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The Federal Reserve in Times of Economic Crisis – Paths and Choices since 2007*

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Abstract

This paper studies the actions of the U.S. Federal Reserve Bank during the financial crisis from 2007-2012. Whereas the first two parts concentrate on asset bubble theory and the development of the housing bubble, the third part rates the performance of the Federal Reserve during the crisis. The chosen scoring model approach shows that the average performance of five specific measures taken by the Federal Reserve only ranks between fair and good. Comparing Stiglitz (2010) viewpoints with those of the Federal Reserve, this paper analyzes the federal funds rate, the bailout of AIG, the lending to Bear Stearns, the Term Auction Facility and the failure of Lehman Brothers. This paper argues that the resulting decisions were well intentioned but that the outcome was different from expectations because of missing regulations and restrictions. Furthermore, the structure of the Federal Reserve is examined and criticized.

Keywords: Federal Reserve, financial crisis, housing bubble, monetary policy

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Introduction

The subprime crisis that started in 2007 in the United States can be seen as the worst financial crisis in the real economy since the Second World War (Herr, et al., 2011). It is therefore necessary to understand how it came to such a development and if the responses following the outbreak of the crisis were the right ones.

After the break down of the Bretton Woods system in the late 1960s and early 1970s, most of the western countries followed neoliberal reforms which set the basis for the financial system prevailing today (Herr and Kazandziska, 2011). The key elements are described by Dullien as the deregulation of domestic and international financial markets as well as the deregulation of labor markets. Non-bank financial institutions are getting more and more important, securitization plays an increasing role and financial innovations and derivatives progressively gain market shares. The shadow banking sector, a high risk sector, became more and more important and the traditional banking system lost part of its importance. Due to the liberalized system, shadow banking agents could now use not only their own stocks to speculate, but also money from the commercial banking system (Herr and Kazandziska, 2011). The conservative neoliberal reforms evoked not only a dynamically growing financial market, but also their increasing instability (Bernanke and Gertler, 1999).

This paper studies the origins of asset bubbles in general and the detection of such in the first part. The second part will focus more on the development of the housing bubble which then burst during the subprime crisis in 2007. Therefore, this paper will describe the development of the crisis concentrating on the major events in the early-2000s that helped feed the housing bubble and will further analyze the main reasons that actually led to this bubble. After a short introduction of the Federal Reserve System and its decision process in the first chapter of the third part, the behavior of the Federal Reserve after the bursting of the bubble is analyzed using the lessons learned from parts I and II. To do so, the second chapter introduces the different measures taken by the Fed starting in mid-2007. Then, five specific actions will be studied using a scoring model approach to evaluate the performance of the Federal Reserve. The average of the measures analyzed is the overall grade of the Fed's actions. Then the result will be discussed.

Asset Bubbles and Asset Price Volatility

Asset bubbles have shaped the financial landscape for more than 300 years. Not only did they become more frequent but also the characteristics of assets traded have changed in recent years. There are several definitions of asset bubbles found in the literature. The popular press uses the term for an asset whose price has increased significantly in a short period of time so that a sudden collapse of the price is imaginable (Barlevy, 2007). Kindleberger (1978) defined a bubble as “an upward price movement over an extended range that then implodes”. According to Barlevy, most economists refer to bubbles as a movement, where the price of an asset exceeds the fundamental value of the asset. In case the price of an asset falls short of the fundamental value, one can speak of a negative bubble. Whereas the bubbles during the 17th century were mostly driven by excitement over emerging markets, bubbles during the 18th century were driven by infrastructure and land improvements. During the last century, the key drivers were more of a technological and financial nature such as stocks, high yield bonds, and real estate (Norman and Thiagarajan, 2009). Even though the drivers of bubbles changed over time, most bubbles follow certain steps in their lifetime: Displacement, Boom, Euphoria, Panic and Intervention.

The further analysis of asset bubbles and their creation is necessary as asset bubbles can produce many dysfunctional effects. “The risk is not just that asset prices can go swiftly into reverse. [Asset Bubbles] also distort price signals and can cause a misallocation of resources” (The Economist, 2005). Of course, bubbles can have positive side effects and even be desirable in some situations as they might facilitate trades that would not occur otherwise.¹

Norman and Thiagarajan (2009) show that the bursting of a bubble leads to a relocation of consumption and investment that in return will cause other negative effects related to economic growth. One negative effect is excessive investment. In times of overly optimistic outlook, investors tend to increase investments in start-ups and firm expansions because of the belief that markets will continue to grow over a long period. Once the upward trend has stopped and turned into a downward trend, investors have to liquidate excessive investments on short notice. This sudden investment volatility can lead to destructive effects for economic key drivers and also hurt businesses that cannot handle this sudden investment withdrawal. Another negative effect caused by the bursting of bubbles is the impact of policy mistakes. Governments and corporations are tempted to offer additional benefits for the population and workers in times of economic boom. These benefits can include better health care services,

¹ For further information see Barlevy (2007)

increases in pensions and compensation plans. When the bubble bursts, these benefits become unsustainable and have to be changed radically. This provokes not only economic effects but also social ones, as people see their just gained benefits decreasing again (Norman and Thiagarajan, 2009).²

Origin of Asset Price Volatility and Asset Bubbles

Economists name several factors that are at the origin of asset bubbles. Some approaches are similar to others; some vary in the reasons named. According to most economists, bubbles can vary in many different ways but most of them still have some common ingredients. This section tries to give an overview of some of the main strands of research of the origins of asset price volatility.

Sullivan (2009) argues that three factors often represent the main ingredients for a bubble: financial innovation, investor emotions and speculative leverage. He underlines that most of the bubbles of recent times were triggered by innovation either in the telecommunication, technological or financial market combined with overconfidence of investors and leverage. Innovations in financial markets are mainly driven by investors seeking to reduce, share or transfer risk what results in more and more complex structures where the risk is actually hard to evaluate. This behavior is increased by the desire of even higher returns. These innovations get problematic when they fail to deliver what they originally promised and when they multiply risk in the system as they are so hard to assess. Usually, regulation is not ahead of time with innovation and therefore complex innovations made risk management by investors and regulators more challenging contributing to a “Minsky moment”. That means a situation with positive effects as financial growth but creating financial instability at the same time.

To profit more from the innovations, investors use speculative leverage. Leverage is a necessary ingredient of the capitalistic system but needs adequate liquidity. According to Sullivan (2009) the availability of liquidity is mostly depend on the shadow banking system - that means profit- and risk-seeking financial intermediaries that are independent from the central bank. The problem is that liquidity can drop easily and fast depending on the market's tolerance for risk. This makes the system fragile and volatile and only works as long as not

² The International Monetary Fund has shown that bubbles usually lead to an output loss after their burst. Taking into consideration 40 crises, the average output loss as a share of GDP was 20.1% according to the IMF. The impact on emerging markets can be far more important than the impact on developed markets. The output loss of Thailand after the systemic banking crisis starting in 1997 was measured at 97.7%. This shows the possible destructive effect of a bursting bubble very clearly (Laeven and Valencia, 2008).

everybody wants his money back at the same time. In case liquidity is short, it provokes forced selling which results in declining prices and a self-reinforcing, downward spiral.

Guttman (2009) claims that two main factors are common to recent crises and bubbles: low interest rates and financial innovation. Because of fear of deflation, the Federal Reserve kept interest rates at a low level for a few years after a recession to enable a strong recovery. Combined with financial innovations that mobilized even more additional financing this creates a boom of assets. He also refers to the financial instability hypotheses of Kindleberger and Minsky “according to which speculative bubbles inevitably triggered spectacular financial crises sooner or later”. Furthermore, Guttman names speculation as a driving factor for the development of asset bubbles. As banks involved increasingly in securities, this speculative activity reduces the velocity of money and is generally not even shown in financial statements of banks. Speculation’s constraints usually only exist in the minds of the users and not in any physical (capacity) form. Therefore these assets are climbing as long as euphoria is stimulating investors’ investment decisions.

Dellas and Tavlas (2011) argue that the creation of asset bubbles is possible in situations of increased liquidity. They bring forward the argument that an increase in liquidity stimulates the demand for assets such as government bonds and real estate. This will lead to a price increase of the assets and reduce the rate of return. According to the Austrian view, Dellas and Tavlas state that this increase in liquidity can lead to asset bubbles of monetary policy allows expanding credits what heats up asset price developments even more.

Shiller (2005) names 12 main reasons that explain stock market booms in recent years. These reasons vary from bubble supporting monetary policy, new information technology and the expansion of volume in trade to the decline of inflation and the effects of money illusion. Nevertheless, in his book “the Subprime Solution” (2008) he argues that the most important single factor for creating asset price volatility is the “social contagion of boom thinking”. The observation of rising asset prices leads to so called “new era stories”, stories that tell that something significant has changed what justifies rising prices. Due to social contagion thinking, these stories seem to be more and more credible. People believe in such stories and in a continuing boom because all the others seem to do the same and they hear more and more stories about it. Feedback loops appear, that means increasing prices lead to stories, stories let investors to have an optimistic view and invest more. More investments provoke rising prices which will lead to more new era stories. This kind of loop is repeated over and over again in times of a speculative bubble. The increasing prices and optimistic economic view tend to

increase spending which then leads to economic growth. Many investors fail to notice that the prosperity is actually not caused by economic fundamentals but by the bubble itself because of social contagion.

Shiller (2008) compares social contagion to an epidemic. According to him, every disease has a contagion rate at which it is transmitted from one person to another. Furthermore, every disease has a removal rate at which people are no longer contagious and therefore can't transmit the disease anymore (due to recovery or death). When the contagion rate exceeds the removal rate, an epidemic starts and more and more people will be infected. The same happens concerning social thinking. If certain factors arise that boost an optimistic view of the economy and the removal rate of this optimistic view is significantly lower, then the optimistic view will be widespread through the market and social contagion will replace individual thinking and analysis. This will drive up asset prices and cause an asset price bubble. Of course, Shiller underlines, social contagion is not the only explanation how asset bubbles can arise. But according to him, this group thinking is one major factor as it is leading to a decreasing quality of group thinking because everybody will ignore his individual information to follow instead the general information.

This overview of recent strands in research concerning factors leading to asset price volatility shows, that there is no common ingredient that will inevitably lead to the creation of an asset bubble. Asset bubbles arise because of different circumstances and factors and every bubble is unique in its way. Nevertheless, there are a few main reasons that economists seem to agree on. The following table summarizes the above explained views.

Table 1: Origin of Asset Price Bubbles

	Sullivan	Guttman	Dellas/Tavlas	Shiller
Innovation	X	x		
Social Contagion	X			x
Leverage	x			
Low Interests		x	X	
Increased Liquidity			X	

Therefore, Innovation, emotional behavior of investors and low interest rates that boost spending and investments seem to be the most important factors that tend to lead to rising asset prices without fundamental explanation. A situation showing signs of one or more of these factors should therefore provoke a critical analysis of asset prices so that learning from past bubbles might influence the out coming of future ones.

Regardless of the approach, certain similarities can be recognized and some factors can be reduced to others. These factors can be helpful to understand what drives the creation of asset bubbles in general which will help to analyze the recent asset bubble and the reactions of the Federal Reserve.

Detection of Asset Bubbles?

Asset bubbles are hard to prevent and to detect. The number of recent crises underlines this fact. The International Monetary Fund counted 124 crises within the period 1997 to 2007 (Laeven and Valencia, 2008). If it would be easy to detect bubbles, then their impact on the economy could have been at least reduced if not prevented at all. Nevertheless, opinions about the detection of asset bubbles are widely spread. Some economists argue that identification in time is impossible. Others propose methods or checklists that should make detection possible before a burst. This chapter will explain a few theories of each side to show the ongoing discussions. Nevertheless, the lack of agreement can be seen as a sign how difficult it is as well.

As Alan Greenspan noted in his speech at a symposium about economic volatility in 2002 concerning the dot.com bubble “We at the Federal Reserve considered a number of issues related to asset bubbles – that is, surges in prices of assets to unsustainable levels. As events evolved, we recognized that, despite our suspicions, it was very difficult to definitively identify a bubble until after the fact – that is, when its bursting confirmed its existence” (Greenspan, 2002).

Siegel (2003) proposes an operational definition of an asset market bubble depending on “whether the future realized return of the asset justifies the original price over a time period long enough so that the present value of cash flows received by investors during this period constitutes at least one-half of that price.” This future time period is defined by the duration of that asset. Duration is the time-weighted average of all future expected cash flows of that asset (dividends). If realized return and expected return are more than two standard deviations away from each other taking into account prevailing risk and return conditions, the existence

of a bubble is confirmed. This means it is necessary to wait a sufficient amount of time (the calculated duration) to be able to either confirm the accuracy of the expected return (that means the asset price it is traded for) or disprove it by comparing the realized return with the expected return. Siegel argues, that this definition makes it therefore impossible to judge whether a price decrease indicates that there has been a bubble before that decline or not. He outlines further, that it would be possible to call a price of an asset “irrationally low” promptly after the movement when the future discounted cash flows exceed the price the asset is traded for. Contrary to that, it is not feasible to make the same immediate statement with an asset being “irrationally high” as future developments have to show whether the price was justified at this time or not.

Even though some economists agree with this point of view, there are other approaches as well. Borio and Lowe (2002) argue in their paper that the detection of asset bubbles is difficult, but not impossible. They propose a pre-crisis indicator called credit gap that helps identifying bubbles. Based on work by Kaminsky and Reinhart (1999) which were able to define thresholds for growth rates of credit, Borio and Lowe look at three different measures based on asset prices, credit and investment and found out that the one based on credit is the most suitable indicator. The credit gap is based on ex ante data and is assumed as the “difference between the current ratio of credit to GDP and a slowly changing measure of the trend value of this ratio” (Federal Reserve Bank of San Francisco, 2009). A boom or bust is therefore characterized by the event that the ratio of credit to GDP deviates significantly from its trend (based on data of previous years). The critical point of this theory is the decision which threshold level is used. Borio’s and Lowe’s tests have shown, that the accuracy of the prediction is depending on the percentage of threshold used and the chosen time horizon. Best results were accomplished by choosing a time horizon of three years and a threshold of four percent. 79% of the crises could have been predicted and the percentage of falls alarms went down to 20%.

These are just examples of how economists try to find measures that make predicting asset bubbles easier so that wide economic reactions could be decreased or even prevented. This field of research is highly discussed and there are many different points of views available. The interest in this topic and the complexity of certain models prove that the identification of a bubble is a complicated matter.

The Development of the Housing Bubble and its Burst since 2001

An Overview of the Creation of the Bubble 2000 – 2007

The bursting of the dot-com bubble in 2000 led to a significant decrease in the stock market. After strong growth since the late 1990s, tech stock prices fell up to 75% until October 2002. This led to a recession in March 2001. To fight this recession, Alan Greenspan, Chairman of the Federal Reserve at that time, lowered the federal funds rate. When President George W. Bush failed to stimulate the economy with its tax cuts for the rich, everything was relying on monetary policy. Therefore, the Federal Reserve flooded the market with liquidity in form of cheap money. Because of all the excess capacity in the economy, the cheap money did not enhance investments in plants and equipment. Instead, consumption goods and real estate were the new focus for investments at this time.³

According to Ceyla Pazarbasioglu, head of capital market research at the International Monetary Fund, the global pool of money doubled in size in only six years (Davidson and Blumberg, 2008). This global pool of money basically contains all the money the world is saving at one precise moment and increased from 36 trillion dollars to 72 trillion between 2000 and 2006. This money is mainly put in investments with a low-risk and high-return profile. When Alan Greenspan announced that the Fed Fund rate remains on a low level, investment opportunities in treasury bills were ruined. Therefore mortgage-backed securities became the focus of interest among other investment possibilities, providing a stable income with underlying assets as securities.

Instead of focusing on the design of mature financial products, Wall Street was focusing on products that were generating a higher profit in times of cheap money supply. They created mortgages with high transaction costs, variable interest rates and no protection against falling house prices or job loss. The designed products maximized the profits of lenders and increased homeownership even though this increase was not a long term development. According to Stiglitz (2010), there are two main functions of the banking system: providing an efficient payment mechanism with facilitated transactions and transfers; and managing and assessing risk and making loans. Unfortunately, most banks concentrated more on transaction costs and other ways to make money instead of focusing on their core functions. They were

³ When the United States invaded Iraq in 2003, oil prices started to increase. The price per barrel went from \$32 in March 2003 to \$137 in July 2008. Therefore, the money spent to import oil increased to \$1.4 billion per day – money that was spent for imports instead of investments that could help the economy at that time. Because of that and less inflationary pressure, Greenspan kept the interest rates low and money remained cheap (Stiglitz, 2010).

not focusing on lending to small and medium businesses even though this kind of investment is necessary for a growing economy and job creation. Banks were focusing more on securitization of mortgages.⁴

The global economy needs growing consumption. But growing consumption is only possible if the income of the population increases in the long run. The income of Americans stagnated for so long, nonetheless America acted as consumer of last resort many times. The solution for most Americans was borrowing to finance this growing consumption behavior. The average savings rate fell to about zero. As many rich Americans increased their savings this means that the poorer part of the population had a negative savings rate and went further into debt. The low interest rates of the Federal Reserve and lax regulation policies enhanced this development. The borrowing was mostly based on the assumption that housing prices would continue to increase. So people could take out loans for new cars based on their increased home value and still have a certain amount left they could use for retirement. According to Stiglitz (2010), two thirds to three quarters of the GDP before the burst of the bubble in 2007 was housing related. This included not only the construction of new homes, but also borrowing on them and then spending the money on something else.

As house prices almost doubled from 2000 to 2006, real estate investments were considered as safe investments. Many house owners even speculated on rising prices and so they were able to reduce the necessary down payments for their loans (Sagemann and Reese, 2011). Because of the increased global pool of money, more and more investors were looking for investment opportunities with low risk and a reasonable steady return. To be able to fulfill the low risk criteria, investment firms collected mortgages from smaller banks and brokers to

⁴ Securitization of mortgages has been used since the late 1970s. Subprime loans are more likely to default than prime loans. Because the subprime borrower made a smaller down payment than the prime borrower, he has less to lose in case of a default. Mortgage lenders therefore diversify among a high number of borrowers to reduce the risk exposure. This diversification only reduces specific or diversifiable risks as defaults due to job loss but not systematic risks such as house price decreases. To shift the risk, mortgage lenders use securitization of mortgages. Mortgages are pooled, repackaged and sold to different investors. Securitization became more and more popular since the late 1990s and was used with other types of loans as well such as credit card debt. Because of the high interest rates, subprime mortgages were very appealing for this kind of financial product. Mortgage originators or banks generally create special purpose vehicles that pool numerous residential mortgages to create residential mortgage-backed securities. The creation of special purpose vehicles removes the mortgages from the balance sheet and with that the risk exposure related to those mortgage loans. Less risk exposure on the balance sheet implicates lower capital requirements according to regulators and internal risk management systems which leads to more capital capacity that can be used to make even more loans. The residential mortgage-backed securities are structured into three tranches- a senior tranche with the lowest interest paid and the least risk exposure, an equity tranche with the highest returns paid as any losses are absorbed by this tranche first and the mezzanine tranche that falls between equity and senior tranche. In the case of subprime mortgage-backed securities, the senior tranche is supplemented by overcollateralization and excess spread that allows those securities to be rated with a AAA rating (Jacobs, 2009).

assemble them and sell tranches to the global pool of money. Due to this assemblage and tranche system, investors of mortgage backed securities did not have to handle the hassle and risk coming from single mortgages, e.g. default payments of client XY (Davidson and Blumberg, 2008).

According to Davidson and Blumberg (2008), the demand for asset-backed securities increased even more as the global pool of money went up steadily. As those investment tranches are composed of many single mortgages, the demand for mortgages went up as well. To satisfy this demand and as a result of rising house prices, the necessary criteria for clients to get a mortgage loan decreased and more and more people were allowed to borrow money.⁵ Risk was put aside as all banks and brokers offered the same kind of loans. The fierce competition on the asset-backed securities market made companies join the wave even though they knew the traded mortgages were bad ones.

When housing prices started to decline in late summer 2006 due to an increase in supply and decrease in demand, mortgage rates began to climb to a higher level. People began having problems paying back the higher mortgage rates with their current income. Therefore more and more lenders defaulted on their mortgage payments (Shiller, 2008). The SandP/ Case-Shiller Home Price Index showed a drop of 33 % between 2006 and 2009. Consequently the foreclosure rate went up and tripled to almost 3 million per month in 2008 (Sagemann and Reese, 2011). The defaulted payments caused severe losses for banks and other investors as the underlying securities of those bad loans were decreasing in value and therefore did not cover the full initial loan sum. Consequently, investors had to face losses which were in no relation to the calculated risk profile of the asset-backed securities they had bought before. The subprime credit crisis first became public when HSBC had to announce a write-off of 11 billion USD due to mortgage debt investments. When other investors followed, the credit crisis triggered worldwide turmoil in the capital markets. Banks and hedge funds were forced to recapitalize followed by closed money market funds and the collapse of Bear Stearns and Washington Mutual. In 2008 Lehman Brothers went bankrupt which symbolizes the largest bank failure in history. Subsequently, many large banks and financial institutions had to ask

⁵ Once everyone who was qualified for a verified income, verified asset loan had already gotten a mortgage, guidelines got looser. The next form of loan was a stated income, verified asset loan. Applicants only had to state their income and prove the existence of their underlying assets. When guidelines loosened even further, stated income, stated asset loans evolved, where both factors were just stated and not verified. The next step was a no income, verified asset loan where people did not have to state their income at all, not even their job. Finally, so-called NINA loans were created – no income, no assets loans, where people did not have to state anything at all and just needed a credit score to be approved. This loose lending behavior of banks marked a new era. As banks did not hold these mortgages for a long time because they were sold to Wall Street after a few months, the brokers did not care about the potential risk anymore (Duttweiler, 2009) (Shiller, 2008).

for financial help from their respective governments and were consequently partially nationalized.⁶

Major Reasons that led to this Bubble

The reasons that have caused the American subprime crisis and have subsequently led to a global financial turmoil are numerous and cannot all be taken into consideration in this paper. The focus of this section relies on some major reasons that help understand not only the creation of the bubble but also the development once the bubble burst in 2007. Of course there are many other factors that played a role during the financial crisis and this enumeration does not claim to be complete.

The Housing Myth and Governmental Support

According to Shiller (2008), the overly optimistic view of the real estate market was one major factor during the crisis. During a survey in 2005, a third of all questioned homebuyers in the San Francisco area answered with exaggerated price expectations, sometimes exceeding 50%. The average expected price increase for the next 10 years was about 9% per year. These expectations were mainly results of increasing house prices in the past and interpretations from others concerning these increases. As explained in part one of this paper, the social contagion created “new era” stories, making everybody believe that it must be true because everyone couldn’t be wrong. The price increases supported economic optimism which encouraged spending behavior. The increased spending endorsed economic growth and created therefore even more optimism. As real estate prices were increasing steadily, people considered housing as a safe investment and started basing their decisions on the actions of others instead of their own assessment of the situation.

This behavior was encouraged by what Shiller (2008) calls the “real estate myth”. This is the myth that real estate prices must increase over time as the population and economy are growing and the amount of land available is limited. Therefore, people expect increasing house prices as a result of growing GDP. But even though the fraction of income spent on housing is stable over the years, the growing income is not invested in more expensive housing, but in an increasing amount of housing. According to the U.S. Census Bureau, the average floor area of one-family houses increased almost 50% from 1973 to 2006, and the

⁶ e.g. Citigroup Corporation and Commerzbank

average household size declined from 3.29 persons in the 1960 to 2.63 in the 1990s. This means, people move in bigger houses and spread out among more houses, explaining the increasing amount spent on housing and disproving the myth.

Government programs such as the Community Reinvestment Act (CRA) boosted housing even more as they encouraged financial institutions to lend to underserved communities and to make housing affordable. Also the privatized, government-sponsored enterprises Fannie Mae and Freddie Mac contributed to boosting housing consumption as their purpose is to expand the secondary mortgage market by securitizing mortgages. This securitization made it possible that lenders could reinvest and led to more credit volume for real estate investments to reasonable terms. Both enterprises regulate the quality and quantity of the real estate loan market and are subject to strict oversight. The first mortgage-backed securities were issued in 1970 representing only a small portion of all loans traded. This situation changed after the bursting of the dot.com bubble, when the amount of subprime loans and Alt-A loans increased significantly (Herr, et al., 2011).

Furthermore, the drive of former President Bush for homeownership fueled the bubble. According to George W. Bush, all Americans should own their own home and he tried to expand homeownership especially among minority groups. With “his housing policies and hands-off approach to regulation, [Bush] encouraged lax lending standards”(Becker, et al., 2008).

The Federal Reserve's Monetary Policy

As noted above, the interest rates of the United States Federal Reserve Board of Governors remained at a low level. With these measures, the Fed tried to fight the economic downturns following the burst of the internet bubble and the attacks of 11th of September 2001 as low interest rates favor investments and economic development. Nevertheless, low interest rates hold a certain risk of inflation if maintained for a longer period. Alan Greenspan believed that the potential inflation coming from low long-term rates would be counterbalanced by innovation and globalization boosting productivity and competition. During his 18 years as the head of the Fed, Greenspan flooded the US economy with cheap money to encourage spending and borrowing in times of financial crises. Market participants were relying more and more on this behavior, also known as “Greenspan put” (Sagemann and Reese, 2011). Therefore the Fed approved loose lending policies of banks and other financial institutions because it encouraged consumption and was seen as an efficient tool to stimulate the growth

of the US economy. When house prices rose significantly, Ben Bernanke (2005), the successor of Alan Greenspan, noted that this rise mostly reflected strong economic fundamentals. According to the Fed, asset bubbles would not have an impact on the long-term development of the economy. And this theory was not completely wrong as Americans had been buying houses using debt financing for a long time.

Nevertheless, the low interest rates implemented by the Fed were driven by economic conditions and cannot alone explain the nine year upward trend of real estate prices. Shiller (2008) claims that the period of negative interest rates after inflation correction was 31 months long. This is just a third of the nine year price increase and therefore is not enough to justify such a sharp increase over time. The Federal Reserve was mainly focused on preventing a recession and deflation after the stock market crash and interpreted the home price increases as a continuing trend.

Macro-Economic Trends

According to Norman and Thiagarajan (2009), four important macro trends enhanced the less risk adverse behavior and development in recent years that were a crucial factor for recent crises. The 1999 repeal of the Glass-Steagall Act plays an important role in this theory. Introduced in 1933, this Act separated the commercial banking system from the investment banking system and created barriers for banks to engage in speculative activities. When the Glass-Steagall Act was repealed, banks were allowed to take part in transactions and underwritings of instruments like mortgage-backed securities and collateralized debt obligations. Because of the missing separation, banks became “too big to be allowed to fail” which created “incentives for excessive risk-taking” (Stiglitz, 2010). The second important macro trend is the effect of disintermediation. Norman and Thiagarajan (2009) claim that removing banks as intermediaries caused that they are responsible for less than 25% of all financial assets through loans. Non-financial-banks could offer lower spreads than banks and therefore risk was transferred to the financial markets because non-bank financial intermediaries were less regulated and allocated riskier investment opportunities. As Sullivan, both authors argue that financial innovation was one reason leading to recent crisis. Even though financial innovation is a positive force that drives up efficiency and productivity, the evaluating systems were mostly inadequate for the new complex structures and led to misjudgment of taken risks. Furthermore, increasing short term interests of investors led to shorting of securities which has a negative effect concerning the propagation of bubbles.

Together with increasing equity volatility, covered stocks with high short term interest rates led to additional investments in stocks enhancing the creation of a bubble. According to the Norman and Thiagarajan (2009), “high levels of short interests also result in investors seeking and propagating negative information about the company”.

Financial Innovation

As explained earlier in this chapter, financial innovation was one key driver of the housing crisis. The securitization of mortgages and the selling of tranches led to complex structures that were hard to assess and judge when it comes to the involved risk. According to Stiglitz (2010), the financial markets failed to perform their functions of managing risk, allocating capital and mobilizing savings while offering low transaction costs. “Instead, they had created risk, misallocated capital, and encouraged excessive indebtedness while imposing high transaction costs” (Stiglitz 2010; 7). Banks and other institutions not only misjudged the risks involved in their transactions and the according rating of their investments, they also misjudged the risk evolving with high leverage. Risky assets only hold small risk premiums because Bankers were speculating that either the Federal Reserve or the Treasury would bail them out in case something happened (which turned out to be right). Stiglitz (2010) argued that wrong incentives and opportunities made bankers greedy. The deregulation made it possible to create complex investments with increasing risk and information asymmetries.

Agency Problem and Poor Corporate Governance

There was also an agency problem in the process of investment. The people that took investment decisions did invest on behalf of others and not on behalf of themselves. Therefore the focus shifted to short-term returns for the decision-making investors instead of long-term performance for those who provided the funds. For banks this meant that they were more focusing on how to create more fees instead of focusing on the creation of better products. Higher fees meant higher quarterly returns and higher returns usually translated into higher stock market prices. That was all that management cared about as their pay depended on stock market prices instead of long-term returns. Securitization not only separated lenders from brokers, it also created imperfect information. The buyers of the mortgage-backed securities have to trust the banks, which in return have to trust the mortgage originator. The problem was that the mortgage originator cared only about quantity but not about quality. The bankers used to blame the mortgage originators after the bursting of the bubble, but in fact they did

not study the mortgages well enough or just did not want to as their incentive was passing these mortgages to investors.

Severe agency problems and externalities usually prevent markets from efficient outcomes. This is one major argument for financial market regulation. But the government did not only abandon existing regulation, it also failed to adopt new regulation that would respond to the financial innovations. The repeal of the Glass-Steagall Act allowed banks to become too big to fail which created a further incentive to engage in excessive risk. Together with the “Greenspan put” this created a certain moral hazard.

Origins of the Housing Bubble – Comparison with the Theoretical Approach

As shown in earlier, there are many strands of research naming different criteria that are encouraging the development of an asset bubble. According to the different approaches explained in that chapter, the recent subprime mortgage bubble seems to be a textbook example of an asset price bubble as it included all factors mentioned above:

Mortgage securitization and other new financial products are representing the innovation driven by the purpose to reduce and shift risk from mortgage lenders. These innovations spread very quickly as banks tried to maximize their profits. This behavior is coherent to Sullivan’s (2009) first main ingredient for a bubble and also one of Guttman’s (2009) important factors. The belief that housing prices would increase continuously and the housing myth represent the social contagion theory of Shiller (2008) and the investors’ emotion approach from Sullivan (2009). Investors were caught in “new era stories” and wanted to profit from the housing boom as well, what created a further increase until real estate prices reached its peak. Furthermore, leverage played an important role during the subprime crisis. As banks were holding many of their mortgage securities off their books, the capital requirements were not adjusted to their actual risk engagement and the spare capacity could therefore be used for further investments. This drove up the leverage even more. Low interest rates and increasing liquidity were applying during the subprime bubble as well. When Alan Greenspan kept the federal funds rate at a low level to stimulate the economy after the stock market crash in 2001, money was cheap and the credit volume was expanding. The increase in liquidity stimulated the demand for government bonds and real estate instead of investments in plants and equipment due to the excess capacity of the economy.

This analysis shows that all the important factors that could feed a bubble were present during the 2007 subprime asset bubble. All these factors combined with missing regulation and

reckless behavior of market participants fueled the development. This not only proves the applicability of the theories discussed in the first part but also shows, how deep and fundamental some problems were. As all factors played together and market participants kept on believing that this upwards trend would not come to an end so soon, the effects of the bursting of the bubble were disastrous. Nevertheless, this bubble has some unique features as this time assets were concerned. Usually an economy builds up on its assets in times of economic downturn. As this was not possible during this particular bubble, the treatment of certain aspects of the bubble had to be different from usual approaches.

The Federal Reserve's Reaction during the Subprime Crisis – Case Study

This part analyzes the Federal Reserve's reaction during the subprime crisis. For a better understanding of the mechanisms and processes involved when taking decisions, the Federal Reserve System will be briefly explained at the beginning of this part. Then the focus lies on five specific actions taken by the Federal Reserve. These are studied with the help of a scoring model approach.

The Federal Reserve System – Organization, Monetary Policy and Tools

The history of central banks began in 1668 with the establishment of the Swedish Riksbank. At this time and up until the late 1850s the main factor for creating these special banks was war debt financing. Central banks were seen as havens for additional government debts in times of war or civil strife. Since then, the purpose of those institutions has changed remarkably as the main objective changed from financial and banking stability to mostly monetary policy as a key function nowadays (Pollard, 2003).

Rather than being one single central bank, the Federal Reserve System is established as a central bank system with a Board of Governors with its residency in Washington DC and 12 regional Reserve Banks widespread over the United States. These measures have been taken into account to avoid strong governmental control over the Fed (Waller, 2011). The Federal Reserve Banks do not correspond to political entities but comprise parts of different states and follow county lines instead of state borders (Pollard, 2003). Section 2.1 of the Federal Reserve Act specifies that there have to be “not less than eight nor more than twelve cities known as Federal Reserve cities”.

To avoid that the twelve district banks concentrate too much on their respective area, the Board of Governors in Washington DC constitutes an entity focusing on nationwide policies. All seven members are nominated by the President and confirmed by the Senate of the United States. Governors are appointed for a nonrenewable term of 14 years to ensure long term decisions of the board. The terms are staggered so that one term expires theoretically every two years. This ensures that no single government can nominate and appoint all members of the Board of Governors, favoring the government's political tendencies. Therefore the appointment conditions do not only favor a certain independence of the Board to political influences because there is no worry for reappointment from the President or Senate but increases as well the accountability of the Board members as it is more likely, that they have to deal with the outcomes of their earlier decisions within their term of 14 years (Waller, 2011). The Board of Governors has one chairman and one vice chairman. Both have to be appointed by the U.S. President and confirmed by the Senate of the United States among the existing members of the Board or simultaneous with appointment to the board (Pollard, 2003). According to the Federal Reserve Act Section 10, the President has to make sure that in appointing the members of the Board, financial, agricultural, industrial, and commercial interests are fairly represented among the members. The same applies to the geographical division of the country which implies that not more than one member can be selected from any Federal Reserve district bank. In practice, these restrictions haven't been obeyed very closely in recent years. In fact, most members of the Board nowadays are economists and/or bankers and their link to the district banks they have come from is often loose (Pollard, 2003). To ensure that not all policy makers are political appointees, the presidents of the twelve Federal Reserve Banks are chosen by the citizenry of the respective district in a non-electoral manner (Waller, 2011). All twelve district banks contain a board of directors, consisting of nine members. Section 4 of the Federal Reserve Act specifies that the members of the board are classed into 3 categories: class A, B and C, each including three members. These members are chosen from a wide range of sectors to provide a broad perspective of the economic well-being of the district. The members of the board are therefore chosen for their professional qualifications and not according to their political affiliation (Waller, 2011). The class A directors represent the commercial member banks of that district, whereas class B and C directors represent the public. Class A and B directors are elected by the member banks of that district, the class C directors are appointed by the Board of Governors. Neither class B nor class C directors may be officers or employees of a bank or bank holding company (Board of Governors' Publications Committee, 2005). The president of a district bank is appointed by

the board of directors of that bank and has to be approved by the Board of Governors (Pollard, 2003).

The Federal Reserve Bank is a central bank with a focus on independence and accountability even though these are contradictory ideas. The independence of the Fed is also enforced through the financial independence given by Congress in form of budget autonomy. That means that the Federal Reserve can earn its own income and spend it without government interference as long as it returns any excess income to the government. This is ensured through bank statements and balance sheets which are subject to auditing by an independent auditing firm to ensure transparency. On the other hand, mandates are long-term oriented to ensure accountability of the members. Even though accountability means some political oversight and thus contradicts independence. The accountability of the Fed is especially after the subprime crisis heavily discussed (Waller, 2011).

The objective of the Federal Reserve is written in the U.S. Code in paragraph 225A and clarifies that the Fed should “maintain long run growth of monetary and credit aggregates, combined with maximum employment, stable prices and moderate long term interest rates” (USC, § 225A). These three goals are compatible in the long run but not at every given point in time which implicates that the Federal Reserve must have an implicit ranking. In times of turmoil, the Federal Reserve Bank usually concentrates only on the stability of the financial system (Harris, 2008).

The monetary decisions of the Federal Reserve are usually taken by the Federal Open Market Committee which consists of 12 members with the right to vote on decisions. These 12 consist of the seven members of the Board of Governors, the president of the Federal Reserve Bank of New York on a continuous basis and four out of the remaining 11 presidents of the other District Banks on a rotating basis. The rotating members are elected at the first meeting each year by the boards of directors (Pollard, 2003). The non-voting members still attend and participate in the policy discussions and contribute to the committee assessment of the economic situation (Board of Governors' Publications Committee, 2005). There have to be at least eight meetings per year; additional meetings can be scheduled anytime. According to Harris (2008), the chairman of the Federal Reserve is despite of his equal position among the others more powerful than any other FOMC member as long as he enjoys the respect of the committee. Not only is the chair the public face of the Federal Reserve, he also shapes the discussion, choice possibilities and agenda and most committee members fear that raising

their voice against him would undercut the institution. The beliefs and positioning of the chairman are therefore guiding when it comes to the policy decisions of the Federal Reserve.

The Federal Reserve has three main tools to pursue its monetary policy decisions: open market operations, the discount window and reserve requirements. At the Federal Reserve meetings, the Fed sets a target funds rate that means the rate that banks pay each other to borrow overnight. Those transactions are carried out on the federal funds market due to changing amounts of reserves banks want to hold or buy/sell (The Federal Reserve Bank of San Francisco, 2004). Due to the fact that the Federal Reserve can't directly control this funds rate, open market operations are carried out to influence the rate and keep it close to the target rate. The open market operations comprise buying or selling of U.S. government securities, usually in form of repurchase agreements with duration of maximal seven days. Therefore, the Federal Reserve Bank of New York is active on a daily basis through its open market desk. Important is, that the Federal Reserve, in comparison to other central banks only deals in U.S. government securities and in USD (Pollard, 2003).

The discount window is another important tool for achieving the target federal funds rate. It comprises the overnight loans from the Federal Reserve to financial institutions and therefore "serves as backup source of liquidity for individual depository institutions" (Board of Governors' Publications Committee, 2005). Every Fed Bank sets its own discount rate at which financial institutions can borrow overnight, with the approval of the Board of Governors. This rate lies below the federal funds rate target, usually up to 50 basis points lower. The reserve requirements are not seen as an active tool as changes in the minimum reserve requirements for financial institutions are very rare. Nevertheless, the reserve requirements influence directly the transaction volume and risk-behavior of financial institutions and therefore are a way to guide the economy.

The policy decision process includes an open discussion of all FOMC members and the point of view of the chairmen. The latter summarizes the exchanged opinions and reads out a policy directive that is coherent with the committee's view. This directive is then subject of a vote of all 12 voting members (Pollard, 2003).

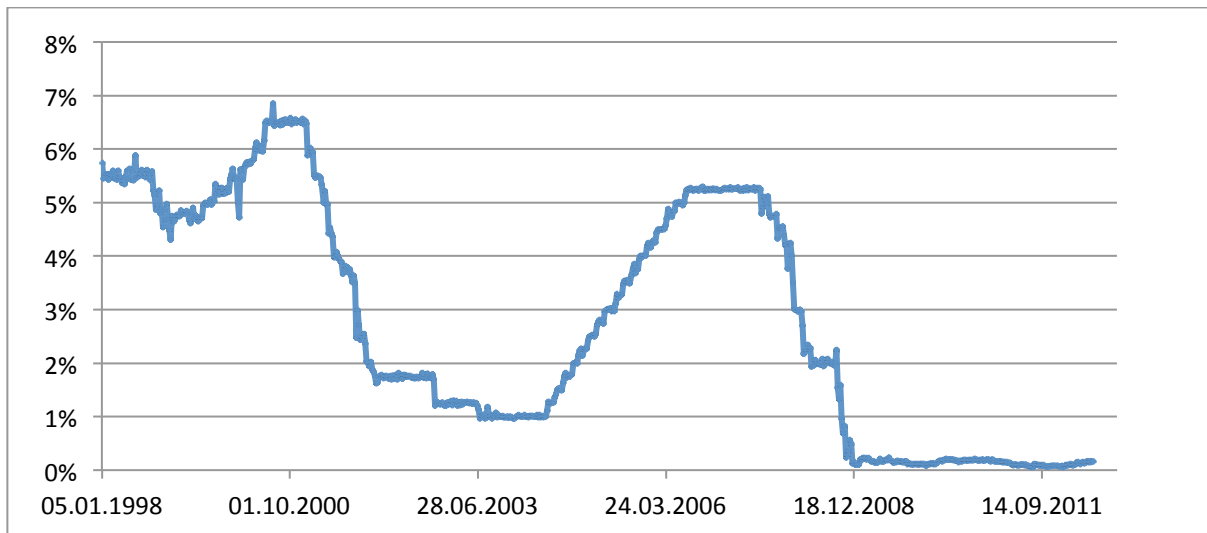
Analysis of the Fed's Behavior during the Crisis

Actions of the Federal Reserve

The severity of the financial crisis led to a variety of actions and measures taken by the Federal Reserve. As described earlier, one main tool of central banks is the setting of a target

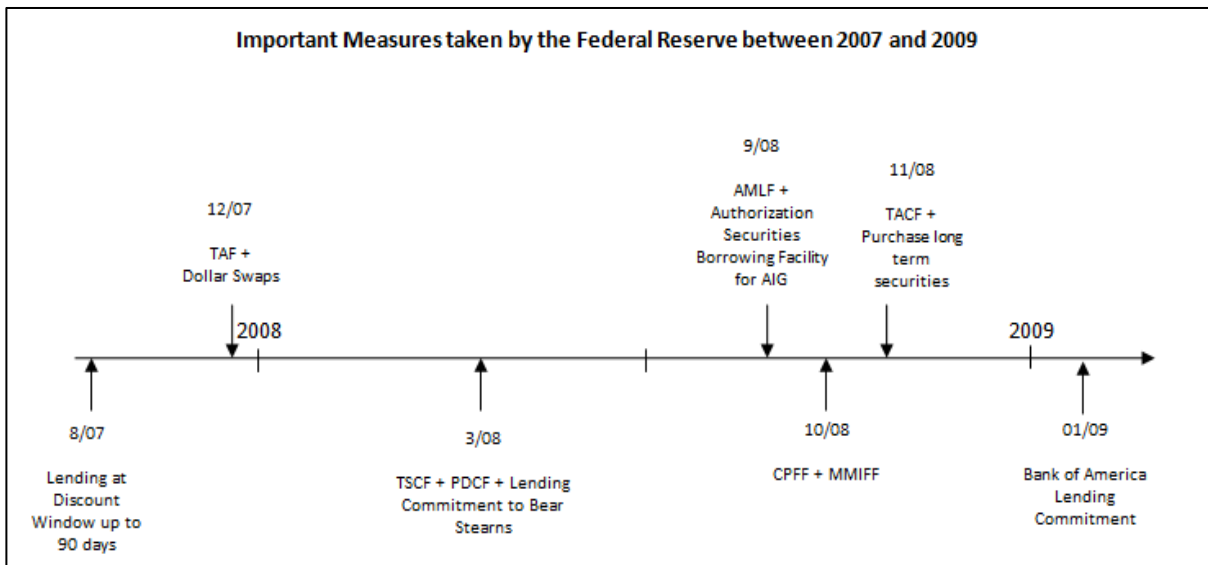
federal funds rate to influence the economy accordingly. The following graph shows the reaction of the Federal Reserve before and after the bursting of the housing bubble. After the dot.com bubble, the Federal Reserve tried to fight a threatening recession in lowering the rate progressively to 1-2%. This was hoped to encourage spending and investment.

Figure 1: The Federal Reserve's Funds Rate from 1998 to 2011



Source: Federal Reserve's Funds Rate Archive, own graph

When the first signs of an economic downturn appeared, the Board of Governors started lowering the funds rate. From mid-2007 until the beginning of 2009 the interest rate dropped from 5.25% to 0 - 0.25%. As this tool of monetary policy was not enough to prevent a slowdown of the economy, the Federal Reserve had to use other tools as well. The following paragraph gives an overview over the most important emergency programs and other Reserve Bank involvements following the bursting of the subprime crisis in 2007.

Figure 2: Important Measures taken by the Federal Reserve

The tools used by the Federal Reserve can be divided into three sections. The first category includes the provision of short-term liquidity to depository institutions, banks and other financial institutions, representing the central bank's role as lender of last resort. The second set of tools comprises the provision of liquidity directly to borrowers and investors. The third section comprehends the purchase of securities for the Fed's portfolio. These actions do not include support for specific institutions which will be explained subsequently.

Provision of short-term liquidity to depository institutions, banks and other financial institutions

When the spread between the LIBOR and the Treasury bills was increasing and the commercial paper market between large financial institutions froze at the end of 2007 and beginning of 2008, the Federal Reserve responded by creating several programs that reallocated funds to those institutions that were most affected by this "liquidity crisis". From August 2007, banks were able to borrow from the **discount window** for a period of up to 90 days instead of just overnight through the Term Discount Window Facility (Eisenbeis, 2010).

In December the same year, the Federal Reserve Board instituted the **Term Auction Facility** (TAF) to address disruptions in U.S. term interbank lending markets. In contrast to the discount window, TAF could be approached by several institutions at the same time, borrowing at an interest rate set by auction and borrowing anonymously. Every borrower that was eligible to borrowing at the discount window could bid at the auction as long as the depository institution was in sound condition. The Term Auction Facility provided the

advantage that there was less stigma attached to the auctions than the traditional discount window as funds were provided anonymously without the public noticing. Furthermore, funds were not obtained directly but 3 days after the auction (Federal Reserve Bank Governance, 2012). TAF was auctioning money to any bank in the country and not just to primary dealers anymore, trying to reduce the spread between LIBOR and the fed rates. With a lending volume of \$450 billion in 2008, this program was used more often than the normal discount window with a lending volume of \$90 billion (Wessel, 2009).

Also in December 2007, the Federal Reserve announced **dollar swaps** with several foreign central banks to flood the market with dollar liquidity to provide the dollar funding markets abroad with sufficient liquidity. Therefore, the Federal Reserve Bank of New York exchanged dollars with a foreign central bank for their local currency for a fixed exchange rate. Meanwhile, the foreign central bank agreed to buy their currency back for the same exchange rate on a set date in the future. The dollar swap lines included agreements with countries such as Japan, United Kingdom, Canada, Switzerland, Australia, Sweden, Norway and Denmark and the European Central Bank (Federal Reserve Bank Governance, 2012).

In March 2008, the Fed created the **Term Securities Lending Facility (TSLF)**, which enabled primary dealers to borrow U.S. Treasury securities against their hard-to-sell collaterals. Dealers could bid a fee to obtain the 28-day loans which they then could use to borrow against in the repurchase agreement markets. There were two different schedules of collateral that could be auctioned against. Whereas schedule I collateral just included the collateral that the Federal Reserve Board of New York accepted in traditional open market operations, the schedule II collateral included also highly rated mortgage-backed securities and other assets. To be able to do so, the Federal Reserve Board had to invoke section 13(3) of the Federal Reserve Act for the first time during the crisis. The range of assets accepted was broadened when the crisis intensified (Federal Reserve Bank Governance, 2012). With this program, the Fed could take up to \$200 billion of the assets Wall Street could hardly sell and exchange them into treasury securities, trying to prevent a downwards price spiral that would have started if dealers were forced to sell these illiquid assets (Wessel, 2009). Because the securities were lent out overnight and taken back every next morning through the lending period, the TSLF was off balance sheet and had no influence on the bank reserves in the Fed's balance sheet. Nevertheless, successful bidders could use the provided securities to engage in repurchase agreements and gain overnight liquidity (Federal Reserve Bank of New York, 2009). This allocated liquidity to primary dealers (Eisenbeis, 2010).

At around the same time, the Federal Reserve created the **Primary Dealer Credit Facility** (PDCF), a facility that provided primary dealers with collateralized cash loans over night, in case the situation with Bear Stearns creates a liquidity run to other banks. Primary dealers include banks and security broker-dealers (Board of Governors of the Federal Reserve System, 2012). Cash loans were therefore extended to investment banks and commercial banks. PDCF was available on March 17, 2008 following the already implement tri-party repurchase agreements with the primary dealers. Bear Stearns itself was the largest PDCF borrower in the first month (Federal Reserve Bank Governance, 2012).

Provision of liquidity to borrowers and investors in key credit markets

In November 2008, the **Term Asset-Backed Securities Loan Facility** (TALF) was created, trying to reopen the securitizations market. TALF opened in March 2009 and provided U.S. companies and individuals access to credit in return for securities as collateral. Before the burst of the bubble, many consumer loans such as credit card debt, student loans and auto loans, were turned into securities. When the market for these securities froze in the fall of 2008, no securities were sold anymore and consequently consumer loans decreased significantly. As this was threatening consumer spending, the Federal Reserve was trying to reopen this consumer credit securities market again through offering loans to hedge funds and other investors to buy these securities. The Treasury put in \$20 billion of tax payers' money from TARP that would absorb the first losses so that when the Federal Reserve put in \$180 billion, the total volume of loans that TALF could offer was \$200 billion. Additionally, both parties agreed that borrowers using TALF do not have to pay back the Federal Reserve in case the end consumers behind the securities the borrowers bought would not pay back their loans. In this case, the borrowing institution would just lose the additional collateral they had to post with the Federal Reserve in the beginning, which usually was just a minor percentage of the total loan. In June 2010, TALF was closed again (Wessel, 2009).

In October 2008, the Federal Reserve authorized the **Commercial Paper Funding Facility** (CPFF) under section 13(3) of the Federal Reserve Act. The created limited liability company CPFF LLC bought unsecured and asset backed commercial papers from U.S. issuers. Through this method, the CPFF LLC tried to provide the commercial paper markets with sufficient liquidity. Issuers had to pay fees up front. Together with the collateral provided to the LLC, lending of the Federal Reserve to the limited liability company was secured. As commercial paper issuers were reluctant to engage in longer-term maturities because they feared they

would be unable to issue new commercial papers to replace the maturing ones, CPFF tried to reduce this risk and encourage the purchase of commercial papers at longer maturities. The Commercial Paper Funding Facility was closed in February 2010 (Board of Governors of the Federal Reserve System, 2011a).

In September 2008, the **Asset-backed Commercial Paper Money Market Mutual Fund Liquidity Facility** (AMLF) was created to provide liquidity to money market mutual funds. When Lehman Brothers failed, the value of a share of the large money market fund “Reserve Primary Fund” broke the buck and fell from its original value of \$1 to 97 cents a share (Mankiw and Ball, 2010). Due to that and the fear of further declining prices, many investors wanted to redeem their shares. The AMLF intended to assist money market funds to be able to meet those redemptions. To make sure that the liquidity provided through the purchase of high-quality asset-backed commercial papers was used in this way, the Federal Reserve established redemption thresholds. Money market mutual funds were only eligible to AMLF loans if they have experienced outflows of at least 5% of net assets in a single day or 10% of net assets within the five prior business days (Board of Governors of the Federal Reserve System, 2011a).

The creation of the **Money Market Investor Funding Facility** (MMIFF) was announced in October 2008. The aim was to finance the purchase of short-term debt from money market mutual funds. As MMIFF expired in October 2009 without having being used, no further explanation for this funding facility is necessary (United States Government Accountability Office, 2011).

Purchase of long-term securities for the Federal Reserve’s portfolio

The Federal Reserve has expended its traditional set of tools by purchasing longer-term securities for the Federal Reserve’s portfolio. In November 2008, the Federal Reserve announced that it would purchase government-sponsored debt and mortgage-backed securities. In March 2009, the amounts were increased to up to \$200 billion in government-sponsored debt and \$1.23 trillion in MBS. The availability of government-sponsored debt decreased. To enhance a smooth transition, the Federal Reserve slowed down the purchases in August and completed the whole program in October 2010.

Support for specific institutions

When **Bear Stearns** informed the Federal Reserve on 13 March, 2008 that it would have to file for bankruptcy the next day without financial help from the Fed because of an increased run on its liquidity, the FRB voted that the Federal Reserve Bank of New York (FRBNY) would provide Bear Stearns with a bridge loan of \$12.9 billion against a collateral of \$13.8 billion Bear Stearns assets that had to be paid back on 17 March with interests of almost \$4 million. This loan was supposed to provide Bear Stearns with some time to find an acquirer who would stand behind its assets when markets reopened to circumvent bankruptcy. On 16 March, the FRB announced that the FRBNY would make a \$30 billion nonrecourse loan against certain Bear Stearns assets to enable the acquisition by J.P. Morgan Chase and Co (Federal Reserve Bank Governance, 2012). J.P. Morgan first offered to pay shareholders a \$2 share price and was standing behind Bear Stearns trades until shareholders voted about the share price. As it was not sure if shareholders would agree to such a low offer and J.P. Morgan feared it might have to guarantee Bear Stearns' trades for a long while without owning the company, the original offer was raised to \$10 per share. Because shareholders then got a better deal, the Federal Reserve wanted to renegotiate their offer as well. Criteria were set for which assets would be in the Federal Reserve's portfolio and J.P. Morgan Chase agreed to cover the first \$1 billion of losses (Wessel, 2009). After several negotiation processes, the special-purpose vehicle *Maiden Lane LLC* was created to buy assets from Bear Stearns, consisting of a senior loan of \$28.82 billion from the Federal Reserve Bank of New York and a subordinated loan of \$1.15 billion from J.P. Morgan Chase and Co (Federal Reserve Bank Governance, 2012).

American International Group Inc. (AIG) is an American multinational insurance corporation that sold among other things insurances against borrowers' defaulting, especially in Europe. After its failure to raise private money to survive, AIG tried to obtain loans. But when AIG's debt was downgraded and the stock price was falling, its business partners stopped trading with AIG and the Federal Reserve had to step in to rescue AIG from bankruptcy. According to the Fed, AIG was a profitable insurance company where just the hedge fund part was making huge losses (Wessel, 2009). On 16 September, 2008 the Federal Reserve Board authorized the FRBNY to create a revolving credit facility with a volume of up to \$85 billion with interests of LIBOR+8.5% in exchange for 79.9% ownership in the company. (Interests were lowered later when it was clear that AIG could not meet those conditions.) When the condition of AIG continued to decline, the Federal Reserve created the securities borrowing facility to provide support to a securities lending program that was

operated by domestic insurance companies that belonged to AIG. The securities borrowing facility provided cash loans to AIG's life insurance companies of up to \$37.8 billion. When the Federal Reserve restructured AIG's debt in November 2008 to strengthen its financial situation, Treasury purchased preferred stock worth of \$40 billion. The cash provided through that was used to diminish the outstanding amounts in the revolving credit facility. Furthermore, the Federal Reserve created the special purpose vehicles (SPV) Maiden Lane II and Maiden Lane III. Maiden Lane II replaced the securities borrowing facility and provided a longer-term solution for the troubled securities lending program of AIG, buying residential mortgage-backed security assets from subsidiaries of AIG. Maiden Lane III purchased collateralized debt obligations from AIG's counterparties that were in connection with the termination of issued AIG credit default swaps contracts. Additionally in December 2009, as part of the restructuring of AIG's debt, the Federal Reserve Bank of New York received preferred interest in the newly created special purpose vehicles AIA Aurora LLC and ALICO Holdings LLC, which were holding outstanding stocks of American International Assurance Company Ltd. (AIA) and American Life Insurance Company (ALICO). The aim of that was to position both SPV for sale or initial public offering and reduce the line of credit provided to AIG. In September 2010, AIG signed a recapitalization plan with the Treasury, the FRBNY and the trustees of the AIG Credit Facility Trust concerning the repayment of AIG's obligations. In January 2011, the recapitalization plan was closed as the revolving credit facility was fully repaid and any further lending terminated.

At the end of November 2008, the FRBNY provided **Citigroup** with a lending commitment together with the Treasury and Federal Deposit Insurance Corporation (FDIC) to prevent the banking organization from failure. The FRBNY agreed to lend to Citigroup after losses of their assets reached a certain value. When the loss sharing agreement was terminated in December 2009, the FRBNY never made a loan to Citigroup under this lending facility. Citigroup subsidiaries used other Federal Reserve emergency programs such as TSLF and TAF, using the "ring-fence" assets agreed in the loss sharing agreement as collateral. When the agreement was terminated by Citigroup, the FRBNY received a \$50 million termination fee.

In January 2009, the Federal Reserve announced jointly with the Treasury and the FDIC that they will provide assistance to **Bank of America** to ensure financial stability. Due to the acquisition of Merrill Lynch and its amount of mortgage backed securities, Bank of America saw its balance sheet threatened. Treasury and FDIC offered protection against unusual losses from a portfolio of loans of \$118 billion. In return Bank of America should have issued

preferred shares to both. Furthermore, the Treasury announced investments of \$20 billion from TARP in exchange for preferred stock with a dividend of 8%. But in May 2009, after the results of the Supervisory Capital Assessment Program, Bank of America announced that it did not want to continue with the announced package of support and paid an exit fee to terminate the term sheet with all three parties. The Federal Reserve received an exit payment of \$57 million (Board of Governors of the Federal Reserve System, 2011c).

Stiglitz's Point of View⁷

This section summarizes Stiglitz's main arguments and critics concerning the Fed which will build the basis for the evaluating process in the next step.

Stiglitz not only judged the actions once the bubble burst, he also brought forth that certain behavior before 2007 aggravated the magnitude of the crisis. When Bernanke and Greenspan argued that they could not tell if there was a bubble or not and even if they could tell that they had no tools to do anything about it, he disagreed. According to Stiglitz, the Federal Reserve could have pushed for higher down payments on houses or higher margin requirements for stock trading to cool down the bubble before its burst. Furthermore, the Federal Reserve could have lowered the maximum loan to value ratio instead of increasing it and restrict negative amortization and low-documentation loans. On the contrary, during his tenure Alan Greenspan allowed banks to engage in even riskier lending and encouraged homebuyers to take variable mortgage loans that could later explode. The Greenspan-put was replaced by the Bernanke-put and contributed to excessive risk taking as banks were betting that the Federal Reserve would bail them out in case they are in trouble. In general, the Federal Reserve underestimated the risk that banks were still holding; misjudged the securitization principles and underestimated the incentives for excessive risk taking of bankers.

Monetary Policy

According to Stiglitz, the main mission of monetary policy in times of economic crisis is to not make things worse. He refers to Maynard Keynes impotence of monetary policy as lowering the federal funds rate in a crisis is like "pushing on a string". Therefore, concerning the interest rates, the Federal Reserve couldn't have done more.

⁷ Economics Nobel prize winner Joseph Stiglitz is known for his economic foresight. In his book "Freefall – America, Free markets and the Sinking of the World Economy" (2010) he analysed the causes of the crisis and discussed the measures taken by several institutions when trying to rescue the financial markets. He also critically analyzed the behavior of the Federal Reserve before and during the housing bubble.

Due to the reduced competition and the low borrowing rates, banks could raise interest rates and recapitalize themselves very fast. Low interest rates can help to increase growth and investments if allocated efficiently. When banks borrowed cheap money from the Federal Reserve in return for poor collateral, this money was used for risky trading and other speculative transactions that even led to reported profits of some institutions in 2009. As nothing is growing from speculation, the provided funds were not allocated sufficiently and the taxpayers' money was at stake. Stiglitz is therefore not criticizing the low interest rates, but the missing regulation that would have forced institutions to use the provided funds for the intended purposes. Consequently, banks could borrow at interest rates of almost 0% but individuals had to face high interest rates.

Provision of Liquidity

At the first sign of problems in August 2007, the Fed started pumping money into the system to stabilize financial markets. The Federal Reserve more than doubled its balance sheet from September to December 2008. Through different tools such as TALF, the Federal Reserve tried to get the securities market going again and flooded the market with liquidity. Unfortunately while doing this, they did not pay attention to the underlying problem. Instead they just focused on the symptoms and ignored that the models of the securities market were badly flawed.

When lending froze, the Federal Reserve extended its safety net to other institutions than banks. At the end, the Fed was lending to all kinds of market participants including investment banks, hedge funds and companies. The safety net which was providing financial help to corporations but not to individuals was extended to those who did not pay into the insurance fund. Stiglitz again criticized the missing regulation. According to him, the Federal Reserve just provided funds without making any important demands that could have stopped the excessive risk taking. Another counterproductive issue that the Fed later on recognized was that reserves which were held at the Federal Reserve banks paid interest. This financial benefit discouraged banks even more from lending. Another important fact was that the Federal Reserve changed from being the banker's banker to being the nation's banker. It left its traditional business and entered unknown territory where it had no qualification in assessing risk accordingly. Through the several programs of the Federal Reserve, the risk shifted to the Fed and the government.

Transparency and Corporate Governance

The Federal Reserve acknowledged that they were missing clear guidelines of principles when it came to death or life decisions for major financial actors. Stiglitz has complained about a lack of transparency concerning the actions taken by the Federal Reserve, as it is still not clear how much of taxpayers' money was put at risk and what the cost will be in the end. Instead of increasing the transparency as Bernanke originally had planned, the secrecy increased and left spectators wondering if the obscured reason was to hide mistakes and other incorrect decisions such as resulting gifts to Goldman Sachs and foreign banks when the Federal Reserve decided to bailout AIG.

Another problem that became visible through the economic crisis includes the corporate governance at the Federal Reserve itself. Of course, when six out of nine directors from the Federal Reserve Bank of New York come from the banking industry, they are interested in continuing to make profits and therefore no re-regulation can be expected from this group of people. The regulated chose the regulators. And those who created the mess in the form of the housing bubble were put in charge of cleaning it up.

Evaluation of the Federal Reserve's Reaction during the Subprime Crisis

To evaluate selected decisions of the Federal Reserve during the housing bubble starting 2007, a scoring model approach will be used. The scoring model is based on scores for different criteria that are weighted according to their importance. Through the weighting, the scores for every criterion will form a weighted average that then provides an overall score for a certain project or action. The averages of all decisions or actions that have been analyzed form the overall score.

Four different criteria

To perform this analysis, four different criteria have been chosen. The first criterion, effectiveness, considers the reasoning and justification behind the decision of the Federal Reserve and analyses if the target outcome was achieved or not. It compares the realized effects of an action to the intentions of the Federal Reserve and analyses if the effects were helping to stabilize the financial markets on a short- and long-term basis.

The second aspect, transparency, measures the communication approach of the Federal Reserve and if their decisions were made transparent to the public and other market

participants. Furthermore, it considers the aspect of clear guidelines and tools that made the process of choosing a particular action understandable.

Additionally, the scoring model takes into consideration whether there have been other reaction possibilities for the Federal Reserve (according to their knowledge at the point of time the decision was taken) and if so, whether the chosen decision was the best one, although it is difficult to decide as the outcome of other actions is hard to predict.

The fourth criterion analyses the consistency of the Fed's actions considering measures taken before and after that specific situation. If it is a measure that was to be expected from previous actions, it is considered to be consistent. If the decision taken contradicts other actions then it is considered as inconsistent or fairly consistent.

Scoring system

Actions or decisions are graded with a scoring system from 1 to 4. Four different grade options seem plausible as they deliver enough room for evaluation. Furthermore, with an even number of grades, neutral grades are avoided. As the decisions involve relatively complex structures which dealt with power limitations and were sometimes taken under time pressure, grades of a more diversified and outspread scoring system would be hard to justify. The scores are translated into the following:

- 1 – bad
- 2 – fair
- 3 – good
- 4 – very good

This classification allows judging the actions of the Federal Reserve accordingly, given that bad (1) is the worst grade and very good (4) the best. Fair (2) represents a decision that was either justified and following the right intentions but not satisfying in its results or involving too much risk on the taxpayers' side and creating wrong incentives for market participants. Good (3) represents a decision that followed the right intentions and improved the overall situation but still leaves room for improvement.

Weighting

As not all criteria are of the same importance, the contribution to the final grade for one decision is adjusted through different weights for the different criteria. The effectiveness of an

action is considered to be the most important criterion of all. That is why its weighting in the final grade is adjusted with a factor of 0.5. That leaves the remaining 50% of the grade are split between transparency and consistency with each 20% and only 10% for the possibility of other actions, as it is hard to tell what outcome other actions might have caused. In the end, the weighted average of the scores of the different criteria is calculated thus grading the overall decision.

After having analyzed and evaluated the important decisions an overall grade is calculated as the mean of all decision grades, meaning all decisions are weighted equally thereby providing a final grade of the Federal Reserve's decisions and actions.

Implementation

Stiglitz analyzed the reasons for the housing bubble and the actions taken before and after the bursting of the bubble in his book "*Freefall- America, Free Markets, and the Sinking of the World Econom*". Stiglitz is one of the economists publicly criticizing major actions and decisions of the Federal Reserve. As his opinion is quite strong and well reasoned, his point of view is chosen as a contrast of the Federal Reserve's own justification and opinion.

For the evaluation process actions and decisions of the Federal Reserve during the housing bubble were chosen that were considered relevant and/or important. To conduct the grading procedure, Stiglitz's point of view is chosen regarding the different criteria for one action with the published opinion of the Federal Reserve. This permits judging the decision from two different and contrary angles that then leads to a specific score. The justification of that score is an interpretation and explanation based on a study of both opinions and reasoned analysis.

Decision 1 of Federal Reserve : The Federal Funds Rate

Criteria	Stiglitz's comment	Fed's comment	Score	Justification/Explanation	weight.
effective-ness	According to Stiglitz, the effect of lowering the federal funds rate in an economic downturn is not sufficient. But it is still something that has to be done.	Even though the effectiveness of monetary policy in times of crises is usually hampered, the monetary policy actions of the Federal Reserve nevertheless have worked to improve credit markets. The aggressive funds rate cuts prevented interest rates from climbing even higher levels. (Federal Reserve Bank of San Francisco, 2009)	3	Like Keynes said: "monetary policy is like pushing on a string". Still, the decision of the Federal Reserve to lower the rate to almost 0 % over time was correct. The time frame in which they were dropping from over 5% to almost 0% was unusually short.	0,5
trans-parency	no critics	Decision of the Open Market Committee. After meetings, the outcome is presented to the public. There are at least eight meetings per year, additional meetings can be scheduled according to the economic situation.	4	The federal funds rate is one main policy tool of the Federal Reserve. The strategy is decided and voted for in the meetings of the Federal Open Market Committee. The meeting schedules and decisions are accessible for the public. No changes were made in the procedure in comparison to the process before the crisis.	0,2
possi-bility of another action	none	The setting of the federal funds rate and the open market operations are the main tools of the Federal Reserve.	4	As the main policy tool of the Federal Reserve, lowering the federal funds rate was the appropriate reaction. Only when these actions did not show enough results, the Federal Reserve had to consider other tools and actions.	0,1
consis-tency with other actions	no critics	The lowering of the federal funds rate was the first reaction during the crisis. All other measures followed, when the low funds rate did not have the hoped impacts.	4	Lowering the federal funds rate over time to almost 0 was hoped to stimulate the markets and reduce interest rates by providing cheap funds. This is consistent with other measures taken by the Federal Reserve.	0,2
weighted average			3,5		

Decision 2 of Federal Reserve : the Term Auction Facility

Criteria	Stiglitz's comment	Fed's comment	Score	Justification/Explanation	weight.
effective-ness	No comment	The Term Auction Facility intended to reduce the spread between LIBOR and T-Bill rates and provide liquidity with fewer stigmas attached (due to anonymous auctioning).	2	Research showed that the Term Auction Facility had only little or no impact on the spread between LIBOR and T-Bill rates. On the other hand was TAF a good way for banks to obtain loans without causing any negative publicity (as would have been the case when using Discount window).	0,5
trans-parency	No comment	TAF was officially announced in December 2007. All information needed was and is accessible on the Federal Reserve's website.	4	Everything is accessible except the names of the institutions that were bidding and those who actually received funds through TAF (what was part of the program). Otherwise, the bidding process was transparent for all market participants.	0,2
possi-bility of another action	No comment	The Federal Reserve tried to offset the negative stigma attached to the discount window. When this did not work, the Fed had to find a different way of lending to banks that were in need of liquidity to stabilize the financial system.	4	The idea behind the Term Auction Facility was good. The discount window is one of the main tools of the Federal Reserve's lending mechanism but the stigma attached to it prevents banks to use it even though they might need it. As the Term Auction Facility is based on the same principle only trying to avoid the negative side effects, another action in this case is hard to imagine.	0,1
consis-tency with other actions	No comment	TAF was part of the first set of tools : provision of short-term liquidity.	4	The action was consistent with other measures taken to provide the financial system with liquidity.	0,2
weighted average			3,0		

Decision 3 of Federal Reserve : Bailout Bear Stearns

Criteria	Stiglitz's comment	Fed's comment	Score	Justification/Explanation	weight.
effective-ness	The system would need preventive actions to ensure that no too-big-to-fail or too-intertwined-to-be-resolved or too-big-to-be-resolved actors exist anymore.	The provision of funds to Bear Stearns prevented the imminent insolvency of the company and bought time to find a buyer for Bear Stearns. Until March 2012, most of the loans were repaid by Maiden Lane LLC and the amount of the outstanding loans of the Federal Reserve was reduced to \$2.9 billion. (Federal Reserve Bank of New York, 2012)	2	The Federal Reserve was stuck with a portfolio they shouldn't have whereas shareholders got a lot through the deal even though they should have been punished. JPMorgan Chase profited from the deal as well - aren't those the wrong people? Nevertheless, bankruptcy of Bear Stearns was prevented, but this action just showed again how bad the situation was. This action was not helping building trust in markets.	0,5
trans-parency	No comment	"Things happened very quickly and left very little time window" (Bernanke in Wessel)	2	The deal was not transparent in the beginning. The Federal Reserve ended up buying \$30 billion of worst assets JPMorgan did not want to buy. The communication about remaining outstanding loans on the Fed's website is now very good.	0,2
possi-bility of another action	Everything was so intertwined that even the failure of a relatively small institution as Bear Stearns could threaten the financial system.	The imminent insolvency of Bear Stearns might have threatened the whole financial sector.	3	Other possibilities were buying time to maybe find a counter offer, helping Bear Stearns unwind its portfolio or just let Bear Stearns fail and try to limit the damage. The first one would have been even more costly, the second would have destabilized the markets even more and for the third the outcome was unpredictable.	0,1
consis-tency with other actions	Shareholders got something, bondholders were fully protected - in other cases this was different so there is no consistency. Furthermore, the Fed is now lending to an investment bank (shadow banking system) - Fed could no longer pretend that they are only responsible for the oversight of the banks.	"The actions that the Federal Reserve and the Treasury have taken to stabilize systemically critical firms were essential to protect the financial system as a whole, and, in particular, the financial risks inherent in the credits extended by the Federal Reserve were, in my view, greatly outweighed by the risks that would have been faced by the financial system and the economy had we not stepped in." (Board of Governors of the Federal Reserve System, 2009)	2	With lending to Bear Stearns, the Federal Reserve deviates from its traditional path of only lending to banks. With lending to a financial firm outside the regulatory net, the Federal Reserve now has to examine the books of all investment banks. Furthermore, there is a lack of consistency to shareholder and bondholder treatment.	0,2
weighted average			2,1		

Decision 4 of Federal Reserve: let Lehman Brothers fail

Criteria	Stiglitz's comment	Fed's comment	Score	Justification/Explanation	weight.
effective-ness	Lehman's failure made the downturn of the crisis faster because it untwined the cross linking between the financial market actors.	The failure of Lehman Brothers was clear for so long, markets had enough time to prepare and protect themselves. The Federal Reserve was sure that the failure would not pose any systemic threat.	3	Even though the reaction of Lehman's failure was harder than predicted, letting Lehman fail sent a clear signal to the financial market. Furthermore, according to the Federal Reserve, Lehman had no assets that anybody would have liked to buy. Therefore it was not predictable when or if the Fed would have been able to recover the money invested.	0,5
trans-parency	There was no set of principles that guided the Fed through this kind of decision. This presents a lack of transparency.	Fed itself states that they had no clear legal framework for resolving big financial institutions other than banks (Wessel).	2	There was a lack of clear principles that made an understanding of the decision possible, but a decision was necessary on short-notice, so there was not really time and chance to follow standard protocols or make new ones.	0,2
possi-bility of another action	Even when the Federal Reserve said that they had not the power to react otherwise, it should have gone to congress to ask for tools/legacy instead of just saying they have no permission to do anything.	According to Bernanke, Congress would have never approved anything because they did not see how bad it was at this point.	3	It is true that up to that point, congress would have never approved any measures to rescue Lehman Brothers; asking for something at that point might have ruined all chances for later. (They had to wait for the right moment to come.)	0,1
consis-tency with other actions	The Federal Reserve bailed out AIG just two days later.	According to Bernanke, perfect consistency simply wasn't possible given the Fed's limited power (Wessel).	1	No consistency with other actions taken just a couple of days and weeks later (ex. AIG)	0,2
weighted average			2,4		

Decision 5 of Federal Reserve : Bailout of AIG

Criteria	Stiglitz's comment	Fed's comment	Score	Justification/Explanation	weight.
effective-ness	AIG received loans from the Federal Reserve to meet its obligations. But in doing so, other market participants received money from the Fed through AIG. Actors that already received money through TARP. Like this, they did not have to face any haircuts and were paid 100 cents of the Dollar (Goldman Sachs).	The Fed itself was very unsatisfied with the situation. Until March 2009, they sunk \$183 billion into AIG with the Treasury together. The credit revolving facility was terminated in 2010. For now, the deal worked out when it comes to survival of AIG and repayment of parts of the loan.	2	It could have been done more effectively, ensuring that no others would profit from these loans as well. The question is if low interest rates were justified as the Fed had to take major parts of the risk (and therefore taxpayers by providing the money) - wouldn't a certain risk premium be justified? In the end, companies like Goldman Sachs profited from the rescue of AIG and were even paying bonuses in 2009.	0,5
trans-parency	The Federal Reserve did not provide the necessary transparency. Through the bailout, money went to foreign countries instead of helping the American economy.	Description of the deal with AIG can be found on the Fed's website. The Federal Reserve was reluctant to reveal where the AIG money had gone.	1	Many facts of the deal were only revealed later; even many members of the Fed didn't know what was going on. The Fed tried to hide the counterparty benefits. The lawsuit between AIG and the IRS (Treasury is responsible for both) concerning tax methods used by AIG underlines the absurdity. On the other hand, it was again an action on short notice.	0,2
possi-bility of another action	Bailout with more regulation, ensuring that no other benefits from the Fed's money.	According to the Federal Reserve, there were no other options than providing AIG with enough liquidity to survive this situation.	2	Why didn't they put AIG in conservatorship? They could have unwind it slowly, making sure that certain partners have to face haircuts where they deserved it, protecting consumers and households, trying to prevent huge impacts on financial markets.	0,1
consis-tency with other actions	First, the Federal Reserve lets Lehman Brothers fail, then the Fed bails out AIG just days later. No consistency.	According to the Federal Reserve, AIG's core business (insurance) was healthy and could be sold whereas nobody was interested in Lehman Brothers. That explains why they did not want to buy Lehman Brothers, but helped AIG.	2	AIG is a global insurance company, not a bank. As the banker's banker, the Federal Reserve let Lehman Brothers fail because they believed that markets can regulate themselves, but provided AIG with billions of USD. At least in the beginning of the crisis, this reaction was not consistent at all. Considering the measures taken after this bailout, it fits in the course of the Federal Reserve (as they provided money to almost everybody in the end).	0,2
		weighted average	1,8		

Conclusion

The average grade of all actions analyzed is 2.56 according to the precedent method. This evaluates the performance of the Federal Reserve only between fair and good. All in all, this analysis shows that the decisions were not optimal and could have been improved most of the time. Of course it is hard to judge if other measures would have resulted in a better economic outcome than the ones the Federal Reserve chose. Especially, as every crisis is unique in its procurement and settings. It is therefore impossible to say, that the decisions were simply wrong and a specific other action would have improved the situation by far.

Nevertheless, as criticized during the analysis, there are certain things the Federal Reserve could have done to improve the impact of the chosen policy tools. One example are restrictions on lending, forcing banks that borrowed from the Federal Reserve at very low interest rates to actually use that money to create loans for consumers and investors at reasonable terms. This would have prevented that borrowers use the provided funds only to recapitalize themselves. Another reason for this unsatisfying outcome is the structure of the Federal Reserve. As described, the election process for the directors earlier, one can say that the regulated (the banking sector) elect the regulator. The Federal Reserve with its main role being the oversight of the financial sector can therefore not be seen as real independent, as many important actors from the financial market were influencing the decision process within the Federal Reserve. The question is if those weren't wrong incentives that were driving the decisions during the crisis. An institution that is responsible for the oversight of the financial system should be willing to regulate the markets if necessary even though it might implicate smaller profits and bonuses for certain actors. Furthermore, the fact that the Federal Reserve was almost unprepared and continued to deny the existence of a bubble right before the housing bubble burst, raises the question if the Federal Reserve is carrying out its mission of oversight of the financial market carefully enough.

The actions of the Federal Reserve have provoked many discussions. This is not only due to the fact that the Fed created new tools that haven't been used before but also due to the lack of transparency of many decisions of the Fed that were criticized earlier. It is not that this lack of transparency sometimes destabilized the markets even more as market participants had the feeling the situation worsened, it also gave the impression that the Federal Reserve was trying to hide certain facts from the public (as was the case with AIG). This left certain market participants believe that the Fed bailed out Wall Street but not Main Street which led to protests, underlining the unsatisfying situation.

After extending the safety net so far, it is going to be difficult for the Federal Reserve to draw back from this extension. Furthermore, the rescuing of financial market players during the financial crisis sent wrong incentives to the financial market. These incentives have to be changed. Banks and other financial institutions should not rely on the Federal Reserve stepping in in case of problems. So it is important that the procedures are changed and not only that the engine of the financial markets is running again. Otherwise, a repetition of the situation is likely.

One major reason for the housing bubble was financial innovation. It is within the Federal Reserve's duty to understand, judge and if necessary regulate financial tools in order to ensure the well-functioning of the financial markets. The recent past has shown that markets are not working efficiently without regulation. One of the main duties of the Federal Reserve now is therefore to close the gap and adopt regulation to the recent changes. If the Federal Reserve was missing power in situations such as the failure of Lehman Brothers, it should have asked Congress for that additional power. This underlines the need for changes in the future as it is important to ensure that this will not happen again. But then the accountability of the Federal Reserve has to be improved as well. By bailing out big market players during the financial crisis, the Fed put billions of taxpayer's money at risk.

All in all, five years after the bursting of the bubble, it is time to stop pointing fingers at who was responsible. It is more important to learn from the lessons the financial crisis taught. New regulations should be the main focus. The 2010 Dodd-Frank reform legislation of the Volcker rule might be a start. Although the question is whether this reform will really help deal with financial meltdowns without risking taxpayer's money. A closer analysis of the reform would be necessary to judge the outcome as it is important to see if the passed reforms really include the lessons that should have been learned from the financial meltdown of recent years. This analysis could be part of a new thesis. Furthermore, as shown in part I of this paper, the frequency of asset bubbles has increased in the past. The analysis of this fact and methods to prevent a further increase are also interesting aspects that could be considered in future work.

After discussing asset bubbles and their origins, the recent crisis development and the reaction of the Federal Reserve, this paper showed that the asset bubble theory is an important field in economic theory as the effects of such bubbles can be disastrous. As the amount of research done and literature published is very extensive, the next important step is to learn lessons from the past and prevent a repetition. Missing regulation and reckless behavior of market participants fueled the recent crisis together with other origins that were explained in part II of

this paper. That is exactly the point where a change is necessary. Even though it is important to improve the handling methods of a bubble, it is nevertheless even more important to change the underlying conditions so that bubbles cannot arise in the first place. All bubbles have common features but are nevertheless unique in their development and especially outcome. Fighting the symptoms of a bubble is therefore riskier and less reliable than eliminating or at least containing the causes of asset bubbles in general.

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