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Jussi Leinonen

TOO BIG TO FAIL: STOCK MARKET REACTIONS TO BAILING OUT LARGE FINANCIAL INSTITUTIONS

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UNIVERSITY OF VAASA
Faculty of Business Studies
Author: Jussi Leinonen
Topic of the Thesis: Too Big to Fail: Stock Market Reactions to Bailing Out Large Financial Institutions
Name of the Supervisor: Timo Salmi
Degree: Master of Science in Economics and Business Administration
Department: Accounting and Finance
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ABSTRACT

The purpose of this thesis is to investigate the stock market reactions to bailing out large financial institutions during the 2008 subprime crisis. Furthermore, the other purpose is to examine how the market reactions to these measures taken by U.S. government changed during a crisis period that saw several bailouts. Previous research has shown that in several cases the largest financial institutions benefit from these bailouts as investors start to perceive them as too-big-to-fail. Similarly, previous research has suggested that smaller financial firms, those perceived as too-small-to-save, experience negative stock returns after the bailout decisions.

The data consist of 216 U.S. publicly traded financial firms whose total assets were above $1 billion in the end of 2007. Further, the data is divided into four portfolios based on the asset size. The reasoning here is to examine whether the stock returns of largest financial firms differ from those of smaller firms surrounding the bailout decision. In order to investigate this, the event study methodology is applied. The differences between portfolio reactions are analyzed through abnormal returns which are calculated by using the widely used market model. Focus is in the subprime crisis of 2008 meaning that the four bailout events chosen, took all place in that year.

The results are somewhat mixed with providing only some evidence for the hypothesis that the largest financial firms benefit from being too-big-to-fail. When examining, how the market reactions changed as more information about the existing policy line came available, the results show that the market reaction did not change. Thus, results suggest that, at least during the subprime crisis, investors rewarded the largest financial firms only temporarily and did not assume the bailout policy to be a permanent policy line.

KEYWORDS: Stock market reaction, financial crisis, event study, abnormal return

1. INTRODUCTION

Since 2007 the global economy has experienced one of its most turbulent times since the great depression. Governments around the world have responded by expanding and extending government support to the systematically important financial institutions. The purpose of these measures has been to protect uninsured depositors and other stakeholders because of the fear that their failure would cause a collapse of to the whole economy. In the U.S. the government has bailed out financial institutions such as investment bank Bear Stearns., mortgage lenders Fannie Mae and Freddie Mac, insurance giant American International Group (AIG) and the Citigroup bank. In addition, the massive group bailout of investment banks in the form of Troubled Assets Relief Program (TARP) has been carried out.

In general the term bailout refers to a situation in which a government or a private sector offers money to a failing business in order to prevent the consequences that arise from a business's bankruptcy. Bailouts can take the form of loans, bonds, stocks or cash and they may or may not require reimbursement. In this thesis the interest is only in the stock market reaction to the bailout decision. Other factors such as reimbursement or the type and characteristics of the bailout are not analyzed in detail. (Brewer & Klingenhagen 2010: 56 – 57)

This thesis focuses on bailouts of financial firms, in which the government directly helps firms by equity purchases, extending long-term loan guarantees, or buying loans at favorable prices. For example, nonperforming loans, that is, loans which are not expected to be paid back, are usually purchased by the government at face value. In addition, sometimes government bonds are exchanged for bad bank loans. The practice often is that a public centralized asset management company is being set up for lending funds to troubled banks against specific loan collateral or for buying the troubled assets from the banks. (Gorton, Huang 2004: 456)

1.1. Background

The proponents of bailouts have argued that they are necessary in order prevent contagion and systemic threats such as a domino effect. On the other hand, the critics of bailouts have pointed out that they cause moral hazard. Firms find it optimal to take

bigger gambles and risks because they do not suffer themselves if the gambles fail. (Kho, Lee & Stulz 2000: 28)

Why should the markets then react to the bailouts? One reason is that a bailout could have an effect on bank's cost of funds. The interest rate a bank pays for its deposits, and non-deposit borrowings should reflect the possibility of bankruptcy, that is, riskier bank pays higher interest. Moreover, partial deposit insurance system means that the deposits above $100 000 incur a risk premium. Therefore, executing the bailout policy means that by removing any coverage limit, the policy removes the possibilities, of those banks concerning, to file for bankruptcy and thus, allows them to avoid paying this risk premium. If market participants become aware that the bailout window is open for the largest banks, then markets should allow them to borrow at a lower rate than otherwise would have been possible. (O'Hara & Shaw 1990: 1588 – 1589; Brewer et al. 2010: 58)

The difference between what they would have paid for borrowed funds, and what they did pay because of the additional access to the government bailout window, results as a subsidy for the financial organization. The access to future government support, thus, is an asset of the firm. The value of this asset is equal to the present value of the stream of subsidies the firm expects to receive, which should also increase stock value to the extent that these subsidies are captured by the shareholders. In addition, another reason is that, with the bailout window open, bank's cost of funds is no longer tied to bank's risk level. Thus, for example a bank has an incentive to increase the risk of its operations, which in turn should lead to a higher expected return. (O'Hara & Shaw 1990: 1588 – 1589; Brewer et al. 2010: 58)

In September 1984, C.T. Conover, the Comptroller of the Currency testified in front of the U.S. Congress that some banks were too big for the government to allow them to file for bankruptcy and thus, for those banks a total deposit insurance would be provided (O'Hara et al. 1990: 1587). The reason for this was the so called Continental Illinois Crisis earlier that year, which led U.S. government to bail out Continental Illinois bank holding company, nation's 8^{th} largest bank. The fear was that the bankruptcy of Continental Illinois would have caused a collapse of confidence in the system as a whole and would have led to bank runs. In addition, it could have set off a domino effect, which would have brought down other banks and eventually the whole macro-economy, as happened in the 1930s (Swary 1986: 45 – 452; Kaufman 1990: 1). The bailout decision led U.S. Congressman Stewart B. McKinney to famously declare: "We

have a new kind of bank. It is called too big to fail. TBTF, and it is a wonderful bank" (Stern, Feldman 2004: 13).

The decision to protect the Continental Illinois Bank after permitting smaller banks to fail without protecting their uninsured depositors drew lot of criticism, especially from representatives whose local areas had recently suffered small bank failures. They questioned the fairness of policy by the government which saw some banks in the 1980s to be saved while other, smaller banks were allowed to fail. (Kaufman 2002: 426)

Because of the concerns and criticism that the U.S. government went too far in protecting large banking institutions during the 1980 – 1990s bank failures, and because the crisis in commercial banking resulted in a Bank Insurance Fund deficit of $7 billion, the Federal Deposit Insurance Corporation Improvement Act (FDICIA) was signed into law in 1991 (Brewer, Jagtiani 2007: 4; Ennis, Malek 2005: 22). In theory, the use of TBTF policy was significantly restricted by the FDICIA. It prohibits the Federal Deposit Insurance Corporation (FDIC) from protecting uninsured depositors or creditors at a failed banking institution, if such protection would increase the loss to the insurance fund. However, the FDICIA has a systemic risk exemption: a bank could be declared TBTF and rescued from failure if not doing so would have dramatic consequences for the economy. This has been invoked a number of times during the current financial crisis. (Brewer et al. 2010: 59; Pop & Pop 2009: 1430).

It is important to notice that a bank's status as TBTF institution can be misleading. Even though the systemic importance of a bank is closely related to its size, it is not always the case. For example, some U.S. banks are not especially large but they are still regarded as TBTF because of their essential role in the markets and in the payment system. Furthermore, the TBTF status does not only concern banks, as the current crisis has shown. Other financial institutions like large clearinghouses and significant players in the mortgage securities market are often perceived as TBTF. (Ennis, Malek 2005: 21-22)

The failure of the private hedge fund Long Term Capital Management (LTCM) in 1998 illustrates this. It shows that an increased complexity in the institution's activities makes it harder for the regulators to monitor and to determine limits on risk exposures. The fund's original activities focused on high-volume arbitrage trading in bond and bond derivatives markets but it later became more active in other markets and, most importantly, more willing to speculate. LTCM was very successful and by the end of

1997 it had generated annual rates of return of around 40% and had nearly tripled the money of its investors. The success made LTCM very popular with investors. Thus, not only because of its size but also because of its role in the markets LTCM was not allowed to fail. Fears about possible direct consequences for global financial markets were too high. (Kane 2000: 673; Jorion 2000: 277; Dowd 1999: 3)

1.2. Bankruptcy, Bailout decision and the Economy

If a firm files for bankruptcy the event has two different kinds of risks scenarios as consequences. The first risk scenario focuses on the effect of a bankruptcy filing on the firm itself. These *firm-specific* risks, if resulting, would seriously dissipate the value of firm's assets. The other scenario highlights the abovementioned consequences of bankruptcy filing outside the firm. A filing affects directly to firm's contractual counterparties. Some of these counterparties, for example lenders and derivatives counterparts, might have claims on the firm or might hold contracts whose value is tied to the firm. In addition, one consequence is possible decline in market confidence. These spillover effects are called *systemic risks*. (Ayotte, Skeel 2010: 471)

In the 2008 subprime crisis especially the systemic risks were the major concern. The government was concerned about the impact that firms' bankruptcy filings would have on their trading partners and other creditors. These fears in fact realized on 15 September when investment bank Lehman Brothers filed for bankruptcy. The bank had a significant amount of commercial paper in its books at the time of filing. Commercial paper is an unsecured debt obligation which is issued by firms that wish to borrow funds on a short-term basis. Traditionally the borrowers in this case had been large and stable companies who have repaid their obligations quickly and, therefore, the risk to the lenders had usually been quite low. Several money market funds held these same papers and when Lehman Brothers filed for bankruptcy these papers suddenly became worthless. Thus, the consequences to counterparties' finances were immediate and significant. (Ayotte et al. 2010: 489)

Money market funds that held the Lehman Brothers commercial paper were forced to write down the value of these holdings. The next consequences were the numerous investor redemption requests and runs on the funds which forced the funds to sell assets at lowered prices. Ultimately, the whole system was in danger because many borrowers had relied on commercial paper while financing their short-term operations. Runs on the

money market funds had dried up the commercial paper market and there was no more capital available. However, even though these direct spillover consequences were substantial the most important systemic consequence was the lack of trust that emerged in the markets after the Lehman Brothers bankruptcy. (Ayotte et al. 2010: 489)

This example above illustrates the concerns that were behind U.S. government bailing out decisions prior and post Lehman Brothers bankruptcy filing. In a paper published before the crisis emerged, Diamond and Rajan (2005) show, that bank failures can be contagious meaning that when one bank files for bankruptcy there is another one waiting around the corner. They argue that this is because a failed bank shrinks the common pool of liquidity among the markets. Thus, one failure creates liquidity shortages in other banks, which could have serious consequences on banks whose financial position is already troubled. Unless the chain reaction is not somehow stopped the ultimate reaction would be the meltdown of the whole system. Given the costs of financial meltdown Diamond et al. suggest a government intervention, in order to stop the chain reaction.

The bailout decision means that the government sees the systemic risks as greater threat to the system than the moral hazard and other problems which the bailout decision would raise. By bailing out a firm, in this case a bank, the government or some other instance subsidizes excessive risk taking and speculation that the bank has practiced in its investment decisions. This trade-off is difficult to solve and therefore, it is important to turn focus on the consequences that a bailout decision has to the economy. (Ayotte et al. 2010: 490)

Especially in recent financial crisis the financial firms under stress have had a large lack of liquidity and liabilities whose value greatly exceeds that of assets. In general, banks and other financial firms rely heavily on short-term liabilities, which, at the time of crisis, are difficult to obtain. In this situation government faces a difficult choice by either providing rescue loan or not intervening at all, which could ultimately damage the whole system. Providing a rescue loan would also mean that government might be stuck with a large long-term commitment to a company with taxpayer money. This was demonstrated in AIG bailout shortly after the bankruptcy of Lehman Brothers. Because AIG’s illiquidity problem so vast, government was forced to issue $85 billion dollar rescue loan in order to prevent the firm from failing. Short maturity and high interest rate of the loan were supposed to give AIG the incentive to pay the loan back quickly in order to avoid the long-term taxpayer commitment. However, this soon proved to be

impossible and after AIG had convinced the government to rewrite the loan terms the maturity of the loan was extended from 2 years to 5 years and the interest rate was cut by 5,5 %. The result was then a longer and larger taxpayer commitment to the firm which was not the original plan. (Ayotte et al. 2010: 484 – 485)

The other consequence of bailouts is the problem of moral hazard. The reasoning is that if a firm is insolvent, losses must be borne by someone, in general by the persons in response. However, a bailout decision means that the persons in response are protected against any risks they have taken on the way that has led the firm to insolvency. Moreover, if investors, who are funding a firm, say a bank, expect that the firm will be rescued by the government if it runs into trouble they have an incentive to extend funding beyond what they would invest otherwise. By continuing investing in the bank the investors in this case would delay the much needed restructuring processes or a merger with healthy acquirer. (Ayotte et al. 2010: 485)

In addition, a taxpayer bailout window being open on the eve of bankruptcy gives incentives to both potential investors and the firm itself to play games with government. In this case a potential acquirer of the troubled bank might wait until the target is in such a bad financial condition that the acquirer can demand for taxpayer assistance as a prerequisite in order to complete the deal. This was highlighted in the bailout of investment bank Bear Stearns when the bank itself was acquired by JP Morgan Chase but the losses were guaranteed by the government. Furthermore, access to taxpayer money gives the managers of the troubled bank incentives to on purpose fail to take the necessary steps in order to prepare for bankruptcy. The more uncertainties there are related to possible bankruptcy, the stronger becomes the bank's need for government intervention. Therefore, it is possible that the government support might actually create instability rather than stabilize the situation. (Ayotte et al. 2010: 485)

In the recent bailouts government has tried to minimize and limit the problem of moral hazard and to penalize shareholders. For example, in Bear Stearns bailout the original purchase price of the shares was substantially below the trading price. In addition, in the original AIG rescue package, government took warrants which allowed it to purchase a little less than 80 % of the equity, which had significant effect on the number of AIG's existing shareholders. Thus, the purpose of both of these measures was not only to limit the moral hazard concerns mentioned above, but also to limit the systemic risks by not allowing these firms to file for bankruptcy. However, this kind of "hybrid" solution, trying to solve two problems with one solution subsidizing creditors and penalizing

shareholders, is also problematic. While it takes the moral hazard of shareholders into account, it magnifies the moral hazard of debt. Thus, even though the stock market may bid against the stock of the debtor, the policy allows it to continue lending because the debt will be guaranteed by the government. Therefore, if markets are expecting the policy, troubled banks or other firms might find it even more difficult to issue new equity in order to repair their balance sheets. Furthermore, when facing liquidity crisis firms will turn their attention to debt because it is the most subsidized security. However, added debt can have significant effects on firm's financial position and can create even greater need for government intervention. (Ayotte et al. 2010: 486)

Yet another consequence of bailouts is the distortion of firm's corporate governance. This is highlighted especially in the form of management turnover. Often as a consequence of a bailout decision the firm's CEO is replaced. Normally the replacement decisions are driven by the investors because of CEO's insufficient results and optimizing the corporate governance. However, if managerial changes are the condition for government intervention the decision is often influenced by other factors such as concern for public response to the intervention. In addition, if government is stuck with the company after bailing it out, the corporate government distortions might grow even larger. Again the AIG bailout is an example for this. Recent AIG CEOs have faced significant difficulties in maximizing firm value while facing sharp criticism over compensation practices. Because of the government constraints imposed on the compensation possibilities the executives have argued for being unable to restore and maximize the value of the firm. (Ayotte et al. 2010: 486 – 487)

1.3. The Research Problem and Methodology

The purpose of this thesis is to examine, how stock markets reacted to the bailing out decisions of financial institutions during the subprime crisis. In literature the impact of a single bailing out decision on stock markets has been relatively popular focus of interest (see for example Brewer et al 2010, Pop et al. 2009 and O'Hara et al. 1986). However, an analysis of how investors' reactions change during a period which sees multiple institutions rescued by the government does not really exist, most probably because such meltdown has not occurred after the Great Depression. However, the subprime crisis of 2007 – 2008 offers a unique environment for this analysis. Therefore, another purpose of this thesis is to investigate how market reactions to bailouts changed as the crisis escalated in 2008.

In order to analyze this, four windows will be chosen. First event date is 14.03.2008 when the Fed agreed to give emergency funding to Bear Stearns, formerly the fifth-largest U.S. securities firm. The second event is the bailout of AIG, which took place on 16.09.2008. The insurance giant had run into a liquidity crisis of such magnitude that the New York Federal Reserve (NY Fed) had to lend $80 billion in order to help the firm to survive. The third event is the announcement of TARP on 14.10.2008. However, even though the original legislation process of the plan had taken place few weeks earlier, this thesis focuses on the announcement of U.S. Treasury to invest $250 billion and acquire stakes in the ten largest banking institutions of the country. The last event is the Citigroup bailout on 24.11.2008.

The data consists of daily stock returns of U.S. banking institutions from 2008. In order to analyze the data, it will be divided into portfolios based on firm's asset size. The methodological framework is closely based on O'Hara et al. (1990) and Pop et al. (2009). With the event study method this thesis will compare the daily abnormal stock returns of different portfolios to analyze the stock market reaction to the bailout decision.

This thesis is based on two research hypotheses. Previous literature has shown that largest banks, that is, banks considered as TBTF, experience positive market reaction, whereas smaller banks, for whom the government bailout window may not be open, experience negative stock return. Therefore, the first hypothesis expects the portfolio consisting of largest banks to generate higher abnormal returns than the other portfolios:

H1: Largest Banks generate higher abnormal returns than other banks.

Previous literature does not provide framework for expectations, how market reaction changed during the crisis. Here we have to look for assistance from another research field. The research focusing on market anomalies suggests that with time, all anomalies will disappear. Here, the same applies. As the crisis progresses, investors should become more aware about the policy line of the government and, thus, be able to anticipate the upcoming bailout. Therefore, the second hypothesis expects the market reaction to bailouts to become weaker after each bailout.

H2: After each bailout, market reaction becomes weaker.

1.4. Structure of the Thesis

The second chapter presents the findings from previous studies. First, the literature focusing on implications of the TBTF doctrine is reviewed. Then, then the focus shifts to literature concerning stock market reactions in financial crises between 1984 and 2007. And finally, the findings of studies investigating bank stock price reactions to different will be presented.

Chapter 3 will focus on the financial crisis which started as a subprime crisis in 2007. First, the thesis traces back the key events of the crises and presents how the crisis escalated, eventually resulting as a global recession. Hereafter the thesis presents some of the factors the literature has suggested for being reasons underlying the crisis. In addition, the chapter will end with an overview of the current situation of the financial markets.

The next chapter presents the theoretical background in the form of the Efficient Market Hypothesis (EMH) and behavioral finance. This chapter also takes interest in the discussion concerning, how the EMH possibly had its part in the creation of the crisis. In chapter five the data and methodology will be presented. First the data will be introduced and then the methodology of event studies, including the theoretical aspects. Results will be presented in chapter six and an analysis of the results will be the focus in chapter seven together with the conclusions and limitations.

2. PREVIOUS LITERATURE

Previous research provides a framework for the thesis to analyze the findings. In the following the findings and implications of the TBTF status will be reviewed. Then the focus turns to research concerning the market reactions during previous crises, that is, crises which occurred between 1984 and 2007. The last part discusses the findings concerning the reactions of bank stock prices to various events in order to give an overview, whether there is some irregularities which have to be taken into account also in this thesis.

2.1. Too Big To Fail

In their study O'Hara et al. (1990) investigated the effect of Comptroller of the Currency's announcement that some banks were too big to fail on bank equity values. The focus was on those banks to which the total deposit insurance would be provided, that is, those banks which were considered as TBTF. With the event study methodology, they analyzed the effects of the announcement on the eleven largest banks, compared to those banks which, because of the announcement, were implicitly considered as "too small to save". In addition, they investigated if the effects differed depending upon solvency situation and the size of the bank.

They suggest that the market did react to the TBTF policy. The reaction depends on factors such as size and solvency. The results show significant positive market reaction for stocks of TBTF banks, with corresponding market reaction to the other banks. The effect of size depends on whether a bank was deemed as TBTF or not. Bigger TBTF banks earn higher the abnormal returns, whereas among banks not considered TBTF, larger banks generate more negative the abnormal returns. Thus, banks "falling just under the cutoff" suffer most from the policy. Furthermore, the results based on the solvency ratio show that, for TBTF banks, the greater the insolvency level, the higher is the abnormal return suggesting that the riskier the bank, the more significant is the policy statement. However, for small banks, solvency ratio has no significant effect on returns. (O'Hara et al. 1990: 1596, 1599)

O'Hara et al. conclude that the impact of the TBTF policy extends beyond the particular institutions involved. Moreover, they criticize the policy by arguing that charging all

institutions the same risk premium but providing greater coverage to TBTF banks, the government imposes unnecessary costs on the financial markets. Related to this, Kaufman (1990: 3) lists two main problems resulting from the policy:

1) Weakened market discipline and moral hazard because penalties for insolvency are not severe.
2) Smaller banks face discrimination and have competitive disadvantage.

Further, Kaufman (1990) analyzed the validity of fears leading to the use of TBTF policy by examining theory and historical evidence. The study systematically denies the fears that were used to justify the TBTF doctrine presented during the Continental Illinois crisis. Kaufman concludes that the costs are too high to still maintain, that the doctrine is necessary in order to preserve the economy from falling,. Concerning the fear of possible bank runs, Kaufman argues that the consequence is not a threat. Through direct or indirect re-deposits to other banks no money is lost because it has only been redistributed within the system. Therefore, the lack of liquidity suffered by banks losing deposits is mostly offset by the surplus of liquidity of banks gaining deposits. However, it should be kept in mind that since 1990 the markets have globalized significantly and financial innovation has made the system more complex. Thus, it is uncertain whether the suggestions are still valid.

Kane (2000) approached the subject of TBTF from mergers & acquisitions point of view. He discovered that, unlike acquirers in general, giant U.S. banking organizations gain value when the banking institution acquired is large. Thus, becoming more gigantic, or in other words establishing the status as TBTF, is rewarded in the stock market. The results, Kane suggests, give increasing support to the possibility that TBTF status gives distorted incentives for large banks. As the post-merger institution strengthens its position among the largest financial institutions in the country, the merger improves the institution's access to unlimited debt insurance. Therefore, the stock price appreciation of the acquiring megabank is caused by opportunities for the post-merger institution to increase its leverage and to hold volatile portfolios without increasing its risk exposure.

Instead of shareholder wealth, Penas and Unal (2004) focused on bond returns. They examine changes in adjusted bond returns at acquiring and target banking organizations in response to their merger announcements during the period 1991-1998. In addition, they compare credit spreads on bonds, issued before and after the merger. They find

little change in either bond returns or credit spreads when the acquiring banks are either small or already TBTF. However, when banks between these sizes acquire another bank, they find increased bond returns and significantly declined credit spreads after the merger. Penas et al. suggest that benefits that banks earn from reaching or getting closer to the TBTF status and attained higher degree of diversification are behind the results. Therefore, the results provide evidence that bondholders value banks becoming TBTF through mergers.

Benston, Hunter and Wall (1995) find evidence against the hypothesis that the mergers are motivated by obtaining TBTF status. They investigated the acquisitions made by large financial institutions. Their focus was on prices that acquirers were willing to bid for target banks during the period 1981 – 1986 with a purpose to find whether the bids were motivated by obtaining TBTF status or by earnings diversification. The study was conducted by examining the purchase premiums which financial institutions were willing to pay for their targets. The results give little support for the hypothesis that the purchase premiums were motivated by TBTF status. In addition, Benston et al. conclude that most mergers were motivated by earnings diversification.

Brewer and Jagtiani (2007) adopted the basic framework from Benston et al. Howerer, they approached the subject slightly differently by asking; how much it is worth to become TBTF? The question was answered by using market and accounting data from the period of 1991 – 2004. During that time large banks expanded heavily through mergers and acquisitions. The results suggest that banking institutions are willing to pay an added premium for mergers that will establish their status as TBTF. If neither of the institutions prior the deal were TBTF the acquiring institution was willing to pay a premium over $1 billion on average in order to become TBTF. In addition, further strengthening of the TBTF status was worth little less than $1 billion on average in premiums. Even though the amounts are large, Brewer et al. argue that the figures may still underestimate the total value of benefits. Institutions enjoying the TBTF benefits are not forced to pass on to their shareholders the full value of the benefits received from mergers.

In addition to the benefits of TBTF mentioned earlier, Rime (2005) finds that the TBTF status of a bank has a significant, positive impact on the bank's credit rating. Based on a sample of large and small banks ($1 billion to $1.1 trillion) in 21 industrialized countries during the period 1999-2003, Rime suggests, that the largest banks get a rating "bonus" of several notches for being TBTF – controlling for all the other external

factors such as explicit state guarantee, etc. Moreover, the rating bonus also implies a significant reduction in the refinancing costs of those banks that the rating agencies regard as TBTF.

Boyd and Gertler (1994) studied the relationship between bank performance and asset size in the U.S. They investigate the banking troubles of the 1980s and argue that large banks were to blame for the poor performance of the whole banking industry. Further, they suggest that the underlying reasons to this were the deregulation of markets and the TBTF policy and, particularly, it became clear after the collapse of Continental Illinois Bank in 1984 that large banks were subject to a TBTF policy. In the study, which uses U.S. bank data from period 1984–1991, Boyd et al. conclude that there is a negative correlation between size and performance and suggest that this correlation may reflect the existence of TBTF subsidies.

However, Ennis and Malek (2005) raised questions about the robustness of the results obtained by Boyd et al. Ennis et al. argue that large banks experienced an especially turbulent time during the 1980s. Moreover, they report that after 1991 bank profitability recovered to levels above those in the 1970s and stayed relatively stable after that. Therefore, in their study they revisit the empirical relationship between bank performance and asset size, using data from 1991 to 2003 and following the methodology by Boyd et al. The paper finds no evidence of TBTF during the period. Therefore, Ennis et al. conclude that the banking system is not necessarily distorted by seeking of advantages offered by the TBTF status. However, whether the results differ from those of the 1980s because of the change in regulation in 1991, or because of change in banking practices, remains unclear. According to Ennis et al., it is especially difficult to determine the effect of the change in the regulation because no major bank has been in danger to fail after 1991.

Even though the TBTF literature concerning the U.S. markets is relatively wide, the subject has not been frequently studied outside the U.S. A study by Pop and Pop (2009) provides an exception. They examined the market reaction to the use of the TBTF doctrine in the Japanese banking sector. On 17 May 2003 the Japanese government decided to bailout Resona Holdings, the 5th largest financial group in the country. In the study conducted with the event study method, Pop et al. find significant and positive stock market reaction among large banks and negative and insignificant reaction among smaller banks. In addition, they report a significant abnormal volume of trading on the days following the bailout announcement date for the largest banks.

Brewer et al. (2010) used the same method in examining the U.S. Treasury Secretary Henry Paulson's plan, announced October 14, 2008, to inject $250 billion as capital into major banking organizations in the U.S. The original purpose of the Troubled Asset Relief Program (TARP) was to allow the US Government to buy up to $700 billion in mortgage-backed securities and other assets, which had become toxic after the collapse of the housing bubble prior the crisis. However, in order to restore confidence in the banking system and the markets the Treasury Department decided, in addition to the original plan, to acquire stakes in the 10 largest banks. Thus, Brewer et al. suggest that those 10 largest banks were considered as TBTF.

The study by Brewer et al. investigates the responses of stock prices of banking organizations to Paulson's announcement on October 14, 2008 with the event study method. To analyze the effects of the announcement, four portfolios of banking organizations based on book assets are formed. First group includes the 10 banks that received the government investment. Second group contains 25 banking organizations with book total assets approximately $15 billion or more. Third portfolio has 34 publicly traded banking organizations with book total assets between $10 billion and $5 billion and fourth portfolio 110 organizations with total assets between $5 billion and $1 billion. By looking at three-day cumulative abnormal stock price changes, Brewer et al. suggest that the TBTF status benefitted the larger banks surrounding the announcement. The cumulative abnormal stock returns are large, positive, and statistically significant not only for the banks included in the initial TARP assistance, but also for those large banks that were not included. The third and fourth portfolio also generated positive abnormal returns but the returns were smaller and insignificant.

2.2. Market Reactions in Previous Crises

Swary (1986) investigated the stock market reaction to the Continental Illinois crisis and the regulatory action taken in response to that crisis. The purpose is to discover the effects of the crisis, if any, on capital markets, share price changes, and trading volume of the banking industry. In the study conducted with event study method, he focuses on two dates when information about the bank's deteriorating solvency was revealed. The first one is the date of the interim rescue plan that contained the announcement that the government would guarantee all deposits including those above the maximum $100,000. The second date is the announcement date of the permanent rescue plan. The

data includes all 68 actively traded banks, including Continental Illinois, at the time. To investigate the extent to which a bank-run or an informational effect exists, the data are divided into two classes, based on the rate of solvency. Class A includes the banks whose solvency was uncertain, whereas class B contains the solvent banks. Further, class A is divided between banks which managed their liabilities and those that did not.

Swary (1986: 463, 469) finds that market reaction based on abnormal returns is stronger for the banks with questionable solvency than for the solvent group. In addition, the results suggest that the abnormal trading volume is much higher for banks with questionable solvency. He concludes that during the crisis in general, despite the regulatory measures, the bank stock price reactions on negative implications of the crisis were strong and the effect was much more significant on the group of banks whose solvency was questionable. Moreover, for banks with questionable solvency, and especially for those that managed their liabilities, the abnormal volume of trading reflects the uncertainty regarding future regulatory policy and banks' asset quality.

Another crisis that has been a popular focus of interest is the international debt crisis of 1982, when Mexico declared that principal payments of its external debt would be ceased until the debt could be restructured. Because many U.S. banks had exposure to Mexico and to other Latin America countries that were in the centre of the crisis, the announcement heightened concerns for the quality of banks' assets. Bruner and Simms (1987) analyzed the bank stock price reaction to news about circulation of rumors published on August 19, 1982 that Mexico would default its debt.

The study conducted with the event study method finds significant negative stock returns upon the arrival of the news and rumors. Furthermore, the results suggest that the most significant price adjustment happened as a result of news reports on August 19th. However, the results do not cancel out the possibility of price adjustments before that date. In addition, Bruner et al. investigated whether bank's exposure to Mexico was related to stock price reaction. They report a positive relationship meaning that larger exposure resulted as a stronger negative stock market reaction. However, by the sixth day after the announcement this relationship turned negative suggesting that information related to the announcement was fully incorporated in market prices within six days. Thus, Bruner et al. conclude that in this case markets learn rapidly and investors seem to respond to surprising news rationally and quickly even though reliable information about the loan exposures was not available.

The Brazilian debt crisis of 1987 is considered as a follow-up to the Mexican crisis over four years earlier. Mathur and Sundaram (1997) examine the stock market reaction to eight significant events associated with the crisis with data consisting of large money center banks with exposure to Brazilian debt and other banks. The first event is the announcement of the debt moratorium on 23 February 1987 and the final event is the announcement of an agreement between Brazil and its creditors on 22 June 1988. The results suggest that money centre banks experienced significant negative reactions to announcements of new information regarding the crisis. The final announcement, concerning the agreement between Brazil and its creditors generated positive abnormal results to the money centre banks. Furthermore, the results show that banks without exposure to Brazilian debt did not experience any significant price changes around the first seven events. However, the final announcement resulted in significant negative abnormal returns for banks without exposure. Based on the results Mathur et al. conclude that while the crisis was going on, investors continued to revalue bank stock prices every time as new information was released and therefore, the new information was also incorporated into prices.

In Scandinavia, Norwegian banking system almost collapsed during the crisis period 1988 – 1991. The ultimate result of the crisis was that Norway's largest banks were nationalized. Ongena, Smith and Michalsen (2004) used this crisis to measure the effect of bank distress announcements on the stock prices of firms maintaining a relationship with a distressed bank. During the event period, banks experienced large and permanent decline in their equity value. However, the results suggest that the average firm maintaining a relationship with a distressed bank faced only small and temporary negative stock price reaction when its bank announced distress. Moreover, the average stock price of all listed Norwegian companies grew over this crisis period even faster than in other stock markets around the world. Thus, Ongena et al. argue that even though banks were the primary source of debt financing to Norwegian firms, bank distress did not cause any significant interruptions to their financing and investment abilities.

2.3. Bank Stock Price Reactions

Related to the crises in the emerging markets in 1990s, Kho et al. (2000) examined the impact of crises and bailouts on U.S. bank stock prices through bank exposure to the country in the middle of the crisis. The first object was to investigate whether currency crises in emerging markets had a significant impact on bank stock prices. Another issue

to examine was the stock price reaction to largest bailouts of one specific country. The third issue was to consider the Long Term Capital Management (LTCM) crisis in order to take some perspective to emerging market crises. Kho et al. expected that systemic threats resulting from crises in the emerging markets would decrease bank stock prices because of the negative effect on the value of banking institutions through globalized financial markets.

The study conducted in the event study method finds that exposure to the country in crisis affects the market value of the bank. First, banks without exposure to the country in trouble are generally not affected by the events, but banks with exposure are. Second, when a country was bailed out, the measures significantly benefited banks with exposure to the bailed-out country. As expected, the bailout had generally no significant impact on banks without exposure. Concerning the case of LTCM, the banks that participated in the LTCM rescue package, that is were exposed to LTCM, experienced a significant loss in the market value, when the LTCM losses became known and when the rescue was announced. Kho et al. conclude that based on results the market identifies exposed banks. In addition, they add to debate of whether a bailout is a necessary measure by questioning the existence of systemic risk, which was used to justify the bailing out decisions. This is because non-exposed banks did not experience similar value depreciation as the exposed banks did.

A significant part of the research concerning bank stock price reactions concentrates on market reactions to loan-loss reserve (LLR) announcements. Even though the LLR announcement does not have any cash-flow implications, the research has found significant stock price reactions to the LLR announcements. LLRs are comparable to asset write-downs, both are simply bookkeeping adjustments which generally do not coincide with the changes in the value of the bank loan portfolio or with writing off decisions. However, the LLR announcements are considered to have informational value due to signaling elements. (Docking, Hirschey & Jones 200: 278)

Cushing (1994) investigated the price reaction of Canadian banks to an announcement by Citicorp bank in 1987. The announcement was that the bank was forced to a $3 billion increase in their provision for loan losses because of their exposure to Brazilian debt. The US bank stock reaction had been positive mostly because the announcement was highly anticipated and it suggested that the exposure to Brazilian debt had been over-estimated. In line with the US reaction, Cushing finds a positive reaction among the Canadian banks. In addition, the abnormal returns are reported to be higher than in

the US. He concludes that the stronger reaction results from on average higher exposure to the ongoing third world crisis and from earlier negative price movements.

Docking et al. (2000) broadened the perspective to not only pay interest to one specific LLR announcement, but to consider a sample of announcements over the 1985 – 1990 period. Their purpose was to draw more consistent conclusions about signaling elements of the LLR announcements. The data consisting of listed US banks was divided between money-center and regional banks, the money-center banks being the nine biggest banks. The results suggest that in general a LLR announcement has a negative impact on bank stock price. However, the reaction tends to be much stronger with the regional banks compared to the money-center banks. Docking et al. suggest that the money-center banks are subject to intense media coverage. Thus, the LLR announcements have limited informational value for shareholders of those banks and the bad loan information is already reflected in the market prices. On the contrary, the LLR announcements of regional banks are highly informative because the investors have less information available prior the announcement about the quality of loan portfolios of those banks.

Cummins, Lewis and Wei (2006) analyzed the operational risk events reported by publicly traded U.S. banking and insurance institutions from 1978 – 2003. With event study method they investigated a total of 403 bank events and 89 insurance company events which caused losses of at least $10 million. The results show a strong and statistically significant negative stock price reaction to the announcements of the events. Cummins et al. argue that on average the reaction is stronger for insurers than for banks. In addition, they find that the loss in market value significantly exceeds the loss caused by the actual event suggesting that such operational loss events are expected to have an effect on firm's future cash flows. In addition, the market value losses are reported to be larger for companies with higher Tobin's Q and therefore, are more costly for firms with higher growth opportunities.

Bank stock prices tend to react negatively also on regulation attempts, which might impose restrictions to their operations. On July 11, 1988, representatives from the central banks of twelve industrial countries approved a risk-based capital requirement for banks in their respective countries. Eyssell and Arshadi (1990) examined the stock price reactions of large publicly traded banks around the announcement of capital requirements. They find negative price reaction at the time of the announcement.

Furthermore, Eyssell et al. suggest that banks with low capital level relative to the new requirements experience the largest losses.

A recent paper by Yin, Yang and Handorf (2010) is an example of numerous papers related to market reactions to monetary policy changes. Yin et al. investigate how U.S. bank stock returns react to adjustments in the federal funds rate target. In addition, they also examine the state dependency of such reactions. The paper confirms the inverse reaction between bank stock returns and changes in the federal funds target rate. However, Yin et al. suggest that stock returns seem only to respond to surprise or unexpected changes in the federal funds target rate. Moreover, the results suggest that the responses are state dependent meaning that the results differ depending on such factors as other measures taking place at the same time, magnitude of the adjustment or what the funds rate change actually represents.

3. THE FINANCIAL CRISIS 2007 –

This chapter traces back the events through which the subprime crisis first developed as a global financial crisis and then later resulted in the form of global recession. In addition, the chapter presents the main reasons underlying this crisis and gives an overview of the current situation in the financial markets.

3.1. The Key Events of the Crisis

The first Wall Street institution to run into troubles was Bear Stearns, an 85-year-old investment bank. On Friday March 14, 2008 The Federal Reserve (Fed) agreed to give emergency funding to Bear Stearns, formerly the fifth-largest U.S. securities firm, after a run on the bank wiped out its cash reserves in only two days. During the weekend following the rescue, Fed officials helped arrange a takeover deal, which was reached on following Sunday. In the deal JPMorgan Chase & Co. bank agreed to pay a price of $2 per share to buy all of Bear Stearns, less than one-tenth of the firm's market price on Friday. In addition, Fed and JPMorgan agreed to jointly guarantee the trading obligations of the firm. (Bloomberg 2008; The Federal Reserve 2008a; The New York Times 2008a)

Only one year before, Bear Stearns's shares were traded for $170. The collapse of Bear's market value describes the speed of how fast things got worse when they first started to go wrong. The firm's problems had started with the declining subprime market in 2007. On 31 July it was forced to liquidate two hedge funds that had invested in various types of mortgage-backed securities. Later that year in December, the firm announced the first loss in its 80-year history, reporting losses about $854 million, or $6,90 a share, for the fourth quarter, compared to a profit of $563 million, or $4 a share, for the same time last year. In addition, the firm announced it had written down $1,9 billion of its holdings in mortgages and mortgage-based securities. (Federal Reserve Bank of St. Louis 2011; The New York Times 2008b)

According to Fed chairman Ben S. Bernanke, it was necessary to rescue the bank. On April 2 he told to the Joint Economic Committee of Congress that "With financial conditions fragile, the sudden failure of Bear Stearns likely would have led to a chaotic unwinding of positions in those markets and could have severely shaken confidence."

The low price for Bear Stearns's shares reflected the deep concerns about its future and the enormous obligations that JPMorgan assumed in guaranteeing the firm's obligations. In this first bail out of a broker since the Great Depression of 1930s, the Fed declared to provide financing for the transaction, including support for as much as $30 billion of Bear Stearns's less-liquid assets. Ironically, it was Bear Stearns who refused in 1998 to join to the Fed bailout plan of Long Term Capital Management, a collapsed hedge fund which nearly brought the financial system to its knees. (Bloomberg 2008; The New York Times 2008; Reuters 2010)

It was not only Bear Stearns that run into problems in the summer of 2007. More signs of the upcoming crisis started to emerge also elsewhere. On September 13, a British mortgage lender Northern Rock asked for emergency financial support from the Bank of England. It launched a run on the bank's deposits by worried customers in the days that followed. However, it was not the first symptom of the crisis on the other side of the Atlantic. On August 9 France's largest bank, BNP Paribas, announced that it had halted redemptions on three investment funds worth of $2 billion. The problem was that the market for assets, backed by American mortgage loans, had dried up which made it difficult to determine what they were actually worth. The announcement halted the interbank lending due to concerns about banks' subprime exposure. The European Central Bank responded to the lack of liquidity by injecting the record amount of nearly €95 billion in order to restore trust in the market. (Reuters 2010)

The following October brought massive write-downs. A Swiss bank UBS AG wrote down $3,4 billion of assets and in Britain Barclays bank cut £1,3 billion of the value of securities related to the subprime mortgage market. At Wall Street investment bank Merrill Lynch announced losses and write-downs up to $8,4 billion in total in collateralized debt obligations, subprime and leveraged loans. In addition, Citigroup, one of the largest financial organizations in the world, announced a need for further write-downs of $8-11 billion. In January 2008 Citigroup went on to report the largest loss in its history – a loss of $9,8 billion in the fourth quarter. (Reuters 2010)

Northern Rock, Britain's fifth largest mortgage lender was the first bank to be bailed out. On 17 February 2008 the UK government announced the bank had been taken into state ownership by the Treasury of the United Kingdom (HM Treasury 2008). By that time the central banks on both sides of the Atlantic had started the rescue operations in order to stop a domino effect. In December The Fed had announced the creation of Term Auction Facility (TAF) in which fixed amounts of term funds would be auctioned

to depositary institutions against a wide variety of collateral. In addition, at the same time Bank of Canada, the Bank of England, the European Central Bank and the Swiss National Bank announced measures designed to calm down pressures in short-term funding markets (The Federal Reserve 2007). On 30 January the Fed continued to reduce the primary credit rate from 50 basis points to 3,5 %, only eight days after the previous cut. It had been reducing the credit rate since August when it was 6,25 % resulting a drop of 275 basis points less than six months (The Federal Reserve 2008b). Furthermore, on February 13 President Bush signed the Economic Stimulus Act of 2008, a package worth of $168 billion providing stimulus payments to individuals and incentives to businesses (IRS 2008).

However, the government measures did not help to restore confidence in the market. After Bear Stearns had collapsed rumors started to circulate wondering which firm would be the next to go. Investment bank Lehman Brothers Holdings Inc. was at the center of those rumors. Being a major player in the market for subprime mortgages, and also being the smallest of the major Wall Street firms, the market participants reckoned that the firm faced larger risks and large losses could be fatal to it (The New York Times 2010). In addition, two other institutions were considered problematic. Fannie Mae and Freddie Mac, the two biggest mortgage creditors, who guaranteed almost half of the mortgage base in the U.S., had been experiencing significant difficulties because of the stressed mortgage markets (Reuters 2010). When it became clear that the two institutions could not survive without significant government assistance, the Fed authorized the Federal Reserve Bank of New York on July 13 to lend to Fannie Mae and Freddie Mac if such lending proved to be necessary (The Federal Reserve 2008c).

In the spring and summer of 2008 politicians were still denying that the economy has entered recession. In April President Bush declared that “We’re not in a recession, we are in a slowdown”, in the same spirit German Chancellor Angela Merkel maintained that “With all forecasts available to me, I see no recession so far but I see a significant slowdown in growth” (Reuters 2010). However, in September the slowdown changed into a meltdown. On Sunday 7 September Fannie Mae and Freddie Mac were placed into a government conservatorship in order to avoid them for filing for bankruptcy (The Economist 2008). The takeover, engineered by Treasury Secretary Hank Paulson, was necessary according to Fed chairman Bernanke: “These steps will help to strengthen the U.S. housing market and promote stability in our financial markets” (The Federal Reserve 2008d). The actions did not bring enough stability to Lehman Brothers which filed for bankruptcy on 15 September, the biggest bankruptcy in U.S. history. The firm

collapsed after experiencing heavy losses in the mortgage market and a loss of investor confidence. The ultimate hit came when it was certain that the firm was unable to find a buyer. (The New York Times 2008c)

On September 15, when Lehman Brothers filed for bankruptcy, the U.S. stock market suffered its largest losses since the first day of trading after the September 11, 2001, terrorist attacks. Now the main concern was the fate of insurance giant American Insurance Group (AIG), which had similar mortgage backed securities in its books as Lehman Brothers had, but was much bigger with total assets of more than $ 1 trillion. Later on that day the credit rating agencies downgraded AIG's credit rating, which forced it to post $14,5 billion in collateral to meet its obligations. However, the firm had run into a liquidity crisis and was unable to raise additional financing. Even though AIG had enough assets to sell, they were not liquid enough to be sold quickly in order to satisfy the collateral demands. The following day, September 16, was the third trading day in a row to see the firm's stock price decline with double digits, this time 21% making the AIG stock worth of $3,75. At the same time the firm made the last efforts to raise additional financing in meetings with representatives of major banks and the Federal Reserve Bank of New York. The firm's object was to put together a $75 billion. By the early afternoon, however, it became clear that there was no private sector lending available for AIG. (Sjostrom 2009: 962-963; The Wall Street Journal 2008a)

In the evening at 9:00 p.m. the Fed announced, with the support of the U.S. Treasury, that it had authorized the NY Fed to bail out AIG by lending $85 billion to the firm against a stake 80% of the firm. The Fed stated that "a disorderly failure of AIG could add to already significant levels of financial market fragility and lead to substantially higher borrowing costs, reduced household wealth, and materially weaker economic performance" (The Federal Reserve 2008e). Or in other words, as The Wall Street Journal described the decision, "the government decided AIG truly was too big to fail" (The Wall Street Journal 2008a).

As the collapse of Bear Stearns, the fall of AIG was also fast. Only less than seven months earlier in February the firm was the largest insurance company in the United States announcing 2007 earnings of $6,20 billion or $2,39 per share. On that day its stock price closed at $50,15. AIG's downward spiral was largely driven by losses generated by a unit separate from its traditional insurance business, the Financial Services unit. Between January 2007 and September 2008 the unit produced losses of $32,4 billion which were almost entirely generated by the activities with mortgage

backed securities. As the housing market plummeted, the value of those securities dropped sharply which forced AIG to put up billions of dollars in collateral. (Sjostrom 2009: 945 – 947; The Wall Street Journal 2008a)

A major concern was that AIG would not be the last one to be bailed out. Fed Chairman Bernanke and Treasury Secretary Paulson were asked if they could guarantee that AIG was the final government intervention. They could not. Markets remained worried about the solvency of major banks and the turmoil gripping Wall Street was only growing worse. It became more and more inevitable that an extensive federal intervention was necessary in order to stabilize the markets. On September 18 the world's major central banks joined forces to pump billions of dollars to global markets in an effort to free up bank-to-bank lending which had dried up because of the mistrust among the financial industry. The Fed made $180 billion available to other major central banks to lend to their local commercial banks. The purpose was to get dollars circulating in overnight and short-term money markets. (The New York Times 2008d; Reuters 2010)

On 20 September Treasury Secretary Paulson announced a proposal, named as Troubled Assets Relief Program (TARP), to bail out firms burdened with bad mortgage debt. The purpose of TARP was to give the U.S. Treasury a permission to buy mortgage-backed securities and other troubled assets from banking organizations with up to $700 billion. However, the plan could not have been put into action before the approval of the U.S. Congress and was expected to face debate and amendments before it could have been approved. In addition, the fear was that, if the Congress would reject the proposal, it would just shock the markets even more. The fear became reality on 29 September when the U.S. House of Representatives rejected the plan. On the same day Dow Jones index experienced its largest point decline ever, while the S&P 500 had its worst day since 1987 with a drop of 8,8%. However, five days later on October 3, a revised proposal passed the necessary steps in order to be signed into law. (Brewer et al. 2010: 57; The New York Times 2008e; Reuters 2010)

Under this new authority the Treasury Department announced on October 14 that it would purchase capital in financial institutions with $250 billion. In this largest government intervention in the U.S. banking system since the Great Depression of the 1930s the U.S. government prepared to buy preferred equity stakes in nine major banks in order to restore the confidence in the banking system and the markets. Other elements of the plan included equity investments in thousands of other banks, lifting the cap on deposit insurance for certain bank accounts, such as those used by small businesses and

guaranteeing certain types of bank lending. The plan replaced the earlier proposal to buy mortgage-backed securities and other troubled assets from banking organizations, which was not enough to calm the markets. In addition, the plan followed the actions taken by European central banks in order to help the major banks to survive the crisis. One day earlier the UK government had announced to inject £37 billion in cash to three of its major banks in line with Germany, France, Spain and Italy. The same measures were taken into action governments around the world by pumping hundreds of billions of dollars for the banks which were in danger to fail. (Brewer et al. 2010: 57; The Wall Street Journal 2008b; Reuters 2010)

Figure 1. Dow Jones Wilshere 5000 Composite index

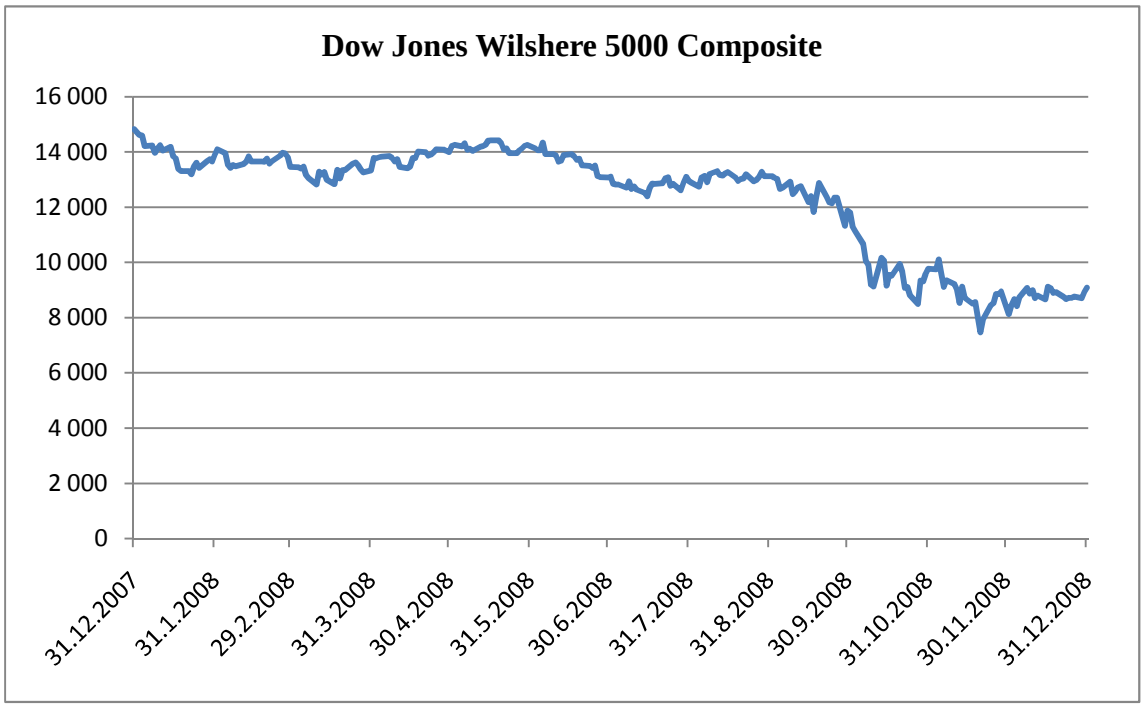


Figure 1 presents Dow Jones 5000 index, which includes all publicly traded U.S. firms. The downturn in late September and early October is remarkable with the index decreasing over 3000 points in less than 30 days. According to index, the actions taken by governments all around the world helped to stop the downward spiral. However, the volatility remained strong still after October reflecting the nervousness among the markets.

Figure 2. U.S. Banks index.

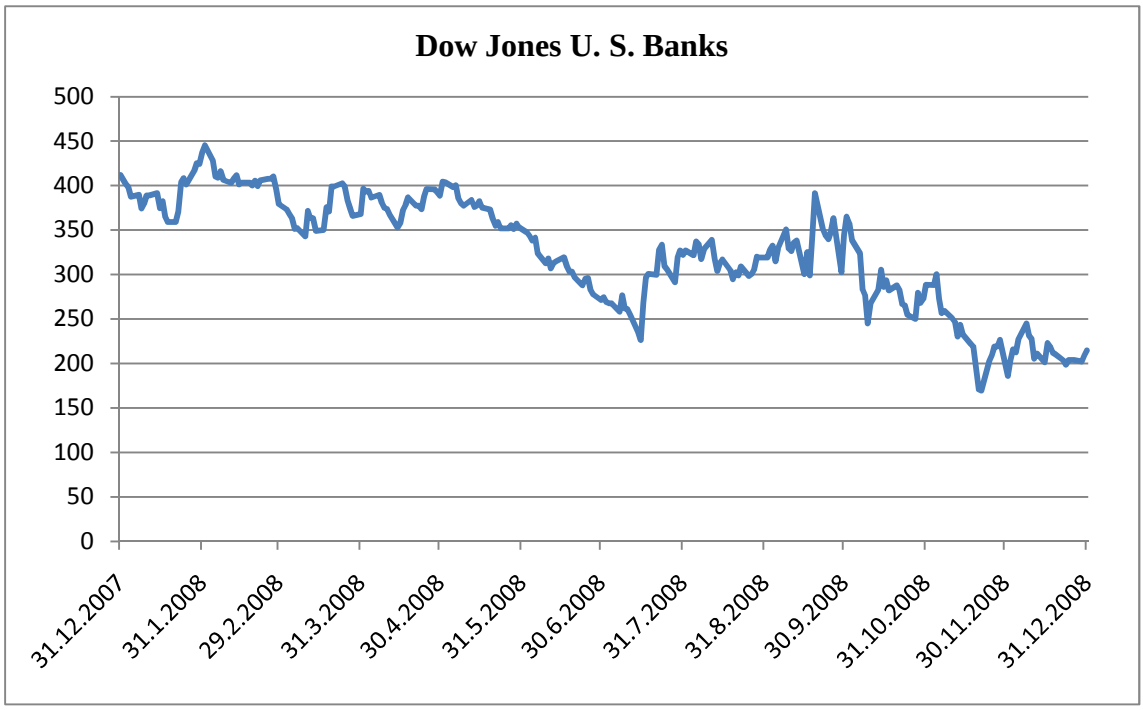


Figure 2 shows the stock price movements of the U.S. banking sector in 2008. The prices decreased significantly from April until mid-July. The near meltdown of September and October resulted as a period of extremely high volatility with investors experiencing heavy daily losses and large gains in a row. Even though the downward spiral did stop during October the markets remained unstable throughout the whole year as the figure 1showed as well.

The inevitable consequence of the crisis was the world entering a global recession. This became reality shortly after the massive rescue operations of banks. On November 3 the European Commission predicted for 2009 an extremely weak growth of GDP, by only 0,1%, for the countries of the Eurozone. Moreover, growth was forecasted to be negative for the UK, Ireland and Spain. Furthermore, on 13 November the Organization for Economic Cooperation and Development (OECD) reported that the 30-nation OECD nation area had entered recession. In Germany the GDP contracted 0,5 % in the third quarter meaning that the largest economy in Europe had now entered recession. (European Commission 2008: 1; Reuters 2010)

Already in October the International Monetary Fund (IMF) had forecasted that the U.S. and Europe were either in, or on the brink of recession. In its World Economic Outlook

the IMF had reduced the global growth projections by 3 % for 2009, which meant that the global economy was now predicted to grow in the slowest pace since 2002. In addition, it warned that the forecast was subject to considerable downside risks. Further, in November the IMF updated the forecast by predicting a worldwide recession with GDP of advanced economies contracting 0.3 % in 2009. (IMF 2008a: 1; IMF 2008b:1)

As a consequence of a collapsed bubble in the U.S. housing market, in the summer of 2009 the recession was reality around the world. In the first quarter of 2009 the annual GDP rates declined 14,4 % in Germany, 15,2 % in Japan, 7,4 % in the UK, 9,8 % in the Euro area and 21,5 % in Mexico. Meanwhile, in the U.S. the decline was 5,7 %. Even though some signs of recovery, as the rallying stock market, were already seen in the horizon, it was still unclear how long would it last and how profound the effects of the crisis would be. (Baily & Elliot 2009: 3 – 4, 17)

3.2. The Reasons for the Crisis

The fundamental cause of the crisis was the combination of a credit boom and a housing bubble. During the boom the number of mortgages designed for households which otherwise would not have access to the credit market, called as subprime mortgages, quickly increased. Because of the cheap money available, Banks began increasingly to give out more loans to potential home owners. Thus, the market prices began to rise. In the optimistic economic atmosphere and due to low interest rates, the banks encouraged households to take on considerably high loans in the belief that they would be able to pay back. (Acharya, Philippon, Richardson and Roubinithe 2009: 98, 105)

However, this led to deteriorating loan quality. The reason why banks and mortgage institutions were willing to acquire more risk in terms of low loan quality was the huge growth in securitized credit. The purpose of securitization was that by transferring credit risk from lenders to investors, the risks would be spread throughout the economy with minimal systemic effect. This process led to very complex financial products, which contents even the most sophisticated investor was not able to understand. The mortgage broker or the bank which granted the mortgages would repack them into Mortgage Backed Securities (MBS) and sell them to an investment bank which would repack the MBSs into Collateralized Debt Obligations (CDOs), CDOs of CDOs, or even CDOs cubed and finally credit rating agencies would give AAA rating to such instruments. (Acharya et al. 2009: 105 – 106)

Each of these intermediaries earned income from charging fees for their step of the process and for transferring the credit risk down the line. Therefore, eventually the credit risk got transferred to a structure which none of the market participants really understood. As the system was built on continually raising housing prices and when in the first quarter of 2006 the housing market turned and prices started to fall, the whole system collapsed. Market participants lost trust to each other's holdings. (Acharya et al. 2009: 106)

According to Acharya et al. (2009: 98), the fundamental mispricing in capital markets which occurred during the bubble was caused by too low risk premiums and expectations that short-term volatility would stay at its current low levels. This implied low credit spreads and inflated prices of risky assets. Federal Reserve and some other central banks have been considered as partially responsible for this. In particular, Acharya et al. (2009: 99) argue that the decision of the Fed to keep the Fed Funds rate too low for too long (down to 1% until 2004) created both the credit bubble and the housing bubble. The low fed funds target allowed cheap funding and made cheap loans available. However, the credit boom and the housing bubble were worldwide phenomena, making it difficult to direct the blame only on the Fed.

Although problems in the US subprime mortgage market may have triggered the crisis, Crotty (2009: 564) argues that the underlying cause is to be found in the flawed institutions and practices of the current financial regime, referred to in literature as the New Financial Architecture (NFA). It reflects the integration of modern day financial markets with the era's light government regulation. After 1980, accelerated deregulation accompanied by rapid financial innovation stimulated the financial markets to grow ever larger relative to the nonfinancial economy. At the same time financial products became more complex and illiquid, and system-wide leverage exploded. This process then culminated in the crisis of 2008, which pushed the global economy into depression.

Even though the crisis became global, the markets globally have been affected differently. Ehrmann, Fratzscher and Mehl (2009) investigated the global transmission channels of the crisis focusing on equity markets in order to understand why the effects have been different between countries. They argue that the degree of integration of equity portfolios with the US market has been a key factor in the transmission process. Valuations of equities highly integrated with the US market before the crisis increased relatively more prior to the crisis, but also corrected significantly more during the crisis. Thus, the crisis reflects the normal degree of

market integration with the United States. In addition, Ehrmann et al. (2009: 19) suggest that country risk is another reason explaining the global transmission of the crisis. The results show that differences in foreign exchange reserves, credit ratings and current account positions are highly significant in crisis transmission process. Portfolio returns in countries with weak country fundamentals declined by about one third more than those in countries with low country risk.

4. THEORETICAL BACKGROUND

This part introduces the theoretical background of stock price movements and pricing irrationalities in the form of market efficiency and behavioral finance. Both theories are important tools in the field of market bubble research. Moreover, market efficiency is the basic framework of the event study method used in this thesis. In order to give background to the research hypotheses, the theoretical valuation model of the firm's assets through option theory is also presented.

4.1. The Efficient Market Hypothesis

The term market efficiency is generally referred to as the informational efficiency of financial markets, which emphasizes the role of information in security price changes. According to Fama (1970: 383) an ideal market is a market in which prices provide accurate signals for resource allocation. In an efficient market firms can make investment decisions and investors can choose among the securities under the assumption that security prices at any time fully reflect all available information. Therefore, the efficient markets hypothesis (EMH) defines an efficient market as one in which new information is quickly and correctly reflected into security prices (Brooks & Lim 2011: 69).

The EMH is associated with the concept of random walk, which means that price changes represent random departures from previous prices. The logic behind the random walk is that if the flow of information is not regulated and information is immediately reflected into security prices the prices follow random walk. Thus, the price change tomorrow will reflect only tomorrow's news and will be independent of the price changes today. However, it is critical that the news is unpredictable to make the resulting price changes also unpredictable and random. (Malkiel 2003: 59)

Fama divides the market efficiency into three categories. *Weak-form efficiency* occurs when prices fully reflect all historical information. It is the lowest level of market efficiency. The next level is *semi-strong efficiency* when prices contain all the public information available. That is, prices reflect not only information about past performance but also forecasts about future developments and prospects. The third and the highest level of efficiency is called *strong-form efficiency* when also private

information is included in market prices. On that level, in addition to public information, also insider-information is reflected in prices.

Market efficiency is relevant to this thesis because it determines how quickly stock prices change when new information is available. The event study approach used in this thesis can be considered as a tool with which the market efficiency level can be investigated. Fama (1991: 1607) maintains that the event study method produces the cleanest evidence on market efficiency, especially event studies on daily returns. Event studies have been used to examine the behavior of returns around the time of a significant event such as the public announcement of the company's profit, dividend details or intention to take over another company (Easton & Kerin 2010: 465). According to Fama (1991: 1607) when an information event can be dated precisely, as in this thesis, and the event has a large effect on prices, which bailing out decisions may be considered as having, the event studies can give a clear picture of the speed of adjustment of prices to information.

The predictability of stock returns on the basis of historical information has been widely investigated because of its direct implication on weak-form market efficiency. The vast majority of literature assumes the level of market efficiency remains unchanged throughout the estimation period. However, the possibility of temporal instability in the underlying assumptions of the EMH theory has received increasing attention from economists and especially from the side of behavioral finance. In addition, there is an expanding literature concerning anomalies and other irrationalities which challenge the assumed static characteristic of market efficiency (Brooks et al. 2011: 91). Also the current financial crisis has been described as evidence against the EMH because especially privately held information was not fully incorporated into stock prices prior to crisis and securities were not correctly valued. (Easton et al. 2010: 467).

Despite the fact that prior research has discovered many long-term return anomalies, Fama (1998: 304) argues that those results do not suggest that market efficiency should be abandoned. It is consistent with the market efficiency hypothesis that the anomalies are chance results, apparent overreaction of stock prices to information is about as common as under-reaction. And post-event continuation of pre-event abnormal returns occurs as frequently as post-event reversal. Thus, admitting the existence of anomalies does not take away the support from the EMH in the long run. Fama adds that, most importantly, the long-term return anomalies are fragile and tend to disappear with reasonable changes in the way they are measured.

Concerning the critique on the EMH, Malkiel (2003: 80) admits that some market participants are not always acting rationally and as a result, pricing irregularities and even predictable patterns in stock returns can appear over time and even persist for short periods. However, Malkiel concludes that despite all anomalies or other irrationalities that have been discovered in the pricing of securities, they are unlikely to persist and will not provide investors a method to gain abnormal returns. In the end "if any $100 bills are lying around in the stock exchanges of the world, they will not be there for long".

4.1.1. The EMH, Market Bubbles and Behavioral Finance

While the debate concerning whether the EMH theory holds or not continues, stock market bubbles have still occurred around the world throughout economic history. Malkiel (2003: 80) acknowledges that periods such as 1999 internet bubble have existed, at least in certain sectors of the market, but these periods are still exceptions rather than the rule. However, these exceptions or bubbles have significant effects on the foundations of the economy and on shareholder wealth. The school of behavioral finance likes to point out, that the EMH theory seems to be unable to explain the existence of these bubbles. Concerning the current financial crises Easton et al. (2010: 467) conclude that the crisis simply adds more evidence against the EMH that privately held information was not fully incorporated into prices quickly enough and suggest that markets, at times, might be inefficient.

During 2008 the stock indexes around the world experienced significant value depreciations. The Dow Jones industrial average fell more than 33%, S&P 500 over 38% and in Europe the FTSE 100 lost 31% of its value (BBC 2008; Reuters 2008; Marketwatch 2008). It is difficult to accept that investors were acting rationally during that time. Compared to the EMH, behavioral finance, which is an application of psychology to financial decision making, offers a different view on market bubbles. In his book, Beyond Greed and Fear, Professor Hersh Shefrin (2002) writes that the foundation of behavioral finance is that it recognizes investors are imperfect in processing information and suffer from biases and other limitations. In other words, investors are neither as rational nor as perfect, as the traditional financial theory assumes.

Behavioral characteristics such as overconfidence, loss aversion and herding have been seen not only as contributing to the creation of the bubble but also to bursting it. Prior the crisis market participants such as investors, traders and brokers experienced a state of "financial euphoria" during the bull market. It caused them to become increasingly overconfident about their own abilities and misled them to think irrationally that the prices would rise indefinitely. After the bubble eventually collapsed, liquidity disappeared from the market. This can be considered as a clear example of the loss-aversion bias. Even though high interest rates offered higher than normal results, it meant nothing to market actors who had become increasingly loss-averse. (Avgouleas 2009: 35 – 36, 38)

The herding bias has often been viewed as the origin of market bubbles. It means that people have a tendency to rely on the judgments and behaviors of other people and may follow others without any apparent reason. Such behavior results in the form of herding, which helps to explain the developments of bubbles and crashes. Bull market makes investors to invest more because other investors do that as well, whereas in the bear market investors follow others in selling their stocks. Herd behavior is that investors tend to do as other investors do. Thus, if there is uniformity in the view concerning the direction of a market, the result is likely to be a movement of the market in that direction. (Hirshleifer 2001: 1562)

4.1.2. The EMH and the 2008 Financial Crisis

Not only has the EMH received criticism against its assumptions but the theory has also been claimed for being responsible for the current worldwide financial crisis, because it "led to a chronic underestimation of the dangers of asset bubbles breaking" (The New York Times 2009). The underlying argument for this is that the market participants were misled by the EMH to think that market prices reflected all available information. Thus, investors and regulators felt too little need to look into and evaluate the true values of publicly traded securities, and therefore failed to discover that the prices were significantly overvalued. (Ball 2009: 1)

In addition, former US Federal Reserve Board Chairman Alan Greenspan, who has received criticism from his actions prior the crisis, maintained several times during his reign that the US markets were "exceptionally efficient" in terms of the EMH (Easton et al. 2010: 465-466). To explain why market bubbles occurred, Greenspan developed the phrase "irrational exuberance" referring to "the mindset that occurs during speculative

bubbles like that of the 1990s" and to explain why such bubbles could exist in efficient markets. (Greenspan 1996; Shiller 2005)

However, even though Ball (2009) acknowledges that the EMH has its limitations, he argues that the claim that the EMH is responsible for the recent financial crisis is strongly exaggerated and that the theory is not solely to be blamed for the crisis. He maintains that market bubbles have occurred throughout history but the EMH emerged not earlier that the late 1960s. In addition, to the claim that investors passively accepted that the prices were correct he answers that almost all investment money is actively managed. The enormous losses by banks and investment banks in 2007 – 2008 originated in their trading activities whose object was making money out of market mispricing.

Thus, Ball concludes, that investments in the property market, stock market, and other asset markets during the years in which the bubble was forming seemed to be done in the belief that prices would continue to rise with the implication that they believed current prices were incorrect. Therefore, it seems inconsistent to argue that at the same time the bubble occurred investors passively believed the asset prices were correct. However, the discussion concerning if the EMH is to blame for the crisis is clearly not yet finished and more argument for and against the theory are expected together with some statistical analysis which, while writing this, is not yet available.

4.2. Equity as Call option

In order to introduce the hypotheses of this thesis, it is necessary to turn focus to option theory. There are two kinds of basic option contracts in the market. A call option gives the holder of the option a right to buy an asset of the firm at a certain date for a certain price. A put option, however, gives its holder a right to sell an asset of the firm at a certain date for a certain price. In this thesis the options are assumed to be European meaning that they can be exercised only on the expiration date. If the option contract is not exercised on the expiration date, the contract expires and is worthless. (Hull 2004: 181)

If on the expiration date the stock price per share S, is higher than the exercise price E of the call option contract, then it is wise to for the option owner to exercise his right to buy the share at a lower price. Thus, the value of the call option is the difference

between stock price and the exercise price $S - E$. However, if on the expiration date the stock price is lower than the exercise price, the owner of the call option will not exercise the option because he can buy it from the market at a lower price. In that case the option is expires worthless. Thus, the payoff from the call option is:

(1) $$Max[0, S - E]$$

If on the expiration date the stock price per share S is higher than the exercise price per share E, the put owner will not exercise his right to sell the stock at the exercise price when he could sell it on the open market at a higher price. In this case, the put option would expire worthless. However, if on the expiration date the stock price is lower than the exercise price, then the put owner will exercise his right. Thus, the value of the put option would be the difference between the exercise price and the stock price $E - S$. The payoff of a put option can therefore be written as (Merton 1977: 6):

(2) $$Max[0, E - S]$$

Merton (1974) and Black & Scholes (1973) introduced the idea that firm's capital structure, risky debt and equity, can be valued in the same way as the call and put options are valued. An investor holding one stock of a firm can be considered holding a call option on the firm's assets with an exercise price equal to the value of the firm's debt. As the value of the firm's assets grow, shareholder profits. Furthermore, a bond holder of the firm holding risky debt can be considered holding risk-free debt and writing a put option on the firm's assets. According to Merton (1977) the mechanism here is the following. If on the expiration day the value of the firm's assets, *V*, is larger than the promised payment to bondholders, *D*, then it is in the interests of the equity holders for the management to make the payment. Therefore, the value of the debt in this case is *D*, and the value of equity is *V–D*. However, if on the expiration the management is not able to make the payments to the bondholders because the value of firm's assets is less than the promised payment, the firm is defaulted to bondholders. In this case the value of the debt is *V* and the value of the equity is zero. Expressed in other form value for equity is similar to the payoff from long position in a European call option (eq.1):

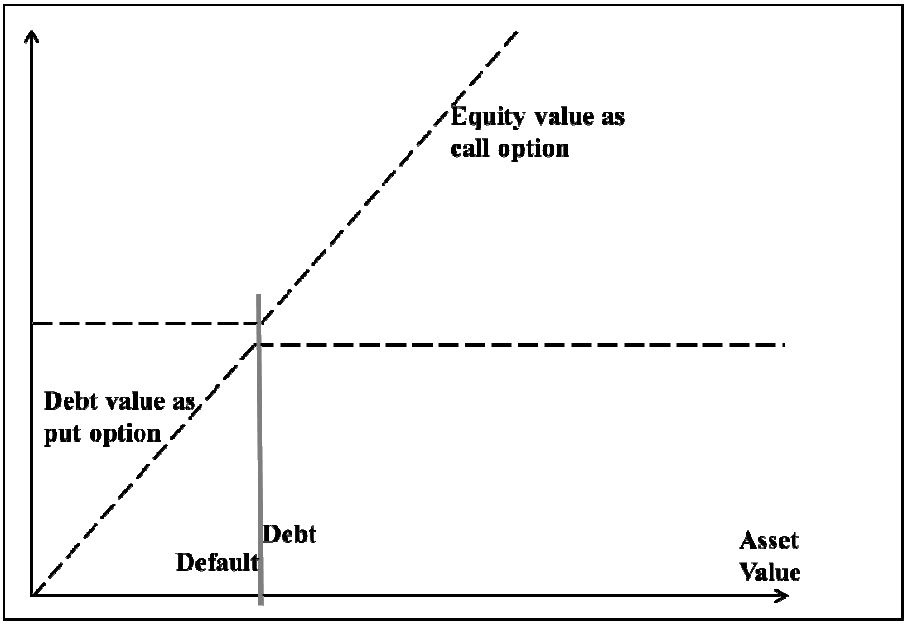
(3) $$Max[0, V - D]$$

Thus, value for debt is risk free debt minus the value of the put option on the firm's assets:

(4) $Min[V, D]$

This relationship is illustrated in figure 1, where the payoffs from equity and debt are viewed as payoffs from call and put option.

Figure 3. Equity value as call option.



However, if the firm is not able to make the demanded payments to the bondholders, it is possible that a third party is interested in guaranteeing the payments, so that the firm will not have to be defaulted to bondholders. In other words, the third party is interested in bailing out the firm. The terms of this kind of guarantee are that if the management is not able to make the payments, the guarantor will meet these obligations. However, if this happens, the firm will default its assets to the guarantor. Thus, the guarantor ensures that the value of the firm's assets on the expirations date is at least amount *D*. (Merton 1977: 7)

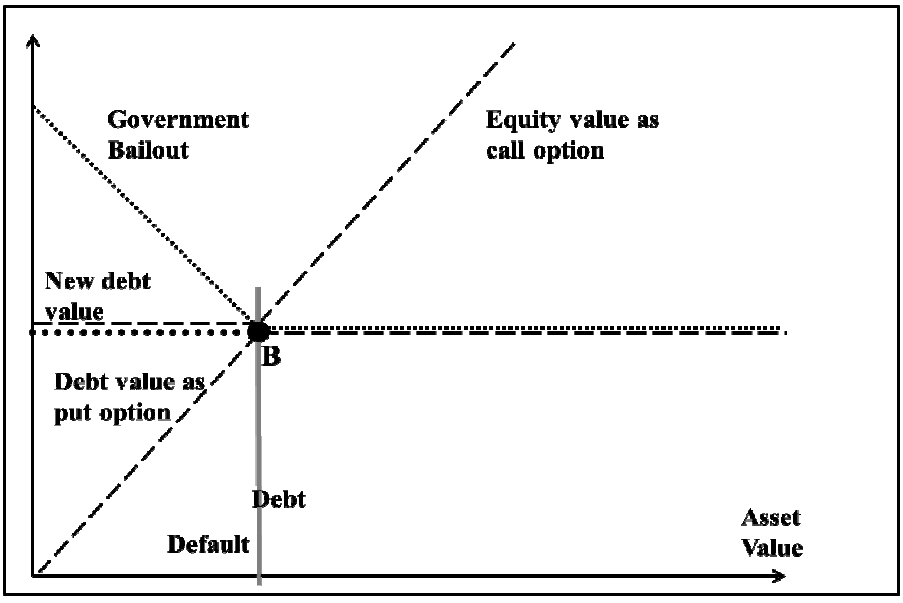
Therefore, on the expiration date, if the value of the firm's assets exceeds the promised payments to the bondholders, the bondholders receive D and equity holders receive $V - D$, that is, similar payoffs as without the guarantee. However, if the management is unable to make the payments and the third party is forced to step in. Now, the

bondholders also receive D, the equity holders receive nothing and for guarantor this means either a payout or a loss of $D - V$, the difference between promised payment and the value of firm's assets which is always non-positive. Therefore, if needed to step in, the guarantee creates an additional cash inflow to the firm of $-Min[0, V - D]$. According to Merton this can be rewritten as:

(5) $$Max[0, D - V]$$

A comparison of equations (5) and (2), shows that the payoff of the loan guarantee is identical to that of a put option. The amount that bondholders receive D corresponds to exercise price E and the value of firm's assets V corresponds to the stock price S. Therefore, by guaranteeing payments to the bondholders, the guarantor has issued a put option on the assets of the firm which gives management the right to sell those assets for B dollars on the maturity date of the debt. Merton (1977: 7 – 8)

Figure 4. Equity value as call option with a third party guarantee.



The abovementioned is illustrated in figure 4. It is important to notice that the picture is from the point of view of the firm's stakeholders. As the value of the firm's assets decreases the equity holder's wealth decreases as well. When the asset value equals to that of debt, the value of equity is zero and the firm is defaulted to bondholders whose losses are now unlimited. However, a third party can intervene and guarantee the payments to the bondholders. In this thesis the abovementioned third party guarantor is

the U.S. government and the bailout decisions, which were carried out by the government, are the guarantees.

5. DATA AND METHODOLOGY

This chapter discusses the data and methodology used in this thesis. First the data and sources are described and then the method for limiting the data via risk analysis. Before the final analysis, the event study method is introduced in order to clarify the methodology used in this thesis.

The data consists of publicly traded U.S. financial institutions. Described in a more detailed way, the companies with Standard Industrial Classification (SIC) -codes starting with numbers 60, 61, 62 and 93 are included in the data. The industrial sectors with each corresponding SIC-code are presented in table 1. (U.S. Securities and Exchange Commission 2011)

Table 1. SIC –codes of the companies included in data.

SIC Code	Sector
60	Depository Institutions
61	Non-depository Credit Institutions
62	Security & Commodity Brokers, Dealers, Exchanges & Services
93	Public Finance, Taxation and Monetary Policy

The daily stock prices and the balance sheet components for the financial ratios used in risk evaluation were collected from Thomson One Banker Analytics Database provided by the University Of Vaasa. Database offers, at least from that period, information only about firms, which are still operating in 2011, meaning that if a firm has been acquired during that time, data for that firm are not available. However, data for firms which have filed for bankruptcy since the beginning of 2008, are still available. Thus, for example large banks such as Bear Stearns, Merrill Lynch and Wachovia are excluded from the analysis.

The time period for the analysis is from 31.12.2007 – 31.12.2008. This time period is chosen not only because of the events which took place in that period, but also because bailouts were the “hot topic” during that time. Figure 1 illustrates this by presenting the amount of Google searches executed worldwide with the word “bailout” between 1.1.2007 and 1.1.2010. After the peak in the last quarter of 2008 the amount of searches is clearly dropping and finally stabilizing in 2009 at the same level as prior the

rocketing in 2008. The numbers on the graph do not represent absolute search volume numbers, because the data is normalized and presented on a scale from 0-100.

Figure 1. Google searches with the word "bailout" between 2007 and 2009. (Google Insights 2011)

5.1. The Event Windows

In order to choose the relevant event windows, not only the news articles are being examined. Here, also the 5-year Credit Default Swap spreads (CDS) are analyzed. As learned in previous chapter, if a borrower does not repay back the loan the borrower will be defaulted. A CDS contract is an insurance against this default. It is a contract between two parties, a buyer who makes fixed periodic payments, and a seller, who collects the premium in exchange for promising to pay back the buyer the insured amount in case of default. A 5-year contract simply means that the contract has a 5-year maturity. The daily mid spreads are used in this thesis. (Markit Credit Indices 2008: 4)

CDS contracts are generally priced by spread, which represents the cost a protection buyer has to pay to the protection seller in exchange for the insurance. Naturally, as the probability of firm's default rises, the CDS spread rises as well. Therefore, by examining CDS spreads one is able to determine, when the risk of default amid the markets was the highest and thus, when the probable bailouts would have been expected. CDS spreads are widely used in indicating banks' health and as warning system by banking supervisors. Furthermore, CDS market participants are mostly institutional investors, who are better informed about the risks that banks contain. Due

to these factors, the CDS market provides a reliable picture of banks' default risk. (Wölz, Wedow 2011: 195 – 196)

The object of CDS spread analysis is here to determine the possible bailout events. As the spread represents the firm's riskiness, it is assumed that after the government intervention the spread is decreasing. The higher default risk of one firm increases the total risk amid the markets and thus, median spread raises as well. For this analysis, CDS spreads of 25 firms of the data are able to be obtained. Thus, peaks in the CDS spread graph can represent a third party intervention to a financial firm with a high default risk.

Figure 6. CDS spread graph

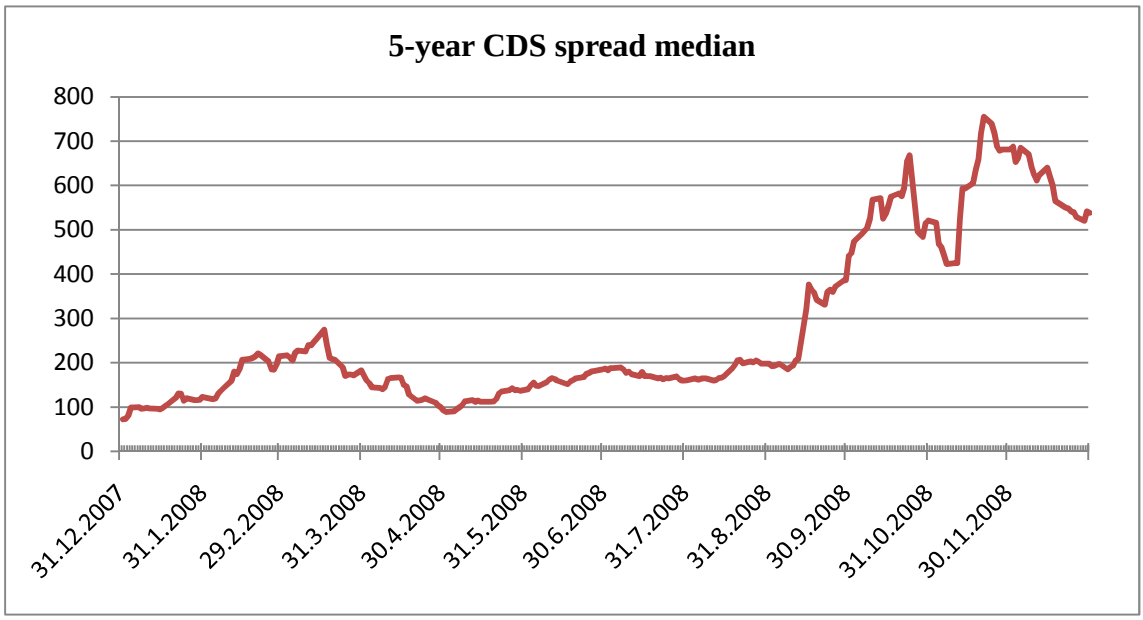


Figure 6 illustrates the median CDS spread of 25 financial firms of the dataset. During 2008 some peaks in the graph are clearly visible. First peaking happened in mid-March, second in mid-September, third in late-October and fourth in late-November. After closer examination, the actual dates turn out to be March 14, September 16, October 23 and November 21.

Next it is important to cross-reference these dates with news reports from 2008 in order to determine the background of these peaks. According to news reports, as discussed in chapter three, the peak of March 14 is connected to near-failure and bailout of Bear Stearns investment bank. On Friday, March 14, 2008, The Fed agreed to give

emergency funding to Bear Stearns, after a run on the bank had wiped out its cash reserves in only two days. During the weekend following the rescue, Fed officials helped arrange a takeover deal with JP Morgan, which was reached on following Sunday. The announcement of the bailout was made at 9.00 A.M. on Friday. However, as the actual takeover deal and other details were negotiated over the weekend, the first event date is chosen to be Monday, March 17. (The New York Times 2008a)

The second peak, September 16, is related to the AIG bailout and to Lehman Brothers bankruptcy. In the evening of September 16, at 9:00 p.m. the Fed announced, with the support of the U.S. Treasury, that it had authorized the NY Fed to bail out AIG by lending $85 billion to the firm against a stake 80% of the firm. After credit rating downgrade one day earlier, AIG had run into a liquidity crisis and was unable to raise additional financing. Normally, September 16 would be chosen as the second event date. However, the NY Fed made the announcement in the evening at 9.00 P.M. when the markets had already closed. Thus, September 17 is chosen as the second event date. (The Wall Street Journal 2008a; The Federal Reserve 2008e)

The peak of October 23 is more difficult to connect in any government measures. According to Federal Reserve Bank of St. Louis' and NY Fed's government policy responses timelines, no government intervention nor policy responses took place on October 23 in the U.S. or in Europe. The closest bailout decision took place on October 14 when U.S. Treasury announced that it will purchase capital in largest financial institutions with $250 billion. In this largest government intervention in the U.S. banking system since the Great Depression of the 1930s the U.S. government prepared to buy preferred equity stakes in nine major banks in order to restore the confidence in the banking system and the markets. (Federal Reserve Bank of St. Louis 2011; Federal Reserve Bank of New York 2011)

Even though the peaking of CDS market happened more than a week later, October 14 is chosen as the third event date. There can be several reasons for the peaking more than a week later and it would require, more guessing and simplifying than necessary in order to examine the reasons behind it. In addition, as the original TARP funding was only made available for 9 largest banks it is interesting to compare the market reaction between those banks among top 9 and those who were left out. The TARP was published in the morning of Tuesday October 14 and thus, that day is defined as the third event day.

On Sunday, November 23, U.S. Treasury and Fed jointly announced that they would guarantee more $300 billion of Citigroup's losses. In addition, Treasury would invest $20 billion of the TARP money to the bank. Median CDS spread dropped clearly after the weekend of November 22 – 23. Thus, November 24 is chosen as the fourth and final event date. (Reuters 2010; The Federal Reserve 2008f)

Table 2. The event dates and bailouts.

Event	1	2	3	4
Date (Day = 0)	17.3.2008	17.9.2008	14.10.2008	24.11.2008
Bailout	Bear Stearns	AIG	TARP	Citigroup

The event dates are summarized in table 2. Around each event date, an 11-day event window (-5, +5) is formed in order to analyze the stock price movements before and after the bailout decision. The length of the event window is based on the CDS market graph in figure 3, which shows that the market is within few days after peaking at the same level as before the peaking. Thus, a longer event window is not expected to provide any valid results about the market reaction to bailout decisions. However, an 11-day event window is long enough to capture the market reactions and is similar to that of in O'Hara et al. (1990) who examined the market reactions to the famous TBTF-announcement of 1984.

5.2. Risk evaluation

Before dividing the data into portfolios, it is necessary to evaluate the probability of default risk of each firm. The financial situation in each firm is relatively public knowledge and therefore in order to get as clear results as possible it is important to investigate which firms had significantly lower risk to be defaulted. In order to get robust results, these lower risk firms are excluded from the later analysis. The process here is the following. First three different ratios are chosen which reflect firms' financial position. Then, after calculating those ratios to each firm, the most "healthy" ones are excluded from the data. Firms are given risk points from 0 to 3 based on the level of risk represented by each ratio, 3 representing the highest risk exposure. Finally all the risk points are being aggregated. Firms with more risk points are considered riskier than firms with fewer points. The reasoning here is that firms with more financial risk are

expected to react more significantly to bailout decisions, whereas firms with strong balance sheets are expected to react less to the events because of their lower default risk.

The first ratio is a leverage multiple, which is simply total assets of a firm divided by common equity.

(6) $$\frac{Total\ Assets}{Common\ Equity} = Leverage\ multiple$$

According to D'Hulster (2009), excessive leverage of banks contributed significantly to the financial crisis. In order to address this phenomenon in future, the regulators have proposed that limited level of leverage should be added to the capital requirements of financial institutions. The main reason for this is the urge to reduce risk of excessive leverage build-up in the financial system. The balance sheet leverage used here is a valid measure because it is the most visible and widely recognized form of leverage. The rule of thumb is that whenever firm's assets exceed its equity base, the firm is considered leveraged. Banks become leveraged by borrowing more in order to acquire more assets and eventually aiming to increase their return on equity. In general investment banks are more leveraged than commercial banks which face more strict capital requirements.

In U.S. banks whose leverage ratio is not lower than 3% are considered financially strong if they are highly rated by the supervisory rating system. The leverage multiple which is used in this thesis is the leverage ratio turned upside down. Therefore, the multiple of 33 is equivalent to financially strong. For banks, who present some weaknesses according to supervisory rating system, the level is 4% which is equivalent to leverage multiple of 25. Furthermore, in order to be considered well capitalized banks are required to maintain a leverage ratio of 5% or higher which is equivalent to leverage multiple of 20 or lower. Leverage multiples were calculated quarterly. Thus, March 31, June 30, September 30 and December 31, 2008 were the valuation dates.

The second ratio used to measure riskiness is Texas ratio, which was developed to indicate the likelihood of bank failures. Texas ratio focuses only on few specific accounting variables which summarize the possible credit troubles experienced by banks. The ratio is calculated by dividing the bank's non-performing assets by the sum of its tangible equity capital and loan loss reserves. Because of its simplicity and

success in forecasting bank failures Texas ratio has gained more and more popularity in recent years. (Jesswein 2009: 66)

$$\frac{NonPerforming\ Assets}{Tangible\ Equity + Loan\ Loss\ Reserve} = Texas\ ratio \quad (7)$$

Texas ratio of 1,0 is considered an immediate warning sign. Furthermore, according to Jesswein (2009), banks' whose Texas ratios were greater than 0,40 represented 73% of bank failures between January 2008 and April 2009 in the U.S. The average ratio for banks that failed had average quarterly ratios prior the failure of 0,45, 0,79, 1,08 and 1,81 percent. For banks that did not fail, the corresponding ratios were 0,09, 0,11, 0,12 and 0,15. Based on these results the risk points which reflect firms' risk levels are as presented in table 1. Texas ratios were calculated from annual data. Therefore, instead of quarterly numbers only yearend 2007 and 2008 are available to analysis due to data limitations. In order not neglect the weight of Texas ratio in the ultimate risk evaluation, the risk points here are automatically doubled.

The last ratio adopted is simply logarithmic stock return for each quarter of 2008. According to EMH, security prices reflect all available information. Furthermore, even though if all the information was not available to all investors, stock prices still reflect the expectations about future cash flows. Therefore, firms whose future is uncertain because of various problematic factors inside and outside the firm experience stronger bear market stock price depreciation than financially more stable firms. The risk points here were determined by calculating lower quartile, median and upper quartile for quarterly stock returns. Thus, for example firm whose stock return is among the lowest 25 % receives 3 risk points from that specific three month period.

Table 3. Ratio levels for each risk point.

Leverage Multiple Q1-Q4*	Texas Ratio**	Stock Return Q1	Stock Return Q2	Stock Return Q3	Stock Return Q4	Risk points
33	0,4	-13,21 %	-31,44 %	-13,47 %	-46,42 %	3
25	0,2	-2,98 %	-14,78 %	-0,32 %	-23,76 %	2
20	0,1	3,89 %	-3,93 %	18,39 %	-8,85 %	1
<20	<0,1	> 3,89 %	> -3,93 %	> 18,39 %	> -8,85 %	0

* Same for all Q1-Q4 quarters

** Same for both 2007 and 2008 year ends

Table 3 summarizes all of the above mentioned ratios, point levels and their corresponding risk points. At this point of the analysis the data consist of 725 publicly traded U.S. financial institutions.

In table 4 the average and median values for leverage multiple, Texas ratio and stock returns are presented. Leverage multiples and stock returns were calculated for each quarter of 2008, whereas for Texas ratio, only values for end of 2007 and 2008 are available. In general, the ratio values have increased during 2008. In addition, stock returns are remarkably low and negative except the third quarter of 2008. The returns also reflect the indexes in figures 1 and 2 which showed that between beginning of July and end of September the markets turned even though the significant uncertainty remained.

Table 4. Average and median ratio values.

n=725	Leverage Multiple Q1	Leverage Multiple Q2	Leverage Multiple Q3	Leverage Multiple Q4	Texas Ratio Y2007	Texas Ratio Y2008	Stock Return Q1	Stock Return Q2	Stock Return Q3	Stock Return Q4
Average	11,41	10,22	11,61	13,13	0,08	0,51	-6,36 %	-21,37 %	-0,08 %	-35,85 %
Median	10,54	10,88	11,17	11,66	0,05	0,13	-2,98 %	-14,78 %	-0,32 %	-23,76 %

Table 5 summarizes the results of the risk point calculation. Table shows that average amount of risk points received based on Leverage multiple has increased during the year from 0,08 to 0,16. This is because, as the subprime crisis heated up, financial institutions were forced to acquire more debt in order to keep their businesses running. The same phenomenon is apparent with Texas ratio as well. It is important to note that the Texas ratio risk points received by each firm were doubled because instead of quarterly, only annual figures were available. In the end of 2007, the average risk points received by firms was 0,69. After the economic turbulence of 2008, the firms had become riskier the average amount of points had increased to 1,91. This resulted as higher Texas ratios and further as higher risk points.

As table 5 shows, the average risk points received by each firm was 9,05 and median 8,00. The object of these risk points was to evaluate the riskiness and financial stability of each firm. In other words, to determine how close or how far each firm is from being defaulted to bondholders. Even though this analysis carried out is simplified and does not represent the whole situation in each firm, it sheds some light to firms' financial situation.

Table 5. The average and median risk points received by firms.

n=725	Leverage Multiple Q1	Leverage Multiple Q2	Leverage Multiple Q3	Leverage Multiple Q4	Texas Ratio Y2007	Texas Ratio Y2008	Stock Return Q1-Q4*	Total
Average	0,08	0,09	0,12	0,16	0,69	1,91	1,50	9,05
Median	0,00	0,00	0,00	0,00	0,00	2,00	1,50	8,00
Q1								5,00
Q3								12,00
Min								36,00
Max								0,00

* Same for all Q1-Q4 quarters

At this point, this thesis makes an assumption that firms with more risk points are closer to the default point than firms with less risk points. Therefore, the lower half of the firms are excluded from further analysis, meaning that firms which received less than 8 risk points are being left out. This results as 331 firms being excluded.

As the purpose of this thesis is to examine the stock price reaction to bailout decisions, analyzing all the firms no matter how risky they are, would produce less robust results. Firms which are in greater danger to become defaulted are expected to react more strongly, negatively or positively, to the bailing out decisions. This is because the question of, whether the government guarantee is available for the firm or not, concerns more those firms who are riskier and thus have higher probability of default.

5.3. Portfolios

When the default is close, the government intervention depends mostly on the size of the firm. The bigger the firm is the higher are systemic risks generating from the firm's possible failure. Therefore, this thesis forms portfolios based on total assets in order to examine and compare the market reactions.

The original composition of Portfolio 1 contains the 8 absolute biggest U.S. financial institutions. Based on the information from 2008, for those firms the government bailout window was effectively open during the crisis. . The reasoning here is somewhat backwards-looking, meaning that Portfolio 1 is constructed based on the assumption, that U.S. government in fact considered those largest financial institutions as TBTF. However, the focus of interest here is, whether the investors shared this assumption already when the events were taking place. If investors already perceived this while the

events took place, then market reaction of portfolio 1 stocks to bailout decisions is expected not to differ from that of other portfolios. This is because of the government guarantees which make sure that the firm is not defaulted to bondholders, as in figure 1, but is in fact guaranteed against default as in figure 2. Therefore, the bailout decision should have generated higher stock returns for portfolio 1 stocks than for other stocks. As the investors saw one firm being guaranteed against default by the government, it is justified to assume that investors perceived firms with similar characteristics being effectively guaranteed in future as well.

Portfolio 2 is more problematic. Although, all 19 companies in this portfolio are large, it is not clear whether they were large enough for the government guarantee. For example, Lehman Brothers was allowed to fail whereas Bear Stearns was saved from bankruptcy. In addition, firms such State Street Corporation and Bank of New York Mellon were among banks to receive the original TARP funding on October 14, 2008. Therefore, if looking backwards again. if a portfolio 2 firm was in danger to fail it was not clear for even the most informed investors whether the firm was going to be defaulted to bondholders or was the government going to intervene. The expected market reaction to bailout decision is therefore also unclear. However, generally the reaction is expected to be lower than for portfolio 1 stocks because of uncertainty of the possible government guarantee. When a firm was bailed out, investors could not have been certain, whether the government would also consider the portfolio 2 firms as TBTF or not.

Portfolios 3 and 4 consist of significantly smaller financial firms. Therefore, the investors during the crisis could not have been expecting a government intervention at the time of failure. Because of the smaller sizes of the firms in these two portfolios, the systemic risks related to bankruptcies were not large enough to shock the system and therefore these firms were allowed to fail. In terms of Merton (1977) this means that firms of these two portfolios were allowed to be defaulted to bondholders, as in figure 1, and a third party guarantee, at least in the form of government intervention, should not have been expected. The difference between these two portfolios is that firms with total assets more than $5 billion and less than $70 billion are in portfolio 3, and firms with total assets between $1 – 5 billion are in portfolio 4. Here, the division is similar to that of in Brewer et al. (2010) meaning also, that firms with total assets less than $1 billion are excluded, due to insufficient trading. The number of firms in portfolio 3 is 53 and 136 in portfolio 4. Here, table 6 summarizes the number of firms in each portfolio.

Table 6. The basic structure of portfolios

Portfolio	1	2	3	4
N	8	19	53	136
Total Assets*	700	100	5	1

* $ billion

However, the amount of firms in each portfolio varies depending on the bailout event. This concerns basically only portfolios 1 and 2, because at least one of the firms of those two portfolios was each time either the firm which was bailed out, or was the firm that acquired another firm as part of to the bailout. Thus, those firms being involved in the actual bailout are excluded from the analysis during that specific event window.

This has the following consequences. JP Morgan is excluded from Portfolio 1 relating to the Bear Stearns bailout in March 14. After the government had guaranteed Bear Stearns' losses, the firm was sold to JP Morgan in a heavily reduced price. AIG is excluded from the analysis concerning the market reaction on AIG bailout in September 16 and is being excluded also from events taking place after that. A week earlier, on September 7, the mortgage giants Fannie Mae and Freddie Mac were put into a government conservatorship in order to avoid them for filing for bankruptcy. Thus, both firms are excluded from the analysis of events after September 7. In addition, due to bankruptcy filing on September 15, Lehman Brothers is treated the same way.

Table 7. The number of firms in each portfolio for each event window.

Portfolio	March 14, "The Bear Stearns bailout"	September 17, "The AIG Bailout"	October 14, "TARP"	Novemeber 24, "The Citigroup bailout"
1	7	5	8	7
2	19	18	16	16
3	53	53	53	53
4	136	136	136	136

The announcement of TARP on October 14 produces several changes to the portfolios. The firms which were on a list of banking organizations receiving the original liquidity injection are all included in Portfolio 1. This means that State Street Corporation, Bank of New York Mellon and Wells Fargo are moved from Portfolio 2 into Portfolio 1 for the two last event windows. The reasoning here is similar to Brewer et al. (2010) that the firms on that list were considered as TBTF. Finally, related to the Citigroup bailout

on November 24, Citigroup Inc. is excluded from the analysis. Table 7 presents the number of firms in each portfolio for each event window.

5.4. The Event Study Method

With financial market data, an event study measures the reaction of a certain event to the firm value. It is a useful method because, given the rationality in the marketplace, the effects of an event will be reflected immediately in stock prices. Therefore, the event's economic impact can be measured by using security prices over a relatively short time period, whereas other methods may require observation period of many months or even years. In addition, event studies provide a way of testing the market efficiency. Abnormal stock returns that persist after a particular event are seen as evidence against market efficiency. Therefore, event studies focusing on long period following the particular event can provide key evidence about market efficiency. (Kothari & Warner 2006: 4; MacKinlay 1997: 13)

The first step of the event study is to identify the period over which the stock prices of the firms involved will be examined. This period is called the event window. In general it is useful to define the event window to be larger than for example only one day in order to capture the movements surrounding the event. Thus, in practice the event window is often expanded to multiple days, including at least the day of the announcement and the day after the announcement. This way it is possible to capture also the reactions to announcements which occur after the markets have already closed on the announcement day. (MacKinlay 1997: 14 – 15)

In addition, the periods before and after the event, may also be the focus of interest. For example considering the case of an earnings announcement, the market may acquire information about the soon-to-be-published earnings before the actual announcement. Thus, by examining the price movements prior the announcement it is possible to analyze the information flow to markets by focusing on pre-event stock returns. In order to examine the stock markets reactions to bailout decisions, an 11-day event window [–5, +5] is formed surrounding the announcement. (MacKinlay 1997: 14 – 15)

In order to evaluate an event's impact it is necessary to measure the abnormal returns caused by the event. The abnormal return is defined as actual ex post return of the security over the event window minus the normal return of the firm over the event

window. The normal return is the expected return without conditioning on the event taking place. According to MacKinlay (1997), the abnormal return is:

(8) $$AR_{i\tau} = R_{i\tau} - E(R_{i\tau}|X_\tau)$$

where, $AR_{i\tau}$ = the abnormal return for firm i at the event day τ
$R_{i\tau}$ = the actual return for firm i at the event day τ
$E(R_{i\tau})$ = the expected normal return for firm i at the event day τ
X_τ = conditioning information for the normal return model

Thus, the abnormal return is the difference between the actual return and expected normal return. It is the measure of unexpected change in shareholder's wealth associated with the event. For measuring the expected normal return, there are two options. The constant mean return model assumes that X_τ is constant which implies that the mean return for the given security is constant through time. The market model, however, assumes that X_τ is the market return and thus, assumes that there is a stable and linear relation between the market return and the given security return. (Kothari et al. 2006: 9; MacKinlay 1997: 15)

For measuring the expected return, the market model is applied in this thesis. Thus, as described in MacKinlay et al. (1997) the expected return is calculated as follows (9). The parameters of the model are estimated using Ordinary Least Squares (OLS) regression.

(9) $$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$$

where, α_i, β_i = firm specific intercept and covariance with the market
R_{it} = period t return for security i
R_{mt} = period t return for market portfolio

The error term ε_{it}, is assumed to have zero mean, be independent of market return and be uncorrelated across firms. According to MacKinlay, the market model is an improvement to the mean returns model. The variance of the abnormal return is reduced by removing the portion of the return which is related to variation in the market return. (MacKinlay 1997: 18)

After the parameters to estimate the normal return have been defined, the abnormal returns can be calculated. Therefore, the next step is to design the testing framework for the abnormal returns. Here, it is important to pay attention in defining the null hypothesis and in determining the methods for aggregating the individual firm abnormal returns. This is possible by combining equations (8) and (9). Now, the abnormal returns are ready to be estimated. The equation for abnormal return for security i at time t is as follows:

(10) $$AR_{it} = R_{it} - (a_i + \beta_i R_{mt})$$

The OLS estimates a_i and β_i are estimated from returns for days -51 to -7 relative to each event date, March 17, September 17, October 14 and November 24. Each event window is assumed as being unique and separate, that is, not related to other bailout decisions. Thus, it is possible for the estimation periods to overlap the event windows of other bailout decisions.

The methodology used in estimating normal returns and abnormal returns is similar to that of in O'Hara et al. who examined the stock market reaction to the announcement of the Comptroller of Currency that some banks were considered as TBTF. In addition, Pop et al. (2009) used the same methodology in examing the market reaction to Resona Holdings bailout decision in Japan. As in O'Hara et al. and in Pop et al., also in this thesis every bailout decision occurred each time on the same calendar date for all firms and all firms represent the same industry. Therefore, it is not possible to assume that the abnormal returns are cross-sectionally independent (O'Hara et al. 1990: 1593). Thus, a test statistic, which is based on standard deviation estimated for each portfolio from abnormal returns in the estimation period, is used. This test statistic (11), which is widely used in event studies (see Brown & Warner 1985; O'Hara et al. 1990; Pop et al. 2009), is a ratio of the day t average abnormal return to its standard deviation. Therefore, for any day t in the (-5, +5) event window, the test statistic for each portfolio is the following:

(11) $$\overline{AR}_t / S(\overline{AR}_t)$$

where, $$\overline{AR}_t = \frac{1}{N}\sum_{i=1}^{N} AR_{it}$$

$$S(\overline{AR}_t) = \sqrt{\left[\sum_{-51}^{-7}\left(AR_t - \overline{R_i}\right)^2\right]/44}$$

$\overline{R}_i$ = $\frac{1}{45}\sum_{-51}^{-7} \overline{AR}_t$

N = number of firms in the portfolio

Furthermore, the abnormal returns are not only aggregated across securities but also through time. The cumulative average abnormal return, $\overline{CAR}$, shows how new information about bailouts is included in prices. The cumulative average abnormal returns are calculated by summing up the average abnormal returns of each portfolio for the event window [–5, +5]. Therefore, for each portfolio, the cumulative abnormal return for any period t is as described in equation (12). (MacKinlay 1997: 24)

(12) $$\overline{CAR}_t = \sum_{t=-5,+5} \overline{AR}_i$$

In addition, it is useful to present the cumulative abnormal returns as a graph in order highlight the market reactions to the specific events under the analysis. In order to test the statistical significance of cumulative abnormal returns, the methodology is similar to that of in Pop et al. (2009). For any interval $[\tau_1 : \tau_2]$ in the [–5, +5] event window, the test statistic is the following:

(13) $$\frac{\overline{CAR}[t_1:t_2]}{\left[\sum_{t=\tau_1}^{\tau_2} \hat{s}^2(\overline{AR}_t)\right]^{1/2}}$$

where, $\overline{CAR}[\tau_1 : \tau_2]$ = $\sum_{t=\tau_1}^{\tau_2} \overline{AR}_t$

It is important to note that the event study method is often used to compare the distributions of the actual and expected returns and traditionally, the interest is on the mean of distributions of the abnormal return. Thus, the null hypothesis to be tested is whether the mean day 0 abnormal return is equal to zero for each portfolio. In other words, the test statistic expects that the given bailout has no impact on the behavior of returns. (Kothari et al. 2006: 10; MacKinlay 1997: 15, 27)

6. EMPIRICAL RESULTS

This chapter presents in chronological order the empirical results of the analysis described in previous chapter. First sub-chapter concentrates on the stock market reactions to the Bear Stearns bailout, followed by the rest of the event windows. In the beginning of each chapter, a short review of the events behind each bailout decision is presented. The results are presented in tables 8 – 11, and together with each table, the results are overviewed, explained and analyzed.

Furthermore, table 12 presents results from the comparison of the abnormal returns immediately after the bailout decision. Here, the daily abnormal returns are compared between event windows, in order to examine whether the investor reaction changed as the crisis progressed.

6.1. Stock Market Reactions to Bear Stearns Bailout

On March 14, the U.S. government decided not let the investment bank Bear Stearns to fail. The Fed agreed to give emergency funding to Bear Stearns, after a run on the bank had wiped out its cash reserves in only two days. During the weekend following the rescue, Fed officials helped arrange a takeover deal with JP Morgan, which was reached on following Sunday, March 16.

The findings of the stock market reaction to the bailout decision are reported in table 8. In general, the abnormal returns surrounding the bailout decision indicate that the reaction was positive among the biggest financial institutions. Portfolio 1, which includes the seven largest financial firms, or firms that looking backwards were considered as TBTF, generated positive abnormal returns between dates +1 to +3. On day 0, which was the first trading day after the bailout package had been formed and accepted the abnormal returns were on the same level as days before the bailout became reality. This suggests that markets did not fully understand or accept the news and meanings of the decision. Moreover, investors did not start immediately to perceive the largest financial institutions as TBTF.

Table 8. Abnormal returns around the Bear Stearns bailout

Day Relative to the bailout decision (Day 0 = March 14, 2011)	Portfolio 1 (N = 7)		Portfolio 2 (N = 19)		Portfolio 3 (N = 53)		Portfolio 4 (N = 136)	
	AR	CAR	AR	CAR	AR	CAR	AR	CAR
-5	-0,0209	-0,0209	0,0011	0,0011	0,0103	0,0103	-0,0002	-0,0002
	-0,75 †		0,05 †		0,22 †		-0,01 †	
-4	0,0218	0,0009	0,0268	0,0279	0,0076	0,0179	0,0130	0,0127
	0,58		1,35		0,15		0,32	
-3	0,0050	0,0059	-0,0113	0,0167	-0,0051	0,0128	0,0016	0,0143
	0,33		-0,55		-0,20		0,04	
-2	-0,0010	0,0049	-0,0073	0,0093	0,0002	0,0130	0,0067	0,0210
	-0,04		-0,46		0,01		0,21	
-1	-0,0070	-0,0022	-0,0135	-0,0042	-0,0050	0,0080	-0,0053	0,0157
	-0,30		-0,51		-0,16		-0,16	
0	-0,0129	-0,0151	0,0017	-0,0025	-0,0159	-0,0080	-0,0002	0,0155
	-0,44		0,03		-0,26		-0,01	
1	0,0674	0,0524	0,0128	0,0103	-0,0187	-0,0267	-0,0031	0,0124
	1,20		0,17		-0,35		-0,09	
2	0,0405	0,0929	0,0148	0,0251	0,0240	-0,0028	0,0135	0,0259
	0,57		0,63		0,84		0,30	
3	0,0511 *	0,1439	0,0242	0,0493	0,0179	0,0151	0,0071	0,0330
	1,83		0,66		0,45		0,14	
4	-0,0244	0,1195	-0,0220	0,0273	-0,0017	0,0134	-0,0009	0,0321
	-0,73		-0,90		-0,04		-0,02	
5	-0,0035	0,1160	-0,0127	0,0147	0,0015	0,0150	0,0071	0,0392
	-0,13		-0,97		0,03		0,19	

Window	CAR	t-stat	CAR	t-stat	CAR	t-stat	CAR	t-stat
[-5 +5]	0,1160	0,93	0,0147	0,13	0,0150	0,10	0,0392	0,30
[-5, -1]	-0,0022	-0,04	-0,0042	-0,09	0,0080	0,09	0,0157	0,20
[-1, 0]	-0,0199	-0,53	-0,0118	-0,20	-0,0209	-0,30	-0,0055	-0,10
[+1, +3]	0,1590	1,67	0,0518	0,59	0,0231	0,32	0,0175	0,23

† t-statistic

* Significant at 10 % level

** Significant at 5 % level

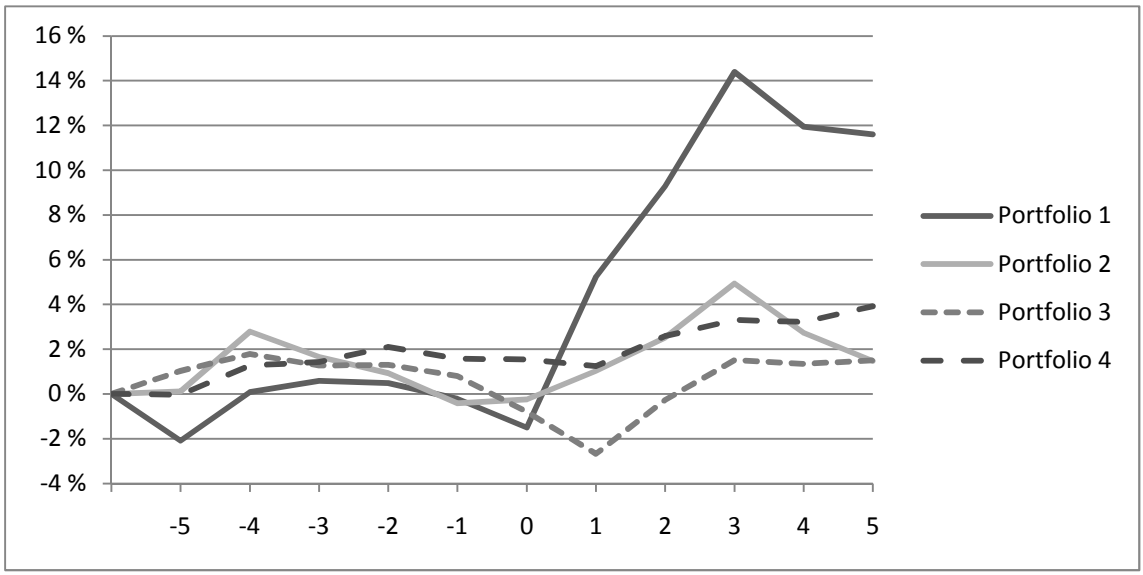
*** Significant at 1 % level

The positive abnormal returns after March 17, are relatively high (6,74 %, 4,05 % and 5,11 %) but except March 20 (+3), which is statistically significant at the 10 % level, they are not significantly different from zero. Thus, in the case of Portfolio 1 and the hypothesized TBTF-stocks, the results suggest only weak statistical evidence towards the hypothesis that the largest financial institutions generated higher stock returns after the bailouts. The abnormal returns of Portfolio 2 are not statistically significant throughout the event window (-5, +5) but in general the market direction follows that of among Portfolio 1 stocks. Thus, the Bear Stearns bailout did not make investors to perceive the largest financial companies as TBTF. Also stocks of smaller firms, as in Portfolio 3 and 4, generated negative returns on day 0. The only clear difference in

returns took place on day 1, when portfolio 1 and 2 generated positive returns of 6,74 % and 1,07 % respectively while portfolios 3 and 4 experienced negative, yet statistically insignificant, market returns.

The 11- day cumulative average abnormal returns (CAR) describe the stock returns over generated by each portfolio over the 11-day event window. Here, the difference is more clear than with daily abnormal returns. Portfolio 1 produced 11,60 % stock return over the event window, whereas rest of the portfolios (2 – 4) only 1,47 %, 1,50 % and 3, 92 %, respectively. Thus, investing in the largest financial institutions increased investor wealth, during the 11-day period.

Figure 7. Graph of CAR for each portfolio from day -5 to day +5 relative to the Bear Stearns bailout.



However, the CARs computed are not significantly different from zero for any of the portfolios. This applies to all the sub-windows as well. CARs prior the bailout decision are negative for Portfolio 1 and mostly negative for the three other portfolios as well. The post-event window [+1, +3] generated clearly higher CARs for Portfolio 1 (15,90 %) than for any other portfolios, even though still being statistically insignificant. These, high post-event CARs, are illustrated in figure 7 which presents CARs of each portfolio during the 11-day event window.

6.2. Stock Market Reaction to AIG Bailout

In the evening of September 16, at 9:00 p.m. the Fed announced, with the support of the U.S. Treasury, that it had authorized the NY Fed to bail out AIG by lending $85 billion to the firm against a stake 80% of the firm. Stock market reactions to this significant government intervention are described in table 9, September 17 being the day 0.

Table 9. Abnormal returns around the AIG bailout.

Day Relative to the bailout decision (Day 0 = September 17, 2011)	Portfolio 1 (N = 5)		Portfolio 2 (N = 17)		Portfolio 3 (N = 53)		Portfolio 4 (N = 136)	
	AR	CAR	AR	CAR	AR	CAR	AR	CAR
-5	-0,0398 **	-0,0398	-0,0350	-0,0350	-0,0364	-0,0364	-0,0117	-0,0117
	-3,43 †		-1,17 †		-0,92 †		-0,26 †	
-4	-0,0224	-0,0623	-0,0125	-0,0476	-0,0439	-0,0803	-0,0244	-0,0361
	-0,91		-0,46		-1,41		-0,70	
-3	-0,0309	-0,0932	-0,0077	-0,0553	0,0019	-0,0784	-0,0064	-0,0425
	-1,52		-0,37		0,05		-0,12	
-2	-0,0335	-0,1267	0,0517	-0,0035	0,0338	-0,0446	0,0133	-0,0292
	-0,99		1,04		0,39		0,19	
-1	-0,0305	-0,1572	0,0065	0,0030	-0,0116	-0,0562	-0,0050	-0,0342
	-0,38		0,22		-0,19		-0,08	
0	-0,0252	-0,1824	0,0421	0,0450	0,0554	-0,0008	0,0165	-0,0177
	-0,25		0,73		0,83		0,20	
1	-0,0456	-0,2280	-0,0172	0,0278	0,0301	0,0293	0,0403	0,0226
	-0,70		-0,23		0,30		0,28	
2	0,0702 *	-0,1577	-0,0218	0,0060	-0,0538	-0,0246	0,0049	0,0275
	2,01		-0,28		-0,39		0,04	
3	0,0403	-0,1175	0,0167	0,0227	0,0044	-0,0201	0,0125	0,0401
	0,78		0,36		0,06		0,12	
4	0,0457 *	-0,0718	0,0024	0,0250	0,0253	0,0052	0,0094	0,0494
	2,57		0,07		0,51		0,16	
5	-0,0189	-0,0906	-0,0069	0,0182	-0,0032	0,0019	-0,0133	0,0362
	-0,27		-0,25		-0,06		-0,21	

Window	CAR	t-stat	CAR	t-stat	CAR	t-stat	CAR	t-stat
[-5 +5]	-0,0906	-0,51	0,0182	0,12	0,0019	0,01	0,0362	0,13
[-5, -1]	-0,1572	-1,67	0,0030	0,04	-0,0562	-0,46	-0,0342	-0,28
[-1, 0]	-0,0557	-0,44	0,0486	0,74	0,0437	0,48	0,0115	0,11
[+1, +3]	0,0649	0,72	-0,0224	-0,19	-0,0193	-0,10	0,0578	0,27

† t-statistic

* Significant at 10 % level

** Significant at 5 % level

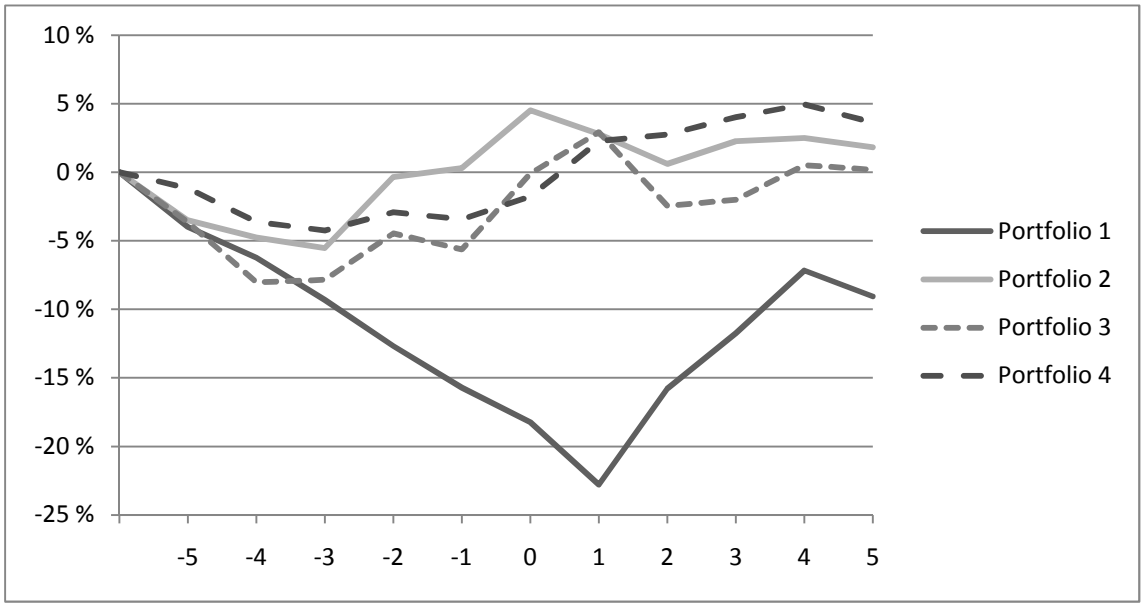
*** Significant at 1 % level

As a sign of the market turmoil during the days of the crisis, Portfolio 1 experienced negative and statistically significant abnormal return on day -5. The direction of the market remained negative until day +2, which produced positive and statistically

significant at 10 % level return of 7,02 %. Days +3 and +4 generated also positive abnormal returns, with day 4 return of 4,57 % being also statistically significant at the 10 % level. During the days after the AIG bailout, investors clearly started to perceive the largest financial firms as TBTF. Days following the bailout produced only low returns for the rest of the portfolios. On day +2, when Portfolio 1 experienced significant positive abnormal returns, Portfolio 2 generated -2,18 % return and portfolio 3 -5,38 % return.

However, it is important to notice that before the bailout, the abnormal returns of Portfolio 1 were highly negative, yet, except day -5, statistically not significantly different from zero. However, the Lehman Brothers Bankruptcy on September 15 (day -2) cannot be forgotten here, as it clearly had significant negative effect on the largest financial firms by spreading the uncertainty along Wall Street.

Figure 8. Graph of CAR for each portfolio from day -5 to day +5 relative to the AIG bailout.



The CARs of Portfolio 1 highlight the negative abnormal returns prior day +2. Until then the abnormal returns were negative and CAR broke the -20 % level on day +1. In other words, between day -5 and day 1 Portfolio 1 generated -22,80 % abnormal return. This is clearly more negative than the CARs of other three portfolio during the same (-5, +1) period. On day +1 portfolio 2 – 4 had CARs of 2,78 %, 2,93 % and 2,26 %, a difference of almost 25 % points to the Portfolio 1 stocks. Again the CARs of Portfolio

1 prior the event are negative and turn positive on the post-event [+1, +3] window. Interestingly, for Portfolio 2 the CARs prior the event, [-5, -1] and [-1, 0], were positive and turned negative over the post event [+1, +3] period. However, for all portfolios over whatever event windows the CARs are not significantly different from zero suggesting that the results do not have statistically strong basis. Further, figure 8 illustrates the progressions of CARs over the 11-day event window surrounding the AIG bailout.

6.3. Stock Market Reaction to TARP

TARP produces some problem for the analysis, since the 9 firms which were included in the original program published on October 14, were not all among the 9 largest financial firms by total assets, which has been the classifier so far. In other words, when the choosing the firms to receive the original capital injection the U.S. Treasury did not just pick the ten largest financial institutions by total assets. Thus, it is not possible to assume that the investors could have anticipated which firms were about to receive the money. Therefore, the statistical analysis of TARP does not take the possible surprise effect into account.

On October 14 the U.S. Treasury announced that it will purchase capital in largest financial institutions with $250 billion. In this largest government intervention in the U.S. banking system since the Great Depression of the 1930s the U.S. government prepared to buy preferred equity stakes in nine major banks in order to restore the confidence in the banking system and the markets. The stock market reactions to this “group-bailout” are presented in table 10.

As anticipated, the abnormal returns before the day 0 are somewhat mixed and not significantly different from zero. On day 0, when the original TARP was announced the portfolio 1 consisting of the stocks participating to the program generated statistically significant return of 13,68 %. However, the stock market did not only reward the firms participating to the program. Portfolio 2 generated even higher returns gaining 15,82 % on day 0. However, this high return is not statistically significant. Portfolios 3 and 4 generated also positive but lower abnormal returns on the same day. Again, the absence of statistical significance makes it difficult to draw sound conclusions. However, it is possible to suggest that those firms participating in the program increased investor wealth.

Table 10. Abnormal returns around the TARP announcement.

Day Relative to the bailout decision (Day 0 = October 14, 2011)	Portfolio 1 (N = 8)		Portfolio 2 (N = 15)		Portfolio 3 (N = 53)		Portfolio 4 (N = 136)	
	AR	CAR	AR	CAR	AR	CAR	AR	CAR
-5	-0,0315	-0,0315	0,0303	0,0303	0,0058	0,0058	-0,0005	-0,0005
	-0,36 †		0,69 †		0,08 †		-0,01 †	
-4	0,0258	-0,0057	-0,0688	-0,0384	-0,0291	-0,0233	-0,0262	-0,0267
	0,43		-0,75		-0,39		-0,36	
-3	0,0398	0,0341	-0,0112	-0,0496	-0,0291	-0,0524	-0,0470	-0,0737
	0,46		-0,12		-0,23		-0,44	
-2	0,0263	0,0604	0,0857	0,0360	0,1114	0,0590	0,0391	-0,0346
	0,20		1,30		0,84		0,30	
-1	-0,0623	-0,0019	-0,1299	-0,0938	-0,1190	-0,0600	-0,0449	-0,0795
	-0,29		-0,85		-0,86		-0,38	
0	0,1368 *	0,1349	0,1582	0,0644	0,0680	0,0080	0,0159	-0,0636
	1,88		1,12		0,53		0,17	
1	0,0802	0,2150	0,1145	0,1789	0,0849	0,0929	0,0408	-0,0228
	1,25		1,13		0,98		0,43	
2	-0,0793 *	0,1358	-0,1021	0,0768	-0,0296	0,0633	-0,0062	-0,0290
	-2,14		-1,34		-0,35		-0,07	
3	-0,0324	0,1033	-0,0276	0,0492	-0,0201	0,0432	-0,0117	-0,0407
	-0,73		-0,65		-0,27		-0,18	
4	-0,0706 *	0,0327	-0,0892	-0,0400	-0,0808	-0,0376	-0,0370	-0,0778
	-1,97		-1,57		-1,04		-0,54	
5	0,0508 *	0,0835	0,0599	0,0199	0,0091	-0,0286	-0,0058	-0,0835
	2,06		0,97		0,18		-0,08	

Window	CAR	t-stat	CAR	t-stat	CAR	t-stat	CAR	t-stat
[-5 +5]	0,0835	0,27	0,0199	0,07	-0,0286	-0,09	-0,0835	-0,28
[-5, -1]	-0,0019	-0,01	-0,0938	-0,44	-0,0600	-0,24	-0,0795	-0,35
[-1, 0]	0,0745	0,33	0,0284	0,14	-0,0510	-0,27	-0,0291	-0,19
[+1, +3]	-0,0315	-0,36	-0,0152	-0,11	0,0352	0,25	0,0229	0,16

† t statistic

* Significant at 10 % level

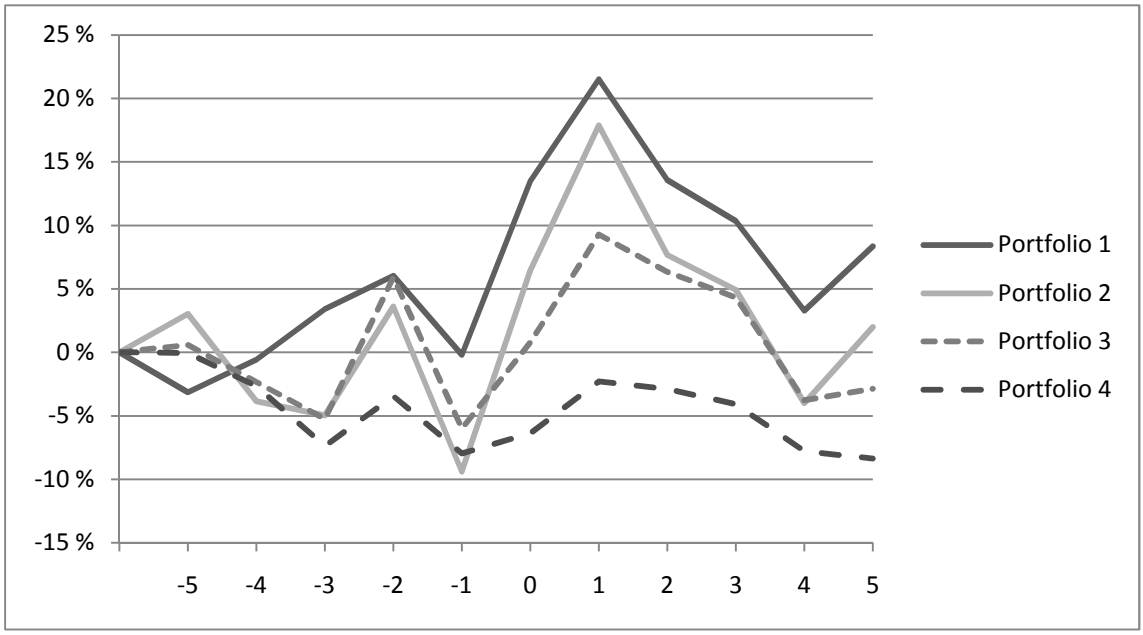
** Significant at 5 % level

*** Significant at 1 % level

The wealth gain was, however, only short lived and already at day 2 the abnormal returns turned negative. This reflects lack of investors trust to government measures and general uncertainty among the markets. Day +2 and day +4 returns for Portfolio 1 were negative and statistically significant at the 10 % level. At the same time the three other portfolios also experienced stock price depreciation. However, for them the abnormal returns were not significantly different from zero. The analysis of CARs provides results extremely difficult to evaluate. The post-event [+1, +3] CARs are negative for portfolios 1 and 2, whereas for portfolios 3 and 4, they are positive. During the period prior the event [-5, -1] CARs all negative for all portfolios and positive for portfolios 1

and 2 during the [-1, 0] window. However, all CARs being statistically insignificant suggests, that there was no common reaction to the event under the investigation.

Figure 9. Graph of CAR for each portfolio from day -5 to day +5 relative to the announcement of TARP.



All in all, the examination of CARs shows that portfolio 1 generated higher abnormal returns over the event window than other portfolios. For portfolios 3 and 4, the CARs during the event window are negative and more than 10 % points lower than 8,35 % gain of Portfolio 1. Figure 9 presents the CARs surrounding the TARP announcement. Visible here is also the volatility of abnormal returns during the 11-day event window indicating that at least for stock markets on a short-term, the announcement of TARP did not have the wished stabilizing effect.

6.4. Stock Market Reaction to Citigroup Bailout

On Sunday, November 23, U.S. Treasury and Fed jointly announced that they would guarantee more $300 billion of Citigroup's losses. In addition, Treasury would invest $20 billion of the TARP money to the bank. In the end of previous year Citigroup had been the largest financial institution in the U.S. by total assets. On the following Monday after the announcement (day 0) stocks throughout the sample reacted positively to the Bailout decision. These market reactions are presented in table 11.

Table 11. Abnormal returns around Citigroup bailout.

Day Relative to the bailout decision (Day 0 = November 24, 2011)	Portfolio 1 (N = 7)		Portfolio 2 (N = 15)		Portfolio 3 (N = 53)		Portfolio 4 (N = 136)	
	AR	CAR	AR	CAR	AR	CAR	AR	CAR
-5	-0,0272	-0,0272	-0,0584	-0,0584	-0,0074	-0,0074	0,0086	0,0086
	-1,20 †		-0,76 †		-0,13 †		0,09 †	
-4	-0,0042	-0,0314	-0,0249	-0,0832	-0,0170	-0,0243	-0,0220	-0,0135
	-0,12		-0,59		-0,36		-0,26	
-3	-0,0312	-0,0626	-0,0281	-0,1114	-0,0317	-0,0560	-0,0306	-0,0441
	-1,24		-0,38		-0,58		-0,38	
-2	0,0106	-0,0520	-0,0080	-0,1194	-0,0389	-0,0950	-0,0096	-0,0537
	0,16		-0,14		-0,52		-0,08	
-1	-0,0597	-0,1116	-0,0626	-0,1819	-0,0072	-0,1022	-0,0446	-0,0983
	-1,36		-0,72		-0,09		-0,38	
0	0,1137 **	0,0021	0,0864	-0,0956	0,0395	-0,0627	-0,0334	-0,1317
	2,77		1,59		0,48		-0,10	
1	0,0161	0,0181	0,0449	-0,0506	-0,0136	-0,0764	-0,0012	-0,1330
	0,28		0,84		-0,12		-0,01	
2	-0,0190	-0,0009	-0,0192	-0,0698	0,0050	-0,0713	0,0199	-0,1130
	-0,46		-0,48		0,06		0,19	
3	0,0263	0,0254	0,0345	-0,0353	0,0283	-0,0430	0,0155	-0,0975
	1,34		0,82		0,35		0,23	
4	-0,2180 ***	-0,1926	-0,2090 ***	-0,2443	-0,1805 **	-0,2235	-0,1107	-0,2082
	-5,70		-5,04		-2,23		-0,82	
5	0,2121 **	0,0196	0,2063 **	-0,0380	0,2057	-0,0178	0,1193	-0,0889
	3,30		2,73		1,43		0,77	

Window	CAR	t-stat	CAR	t-stat	CAR	t-stat	CAR	t-stat
[-5 +5]	0,0196	0,13	-0,0380	-0,19	-0,0178	-0,04	-0,0889	-0,19
[-5, -1]	-0,1116	-1,18	-0,1819	-1,18	-0,1022	-0,25	-0,0983	-0,44
[-1, 0]	0,0540	0,90	0,0238	0,23	0,0322	0,11	-0,0781	-0,23
[+1, +3]	0,0233	0,32	0,0602	0,76	0,0197	0,14	0,0342	0,21

† t statistic

* Significant at 10 % level

** Significant at 5 % level

*** Significant at 1 % level

Only Portfolio 4 experienced negative but statistically insignificant, abnormal returns. On day 0 Portfolio 1 generated positive and statistically significant at 5 % level abnormal return of 11,37 %. This indicates, that the investors began to consider, with the implementation of TARP, the largest financial institutions as TBTF. On the same day, Portfolios 2 and 3 also generated positive abnormal returns However, those returns are not significantly different from zero. Again, the effect of the bailout decision to the stock market can be seen as short lived, when the returns turn negative on day +2 for portfolios 1 and 2. Interesting here is also, how the highly significant negative and positive abnormal returns on days +4 and +5 can be explained. It is not likely that the

sudden market decline on day +4 and immediate gain on day +5 are directly related to the Citigroup bailout. According to The New York Times (2008f), the markets experienced just a sudden drop in the investor confidence and it did not have any actual new information behind it. This down-and-up movement is however, a sign of the market conditions during 2008, which makes it extremely difficult to form strong conclusions about the market reactions.

Figure 7. Graph of CAR for each portfolio from day -5 to day +5 relative to the Citigroup bailout.

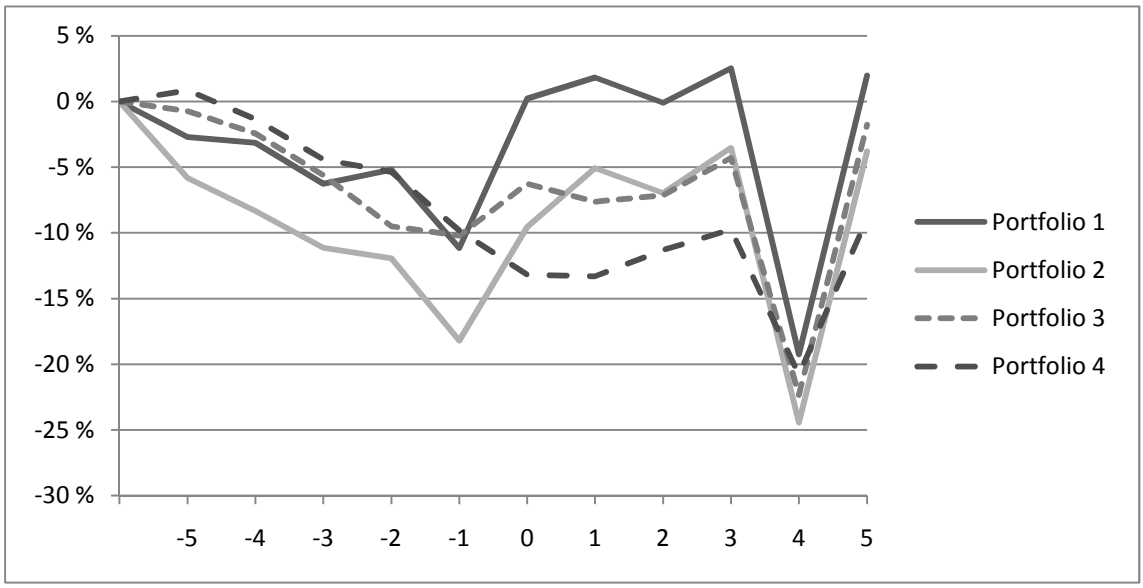


Figure 7 presents the CARs around the Citigroup bailout. The positive reaction to the bailout decision is clearly visible whereas, also the sudden stock market drop on the day +4. However, being unrelated to the bailout decision, this drop is not in the focus of further analysis. The prior-event window [-5, -1] CARs are negative for all four portfolios, whereas they are positive over the post-event window [+1, +3]. Again, investing in Portfolio at day -5 would have generated the highest abnormal returns during the 11-day period. However, as with other event windows, also here the CARs are not significantly different from zero. Thus, the results provide only weak evidence that smaller financial institutions suffered from not being TBTF and generated negative CARs over the event window.

6.5. Differences in Market Reactions between the Event Windows

Another aim of this thesis is to examine how investors' reactions changed during the investigation period which saw several institutions being rescued by the government. The year 2008 offers a unique environment for this analysis because a financial meltdown of such magnitude has not occurred before since the Great Depression in 1930s. In order to investigate how market reactions to bailouts changed as the crisis escalated in 2008, the focus is turned in Portfolio 1 abnormal returns. As stated earlier, Portfolio 1 contains stocks of the largest financial institutions. The reasoning here is somewhat backwards-looking, meaning that Portfolio 1 is constructed based on the assumption, that during the financial meltdown U.S. government in fact considered those largest financial institutions as TBTF. However, the focus of interest here is, whether the investors shared this assumption already when the events were taking place.

Furthermore, when investigating how the investor reaction changed as the crisis escalated, it is necessary to compare the daily abnormal returns from each four event window. The second research hypothesis expected that as the crisis progressed, investors should have become more aware about the policy line of the government and, thus, be able to anticipate the upcoming bailout. Because of this, all bailout reactions are compared to the market reaction to the Bear Stearns bailout, which was the first bailout in years. This analysis is presented in Table 12.

Table 12. The differences between event windows in post-bailout [0, +3] Portfolio 1 abnormal returns.

Event day	$\overline{AR}_{Bear\ Stearns} - \overline{AR}_{AIG}$	$\overline{AR}_{Bear\ Stearns} - \overline{AR}_{TARP}$	$\overline{AR}_{Bear\ Stearns} - \overline{AR}_{Citigroup}$
0	0,0123 [A]	-0,1497 [A] ***	-0,1266 [A] ***
	0,46 †	-4,96 †	-3,34 †
1	0,1130 ***	-0,0127	0,0514
	4,26	-0,42	1,35
2	-0,0297	0,1198 ***	0,0596
	-1,12	3,97	1,57
3	0,0108	0,0835 **	0,0248
	0,41	2,77	0,65

† t-statistic, which has been computed by dividing the difference in abnormal return between the Portfolio 1 returns from different event windows to the standard deviation of the difference in abnormal returns estimated over the period [-51, -7] (see Pop et al. 2009: 1442).
* Significant at 10 % level
** Significant at 5 % level
*** Significant at 1 % level
[A] The difference in Abnormal return between the two event windows

The results show, all in all, that market reactions to bailouts did not change as the crisis progressed. Focusing on day 0 returns shows that, while the reaction to AIG bailout was weaker, reactions to TARP and Citigroup bailout later in that year were significantly stronger. The announcement of TARP produced 15 %-points higher abnormal returns on day 0 and the reaction to Citigroup was almost 13 %-points higher, both being statistically significant at 1 % level. The comparison between AIG and Bear Stearns bailouts could produce some weak evidence that the investors “learned” from Bear Stearns bailout. On day 0 and 1 the difference is positive, which means that the abnormal returns after the Bear Stearns bailout were higher. However, the market reactions to TARP announcement and Citigroup bailout produce evidence against this.

Examination of day 3 abnormal returns suggests that the market reaction to Bear Stearns bailout was somewhat more permanent than the reaction to other bailouts. The differences in abnormal returns are all positive meaning that day 3 returns were higher after Bear Stearns bailout than after other bailouts. However, only the difference in abnormal returns between Bear Stearns and TARP day 3 returns is statistically significant, thus, only weak evidence for this argument is provided.

7. CONCLUSIONS

The purpose of this thesis was to examine, how stock markets reacted to bailing out the large financial institutions during the subprime crisis. During the most critical period of the crisis, several large financial institutions were bailed out by the U.S. government. In media these actions raised heavy criticism and controversy but they were justified by the Fed and U.S. Treasury as decisions necessary to make in order to stabilize the turbulent state of the economy. With the data consisting of publicly traded U.S. financial firms the stock markets reactions to these bailouts were analyzed. Previous literature had shown that the largest financial firms experience higher stock returns surrounding the bailout decisions. Thus, the first research hypothesis expected the stocks in Portfolio 1 to generate higher returns than the other portfolios.

The other purpose was to analyze how investors' reactions changed as the crisis progressed. Previous research concentrating on this does not really exist, most probably because a financial meltdown of such magnitude has not occurred before since the Great Depression of 1930s. Therefore, there are no previous results to base the expectations on. However, the research concentrated on market anomalies has shown that with time, all anomalies tend to disappear. Therefore, as the investors learned that the bailout window would be open for the largest financial firms, the positive stock price reaction should become milder. Based on this, the second research hypothesis expected the stock price reaction to bailout decisions to become weaker after each bailout.

In order to analyze these two hypotheses, four event windows were chosen based on CDS spreads, which reflect the expectations of a firm being defaulted. The first event date chosen was 14.03.2008 when the Fed agreed to give emergency funding to Bear Stearns, formerly the fifth-largest U.S. securities firm. The second event was the bailout of AIG, which took place on 16.09.2008. The insurance giant had run into a liquidity crisis of such magnitude that the New York Federal Reserve (NY Fed) had to lend $80 billion in order to help the firm to survive. The third event was the announcement of TARP on 14.10.2008 in which U.S. Treasury prepared to invest $250 billion and acquire stakes in the ten largest banking institutions of U.S. The fourth and last event was the Citigroup bailout on 24.11.2008.

Before the data was divided into portfolios it was necessary to evaluate the level of default risk of each firm. In order to get robust results, firms with lower default risk

were excluded from further analysis. At this point, three different ratios, which reflect firms' financial position, were chosen. Then, after calculating those ratios for each firm, the most "healthy" ones were excluded from the data. The reasoning was that firms with more financial risk were expected to react more significantly to bailout decisions, whereas firms with strong balance sheets are expected to react less to the events because of their lower default risk.

The first hypothesis expected that the portfolio consisting of largest financial institutions by total assets, named as Portfolio 1, would generate higher abnormal returns than the three other portfolios which include smaller firms. The evidence for this is somewhat mixed. Starting from the Bear Stearns bailout, the abnormal returns indicate that Portfolio 1 stocks benefitted from the bailout decision over the three days after the announcement. Between days +1 and +3 the largest financial firms generated high positive abnormal returns compared to other portfolios whose returns were lower and in some cases negative. In other words, investors began to consider the largest financial firms as TBTF which was rewarded in stock market. However, the abnormal returns surrounding the AIG bailout do not reinforce this. For the analyzing purposes it is problematic that the methodology is unable to separate the effects of Lehman Brothers bankruptcy from the market reaction to the bailout decision. However, the results suggest that the possible positive reaction to the bailout decision was unable to outweigh the negative abnormal returns surrounding the Lehman Brothers bankruptcy, thus, providing no evidence about the TBTF effect.

It is not far-fetched to consider TARP as a massive group bailout. Injecting billions of dollars to nine different banks simultaneously, could be considered as evidence from the existence of TBTF banks. This generated positive and statistically significant abnormal returns for Portfolio 1 banks. However, the evidence of TBTF effect here is limited since also Portfolio 2 stocks generated even higher positive, however indistinguishably different from zero, abnormal returns. The difference in market reaction here to smaller financial firms is clear but still it seems that the investors did not so much react to the TBTF status of the firms as they reacted to the bailout as a stimulus package. Brewer et al. (2010) found similar results. However, based on statistically significant abnormal returns generated by banks taking part to the original program, they end up suggesting that at least in a very short term the largest financial firms benefitted from the TBTF status. Thus, all in all, if TARP announcement provides any additional support for the hypothesis, this support is only weak and not in any case conclusive. With the Citigroup bailout, the case is different. The results provide strong support that the largest financial

firms benefitted from the TBTF status. The day 0 returns were double digits positive and statistically significant for Portfolio 1 firms whereas for rest of the portfolios the abnormal returns were lower or even negative and not different from zero. However, as with Bear Stearns bailout these higher abnormal returns are only temporary and show no long-lasting market reaction.

Even though this thesis is able to find some evidence of TBTF effect, an evident conclusion is that this effect, if existing, is only short lived and largest financial firms benefit from their possible TBTF status only in maximum 3-day period. Even in this very short period the evidence is mixed and not conclusive suggesting that there was no strong consensus among the investors about perceiving the largest financial institutions as TBTF. In order to explain the difference of these results to those of achieved while examining bailouts of Continental Illinois or Resona Holdings, it is necessary to take the exceptional market conditions of 2008 into account. The near-meltdown of the whole financial system created enormous uncertainty among the investors and created a climate where even an evident TBTF status was forgotten in few days, if acknowledged at all.

For the second hypothesis, the analysis is not able to provide evidence to support it. After each bailout, the market reaction was expected to become weaker. The results show that the market reactions varied significantly but there was now trend in that variation. Bear Stearns bailout in March did not make the investors to expect and anticipate the bailout of AIG. Moreover, not even the announcement of TARP in October help the investors to anticipate the Citigroup bailout in November, at least based on abnormal returns. These findings suggest that investors either did not “learn” about the government policy line or did not use this information in their investment decisions. It seems that investors perceived each bailout decision as separate from the prior ones and did not form expectations based on the events.

As mentioned earlier, the results suggest investors to have relatively short memory concerning the TBTF policy. The positive daily abnormal returns turn negative in only few days providing evidence that the bailout decisions did not provide any long-lasting value premiums for the largest financial firms. The results showing that the market reaction did not become weaker as more bailouts took place, supports this also.

7.1. Limitations and Need for Further Research

Despite the mixed results, the financial crisis provides interesting framework for further research. By more carefully cancelling the other market events out, it would be possible to examine the stock market reactions in more detailed way. Instead of focusing on bailouts, it would be interesting to examine the market reaction to different legislative events or other measures taken in order to stabilize the economy. The events in the fall 2008 provide several options for this kind research. If, instead of stock returns, concentrating on market volatility would also provide interesting results of how the stock markets reacted to these significant government interventions.

In this thesis the TBTF status was assumed to be closely related to total assets. However, this is not the only way to approach the subject. By analyzing the connectivity of the firms operations to other firms, one would be able to determine which firms were not only TBTF but also too connected to fail. In addition, this approach could help to filter out firms which have little systemic importance and which are not expected to be in danger to be defaulted because of bankruptcies of other firms.

In addition, the usefulness of CDS spreads should not be forgotten. Recent research combining CDS spreads, financial crisis and the TBTF problem has shown that CDS spreads reflect accurately equity and credit market conditions and that there is a connection between CDS spread of a bank and its size (Trutwein, Schiereck 2011; Völz, Wedow 2011). Due the limitations in data supply, the use of CDS market information was limited in this thesis. However, future research with broader databases is able to make use of the spreads. The financial ratio approach used in this thesis, even though being able to reflect firm's financial position, is not able to reflect the expectations about future performance. CDSs are insurance against firm's possible default and thus provide also information about the default expectations. Thus, by using the CDS spreads to determine which financial firms are in danger to fail, one could be able to produce more conclusive results concerning the market reactions to bailing out decisions.

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