Bank Bailouts: REITs and their Performance as Financial Stock

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Abstract

Previous evidence on monetary policy finds positive value effects on REITs when federal fund rates are decreased in order to strengthen the market's liquidity pool. Bank bailouts can also be seen as a positive monetary shock to capital markets as government intervention restores bank liquidity and thus market liquidity. However, empirical evidence on moral hazard shows that bailing out banks may increase risky behavior and benefit relatively risky assets. Therefore, we expect REITs as hard assets to underperform the market on a short term basis. In fact we find supporting evidence i.e. negative abnormal returns and beta risk increases for REITs around bank bailout announcements. This extends previous research on bank failures and REIT returns where positive abnormal REIT returns around bank failures identify REITs as a safe haven in times of market uncertainty. Furthermore we complete our research by investigating other financial stocks, finding unique results.

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1 Introduction

In the turbulent times of the financial crisis that started in 2007, the financial sector (first and foremost with banks as well as real estate) was commonly believed to have triggered the global crisis through the subprime mortgage problem. The banking crisis and the fear of a fatal breakdown of the economic system have caused the government to launch the largest bailout program in the history of the United States of America. The US government created the $700 billion Troubled Asset Relief Program (TARP) to purchase failing bank assets. The major goals of this highly criticized program were economic stabilization, market liquidity improvement and investor confidence restoration (Paulson, 2008).

Although REITs are commonly classified as financial stocks along with banks, many consider them to be an asset class of their own, due to their special characteristics and differences from common equities. REITs are highly dependent on external financing, which might on the one hand hinder their performance during times of market uncertainty, but on the other hand might drive their performance following a recapitalization and stabilization of the banking sector.

There has been discussion on the moral hazard involved in government bailout programs, and the danger of encouraging excessive risk taking behavior. Looking at REITs, previous research has shown that REITs' risk-return behavior appears to be a combination of real estate and common equity market behavior, which does not allow for a clear correlation to any other stock group. All in all, we are convinced that a detailed analysis of REITs' risk-return behavior compared with other financial stocks and relative to common equities in the event of bank bailouts represents worthwhile research effort and adds to the current literature.

Regarding behavioral expectations of REITs' risk-return movements around bank bailouts, we would expect a behavior similar to common equities but have found negative valuation effects. The recapitalization of the banking sector, resulting in restored liquidity of

the market should favor relatively risky investments such as equities (including REITs) compared to low risk investments such as government bonds and commodities, e.g., precious metals. Because REITs are strongly dependent on external financing they might have abnormal profits from restored market liquidity. This valuation effect on REITs constitutes our null hypothesis.

The alternative hypothesis implies a relatively negative valuation effect for REITs. As investors commonly interpret REITs as a safe haven during financial crisis, REITs might underperform other equities in the aftermath of a market recapitalization. Moral hazard symptoms, encouraging risk taking, might favor assets that show less hard asset characteristics than REITs and appear to be more risky and hence more promising. Consequently, the alternative hypothesis assumes that REITs do not follow common equities behavior in the case of specific monetary shocks, such as bank bailouts, as they do in the case of monetary shocks through unexpected monetary rate changes.

The effects of monetary shocks to the market have been researched extensively. Bernanke and Kuttner (2005) researched the impact of a change in monetary policy and found that unexpected decreases in the monetary rate let to an increase in stock prices. In their research Bredin, O'Reilly, and Stevenson (2007) focus on the effects these monetary rate adjustments might have on REITs. They also state that REITs, due to their special characteristics, are a good estimator for common equities' behavior. Diamond and Rajan (2005) showed that, when banks fail, this can potentially be contagious and a consecutive shrinking of the market's liquidity pool might trigger liquidity shortages, representing a monetary shock to the market.

We investigate whether REITs show comparable results to common equities in the case of bank bailouts and if their behavior depends critically on the type of monetary shock to the market. Monetary rate increases and bank failures result in a limitation of the market's liquidity pool. But they generally occur in completely opposing market situations. Monetary

rates are generally increased in times of positive economic and market prospects, whereas bank failures typically occur at the peak of, or in the aftermath of, an economic crisis. Our earlier research documents that REITs show a positive valuation effect in relation to the stock market in the case of bank failures and hence react differently, compared to the case of a monetary rate increase. We are curious to find out whether, in the case of subsequent bank bailouts, REITs show comparable behavior to other equities. This expectation is based on the fact that generally the market is in the same state when bank bail-outs occur or monetary rates are decreased. However, it is also a valid assumption to expect negative valuation effects, as bank bailouts represent the opposite outcome for banking crises compared to bank failures, which caused positive REIT valuation effects.

We analyze the impact of bank bailouts on REITs as financial stock in the U.S. with respect to any shifts in prevalent risk-return profiles. Consistent with a previous study on bank failures the research period extends from January 1999 until July 2010 and covers US-REITs. In addition, a representative sample of other financial stocks is analyzed for robustness. Although the analyzed time period reaches back to 1999, the actual observations were made from January 2008 until July 2010, due to the fact that no bank bailouts occurred in the time period from January 1999 until January 2008. Within the observation period 700 banks where bailed out on 49 different dates. Eliminating dates that overlap with bank failure dates, seven bank bailout dates are left. In order to obtain a number of events that can allow for statistically significant results, the research is carried out on the single stock level instead of on index level. Hence, the analysis is conducted for 121 REITs and for 229 other financial stocks. Diverse sub-samples where set up in order to investigate whether different types of REITs or other financial stocks are affected in a different manner.

For all events we analyze short window abnormal returns and abnormal risk shifts to verify whether bank bailouts have affected REITs' risk-return profile differently than

common equity markets and other financial stocks, and whether we can observe different reactions compared to the findings on bank failures in previous research.

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 present our results; in part 5 we conclude.

2 Literature Review

2.1 Market Liquidity, Bank Bailouts, and REIT Behavior

Bernanke and Kuttner (2005) investigate the effect of changes in monetary policy as a monetary shock on equity prices and find that an unanticipated cut of the federal funds rate leads to an increase in stock prices. They furthermore find that the largest part of the response in stock prices is due to the revision of cash flows and only a very small portion is attributable to the changes in expected real interest rates. In their research Bredin, O'Reilly, and Stevenson (2007) focus on the effects that monetary rate changes may have on REIT returns and volatility. Their results are in line with previous evidence on broader equity markets and show, that REITs had a strong response to unanticipated changes in monetary policy in both, first and second moments of REIT returns. Their findings support the expected trend of the effect, hence a positive return and a negative volatility reaction for a cut in the monetary rate.

The assumption, that banking crises can also be seen as a monetary shock is supported by the findings of Diamond and Rajan (2005). They state, that banking crises, especially those resulting in bank failures, can potentially shrink the market's liquidity pool, causing liquidity shortages. Furthermore they state, that bank failures can be contagious, which may eventually lead to a collapse of the financial system. Gorton and Huang (2004) state in their research on market liquidity, efficiency, and bailout policies, that market liquidity can effectively be strengthened or restored through bailing out distressed banks and the government can actually improve welfare by doing so. Concluding, it can be said that banking crises as well as

liquidity injections by the government can be seen as monetary shocks similar to changes in the federal funds rate.

REITs rely heavily on external financing. Dell'Ariccia, Detragiache, and Rajan (2008) found that banking crises can externally hinder real activity, especially in those sectors that are more dependent on external financing. This might lead to the expectation that REITs profit from the positive signaling effect of a bank bailout, strengthening the market's liquidity pool. Furthermore, Giannetti and Simonov (2009) found that the recapitalization of a bank leads to positive abnormal returns for the bank's customer companies. However the question remains on whether bank bailouts as a positive market signal produce the same effect on broader equity markets or even favor capital intensive industries like REITs. In their investigation of stock market responses on bank restructuring policies Klingebiel et al. (2001) found that bank stock prices as well as non-financial stocks respond positively to the announcements of government guarantees for bank liabilities. However, non-financial companies react negatively when public recapitalization schemes which aim to strengthen banks' capital bases and support generous liquidity programs are announced. Bank stocks do not show a similar reaction. Klingebiel et al. (2001) conclude from these results, that "announcements of deposit guarantees may provide comfort to market participants during a crisis of confidence, but the provision of public funds for bank bailouts were not necessarily viewed as a credible means to restore the health of the financial sector."

Bank bailouts are often accompanied by a public discussion about the moral hazard this might provoke. There is an ongoing discussion whether banks should be bailed out in general and if so, what would be the optimal way, in terms of the social cost and moral hazard trade-offs (see Goodhart and Huang, 2005). Standard LOLR (lender of last resort, the function of the central bank) practice assumes that ex-ante commitment to assist troubled institutions provokes excessive risk taking. This moral hazard should therefore be avoided (see Cordella and Yeyati, 2003). Furthermore Hakenes and Schnabel (2010) find that the bailout of banks

leads to higher risk taking among the protected bank's competitors, independently of market transparency. Nonetheless, Cordella and Yeyati (2003) also state, that the right bailout design might, under certain circumstances, lower the banks' appetite for risk exante. Concluding, this poses the question of what effects bank bailouts might have on first and second moments of REIT returns and other financial stocks, compared to the general equity market.

When investigating what influences REIT returns generally, Ghosh, Guttery, and Sirmans (1998) found that REIT prices do respond to real estate related news, whereas Giliberto (1990) on the other hand found that the correlation between non-securitized real estate returns and REIT returns was close to zero. Ghosh, Miles, and Sirmans (1996) state that REITs are strongly influenced by stock market volatility in the short-term but their long-term return is derived from direct real estate growth. However, a constraint is the fact that the interdependencies are never constant. This is supported by Clayton and MacKinnon (2001) who find that the link between REITs, real estate, and other asset classes constantly changes.

Since REITs have been added to three S&P general market indices over the past 10 years they co-move more with common equities than their real estate fundaments may justify, as has been discovered by Ambrose, Lee, and Peek (2007) in their analysis of spillover effects across asset classes. Finally, Basse, and Friedrich (2009) reexamine the relationship between REITs and utility stocks in the current financial crisis and conclude that the crisis led to a structural change in this relationship. Their findings show that investments in REITs have become much more risky in times of crisis than utility stocks.

2.2 Contribution to the Literature and Hypotheses

The current banking crises and the discussion about the possible outcomes, of bank failures versus the government bailing out distressed institutions (with the $700 billion Troubled Asset Relief Program) has shown that market liquidity and its implications on real market

behavior is of high interest to the public as well as to scholars of both, financial economics and real estate economics. Because federal funds rate changes (as an external monetary shock) have been broadly researched, we are now keen to examine the effects of banking crises as an internal monetary shock to the system. Research on monetary rate adjustments has shown that REITs show comparable risk-return behavior in size and direction to common equities. As previous research has also elucidated, banking crises can also be seen as a unique internal type of monetary shock, which might produce different results. As earlier research Raudszus, Olliges, and Mueller (2012) on bank failures has shown, this was the case for bank failure announcements and we are now eager to investigate the effects bank bailouts triggered for REITs and other financial stocks. We believe analyzing bank bailout events as a shock to monetary stability and its unique impact on REITs and other financial stocks adds well to the literature.

Regarding behavioral expectations of REITs' return movements around bank bailouts, in line with the research by Bredin, O'Reilly, and Stevenson (2007), it is reasonable to expect behavior similar to common equities, which constitutes our null hypothesis. The occurrence of return behavior comparable to that of common equities would seem to be reasonable as bank bailouts may lead to a comparable increase in market liquidity as caused by monetary rate decreases. This argument finds further support from the fact that both of these monetary shocks generally occur when the market is in the same phase of an economic cycle, in this case a market downturn.

The alternative hypothesis is that REITs show different return behavior compared to common equities, which builds on previous research on REIT behavior in the event of bank failures. Here, positive abnormal returns of REITs relative to common equities were observed. In the case of bank bailouts, as the counterpart of bank failures, this could lead to corresponding results. Thus our alternative hypothesis is that REITs as hard assets may underperform common equities, showing negative abnormal returns.

3 Data and Methodology

3.1 Data Selection and Structure of the Analysis

The sample of the U.S. bank bailout announcements is taken from the list of bailed out banks by the U.S. Department of the Treasury (2011). Consistent with previous research on bank failures, we first consider all U.S. bank bailout dates between January 1999 and July 2010. Nonetheless, bank bailouts only occurred after January 2008 leaving us with a relatively short observation period which might potentially bias the results. The total sample of bank bailouts is composed of 49 event dates reflecting a total of 700 single bank bailouts totaling about $204 billion of invested capital by the U.S. Department of the Treasury.

Cross checking with bank failure dates to eliminate overlapping, we find that only seven bank bailout dates are left. To overcome this problem, that with only seven event dates it is hardly possible to obtain statistically meaningful results when analyzing REIT indices, we conduct our analysis at the individual REIT level for 121 REITs as well as on single company level for other financial stocks. In total 229 other financial institutions are analyzed. The S&P 500 Composite Index is used as the overall market return index. The stock return data is retrieved from Datastream. Respective return series are used from January 1st 2007 until July 31st 2010.

We apply standard event study methodology to measure short term abnormal returns around bank bailout dates. To obtain comparable results on a risk perspective we use a beta-aligned event study approach. Determining daily REIT beta measures by applying a simple GARCH (1,1) model enables us to capture market adjusted abnormal beta shifts within short-term windows, equivalent to the standard event study.

The 121 REITs that are investigated in this analysis divide into REITs from eight different subsectors which are composed as follows: 10 Industrial, 11 Lodging, 12 Office, 22 Retail, 14 Residential, 12 Healthcare, 10 Specialized, and 16 Diversified REITs. Furthermore,

the REITs can be divided into 91 Equity REITs, 14 Mortgage REITs, and the 16 Diversified REITs. The Diversified REITs are not accounted for in the Equity REIT sub-sample since they may contain both, equity and mortgage real estate investments. In the course of the investigation also a representative sample of 229 other financial stocks are analyzed. This sample is composed of 30 asset management companies, 119 banks, 19 brokers and 61 insurances.

In order to gain a more precise insight on REIT and other financial stock behavior we perform return and risk event studies on every individual sub-sample. For an event window [-1, +1 day] we find the following CAARs (mean values): -3.34% for Lodging REITs, -2.51% for Office REITs, -1.61% for Retail REITs, -3.12% for Residential REITs, -1.94% for Healthcare REITs and -1.30% for Industrial REITs. For Specialized REITs and Diversified REITs we do not find statistically significant results. So, the overall result of a negative return effect is supported almost throughout every sub-sample, which is in line with the observation of a negative return effect for Equity REITs of -2.08%. Mortgage REITs do not show any statistically significant return effect.

When looking at the risk effect, the picture is not quite as clear as with the return effect. For the total sample we do not find any statistically significant abnormal shift in risk regarding the means (the medians nonetheless show a positive risk shift). For Lodging and Healthcare REITs we observe a negative risk shift, Office REITs, Residential REITs, Specialized REITs, and Diversified REITs show a positive risk shift.

When scrutinizing for a possible “Financial Stock“ biasing effect we find that the negative return effect is observable in numerous event windows (total sample, as well as sub-samples), although the picture is not as clear as it is for REITs. When looking at the risk effect we observe a highly significant positive risk shift throughout basically every event window in every sub-sample.

Comparing these results with our findings from previous research on bank failures, where we observed a positive return effect and no significant risk shift, our findings add well to the literature.

Five observations might uncover as potential biases for our analyses:

First, at each specific bank bailout date up to 49 banks (on average 27 banks) were bailed out by the U.S. government at the same time. This is the reason why we denote the events as bank bailout dates instead of bank bailouts.

Banking crises have two possible outcomes: 1) the recapitalization by the government, namely the bank bailout and 2) the bank failure which commonly results in bank M&A because former competitive financial institutions continue the failed banks' operations and accounts. Hence, we use the results of previous research on bank failures as a robustness check for this analysis.

Due to the prevalent accumulation of bank bailouts in short time periods the average time gap between the analyzed bank bailout dates is 18.6 days. This could lead to a certain overlap of effects in relatively short event windows. We control for this biasing issue by narrowing the maximum event window size to a [-2,+2] days around the specific event date.

3.2 Methodology of the Return and Risk Event Study

In our analysis on REITs and other financial stocks we investigate both, first and second moments of return. Therefore our approach must be twofold. First we look at the return component and secondly we investigate the risk shift.

For the return part we apply a standard event study methodology similar to MacKinlay (1997). Hereby, for the regression, we use the market model approach according to the Capital Asset Pricing Model (CAPM) by Sharpe (1964) and Lintner (1965). In order to obtain

case specific betas *(β)* as systematic risk estimators, we perform a simple Ordinary Least Squares (OLS) regression 30 days prior to each event over a 250 trading day estimation period. As a product of these betas and the actual market returns we are now able to forecast expected REITs returns throughout the event windows. Subtracting the expected returns from the actually observed returns, we obtain the Abnormal Returns *(AR)*. For every single event the abnormal returns are cumulated accordingly to the varying event window size which gives us the Cumulated Abnormal Returns *(CAR)*. The Cumulated Average Abnormal Returns *(CAAR)* are derived by computing the arithmetic and geometric averages of the *CARs*, accounting for the specific number of events. We estimate the *CAARs* for the event windows [0], [-1,+1], [-2,+2], [-1,0], [-2,0], [0,+1] and [0,+2]. Since the average time span between two events is only 18.6 days and the smallest gap only 5 trading days, longer event windows are not accounted for, in order to minimize biasing effects through overlap of events and effects.

A Kolmogorov-Smirnov test is applied to verify whether the *CARs* are normally distributed (see Massey, 1951). The *CAAR* means are tested for difference from zero with a parametric Boehmer test (see Boehmer, Musumeci, and Poulsen, 1991). For the medians this is done by applying the Wilcoxen signed-rank test.

For the risk analysis we also use an event study methodology that enables us to determine abnormal risk shifts and test them statistically for difference from zero. The mathematical approach to this is very similar to the standard event study applied for the return analysis. Our risk event study model consists of five steps. In the first step daily REIT and other financial stock betas have to be calculated. In the next step expected betas have to be estimated around bank bailout dates. The third step consists of subtracting the observed betas from the expected betas in order to obtain Abnormal Beta shifts *(AB)*. Next the Cumulative Abnormal Beta shifts *(CAB)* and the Cumulative Average Abnormal Betas shifts *(CAAB)* are calculated. In the fifth and last step the *CAABs* are tested for difference from zero.

Measuring time-variant betas contradicts one of the basic assumptions of the Capital Asset pricing model *(CAPM)*, in which it is assumed that beta is stable over time. Nonetheless, many financial economists like Fabozzi and Francis (1978), Sunder (1980), Bos and Newbold (1984), Collins et al. (1987), Liang, McIntosh, and Webb (1995) and Jagannathan and Wang (1996) have argued against the assumption of beta stability and shown that beta is actually stochastic and thus conditional.

We apply the generalized autoregressive conditional heteroscedasticity (GARCH) approach in order to determine time-varying volatilities and beta measures. The GARCH model is one of the most commonly applied methods to observe changes in risk levels. The technique was developed by Engle (1982) and later on refined by Bollerslev (1986). It was also Bollerslev who advanced the model to the Multivariate GARCH (M-GARCH) (see Bollerslev, 1990). Giannopoulos (1995) shows that GARCH models can not only be used to measure total risk but also to divide into the two components, systematic and unsystematic risk. Brooks et al. (1998) investigate the forecasting accuracy of three techniques regarding time-variant beta: a M-GARCH, a time-varying beta market model suggested by Schwert and Seguin (1990), and the Kalman filter for a sample of returns on Australian industry portfolios. Furthermore, Faff, Hillier and Hillier (2000) applied a M-GARCH approach to model time-varying beta in their study discussing alternative beta risk modeling techniques. They define an additional assumption of a constant correlation coefficient between the returns of an asset and respective market returns. The behavior of this correlation coefficient is core to our risk event study determining *CAABs*.

The simple GARCH (1,1) model determines a specific asset's time-varying variance as a weighted sum of a long-term average variance rate, V_L, the previous day squared return, u^2_{t-1}, and the previous day variance, σ^2_{t-1}. The weighting factors γ, ν, and τ are determined by applying the iterative Maximum Likelihood technique as discussed by Hull (2006).

$$\sigma_t^2 = \gamma V_L + \nu u_{t-1}^2 + \tau \sigma_{t-1}^2 \qquad (1)$$

Obtaining beta measures as next step we apply the M-GARCH model that observes the actual betas as a product of a constant correlation coefficient, ρ_{im}, between the specific REIT returns and the market returns (S&P 500 Composite), respectively the other financial stock returns and the market returns, and the time-varying REIT standard deviation, σ_{it}, divided by the time-varying market standard deviation, σ_{mt}.

$$\beta_{it} = \frac{\rho_{im}\sigma_{it}}{\sigma_{mt}} \tag{2}$$

Finishing the empirical groundwork, we have the following data: Daily volatility measures for all single REITs, all single other financial stocks and the S&P 500 Composite; daily correlation coefficients for all single REITs with the S&P 500 Composite and all other financial stocks with the S&P 500 Composite, based on a one year lag structure; and daily beta measures for all single REITs and all single other financial stocks in relation to the S&P 500 Composite.

Equivalent to beta for the standard return event study we utilize the correlation coefficient 30 days prior to the event for our systematic risk estimates, $E(\beta_{it})$. REIT and market volatility measures remain time variant as the market return does in the standard event study. The abnormal beta shift, *AB*, is then determined as the difference between expected and measured beta from up to two days before to up to two days after the event.

$$AB_{it} = E(\beta_{it}) - \beta_{it} = \frac{\rho_{im}\sigma_{it}}{\sigma_{mt}} - \beta_{it} \tag{3}$$

Cumulating *ABs* along the differently sized event windows [0], [-1,+1], [-2,+2], [-1,0], [-2,0], [0,+1], and [0,+2] we obtain cumulated abnormal beta shifts, *CAB*. The arithmetic mean of *CABs* across the number of events, *n*, per analysis returns the cumulated average abnormal beta shifts, *CAAB*. Again, the Kolmogorov-Smirnov test is used to determine if these *CABs* are normally distributed. The non-parametric Wilcoxen signed-rank test and the parametric t-test are applied to test the *CAABs* for statistical difference to zero.

4 Results

4.1 Bank Bailouts' Effect on REITs and Other Financial Stocks

We begin our analysis by measuring the effect of bank bailouts on risk-return profiles of the total sample of REITs. Before that we derived expectations regarding the reaction of REITs in the event of bank bailouts. Expectations are also formulated before comparing the results with the total sample of other financial stocks, as well as before looking into the different sub-samples.

Our first analysis considers the entire sample of 121 REITs and observes the effects bank bailouts had on the REITs' risk-return profile. We expect bank bailouts as a monetary shock to have a similar effect on REITs as the shock federal fund rate adjustments would have. This means, that we expect REITs to react congruent to common equities and therefore that no significant differences in the risk-return profile can be observed, compared to the market which is represented by the S&P 500 Composite index. However, as Table 1 shows significant negative abnormal returns (between -0.25% and -1.35%) are found for six of the seven event windows. The risk profile however, remains unchanged when looking at the means. The medians show a significant risk increase, the Kolmogorov-Smirnov test however indicates, that in this case the means should be looked at, which show no statistically significant difference from zero. Accordingly, the total sample analysis indicates that bank bailouts induce a negative return shift for REITs compared to common equities. The REITs' systematic risk appears to show no difference from common equities behavior. This results in a negative valuation effect for U.S. REITs in the event of bank bailouts in comparison to the common equity markets. Thus, our alternative hypothesis is supported at an overall level.

Table 1: Results of Risk/Return Event Study – Total Sample REITs

	Abnormal returns, *CAAR*											
	[-x; +y]	Mean		Median		KS-test	p	Wx-test	p	t-test[1]	p	N
Total sample REITs	0 0	0,36%		-0,12%		0,10	0,00	-0,65	0,52	1,40	0,16	847
	1 1	-1,35%	***	-1,84%	***	0,09	0,00	-5,76	0,00	-4,76	0,00	847
	2 2	-1,32%	***	-1,89%	***	0,09	0,00	-4,84	0,00	-4,19	0,00	847
	0 1	-0,62%	**	-0,55%	***	0,09	0,00	-3,27	0,00	-2,27	0,02	847
	0 2	-0,71%	***	-0,97%	***	0,09	0,00	-3,82	0,00	-2,76	0,01	847
	1 0	-0,37%	***	-0,77%	***	0,10	0,00	-2,88	0,00	-2,47	0,01	847
	2 0	-0,25%	*	-0,77%	**	0,10	0,00	-2,22	0,03	-1,77	0,08	847
	Abnormal beta shifts, *CAAB*											
	[-x; +y]	Mean		Median		KS-test	p	Wx-test	p	t-test[1]	p	N
	0 0	-0,01		0,02	***	0,26	0,00	-6,57	0,00	-1,27	0,20	847
	1 1	-0,04		0,06	***	0,26	0,00	-6,30	0,00	-1,35	0,18	847
	2 2	-0,06		0,11	***	0,26	0,00	-6,21	0,00	-1,35	0,18	847
	0 1	-0,03		0,04	***	0,26	0,00	-6,33	0,00	-1,41	0,16	847
	0 2	-0,04		0,06	***	0,26	0,00	-6,25	0,00	-1,43	0,15	847
	1 0	-0,02		0,04	***	0,26	0,00	-6,38	0,00	-1,25	0,21	847
	2 0	-0,04		0,06	***	0,26	0,00	-6,27	0,00	-1,25	0,21	847

***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. *CAAR*: cumulative average abnormal return, *CAAB*: cumulative average abnormal beta shift, KS test: Kolmogorov-Smirnov test - p-value ≤ 0.05 indicates normal distribution at the 5% significance level, Wx-test: Wilcoxon signed rank test as non-parametric median test, [1]t-test: Parametric mean tests: Boehmer test for *CAARs*; Student's t-test for *CAABs*.

These results add well to the findings of earlier research on bank failures. Raudszus, Olliges, and Mueller (2012) showed generally positive valuation effects for U.S. REITs in the event of bank failures, while their risk behavior showed no deviation from common equities.

REITs are generally considered to be financial stock. In order to broaden our insights on the behavior of REITs in the case of monetary shocks, we also investigate the behavior of other financial stocks in the case of bank bailouts. Again our expectation is that financial stocks show a highly similar behavior to common equities, which again makes us expect not to observe any abnormal returns or abnormal beta shifts. As Table 2 shows, against our expectation, we find negative abnormal return effects for four of the seven observed event windows (between -0.30% and -0.79%). For financial services institutions (FSIs) we observe an abnormal increase in risk relative to the market for all event windows. Thus while the return analysis of REITs and FSIs show a somewhat comparable behavior, the risk analysis shows a clearly diverging behavior.

Table 2: Results of Risk/Return Event Study – Total Sample FSIs

	Abnormal returns, *CAAR*												
	[-x; +y]		Mean		Median		KS-test	p	Wx-test	p	t-test[1]	p	N
Total Sample FSIs	0	0	-0,47%	***	-0,09%	***	0,12	0,00	-2,85	0,00	-4,35	0,00	1603
	1	1	-0,01%		-0,07%		0,10	0,00	-1,26	0,21	-1,05	0,29	1603
	2	2	-0,30%	**	-0,15%	**	0,10	0,00	-1,95	0,05	-2,17	0,03	1603
	0	1	-0,72%	***	-0,33%	***	0,11	0,00	-5,13	0,00	-5,29	0,00	1603
	0	2	-0,79%	***	-0,52%	***	0,10	0,00	-4,99	0,00	-5,05	0,00	1603
	1	0	0,24%		0,36%		0,10	0,00	-1,62	0,11	0,18	0,86	1603
	2	0	0,02%		0,02%		0,09	0,00	-0,55	0,58	-0,60	0,55	1603
	Abnormal beta shifts, *CAAB*												
	[-x; +y]		Mean		Median		KS-test	p	Wx-test	p	t-test[1]	p	N
	0	0	0,03	***	0,03	***	0,11	0,00	-15,33	0,00	11,63	0,00	1603
	1	1	0,10	***	0,10	***	0,11	0,00	-15,28	0,00	11,76	0,00	1603
	2	2	0,16	***	0,16	***	0,11	0,00	-15,30	0,00	11,93	0,00	1603
	0	1	0,06	***	0,06	***	0,11	0,00	-15,20	0,00	11,51	0,00	1603
	0	2	0,10	***	0,10	***	0,11	0,00	-15,30	0,00	11,61	0,00	1603
	1	0	0,07	***	0,06	***	0,11	0,00	-15,35	0,00	11,90	0,00	1603
	2	0	0,10	***	0,09	***	0,11	0,00	-15,29	0,00	12,04	0,00	1603

***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. *CAAR*: cumulative average abnormal return, *CAAB*: cumulative average abnormal beta shift, KS test: Kolmogorov-Smirnov test - p-value ≤ 0.05 indicates normal distribution at the 5% significance level, Wx-test: Wilcoxon signed rank test as non-parametric median test, [1]t-test: Parametric mean tests: Boehmer test for *CAARs*; Student's t-test for *CAABs*.

In order to verify whether the return results are truly a comparable reaction, we conduct a mean-difference test. Table 3 shows strong evidence that the bank bailouts affect the return behavior of REITs and other financial stocks differently. The mean return reactions of REITs and other financial stock differ significantly in 4 of the 7 event windows – for medians they differ significantly in 5 out of the 7 event windows. However, there is no clear trend observable on whether REITs or other financial stock are affected more negatively in their return behavior.

Table 3: Results of mean difference test on CAAR (means) of REITs and FSIs

		CAAR		*CAAR*		Diff. in						
[-x; +y]		REITs		FSIs		Returns	Wx-test	p-value		t-test	p-value	
0	0	0,36%		-0,47%	***	-0,84%	2,02	0,04	**	-3,28	0,00	***
1	1	-1,35%	***	-0,01%		1,34%	-4,76	0,00	***	3,44	0,00	***
2	2	-1,32%	***	-0,30%	**	1,02%	-3,68	0,00	***	2,16	0,03	**
0	1	-0,62%	**	-0,72%	***	-0,10%	-0,20	0,84		-0,32	0,75	
0	2	-0,71%	***	-0,79%	***	-0,08%	-1,06	0,29		-0,22	0,83	
1	0	-0,37%	***	0,24%		0,60%	-3,36	0,02	**	1,78	0,08	*
2	0	-0,25%	*	0,02%		0,27%	-1,89	0,00	***	0,68	0,49	

***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. *CAAR*: cumulative average abnormal return. Wx-test: (Wilcoxon rank sum test) non-parametric median test, t-test: (Student's t-test) parametric mean test.

4.2 Bank Bailouts' Effect on Focused REITs

With the analysis of various sub-samples we hope to find determinants that can add explanatory value to the results observed in the total sample analysis. We perform risk-return event studies for eight different REIT property types: Industrial, Office, Retail, Residential, Healthcare, Lodging, Specialized, and Diversified REITs. Furthermore, we compare the results of Equity REITs (consisting of Industrial, Office, Retail, Residential, Healthcare, Lodging, and Specialized REITs) and Mortgage REITs.

We start by comparing Mortgage REITs to Equity REITs. Equity REITs invest directly in properties, whereas Mortgage REITs invest into loans backed by real estate. Since the total sample is mainly composed of Equity REITs and this sample shows negative return effects while risk levels are stable, we expect similar results for Equity REITs. Mortgage REITs, due to their investment into loans, and hence their proximity to the lending sector should stay unaffected in relation to the market or might even profit from bank bailouts. See Payne and Mohammadi (2004) for a previous study on REIT capital investment types and cointegration with equity and bond markets that shows that shocks may indeed disseminate quickly across REIT markets.

For all sub-sample analyses we have chosen to display the results for the exact event day, the [-1,+1] and the [-2,+2] event window because they display the most significant results in a condensed form. Reporting all event windows would exceed the limits of this paper. Important to mention, we have not left out any contradictory results.

As Table 4 shows we indeed observe negative return effects and stable risk levels for Equity REITs, in line with the results from the total sample. Mortgage REITs show ambiguous return effects, without statistical significance. The medians display a significant positive abnormal shift in risk. Nonetheless, the Kolmogorov-Smirnov test indicates, that the CABs are normally distributed and therefore the means and the respective t-values should be considered when

evaluating the significance of risk shifts. The means versus the medians do not show any significant risk shifts compared to the general equity market.

Table 4: Results of Risk/Return Event Study - REIT-type Sub-samples (I/II)

[-x; +y]	*CAAR* REITs		*CAAR* FSIs		Diff. in Returns	Wx-test	p-value		t-test	p-value	
0 0	0,36%		-0,47%	***	-0,84%	2,02	0,04	**	-3,28	0,00	***
1 1	-1,35%	***	-0,01%		1,34%	-4,76	0,00	***	3,44	0,00	***
2 2	-1,32%	***	-0,30%	**	1,02%	-3,68	0,00	***	2,16	0,03	**
0 1	-0,62%	**	-0,72%	***	-0,10%	-0,20	0,84		-0,32	0,75	
0 2	-0,71%	***	-0,79%	***	-0,08%	-1,06	0,29		-0,22	0,83	
1 0	-0,37%	***	0,24%		0,60%	-3,36	0,02	**	1,78	0,08	*
2 0	-0,25%	*	0,02%		0,27%	-1,89	0,00	***	0,68	0,49	

***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. *CAAR*: cumulative average abnormal return. Wx-test: (Wilcoxon rank sum test) non-parametric median test, t-test: (Student's t-test) parametric mean test.

The observations from the recent analyses leads us to the general interpretation that Equity REITs as hard assets generally suffer compared to common equities. This might to some degree be caused by the moral hazard effect bank bailouts induce, favoring an appetite for risk, which is visibly carried over to the investment behavior. Another factor could be that the market might react faster to the positive signaling effect of a bank bailout, and thus outperform Equity REITs in the short run. These factors influence our expectations towards the REIT sub-samples in the following way: We expect those sectors which in times of market uncertainty generally have proven to be the most stable, now suffer the most in the event of bank bailouts, while sub-sectors closer to the general market behavior show no difference to the market or might even profit. See Ro and Ziobrowski (2011) and Payne (2006) for relevant previous evidence on the performance of property-focused REITs.

Industrial REITs: Investing in warehouse buildings, their steady cash flows are secured by long term leases in multiuser properties. Generally, their long term development relies on good economic times. Overall, industrial REITs should be a relatively stable REIT type, which in the case of bank bailouts leads us to expect a tendency toward a negative valuation compared to common equities

Lodging REITs: Investing in hotel properties that cater to business and leisure travelers. Travelling represents one among the first expense categories affected by budget restrictions during crises but certainly also rises strongly in boom times. Thus, Lodging REITs should earn higher returns at higher risk levels. Bank bailouts should favor Lodging REITs compared to other REITs, which should give them a similar, if not positive valuation compared to the market. See also Jackson (2009) for a performance study on Lodging REITs.

Office REITs: Invest in commercial office properties obtain their income on the basis of medium-to-long term leases of mostly multitenant buildings. Their connection to business makes them strongly dependent on the economy. On the other hand their property location close to urban centers should devalue relatively little during recessions due to long leases and potential multifunctional and multi-tenant use. We see Office REITs as a hard asset and therefore expect them to suffer from a relatively negative valuation in the event of bank bailouts.

Retail REITs: Invest in shopping centers and malls, their cash flow depend more on household spending. As bank bailouts do not directly impact households, spending levels should not be affected significantly due to this type of event. Retail REITs are thus expected to have decreased performance relative to common equities. E.g., Zietz, Sirmans, and Friday (2003) provide a performance analysis on the more traditional REIT types such as Retail and Office REITs.

Residential REITs: Investing in rental apartment housing, they should be relatively distant to short-term market developments and hence should represent a rather stable property type. With no ban bail-out connection, they should have a negative valuation compared to common equities. We recommend considering the study of Newell and Fischer (2009)

that documents the role of Residential REITs in REIT portfolios. They identify, a generally beneficial status of Residential REITs caused by decreasing home ownership and increased rentals post to the subprime mortgage and financial crisis.

Healthcare REITs: Invest in seniors housing and medical offices, they receive income from social security, insurance and retirement payments that should be recession resistant. Healthcare REITs should be one of most stable REIT types, in principle being the most distant from short-term economic developments. Therefore, bank bailouts should result in a negative valuation compared to the market which should be able to outperform this type of REIT in the short run after positive market signaling events.

Specialized REITs: Investing in smaller property segments such as public storage or timber, they rely on unique demand segments for their cash flows. Thus, Specialized REITs may operate at either low or high risk levels and experience either positive or negative valuation effects in relation to common equities. See also Newell and Peng (2006) for a performance analysis of non-traditional REIT types such as healthcare and specialty.

Diversified REITs: Through their diversified investment style, both regarding property types as well as equity and mortgage investment, Diversified REITs should generally represent the common equity market. Therefore, we do not expect any abnormal risk or return shifts.

As Table 5 shows the expectation for significantly negative CAARs is largely supported. For the event date itself hardly any abnormal returns are observable but for the event windows [-1,+1] as well as for [-2,+2] we observe significantly negative CAARs for Office, Lodging, Retail, Residential and Healthcare REITs. Industrial and Diversified REITs show no significant CAARs. Specialized REITs show significant positive CAARs, but only on the event date itself. Regarding risk differentials, the picture is even more ambiguous. We observe significant positive risk shifts for Office, Residential, Specialized, and Diversified REITs. Industrial and Retail REITs show no significant risk shift, while Lodging and Healthcare REITs even show a significant negative risk shift.

Table 5: Results of Risk/Return Event Study - REIT-type Sub-samples (II/II)

REIT Type		[-x; +y]		Mean		Median		KS-test	p	Wx-test	p	t-test[1]	p	N
Industrial		0	0	0,47%		-0,13%		0,08	0,68	-0,17	0,87	0,37	0,71	70
	CAAR	1	1	-1,30%		-2,74%	*	0,10	0,40	-1,72	0,09	-0,95	0,34	70
		2	2	0,32%		-2,53%		0,13	0,17	-0,78	0,43	0,26	0,79	70
		0	0	0,01		0,03		0,19	0,01	-1,44	0,15	0,35	0,72	70
	CAAB	1	1	0,02		0,09		0,19	0,01	-1,41	0,16	0,36	0,72	70
		2	2	0,05		0,17		0,19	0,01	-1,43	0,15	0,44	0,66	70
Office		0	0	0,89%		0,24%		0,14	0,06	-0,89	0,37	1,54	0,12	84
	CAAR	1	1	-2,51%	***	-2,98%	***	0,09	0,45	-2,65	0,01	-2,55	0,01	84
		2	2	-2,70%	***	-2,46%	**	0,08	0,57	-2,10	0,04	-2,49	0,01	84
		0	0	0,03	**	0,02	***	0,14	0,07	-2,88	0,00	2,45	0,02	84
	CAAB	1	1	0,08	***	0,05	***	0,13	0,11	-2,66	0,01	2,51	0,01	84
		2	2	0,13	**	0,08	***	0,13	0,11	-2,60	0,01	2,45	0,02	84
Lodging		0	0	-0,59%		-0,86%		0,13	0,13	-0,38	0,70	-0,93	0,35	77
	CAAR	1	1	-3,34%	***	-3,59%	***	0,07	0,87	-2,51	0,01	-2,89	0,00	77
		2	2	-2,55%	**	-0,88%		0,14	0,08	-1,19	0,24	-2,10	0,04	77
		0	0	-0,10	*	-0,01		0,26	0,00	-0,84	0,40	-1,79	0,08	77
	CAAB	1	1	-0,31	*	-0,02		0,26	0,00	-0,78	0,43	-1,80	0,08	77
		2	2	-0,51	*	-0,04		0,26	0,00	-0,76	0,44	-1,80	0,08	77
Retail		0	0	0,79%		-0,52%		0,12	0,02	-0,76	0,45	1,28	0,20	154
	CAAR	1	1	-1,61%	**	-1,52%	***	0,09	0,13	-2,45	0,01	-2,38	0,02	154
		2	2	-2,44%	***	-1,74%	**	0,10	0,07	-2,41	0,02	-2,53	0,01	154
		0	0	0,00		0,01		0,18	0,00	-1,02	0,31	-0,34	0,73	154
	CAAB	1	1	-0,02		0,03		0,18	0,00	-0,88	0,38	-0,40	0,69	154
		2	2	-0,03		0,04		0,18	0,00	-0,80	0,42	-0,42	0,67	154
Residential		0	0	-0,57%		-0,79%		0,11	0,19	-1,51	0,13	-1,13	0,26	98
	CAAR	1	1	-3,12%	***	-3,30%	***	0,09	0,35	-4,02	0,00	-3,98	0,00	98
		2	2	-4,11%	***	-4,34%	***	0,09	0,42	-5,05	0,00	-5,01	0,00	98
		0	0	0,03	***	0,02	***	0,16	0,01	-3,97	0,00	3,45	0,00	98
	CAAB	1	1	0,09	***	0,06	***	0,16	0,01	-3,93	0,00	3,59	0,00	98
		2	2	0,16	***	0,10	***	0,16	0,01	-3,93	0,00	3,59	0,00	98
Healthcare		0	0	0,71%	**	0,19%		0,07	0,84	-1,40	0,16	2,02	0,04	84
	CAAR	1	1	-1,94%	***	-0,88%	**	0,08	0,63	-2,21	0,03	-2,85	0,00	84
		2	2	-2,93%	***	-3,21%	***	0,06	0,89	-3,04	0,00	-3,17	0,00	84
		0	0	-0,06	*	0,03	*	0,35	0,00	-2,39	0,02	-1,74	0,09	84
	CAAB	1	1	-0,20	*	0,10	*	0,36	0,00	-2,31	0,02	-1,81	0,07	84
		2	2	-0,34	*	0,16	*	0,36	0,00	-2,25	0,02	-1,84	0,07	84
Specialized		0	0	1,47%	**	0,78%	*	0,19	0,01	-1,68	0,09	2,32	0,02	70
	CAAR	1	1	-0,70%		-0,79%		0,16	0,06	-1,52	0,13	-1,09	0,28	70
		2	2	-1,16%		-2,14%	**	0,21	0,00	-2,09	0,04	-1,29	0,20	70
		0	0	0,02	***	0,02	***	0,12	0,23	-3,18	0,00	2,72	0,01	70
	CAAB	1	1	0,07	***	0,05	***	0,13	0,16	-2,97	0,00	2,52	0,01	70
		2	2	0,11	**	0,09	***	0,13	0,20	-2,95	0,00	2,46	0,02	70
Diversified		0	0	0,17%		-0,33%		0,09	0,26	-0,30	0,76	0,34	0,73	112
	CAAR	1	1	0,92%		-0,49%		0,11	0,11	-0,09	0,93	0,39	0,69	112
		2	2	1,78%		0,99%		0,12	0,09	-0,53	0,60	0,79	0,43	112
		0	0	0,02	*	0,03	***	0,17	0,00	-3,45	0,00	1,65	0,10	112
	CAAB	1	1	0,07		0,08	***	0,16	0,00	-3,36	0,00	1,63	0,11	112
		2	2	0,12	*	0,14	***	0,15	0,01	-3,35	0,00	1,68	0,10	112

***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. *CAAR*: cumulative average abnormal return, *CAAB*: cumulative average abnormal beta shift, KS test: Kolmogorov-Smirnov test - p-value ≤ 0.05 indicates normal distribution at the 5% significance level, Wx-test: Wilcoxon signed rank test as non-parametric median test, [1]t-test: Parametric mean tests: Boehmer test for *CAARs*; Student's t-test for *CAABs*.

Concluding, we find a clearly negative valuation effect (negative return and increased risk) for Office and Residential REITs which is in line with our expectations. For Retail, Specialized, and Diversified REITs we observe negative valuation effects (either negative return or positive risk shift). For Retail REITs this confirms our expectation. On the contrary, we did not expect negative valuation effects for Diversified REITs. Due to their variant character we did not have a clear forecast for the behavior of Specialized REITs. Against our expectation Industrial REITs do not show negative valuation effects, but instead do not show any significant difference from the market development, neither for return nor for the risk part. For Healthcare REITs we had negative valuation expectations and for Lodging REITs we presumed a rather positive behavior compared to the market. For both REIT types the expectations cannot be confirmed nor denied. Both REIT types show negative return behavior which though is also accompanied by decreased risk levels and it cannot be determined which effect dominates.

4.3 Bank Bailouts' Effect on Other Financial Stock Sub-samples

To complete our analysis on financial stock behavior we examine other financial stock sub-samples.

Asset Managers: This business is closely connected to the other companies in the financial sector, on the other hand the stable character of their management revenues should give them a rather stable standing which may reduce their valuation pop during bank bailouts.

Banks: The findings of Hakenes and Schnabel (2009) show that the bailout of banks leads to increased risk levels of these banks' competitors. Klingebiel et al. (2001) state that bank returns do not react significantly to bailout programs. On basis of this research we expect negative valuation effects for banks in the event of bank bailouts, not driven by return effects but by increasing risk levels.

Brokers: The operating business of brokers is generally closely connected to the general economy. They should participate in the positive development triggered by the positive signaling effect of bank bailouts. Therefore, we do not expect any significant difference from the general market's behavior.

Insurances: Through their diversified investment style, insurance companies should follow the general market movement relatively closely. Nonetheless, their diversified income and cost structure should make them a rather stable equity class. Concluding, we expect insurance companies to show no significantly different behavior from the market, possibly with slightly negative valuation tendencies.

As Table 6 shows we find rare evidence for negative *CAARs* (banks, asset manager, brokers, and insurance companies each have only one at an event date). However, we identify a negative valuation effect driven by increased risk levels which are clearly observable for all four business sub-samples at all event windows showing significant positive risk shifts.

Table 6: Results of Risk/Return Event Study - FSI-type Sub-samples

FSI Type		[-x; +y]		Mean		Median		KS-test	p	Wx-test	p	t-test[1]	p	N
Banks	*CAAR*	0	0	-0,56%	***	-0,16%	***	0,10	0,00	-2,88	0,00	-3,71	0,00	833
		1	1	0,34%		0,21%		0,10	0,00	-0,46	0,64	0,56	0,58	833
		2	2	-0,10%		-0,14%		0,10	0,00	-1,31	0,19	-0,95	0,34	833
	CAAB	0	0	0,03	***	0,03	***	0,13	0,00	-9,74	0,00	6,70	0,00	833
		1	1	0,08	***	0,09	***	0,13	0,00	-9,74	0,00	6,97	0,00	833
		2	2	0,14	***	0,15	***	0,12	0,00	-9,79	0,00	7,16	0,00	833
Asset Mngrs	*CAAR*	0	0	-1,04%	**	-0,20%		0,15	0,00	-1,55	0,12	-2,36	0,02	210
		1	1	-0,97%		-0,56%	**	0,11	0,02	-1,97	0,05	-1,31	0,19	210
		2	2	-0,93%		0,29%		0,07	0,18	-0,71	0,48	-1,07	0,28	210
	CAAB	0	0	0,04	***	0,03	***	0,12	0,00	-6,48	0,00	5,29	0,00	210
		1	1	0,11	***	0,09	***	0,12	0,00	-6,42	0,00	5,12	0,00	210
		2	2	0,19	***	0,14	***	0,12	0,00	-6,38	0,00	5,10	0,00	210
Brokers	*CAAR*	0	0	-0,81%	*	-1,09%	***	0,18	0,00	-2,61	0,01	-1,87	0,06	133
		1	1	-0,35%		-0,09%		0,11	0,06	-1,14	0,25	-1,00	0,32	133
		2	2	-0,74%		-0,87%	**	0,13	0,03	-1,96	0,05	-1,40	0,16	133
	CAAB	0	0	0,02	**	0,02	***	0,08	0,34	-2,62	0,01	2,32	0,02	133
		1	1	0,05	**	0,05	***	0,08	0,38	-2,57	0,01	2,23	0,03	133
		2	2	0,09	**	0,09	***	0,08	0,38	-2,62	0,01	2,29	0,02	133
Insurances	*CAAR*	0	0	0,08%		0,22%		0,12	0,00	-1,32	0,19	-0,31	0,76	427
		1	1	-0,13%		-0,27%		0,13	0,00	-0,99	0,32	-1,21	0,23	427
		2	2	-0,23%		-0,11%		0,13	0,00	-0,52	0,60	-1,27	0,20	427
	CAAB	0	0	0,04	***	0,04	***	0,11	0,00	-9,87	0,00	8,34	0,00	427
		1	1	0,13	***	0,13	***	0,11	0,00	-9,85	0,00	8,30	0,00	427
		2	2	0,22	***	0,22	***	0,11	0,00	-9,81	0,00	8,32	0,00	427

***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. *CAAR*: cumulative average abnormal return, *CAAB*: cumulative average abnormal beta shift, KS test: Kolmogorov-Smirnov test - p-value ≤ 0.05 indicates normal distribution at the 5% significance level, Wx-test: Wilcoxon signed rank test as non-parametric median test, [1]t-test: Parametric mean tests: Boehmer test for *CAARs*; Student's t-test for *CAABs*.

4.4 Robustness Analysis on Differences between Single Bailout Dates

Finally, we investigate whether the observed results are constant over time, or if there are diverging results for different bailout dates and if the dollar magnitude of bailouts has an influence on the behavior of REITs and other financial stock. Generally, we expect the results to be consistent over time. However, larger bailout volumes might have a stronger impact than smaller ones.

As Table 7 shows, in the case of REITs we find a significant negative return effect for four of the seven event dates, including the two dates with the highest amount of bailed out assets. Nonetheless, we also find significantly positive *CAARs* for two event dates. The remaining seventh event date shows only little evidence of a positive return effect. Throughout the seven bailout dates there is hardly any evidence of a risk shift. Hence, we find

evidence of a negative valuation effect for REITs in the event of bank bailouts supporting our findings from the total sample.

The picture is not universal though. The analysis of the other financial stocks, as seen in Table 5.8, shows a similar picture for return. We find significant negative valuation effects for three of the seven event dates, including the dates one, two, and four by dollar volume of the bailed out assets. But for FSIs we find significantly positive *CAARs* for three of the event dates. One event date shows no significant difference in returns from the market. Comparing the results of the return event studies for REITs and FSIs, we find that for the five largest bailouts both groups show similar results in direction and significance of the results. For the risk part however, we observe significantly positive risk shifts for the six largest bailout dates for FSIs.

Generally speaking, our findings from the total sample analysis are validated. Nonetheless, we do not observe a completely universal picture concerning the return analysis across the different event dates.

Table 7: Results of Risk/Return Event Study – Date Sub-samples Total Sample REITs

Date and USD amount of bailed out assets		[-x; +y]		Mean		Median		KS-test	p	Wx-test	P	t-test[1]	p	N
10/28/2008 USD 115 bil.	*CAAR*	0	0	-2,05%	***	-1,05%	***	0,10	0,16	-2,64	0,01	-2,67	0,01	121
		1	1	-1,84%	**	-2,14%	***	0,10	0,13	-3,09	0,00	-2,43	0,02	121
		2	2	-1,38%	*	-2,15%	**	0,13	0,03	-2,21	0,03	-1,78	0,08	121
	CAAB	0	0	0,04	*	0,04	***	0,18	0,00	-3,33	0,00	1,70	0,09	121
		1	1	0,10		0,11	***	0,18	0,00	-2,66	0,01	1,41	0,16	121
		2	2	0,15		0,18	***	0,18	0,00	-2,56	0,01	1,34	0,18	121
11/17/2008 USD 33 bil.	*CAAR*	0	0	-0,91%	**	-0,62%	*	0,13	0,03	-1,62	0,10	-2,16	0,03	121
		1	1	-8,86%	***	-7,93%	***	0,13	0,04	-7,96	0,00	-9,55	0,00	121
		2	2	-12,56%	***	-9,87%	***	0,09	0,21	-8,55	0,00	-10,24	0,00	121
	CAAB	0	0	0,00		0,02		0,20	0,00	-1,52	0,13	-0,08	0,93	121
		1	1	0,00		0,06		0,21	0,00	-1,50	0,13	-0,05	0,96	121
		2	2	0,01		0,11		0,20	0,00	-1,62	0,11	0,11	0,91	121
12/31/2008 USD 15 bil.	*CAAR*	0	0	3,82%	***	2,48%	***	0,16	0,00	-7,58	0,00	8,07	0,00	121
		1	1	4,99%	***	3,99%	***	0,16	0,01	-7,48	0,00	8,59	0,00	121
		2	2	-3,05%	***	-5,94%	***	0,14	0,01	-4,36	0,00	-3,29	0,00	121
	CAAB	0	0	-0,05		0,02	*	0,32	0,00	-1,67	0,09	-1,59	0,12	121
		1	1	-0,15		0,06	*	0,32	0,00	-1,67	0,10	-1,59	0,12	121
		2	2	-0,26		0,09		0,32	0,00	-1,42	0,16	-1,63	0,11	121
01/09/2009 USD 14 bil.	*CAAR*	0	0	-1,29%	***	-1,85%	***	0,14	0,02	-5,12	0,00	-5,42	0,00	121
		1	1	-3,64%	***	-4,93%	***	0,12	0,06	-5,93	0,00	-6,90	0,00	121
		2	2	0,08%		-1,39%		0,09	0,25	-0,80	0,42	-0,63	0,53	121
	CAAB	0	0	-0,04	**	0,00		0,27	0,00	-0,68	0,50	-1,98	0,05	121
		1	1	-0,11	**	0,01		0,28	0,00	-0,71	0,48	-1,98	0,05	121
		2	2	-0,18	**	0,01		0,28	0,00	-0,69	0,49	-1,97	0,05	121
12/19/2008 USD 2.8 bil.	*CAAR*	0	0	4,08%	***	3,35%	***	0,08	0,36	-5,74	0,00	6,14	0,00	121
		1	1	1,57%	*	0,88%	*	0,12	0,04	-1,89	0,06	1,75	0,08	121
		2	2	4,49%	***	3,14%	***	0,10	0,16	-4,40	0,00	4,53	0,00	121
	CAAB	0	0	-0,01		0,06	***	0,28	0,00	-3,75	0,00	-0,42	0,67	121
		1	1	-0,03		0,18	***	0,29	0,00	-3,87	0,00	-0,35	0,72	121
		2	2	-0,05		0,29	***	0,28	0,00	-3,81	0,00	-0,36	0,72	121
12/23/2008 USD 1.9 bil.	*CAAR*	0	0	0,54%		0,09%		0,11	0,12	-0,66	0,51	1,16	0,25	121
		1	1	0,19%		-0,67%		0,14	0,02	-0,98	0,33	0,34	0,73	121
		2	2	4,26%	***	2,17%	***	0,15	0,01	-4,35	0,00	3,98	0,00	121
	CAAB	0	0	-0,01		0,06	***	0,28	0,00	-3,88	0,00	-0,20	0,85	121
		1	1	-0,02		0,18	***	0,28	0,00	-3,91	0,00	-0,17	0,87	121
		2	2	-0,02		0,30	***	0,28	0,00	-3,95	0,00	-0,16	0,87	121
03/13/2009 USD 1.45 bil.	*CAAR*	0	0	-1,65%	***	-2,43%	***	0,14	0,01	-4,77	0,00	-3,11	0,00	121
		1	1	-1,84%	**	-5,07%	***	0,15	0,01	-3,34	0,00	-1,94	0,05	121
		2	2	-1,09%		-3,80%	***	0,15	0,01	-2,58	0,01	-1,12	0,26	121
	CAAB	0	0	-0,02		0,01	***	0,33	0,00	-2,48	0,01	-1,02	0,31	121
		1	1	-0,05		0,03	**	0,33	0,00	-2,29	0,02	-1,04	0,30	121
		2	2	-0,08		0,04	**	0,33	0,00	-2,27	0,02	-1,05	0,30	121

***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. *CAAR*: cumulative average abnormal return, *CAAB*: cumulative average abnormal beta shift, KS test: Kolmogorov-Smirnov test - p-value ≤ 0.05 indicates normal distribution at the 5% significance level, Wx-test: Wilcoxon signed rank test as non-parametric median test, [1]t-test: Parametric mean tests: Boehmer test for *CAARs*; Student's t-test for *CAABs*.

Table 8: Results of Risk/Return Event Study – Date Sub-samples Total Sample FSIs

Date and USD amount of bailed out assets		[-x ; +y]		Mean		Median		KS-test	p	Wx-test	P	t-test[1]	p	N
10/28/2008 USD 115 bil.	*CAAR*	0	0	-4,29%	***	-2,87%	***	0,07	0,16	-7,51	0,00	-8,88	0,00	229
		1	1	-3,15%	***	-2,54%	***	0,06	0,44	-5,48	0,00	-6,29	0,00	229
		2	2	-2,48%	***	-1,17%	***	0,08	0,08	-3,58	0,00	-4,06	0,00	229
	CAAB	0	0	0,06	***	0,03	***	0,11	0,01	-4,54	0,00	5,09	0,00	229
		1	1	0,15	***	0,09	***	0,11	0,01	-4,22	0,00	4,87	0,00	229
		2	2	0,24	***	0,13	***	0,11	0,01	-4,12	0,00	4,78	0,00	229
11/17/2008 USD 33 bil.	*CAAR*	0	0	-0,15%		0,45%		0,11	0,01	-0,86	0,39	-0,37	0,71	229
		1	1	-2,21%	***	-1,39%	***	0,08	0,11	-4,51	0,00	-4,88	0,00	229
		2	2	-4,52%	***	-2,31%	***	0,11	0,01	-5,87	0,00	-6,51	0,00	229
	CAAB	0	0	0,03	***	0,01	***	0,10	0,02	-2,99	0,00	3,39	0,00	229
		1	1	0,08	***	0,04	***	0,10	0,02	-2,87	0,00	3,23	0,00	229
		2	2	0,14	***	0,08	***	0,10	0,03	-3,06	0,00	3,34	0,00	229
12/31/2008 USD 15 bil.	*CAAR*	0	0	1,92%	***	1,30%	***	0,16	0,00	-6,29	0,00	5,61	0,00	229
		1	1	2,80%	***	1,84%	***	0,14	0,00	-6,58	0,00	6,53	0,00	229
		2	2	-0,08%		-1,46%		0,10	0,01	-1,50	0,13	-0,61	0,54	229
	CAAB	0	0	0,03	***	0,04	***	0,18	0,00	-6,33	0,00	3,71	0,00	229
		1	1	0,08	***	0,13	***	0,18	0,00	-6,33	0,00	3,68	0,00	229
		2	2	0,13	***	0,21	***	0,17	0,00	-6,33	0,00	3,78	0,00	229
01/09/2009 USD 14 bil.	*CAAR*	0	0	-1,40%	***	-1,14%	***	0,09	0,06	-6,48	0,00	-6,81	0,00	229
		1	1	-2,43%	***	-2,28%	***	0,06	0,34	-6,33	0,00	-7,00	0,00	229
		2	2	-1,96%	***	-1,38%	***	0,07	0,17	-4,02	0,00	-4,35	0,00	229
	CAAB	0	0	0,02	***	0,03	***	0,17	0,00	-6,39	0,00	3,27	0,00	229
		1	1	0,06	***	0,08	***	0,16	0,00	-6,60	0,00	3,63	0,00	229
		2	2	0,09	***	0,13	***	0,17	0,00	-6,63	0,00	3,68	0,00	229
12/19/2008 USD 2.8 bil.	*CAAR*	0	0	0,22%		0,01%		0,14	0,00	-0,59	0,55	0,50	0,62	229
		1	1	1,32%	***	1,43%	***	0,11	0,01	-3,69	0,00	3,20	0,00	229
		2	2	1,66%	***	1,28%	***	0,10	0,02	-3,46	0,00	3,27	0,00	229
	CAAB	0	0	0,05	***	0,06	***	0,08	0,07	-8,77	0,00	9,18	0,00	229
		1	1	0,15	***	0,17	***	0,09	0,05	-8,72	0,00	9,03	0,00	229
		2	2	0,26	***	0,30	***	0,09	0,04	-8,71	0,00	9,01	0,00	229
12/23/2008 USD 1.9 bil.	*CAAR*	0	0	-0,04%		0,14%		0,14	0,00	-0,01	0,99	-0,03	0,98	229
		1	1	0,21%		-0,20%		0,11	0,01	-0,08	0,93	0,74	0,46	229
		2	2	0,37%		0,46%		0,11	0,01	-1,06	0,29	0,98	0,33	229
	CAAB	0	0	0,05	***	0,06	***	0,11	0,01	-8,47	0,00	8,40	0,00	229
		1	1	0,16	***	0,19	***	0,11	0,01	-8,52	0,00	8,42	0,00	229
		2	2	0,26	***	0,31	***	0,11	0,01	-8,57	0,00	8,63	0,00	229
03/13/2009 USD 1.45 bil.	*CAAR*	0	0	0,43%		-0,03%		0,11	0,01	-0,08	0,94	1,14	0,25	229
		1	1	3,37%	***	1,45%	***	0,16	0,00	-3,67	0,00	4,32	0,00	229
		2	2	4,91%	***	2,90%	***	0,14	0,00	-5,56	0,00	5,82	0,00	229
	CAAB	0	0	0,00		0,01	***	0,23	0,00	-3,64	0,00	0,16	0,87	229
		1	1	0,01		0,04	***	0,22	0,00	-3,79	0,00	0,34	0,74	229
		2	2	0,01		0,07	***	0,21	0,00	-3,69	0,00	0,34	0,73	229

***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. *CAAR*: cumulative average abnormal return, *CAAB*: cumulative average abnormal beta shift, KS test: Kolmogorov-Smirnov test - p-value ≤ 0.05 indicates normal distribution at the 5% significance level, Wx-test: Wilcoxon signed rank test as non-parametric median test, [1]t-test: Parametric mean tests: Boehmer test for *CAARs*; Student's t-test for *CAABs*.

4.5 Multivariate Regressions of FSI CARs on the All-REIT sample

Our final analysis consists of two sets of multivariate regressions. The dependent variables are the cumulative abnormal returns (CARs) and cumulative abnormal beta shifts (CABs) of the All-REIT sample in the [-1,+1] event window. As independent variables we use the respective CARs and CABs of the All-FSI sample (without REITs) and the FSI sub-samples, banks, insurance companies, brokers and asset managers. Because REITs are generally seen as financial stocks along with the 4 previously mentioned sub-samples, our objective is to determine how far the CARs and CABs of the All-REIT sample are driven by the other FSIs. Since we view REITs to be an Asset Class of their own and not just another subclass of the Financial Services Industry we expect the REITs CARs and CABs to be independent and not be driven by the FSIs CARs and CABs. Our previous analysis has shown significant differences in the behavior of REITs compared to FSIs.

Looking at the results of the multivariate regression displayed in Table 9, our expectations are confirmed to a great extent. We find that of the sub-samples, only the asset managers appear to be a driver of the CARs. The All-REIT sample has a low significance level, and the same is true for the All-FSI sample. No other interdependencies are found. Furthermore, when looking at the adjusted R^2 scores, it is obvious, that the CARs and CABs of the All-REIT sample are not driven by those of the All-FSI sample nor by those of the FSI sub-samples, as the explanatory power of the model is close to zero.

These findings are in line with our earlier results and show that REITs clearly differ from FSIs with regard to their behavior during bank bailout events.

Table 9: Multivariate Regressions: Drivers of All-REIT sample's CARs and CABs

Dependent variable:	CARs [0] of All-REIT sample						*CABs* [0] of All-REIT sample					
Model		1	2	3	4	5		1	2	3	4	5
	α	-0,014	-0,009	-0,013	-0,013	-0,009	α	-0,084	-0,080	-0,091	-0,091	-0,084
		-3,733	*-1,165*	*-3,626*	*-3,473*	*0,482*		*-1,954*	*-3,462*	*-3,478*	*-3,219*	*-4,264*
Independent variables:	CARs [0] of FSI samples						*CABs* [0] of FSI samples					
All FSIs	δ_1	-0,287 *					γ_1	-0,018				
		-1,990						*-0,049*				
Banks	δ_2		-1,333				γ_2		-0,888			
			-0,673						*-0,589*			
Insurances	δ_3			0,143			γ_3			0,413		
				0,544						*0,289*		
Broker	δ_4				0,118		γ_4				0,414	
					0,679						*0,250*	
Asset Managers	δ_5					-1,952 *	γ_5					0,263
						1,901						*0,454*
Nobs.	847						847					
R^2 (adj.)		0,003	-0,001	-0,001	-0,001	0,003		-0,001	-0,001	-0,001	-0,001	-0,001
F-stat. (p.-val.)		0,153	0,781	0,871	0,799	0,178		0,806	0,708	0,762	0,792	0,724
DW-stat.		1,669	1,676	1,671	1,673	1,668		1,291	1,292	1,290	1,291	1,291

***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively; t-statistics in italic.

5 Conclusion

This research examines whether REITs, and financial stocks, react differently from the common equity market when a positive monetary shock to the market occurs through the injection of liquidity by the government in form of bank bailouts. The objective is to advance previous research on the behavior of REITs in the case of monetary shocks. Previous research has shown that REITs react similarly to common equities in the event of some monetary shocks such as a change in federal fund rates. We believe though, that the type of monetary shock is of crucial importance on how it affects REIT behavior and previous evidence on bank failure events. Bank failures were shown to cause positive valuation effects on REITS compared to other common equities. Although bank failures and federal fund rate increases both trigger a limitation in market liquidity, they provoke opposite valuation effects on REITs. This might, to some degree, be attributable to the fact that they generally occur in completely different market situations. Since bank bailouts as well as federal fund rate

decreases generally occur in similar market phases, usually in a recession, our null hypothesis states that REITs risk-return profile should not behave significantly different from other equities in the case of bank bailouts.

However, our empirical results for the total sample show that REITs generally experience significant negative abnormal returns (between -0.25% and -1.35%) around bank bailout dates, while we do not observe a shift in systematic risk levels. These results compliment the previous research on bank failures which showed positive return effects around bank failures, while risk levels remained stable.

Comparing the results on REITs with the total sample of other FSIs, we find comparable results with regard to the return analysis, however, in contrast to REITs, FSIs show a significant increase in risk levels. Generally speaking, REITs, as well as the other financial stocks, show a negative valuation effect around bank bailouts. This might bias our findings, as we might not be observing a unique behavior of REITs, but of the entire financial stock sector.

The analysis of the REIT sub-samples provides us with valuable insights on how diverse the different REIT property types react to the monetary shock of bank bailouts. Generally, the findings on the property type sub-samples support the previous research on bank failures, as almost all REIT classes show reverse valuation effects during bank bailouts versus bank failures. The analysis of other FSIs shows, that the negative return effect is only clearly observable for two of the four sub-samples, while a positive risk shift is clearly displayed on a highly significant level throughout all sub-samples.

Concluding, we find that the effect monetary shocks have on REITs, compared to the general stock market, and FSIs depends highly on the type of monetary shock. Bank bailouts and bank failures have reverse valuation effects on REITs.' In our opinion this research supports the safe heaven theory of Mueller and Mueller (2003) indentifying Equity REITs as hard asset in times of market uncertainty, to the degree, that these REITs are outperformed by

the market during the positive market signaling effects of bank bailouts. Furthermore, we find increasing risk levels for financial services institutions which might be a sign for the moral hazard problem involved with bank bailouts.

As our research has shown unique results for REITs from other financial stocks, scholars should further investigate the performance of REITs as a separate asset class versus financial stocks and other industries that also belong to this group, in order to verify what characteristics are generally attributable to financial stocks and which ones are REIT-specific. The multivariate regression supports the initial analyses as it shows that REIT *CARs* and *CABs* are not driven by those of FSIs, and therefore, that REITs and FSIs clearly differ in their behavior with respect to bank bailouts.

The major limitations to our study are the following: First, we only research U.S. REITs and financial stock market data, which might not apply to other markets. Second, although we took into consideration the time period from January 1999 until July 2010, our research is limited to a rather short period of time, as bank bailouts only occurred between January 2008 and July 2010. Third after eliminating bail-out dates that overlap with bank failures only seven event dates remain. We try to compensate for this by conducting the analysis at the individual REIT level in order to investigate a sufficient number of data points.

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