance Estimates

07/2008 - 07/2010[1]	S&P1500 OFFICE REITS	MSCI US INDUS. REIT	US-DS Hotel, Ldg REITs	S&P1500 RETAIL REITS	S&P1500 RESIDENTIAL REITS	FTSE NAREIT HEALTH.	NA-DS Specialty REITs
Mean[2]	.0021 ***	.0034 ***	.0030 ***	.0021 ***	.0020 ***	.0015 ***	.0015 ***
Median[2]	.0009 ***	.0013 ***	.0017 ***	.0010 ***	.0009 ***	.0007 ***	.0007 ***
Skewness	1.26	2.19	1.56	1.38	1.38	1.39	1.42
Kurtosis	3.77	8.06	4.85	4.16	4.40	4.32	4.40
StD	.0022	.0044	.0031	.0022	.0020	.0016	.0016
Q_{10}	6[b]	9[b]	14[b]	12[b]	10[b]	13[b]	9[b]
Q_{100}	84[b]	113[b]	84[b]	99[b]	83[b]	93[b]	80[b]
$ARCH_{10}$	2[b]	3[b]	15[b]	8[b]	13[b]	38[a]	12[b]
$ARCH_{100}$	185[a]	94[b]	199[a]	122[b]	101[b]	89[b]	73[b]

[1]) Descriptive mean variance statistics on the basis of 504 trading days throughout the period of the financial crisis under investigation; [2]) * Means and Medians are tested for difference from the FTSE NA REIT, ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively; applied test statistics are the Wilcoxen signed rank test as non-parametric median test and the standard t-test as parametric mean test; Squared stock returns are tested by the Ljung-Box test (see Ljung and Box, 1978) for serial correlation (Q10/100) and by ARCH test (see Engle, 1982) for heteroscedasticity for 10 and 100 lags; [a]) indicates test result is positive for serial correlation or heteroscedasticity at the 5% significance level, [b]) indicates the opposite.

Appendix 3.1: Descriptive Statistics on Daily REIT Industry-to-market Correlation and Beta Estimates

07/2008 - 07/2010[1]	FTSE NA Financials	FTSE NA REIT[3]	US-DS Mortgage REITs[2]	DJ EQUITY ALL REIT[2]	FTSE NAREIT DEV[2]
Correlation (1 year)					
Mean	0.90	0.84	0.67 ***	0.84	0.29 ***
Median	0.90	0.84	0.69 ***	0.84 *	0.30 ***
Skewness	-0.49	-0.16	-0.74	-0.15	-0.38
Kurtosis	3.16	3.27	2.21	3.35	2.44
StD	0.01	0.02	0.07	0.02	0.07
Beta					
Mean	1.55	1.82 ***	1.20 ***	1.81 ***	0.33 ***
Median	1.52	1.74 ***	1.15 ***	1.73 ***	0.32 ***
Skewness	0.52	0.72	1.18	0.69	0.07
Kurtosis	2.76	3.12	6.91	3.05	2.06
StD	0.32	0.51	0.39	0.50	0.10

[1]) Descriptive mean correlation statistics on the basis of 504 trading days throughout the period of the financial crisis under investigation, [2]) Means and Medians are tested for difference the FTSE NA REIT, ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively; applied test statistics are the Wilcoxen signed rank test as non-parametric median test and the standard t-test as parametric mean test; [3]) FTSE NA REIT Beta mean and median are tested for difference from FTSE NA Financials.

Appendix 3.2: Descriptive Statistics on Daily REIT Industry-to-market Correlation and Beta Estimates

07/2008 - 07/2010[1]	S&P1500 OFFICE REITS	MSCI US INDUSTRIAL REIT	US-DSHotel, Ldg REITs	S&P1500 RETAIL REITS	S&P1500 RESIDENTIAL REITS	FTSE NAREIT HEALTH.	NA-DS Specialty REITs
Correlation (1 year)							
Mean[2]	0.83 ***	0.79 ***	0.81 ***	0.82 ***	0.79 ***	0.76 ***	0.82 ***
Median[2]	0.83 ***	0.80 ***	0.82 ***	0.82 ***	0.80 ***	0.77 ***	0.82 ***
Skewness	0.04	0.17	-0.79	-0.43	-0.81	-1.47	-0.60
Kurtosis	2.89	2.36	2.13	3.03	3.09	5.01	5.01
StD	0.02	0.03	0.03	0.02	0.02	0.03	0.02
Beta							
Mean[2]	1.93 ***	2.24 ***	2.33 ***	1.90 ***	1.82 ***	1.49 ***	1.57 ***
Median[2]	1.86 ***	2.25 ***	2.18 ***	1.81 ***	1.72 *	1.42 ***	1.50 ***
Skewness	0.65	0.14	0.70	0.74	0.83	0.55	0.75
Kurtosis	2.88	2.38	2.71	3.43	3.30	2.69	3.11
StD	0.60	0.60	0.77	0.54	0.57	0.48	0.41

[1]) Descriptive mean correlation statistics on the basis of 504 trading days throughout the period of the financial crisis under investigation, [2]) Means and Medians are tested for difference from the FTSE NA REIT, ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively; applied test statistics are the Wilcoxen signed rank test as non-parametric median test and the standard t-test as parametric mean test.

Appendix 4.1: Average Returns of REIT Industry around Bank Failures and Bank Bailouts

	Event window [-x ; +x]		Office (n=84) Mean		Office (n=84) Median		Industrial (n=63) Mean		Industrial (n=63) Median		Lodging (n=77) Mean		Lodging (n=77) Median		Retail (n=154) Mean		Retail (n=154) Median	
Failures	0	0	-1.34%	***	-0.53%	***	-0.78%		-0.21%		-1.86%	***	-1.28%	***	-1.13%	***	-0.10%	***
	1	1	-0.29%	**	-0.06%		-0.04%		0.05%		-0.83%	***	-0.40%	***	-0.11%		0.11%	
	2	2	-0.60%	***	-0.22%	***	-0.30%	**	-0.03%	*	-1.04%	***	-0.29%	***	-0.37%	**	-0.17%	**
	1	-1[a]	-0.05%		0.27%		-0.37%		0.28%		-0.30%		0.00%		-0.22%		0.36%	
	1	0	-0.69%	***	-0.45%	***	-0.58%	**	-0.28%		-1.08%	***	-1.22%	***	-0.67%	**	-0.34%	**
	2	0	-0.52%	***	-0.22%	***	-0.55%	***	-0.28%	***	-1.03%	***	-0.72%	***	-0.59%	***	-0.35%	***
	0	1	-0.41%	**	-0.06%		0.12%		0.00%		-1.09%	***	-0.53%	***	-0.06%		0.00%	
	0	2	-0.92%	***	-0.63%	***	-0.21%		-0.28%		-1.32%	***	-1.38%	***	-0.40%		-0.27%	
Bailouts	0	0	1.67%	**	0.28%		2.21%	**	0.77%	*	0.04%		-0.48%		1.80%	***	0.38%	**
	1	1	-1.11%	***	-0.72%	***	-0.75%		-0.81%		-1.59%	***	-1.16%	***	-0.72%	**	-0.63%	**
	2	2	-0.73%	***	-0.01%	*	-0.23%		0.03%		-0.87%	**	-0.18%	*	-0.64%	**	-0.28%	**
	1	-1[a]	-1.65%	*	-0.15%		-2.22%	*	-1.21%	*	-3.01%	***	-2.78%	***	-1.41%	**	-1.52%	**
	1	0	0.01%		-0.01%		-0.01%		0.67%		-1.48%	*	-1.29%	*	0.19%		0.43%	
	2	0	-0.24%		-0.14%		0.41%		0.77%		-1.08%	**	-0.14%		-0.15%		-0.14%	
	0	1	-0.84%		-0.88%	*	-0.02%		0.00%		-0.88%		-0.05%		-0.37%		-0.08%	
	0	2	-0.42%		0.01%		-0.05%		-0.09%		-0.36%		-0.47%		-0.32%		-0.14%	

Nobs: number of observations for each sample, failures and bailouts - calculated as number of stocks multiplied each by 7 failure and 7 bailout dates; ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively; applied test statistics are the Wilcoxen signed rank test as non-parametric median test and the standard t-test as parametric mean test; [a]) the event window [1,-1] comprises solely the day before the actual event date.

Appendix 4.2: Average Returns of REIT Industry around Bank Failures and Bank Bailouts

	Event window [-x ; +x]		Residential (n=98) Mean		Residential (n=98) Median		Healthcare (n=77) Mean		Healthcare (n=77) Median		Specialty (n=70) Mean		Specialty (n=70) Median	
Failures	0	0	-0.74%	**	-0.08%	*	-0.12%		0.29%		-0.46%		-0.05%	
	1	1	0.07%		0.05%		0.28%	**	0.37%	***	0.21%		0.06%	
	2	2	-0.31%	***	-0.08%	**	-0.23%	***	-0.09%	***	-0.24%		-0.12%	*
	1	-1[a]	0.07%		0.62%		0.19%		0.78%		0.34%		0.63%	
	1	0	-0.33%	**	-0.15%		0.03%		-0.10%		-0.06%		-0.26%	
	2	0	-0.34%	***	-0.15%	***	-0.19%	**	-0.20%	*	-0.09%		-0.27%	**
	0	1	0.07%		0.13%		0.33%	**	0.20%	*	0.14%		0.00%	
	0	2	-0.42%	***	-0.16%	**	-0.24%	*	-0.20%	*	-0.47%	**	-0.34%	**
Bailouts	0	0	0.40%		-0.59%		1.96%	***	0.66%	**	2.49%	***	0.00%	
	1	1	-1.12%	***	-1.23%	***	-0.61%	**	-0.77%	*	-0.36%		-0.70%	
	2	2	-0.83%	***	-0.57%	***	-0.47%	**	-0.19%	*	-0.30%		-0.08%	
	1	-1[a]	-1.81%	***	-1.62%	***	-2.08%	***	-2.69%	***	-1.91%	**	-1.78%	**
	1	0	-0.71%		-0.54%		-0.06%		0.16%		0.29%		-0.17%	
	2	0	-0.48%	*	-0.34%	*	-0.09%		0.18%		0.06%		0.10%	
	0	1	-0.77%	**	-0.68%	*	0.12%		0.55%		0.41%		0.00%	
	0	2	-0.78%	**	-0.64%	***	-0.04%		-0.29%		0.28%		-0.24%	

Nobs: number of observations for each sample, failures and bailouts - calculated as number of stocks multiplied each by 7 failure and 7 bailout dates; ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively; applied test statistics are the Wilcoxen signed rank test as non-parametric median test and the standard t-test as parametric mean test; [a]) the event window [1,-1] comprises solely the day before the actual event date.

Appendix 5.1: Abnormal Returns of REIT Industry around Bank Failures and Bank Bailouts

	Event window [-x ; +x]		Office (n=84)		Industrial (n=63)		Lodging (n=77)		Retail (n=154)	
			Mean	Median	Mean	Median	Mean	Median	Mean	Median
Failures	0	0	-0.20%[b]	-0.02%[b]	0.62%[b]	0.94%[b] **	-0.63%[b]	-0.23%[b]	0.21%	0.40% ***
	1	1	-0.27%	-0.02%	0.70%[b]	0.97%[b] **	-1.77%[b]	-1.07%[b] ***	0.66%	0.67% ***
	2	2	-0.15%[b]	0.40%[b]	2.17%[b]	1.66%[b] ***	-1.95% **	0.16%	1.89% **	1.73% ***
	1	-1[a]	-0.01%[b]	0.08%[b]	-0.28%	0.50%	-0.24%	-0.43%	-0.09%	0.22%
	1	0	-0.21%[b]	-0.21%[b]	0.34%[b]	0.79%[b]	-0.86%[b]	-1.27%[b] **	0.12%	0.50% ***
	2	0	-0.50%[b]	-0.16%[b]	-0.27%[b]	0.08%[b]	-1.89%[b]	-1.17%[b] ***	-0.32%	0.42%
	0	1	-0.27%	-0.01%	0.98%[b]	0.88%[b] **	-1.53%[b]	-0.43%[b] **	0.75%	0.50% **
	0	2	0.15%[b]	1.02%[b]	3.06%[b]	2.93%[b] ***	-0.69%[b]	-0.32%[b]	2.42% ***	1.65% ***
Bailouts	0	0	0.92%	0.35%	1.12%[b]	0.52%[b]	-0.61%[b]	-0.66%[b]	0.82% *	-0.31%
	1	1	-2.48%[b]	-2.84%[b] ***	-1.49%[b]	-1.90%[b]	-3.48%[b]	-3.88%[b] ***	-1.48%[b] *	-1.45%[b] **
	2	2	-2.66%[b]	-2.36%[b] **	0.28%[b]	-2.23%[b]	-2.78% *	-1.23%	-2.24% **	-2.05% **
	1	-1[a]	-0.91%[b]	-0.43%[b]	-1.30%[b]	-0.22%[b]	-2.06%[b]	-1.47%[b] ***	-0.58%[b]	-0.62%[b]
	1	0	0.00%[b]	-0.28%[b]	-0.19%[b]	-0.18%[b]	-2.67%[b]	-1.97%[b] **	0.24%	-0.14%
	2	0	-0.51%[b]	-0.25%[b]	1.82%[b]	0.45%[b]	-2.44%	-0.47%	-0.20%[b]	-0.90%[b]
	0	1	-1.56%	-1.53% **	-0.19%[b]	-1.29%[b]	-1.42%[b]	-0.67%[b]	-0.89%	-0.32% *
	0	2	-1.24%	-1.62% *	-0.42%	-1.88%	-0.95%[b]	-0.29%[b]	-1.23%	-1.47% **

Nobs: number of observations for each sample, failures and bailouts - calculated as number of stocks multiplied each by 7 failure and 7 bailout dates; ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively; applied test statistics are the Wilcoxen signed rank test as non-parametric median test and the standard t-test as parametric mean test; [a]) the event window [1,-1] comprises solely the day before the actual event date; [b]) Kolmogorow-Smirnow-Test indicates that at a 10% significance level a normal distribution is not on hand and hence the median should be considered instead of the mean.

Appendix 5.2: Abnormal Returns of REIT Industry around Bank Failures and Bank Bailouts

	Event window [-x ; +x]		Residential (n=98) Mean		Residential (n=98) Median		Healthcare (n=77) Mean		Healthcare (n=77) Median		Specialty (n=70) Mean		Specialty (n=70) Median	
Failures	0	0	0.31%[b]		0.27%[b]	**	1.05%[b]		0.98%[b]	***	0.70%[b]		0.48%[b]	**
	1	1	0.84%[b]		1.08%[b]	***	1.62%[b]		1.69%[b]	***	1.45%	***	1.08%	***
	2	2	1.38%[b]		1.90%[b]	***	2.24%[b]		1.84%[b]	***	2.30%	**	1.53%	***
	1	-1[a]	0.14%[b]		0.44%[b]		0.29%[b]		0.55%[b]		0.46%[b]		0.59%[b]	**
	1	0	0.45%[b]		0.36%[b]	*	1.34%[b]		1.10%[b]	***	1.17%[b]		0.93%[b]	***
	2	0	0.03%[b]		0.18%[b]		0.68%[b]		0.69%[b]	***	1.04%		0.06%	
	0	1	0.70%	***	0.55%	***	1.33%[b]		1.26%[b]	***	0.99%	***	0.73%	***
	0	2	1.65%[b]		2.26%[b]	***	2.61%[b]		1.98%[b]	***	1.96%[b]		1.97%[b]	***
Bailouts	0	0	-0.48%[b]		-0.61%[b]		0.82%[b]		0.19%[b]	*	1.53%	**	0.92%	*
	1	1	-2.85%[b]		-2.98%[b]	***	-1.48%[b]		-0.97%[b]	**	-0.48%		-0.77%	
	2	2	-3.66%[b]		-3.73%[b]	***	-1.96%[b]		-2.00%[b]	**	-0.82%		-1.30%	*
	1	-1[a]	-1.05%[b]		-0.76%[b]	**	-1.27%[b]		-1.33%[b]	***	-1.03%[b]		-0.46%[b]	*
	1	0	-1.52%[b]		-1.64%[b]	***	-0.45%[b]		-0.21%[b]		0.50%		-0.66%	
	2	0	-1.42%[b]		-1.43%[b]	**	-0.37%[b]		0.12%[b]		0.36%		-0.75%	
	0	1	-1.80%[b]		-1.38%[b]	***	-0.21%[b]		0.36%[b]		0.55%[b]		0.34%[b]	
	0	2	-2.72%[b]		-2.95%[b]	***	-0.78%[b]		-0.66%[b]		0.35%		-0.70%	

Nobs: number of observations for each sample, failures and bailouts - calculated as number of stocks multiplied each by 7 failure and 7 bailout dates; ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively; applied test statistics are the Wilcoxen signed rank test as non-parametric median test and the standard t-test as parametric mean test; [a]) the event window [1,-1] comprises solely the day before the actual event date; [b]) Kolmogorow-Smirnow-Test indicates that at a 10% significance level a normal distribution is not on hand and hence the median should be considered instead of the mean.

Appendix 6.1: Variance Adjustments of REIT Industry around Bank Failures and Bank Bailouts

	Event window [-x ; +x]		Office (n=84)				Industrial (n=63)				Lodging (n=77)				Retail (n=154)			
			Mean		Median		Mean		Median		Mean		Median		Mean		Median	
Failures	0	0	.00000		-.00001	**	.00007	*	-.00002		.00001		-.00002		.00003		-.00001	
	1	1	.00012	**	.00003	***	.00017	***	.00007	***	.00017	**	.00006	***	.00014		.00006	***
	2	2	.00016	***	.00014	***	.00028	***	.00018	***	.00050	**	.00020	***	.00037	***	.00011	***
	1	-1[a]	.00002		-.00003	***	.00003		-.00005	***	.00008		-.00005	**	.00004		-.00003	***
	1	0	.00002		-.00002		.00011	**	-.00001		.00008	*	-.00001		.00007		-.00002	
	2	0	.00010	***	.00004	***	.00021	***	.00009	***	.00021	***	.00009	***	.00025	**	.00007	***
	0	1	.00010	**	.00000	*	.00014	**	.00003	*	.00009		.00000		.00010		.00002	**
	0	2	.00006		.00001		.00015	**	.00004	**	.00030		.00005	**	.00016		.00005	***
Bailouts	0	0	.00147		-.00008		.00035		-.00013		.00031		-.00005		.00000		-.00014	
	1	1	-.00040		-.00024	**	-.00041		-.00042	**	.00027		-.00024		-.00061	***	-.00026	***
	2	2	.00096		-.00011		-.00065		-.00036		-.00014		-.00057		-.00079	***	-.00021	***
	1	-1[a]	-.00020		-.00006	*	-.00012		-.00018	**	-.00013		-.00014		-.00031	***	-.00017	***
	1	0	.00127		-.00016	*	.00023		-.00015		.00018		-.00003		-.00031	**	-.00014	**
	2	0	.00124		-.00016		.00039		-.00044		.00018		-.00012		-.00013		-.00019	
	0	1	-.00020		-.00020	**	-.00029		-.00030	***	.00039		-.00018		-.00030	*	-.00027	***
	0	2	.00119		-.00016	*	-.00069	***	-.00027	**	-.00001		-.00028		-.00066	***	-.00034	***

Nobs: number of observations for each sample, failures and bailouts - calculated as number of stocks multiplied each by 7 failure and 7 bailout dates; ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively; applied test statistics are the Wilcoxen signed rank test as non-parametric median test and the standard t-test as parametric mean test;) the event window [1,-1] comprises solely the day before the actual event date.

Appendix 6.2: Variance Adjustments of REIT Industry around Bank Failures and Bank Bailouts

	Event window [-x ; +x]		Residential (n=98) Mean		Residential (n=98) Median		Healthcare (n=77) Mean		Healthcare (n=77) Median		Specialty (n=70) Mean		Specialty (n=70) Median	
Failures	0	0	.00003	*	-.00001		.00001		-.00002	**	-.00001		-.00001	
	1	1	.00006	**	.00004	***	.00004	**	.00006	***	.00008		.00001	
	2	2	.00014	***	.00008	***	.00013	***	.00008	***	.00012		.00002	**
	1	-1[a]	.00001		-.00002	**	.00003		-.00002	***	.00008		-.00003	***
	1	0	.00004		.00000		.00004	*	-.00003		.00007		.00000	
	2	0	.00010	***	.00003	***	.00013	***	.00005	***	.00015		.00003	**
	0	1	.00005	**	.00002	*	.00002		.00000		.00000		.00001	
	0	2	.00007	**	.00001	*	.00001		.00001		-.00003		.00001	
Bailouts	0	0	.00015	**	-.00005		.00015	**	-.00002		.00010		-.00004	
	1	1	-.00006		-.00012	**	-.00014		-.00014	*	.00005		-.00012	
	2	2	-.00031	**	-.00020	***	-.00038	***	-.00036	***	-.00035		.00001	*
	1	-1[a]	-.00017	***	-.00010	***	-.00007		-.00005	**	.00010		-.00006	
	1	0	-.00002		-.00017	**	.00008		-.00005		.00020		-.00003	
	2	0	-.00006		-.00023	**	-.00001		-.00016		.00024		-.00005	
	0	1	.00011		-.00005		-.00008		-.00006		-.00006		-.00012	
	0	2	-.00009		-.00005		-.00022	**	-.00018	**	-.00049	*	-.00020	**

Nobs: number of observations for each sample, failures and bailouts - calculated as number of stocks multiplied each by 7 failure and 7 bailout dates; ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively; applied test statistics are the Wilcoxen signed rank test as non-parametric median test and the standard t-test as parametric mean test; [a]) the event window [1,-1] comprises solely the day before the actual event date.

Appendix 7.1: Correlation Adjustments of REIT Industry around Bank Failures and Bank Bailouts

	Event window [-x ; +x]		Office (n=84)				Industrial (n=63)				Lodging (n=77)				Retail (n=154)			
			Mean		Median		Mean		Median		Mean		Median		Mean		Median	
Failures	0	0	.0001		.0000		.0005		.0002		-.0012		.0000		.0011	*	.0000	
	1	1	.0000		-.0003		.0010		.0013		-.0027	*	-.0023	**	.0019	**	.0003	
	2	2	.0004		.0015		.0026		.0031		-.0047	**	-.0027	*	.0023	**	.0019	**
	1	-1[a]	-.0024	***	-.0009	***	-.0017	**	-.0007	*	-.0023	**	-.0010	***	-.0010	**	-.0002	*
	1	0	-.0023	**	-.0007	**	-.0012		.0006		-.0036	***	-.0015	***	.0001		-.0001	
	2	0	-.0007		-.0001		.0007		.0002		-.0035	***	-.0013	**	.0010		-.0001	
	0	1	.0024	*	.0006	**	.0027	**	.0008	**	-.0004		-.0003		.0029	***	.0006	***
	0	2	.0011		.0002		.0024	*	.0006		-.0025		-.0019		.0023	***	-.0003	
Bailouts	0	0	.0014	***	.0009	***	.0006		.0006	***	.0010	**	.0010	***	.0012	***	.0011	***
	1	1	.0021		.0004		.0024		.0007		-.0029		-.0013	**	.0022	**	.0007	*
	2	2	.0026	*	.0016	***	.0018		.0018	**	-.0039		-.0018	*	.0025	**	.0015	***
	1	-1[a]	-.0008		-.0002		.0012		-.0001		-.0020	**	-.0003	**	-.0002		-.0004	
	1	0	.0006		.0006		.0019		.0008	**	-.0010		-.0002		.0010		.0008	***
	2	0	.0014		.0012	**	.0022		.0017	***	-.0007		-.0007		.0024	***	.0016	***
	0	1	.0028	**	.0009	***	.0011		.0011	***	-.0009		.0002		.0025	***	.0011	***
	0	2	.0026	**	.0009	**	.0002		.0009		-.0022		.0000		.0013		.0006	**

Nobs: number of observations for each sample, failures and bailouts - calculated as number of stocks multiplied each by 7 failure and 7 bailout dates; ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively; applied test statistics are the Wilcoxen signed rank test as non-parametric median test and the standard t-test as parametric mean test; [a]) the event window [1,-1] comprises solely the day before the actual event date.

Appendix 7.2: Correlation Adjustments of REIT Industry around Bank Failures and Bank Bailouts

	Event window [-x ; +x]		Residential (n=98) Mean		Residential (n=98) Median		Healthcare (n=77) Mean		Healthcare (n=77) Median		Specialty (n=70) Mean		Specialty (n=70) Median	
Failures	0	0	.0001		.0000		.0014	*	.0003		.0013	*	.0002	*
	1	1	.0004		.0010		.0011		-.0006		.0021	*	.0004	
	2	2	.0010		.0034		.0028	*	.0025		.0038	**	.0028	*
	1	-1[a]	-.0016	**	-.0013	***	-.0006		-.0006		-.0005		-.0002	
	1	0	-.0015		.0000		.0008		.0003		.0008		.0000	
	2	0	-.0003		-.0005		.0024	**	.0010		.0031	*	.0003	
	0	1	.0020	*	.0010	**	.0018	*	.0013		.0026	***	.0012	**
	0	2	.0013		.0001		.0019	*	.0006		.0019	*	.0005	
Bailouts	0	0	.0014	***	.0011	***	.0014	***	.0012	***	.0011	***	.0009	***
	1	1	.0015		.0009	***	.0051	***	.0010	***	.0042	***	.0003	**
	2	2	.0024		.0040	***	.0056	***	.0031	***	.0031	***	.0023	***
	1	-1[a]	.0007		-.0003		.0014	***	-.0002		.0008		-.0002	
	1	0	.0020	***	.0007	***	.0028	***	.0008	***	.0019	***	.0004	**
	2	0	.0032	***	.0023	***	.0041	***	.0037	***	.0017	**	.0012	**
	0	1	.0008		.0014	***	.0037	***	.0012	***	.0034	***	.0009	***
	0	2	.0006		.0018	***	.0030	***	.0009	**	.0025	**	.0006	

Nobs: number of observations for each sample, failures and bailouts - calculated as number of stocks multiplied each by 7 failure and 7 bailout dates; ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively; applied test statistics are the Wilcoxen signed rank test as non-parametric median test and the standard t-test as parametric mean test; [a]) the event window [1,-1] comprises solely the day before the actual event date.

Appendix 8.1: Beta Adjustments of REIT Industry around Bank Failures and Bank Bailouts

	Event window [-x ; +x]		Office (n=84)				Industrial (n=63)				Lodging (n=77)				Retail (n=154)			
			Mean		Median		Mean		Median		Mean		Median		Mean		Median	
Failures	0	0	0.017	**	0.011	***	0.035	**	0.016	***	0.007		0.007		0.025	***	0.021	***
	1	1	0.010		0.002		0.029		0.039		0.004		-0.001		0.022	*	0.024	
	2	2	0.024		0.015		0.037		0.059		0.015		0.015		0.028		0.020	
	1	-1[a]	0.007		0.004		0.021	**	0.007	*	0.025	**	0.008		0.025	***	0.016	***
	1	0	0.025	***	0.009	**	0.056	***	0.045	***	0.033	**	0.007	*	0.050	***	0.047	***
	2	0	0.026		0.016	**	0.041		0.063	**	0.019		0.015		0.031	*	0.051	**
	0	1	0.003		0.004		0.008		0.020		-0.021	*	-0.007	**	-0.003		0.002	
	0	2	0.016		0.001		0.031		0.015		0.004		0.000		0.022		0.011	
Bailouts	0	0	0.003		0.000		0.019		0.039		0.035	***	0.032	***	0.020	*	0.022	**
	1	1	-0.018		0.004		0.001		0.060		0.055		0.074	**	0.010		0.056	
	2	2	0.052		0.032		0.056		0.014		0.114	**	0.077	***	0.071	**	0.029	*
	1	-1[a]	-0.025		0.002		-0.013		0.014		-0.019		0.006		-0.019		0.020	
	1	0	-0.022		-0.011		0.005		0.049		0.016		0.012		0.000		0.021	
	2	0	0.031		0.007		0.052		0.074		0.078	**	0.044	***	0.069	**	0.039	**
	0	1	0.007		0.011		0.014		0.043		0.073	***	0.074	***	0.029	**	0.023	**
	0	2	0.024		0.002		0.023		0.032		0.070	**	0.024	*	0.021		0.023	

Nobs: number of observations for each sample, failures and bailouts - calculated as number of stocks multiplied each by 7 failure and 7 bailout dates; ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively; applied test statistics are the Wilcoxen signed rank test as non-parametric median test and the standard t-test as parametric mean test; [a]) the event window [1,-1] comprises solely the day before the actual event date.

Appendix 8.2: Beta Adjustments of REIT Industry around Bank Failures and Bank Bailouts

	Event window [-x ; +x]		Residential (n=98) Mean		Residential (n=98) Median		Healthcare (n=77) Mean		Healthcare (n=77) Median		Specialty (n=70) Mean		Specialty (n=70) Median	
Failures	0	0	0.029	***	0.016	***	0.013	**	0.018	***	0.021	**	0.008	*
	1	1	0.016		0.012		-0.001		0.018		-0.007		-0.005	
	2	2	0.011		0.017		-0.004		0.016		0.012		0.006	
	1	-1[a]	0.019	***	0.012	***	0.024	***	0.012	***	0.015	*	0.010	**
	1	0	0.047	***	0.036	***	0.037	***	0.030	***	0.037	***	0.035	**
	2	0	0.025		0.009		0.026		0.043	***	0.038		0.036	*
	0	1	-0.002		0.001		-0.025	**	-0.003	**	-0.022		-0.023	**
	0	2	0.015		0.004		-0.017		-0.021	*	-0.005		-0.003	
Bailouts	0	0	0.028	***	0.022	***	0.032	***	0.035	***	0.020		0.031	**
	1	1	0.021		0.028	*	0.022		0.067		0.034		0.039	
	2	2	0.060	*	0.044	**	0.054		0.073		0.057		0.014	
	1	-1[a]	-0.031	*	0.007		-0.011		0.038		0.002		0.019	
	1	0	-0.003		0.012		0.020		0.042		0.022		0.019	
	2	0	0.036	*	0.029	*	0.047	**	0.067	**	0.064	**	0.048	**
	0	1	0.052	***	0.031	***	0.034	**	0.064	**	0.032		0.005	
	0	2	0.052	***	0.026	**	0.038		0.042		0.013		0.022	

Nobs: number of observations for each sample, failures and bailouts - calculated as number of stocks multiplied each by 7 failure and 7 bailout dates; ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively; applied test statistics are the Wilcoxen signed rank test as non-parametric median test and the standard t-test as parametric mean test; [a]) the event window [1,-1] comprises solely the day before the actual event date.

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