

CONTENTS

ACKNOWLEDGMENTS.....	3
ABSTRACT.....	5
1. INTRODUCTION.....	6
1.1. THE FEDERAL RESERVE.....	6
1.1.1. The Gold Standard.....	6
1.1.2. The Great Depression and the World War II.....	8
1.1.3. The stagflation and the great moderation.....	10
1.2. THE FINANCIAL CRISIS.....	14
1.2.1. Consequences.....	17
2. THE FEDERAL RESERVE MONETARY POLICY TOOLS.....	20
2.1. THE FEDERAL RESERVE CONVENTIONAL MONETARY POLICY.....	21
2.1.1. The Open Market Operations (OMOs).....	21
2.1.2. The Discount Rate.....	23
2.1.3. The Reserve Requirements.....	25
2.2. THE FEDERAL RESERVE MONETARY POLICY DURING THE CRISIS.....	29
2.2.1. The Federal Funds rate cut.....	30
2.2.2. The Extraordinary Liquidity Provisions.....	31
2.2.3. The Large Scale Assets Purchase.....	38
2.2.4. The Forward guidance.....	42
2.3. THE FEDERAL RESERVE MONETARY POLICY AFTER THE CRISIS.....	45
2.3.1. The Maturity Extension Program and Reinvestment Policy.....	45
2.3.2. The Open-ended asset purchases program.....	45
2.3.3. The Policy Normalization process.....	46
3. LITERATURE REVIEW.....	48
3.1. The impact on Net Interest income.....	48
3.2. The impact on Non-Interest income.....	50
3.3. The impact on Loan Loss Provisions.....	51
3.4. The impact on Profitability.....	53
3.5. Econometric Framework.....	54

4. THE DETERMINANTS OF BANKS PERFORMANCE.....	58
4.1. THE FEDERAL FUNDS RATE CUT.....	58
4.2. THE DATA BASE CONSTRUCTION.....	58
4.2.1. The Net Interest Income (NII).....	59
4.2.2. The Non-interest income.....	61
4.2.3. The Net Credit Losses.....	62
4.2.4. The Return on Assets.....	63
4.3. THE HYPOTESIS.....	64
4.4. THE MODEL.....	65
4.5. RESULTS AND COMMENTS.....	67
4.5.1. Impact on Net Interest Income.....	69
4.5.2. Impact on Non-interest income.....	69
4.5.3. Impact on Net Credit Losses.....	71
4.5.4. Impact on Return on Assets.....	73
4.6. Conclusion.....	75
5. ANNEX.....	78
6. REFERENCES.....	80

ACKNOWLEDGMENTS

This final work is just the last step, which concluded the journey started many years ago, following the high school graduation.

I did not make any acknowledgments in the bachelor thesis, then, this represent a good opportunity to thank people and mates who have walked with me until the end.

First, I would like to thank my family, that are, my Father and my Mother who always supported and helped me in all the decisions, teaching me the manners and to respect the others.

Subsequently, I am grateful to my University of Verona mates, that is, Gianluca, Enrico B, Antonio, Enrico S. and Pierangelo, who shared with me many experiences and who represent a pillar in my life.

I would like to thank my historical friends. Jessica, Kevin and the “Bolidi” group, that are, Lara, Paola, Lia, Alberto, Giulia, Laura, Matteo, Arianna and Vittoria, with whom I lived a huge part of my journey, being close to me since more than 10 years.

I am especially grateful to my second family, the “Warriors Verona Fight Team” and, in particular, to my coach Damiano and Luca that taught me how to fight inside and outside a ring, believing always in myself and in my abilities. Thanks to all my mates and sparring partners but, in particular, to Fabio who represented for me a true friend, when all the other preferred to go away.

Thanks to the MEF team, who joined with me this Master course, through the adversities, which has characterized this way. Basically, the follow semester will be easier.

Thanks to the CEV United boys, my favorite football indoor team, which, one day, I am sure, I will join again.

A special thank is for my girlfriend Giulia, who has shared with me all the joy and pain that have characterized these two years. She has supported and bore me every time, gifting two of the most important recent life mates, Woody & Rose.

In the end, arrogantly, I would like to thank my self for the effort and energies implemented in these years to achieve the best possible result, not only regarding to the university carrier but also in all the life aspects.

OSS

ABSTRACT

The Master thesis main aim is to analyze the Federal Reserve monetary policies effect over some selected profitability variables. The sample considers the fifty major American banks with respect to the average assets recorded in the 31/12/2017 balance sheet. In particular, it is deeply illustrated the effect of the Fed Funds interest rate¹ reduction during the Financial crisis 2007-2009.

The first Chapter is the introduction, which is splitted into two sections. On one hand, it is reported the Federal Reserve history, its successes and fails during almost one century of activity.

In the second section, it is briefly reported the financial collapse, its causes and consequences.

Chapter two is dedicated to a deeply explanation of all the tools which the Federal Reserve could implement. It is, then, described the instruments used before, during and subsequently the Financial crisis to recovery the economy.

The third reports the literature review, which is an important section of the thesis since it is included the main previous studies on which the final elaboration is based.

In the last Chapter is explained which are the profitability variables selected and their construction.

In the end, it is illustrated the main hypothesis which are accepted or rejected by the econometric analysis.

¹ <https://apps.newyorkfed.org/markets/autorates/fed-funds-search-result-page>

1. INTRODUCTION

1.1 THE FEDERAL RESERVE

The Federal Reserve was created in 1914 by the Congress and the U.S.A. president Woodrow Wilson, in order to smooth the concerns about the financial system stability.

Until the beginning of the 90ies, a Central Bank did not exist and, as consequences, all the action promoting the stability of the financial system was conducted by private institutions.

These were, definitely, not sufficient due to a lack of sources and credibility that, instead, was properly of an independent Central Bank. Furthermore, the public did not believe that a private institution could work towards its interests.

The United States, then, had to institute a lender of last resort in order to stop the “bank runs” that were not rare in this period.

The Congress main aim, therefore, was to promote the financial and monetary stability through the Federal Reserve².

1.1.1 The Gold Standard

The historic environment played an important role. In particular, during the period between the 1879 Civil War and 1933 the United States was peg to the “Gold Standard”.

It was a regime in which the currency was convertible with gold at a fixed exchange rate, set by each state and that, today by the modern economists, is absolutely not consider perfect.

The Gold Standard, indeed, had a huge effect on the Central Bank money supply. Since it was determined by the fixed exchange with gold, the monetary policies power, aimed to the stabilization of the economy, were really weak. In particular, the regime neutralized the monetary authority flexibility in reducing the interest rate during a recession or in increasing it to stop the inflation growth. As consequence, the economic system was characterized by a further volatility with respect to the production and the inflation which, indeed, highlighted a trend more erratic than modern time.

Another important weakness was the fixed exchange rate between the countries.

Since their own currencies were linked to an ounce of gold, automatically the currency exchange became fixed and it could not fluctuate as today³.

² Ben S. Bernanke, “La Federal Reserve e la crisi finanziaria, Quattro lezioni”, Chapter 1.

³ The Gold Standard was partially controlled by the Central Banks but, in the end, it created an alternative and automatic monetary system.

The fixed peg, furthermore, brought to a speculative attacks vulnerability since the banks had not a sufficient quantity of gold to convert all the currency in circulation. If a loss of credibility occurred, it would be possible to have a “bank run” looking for changing more money as possible. This is the United Kingdom 1931 scenario that had constrained the country to exit from the regime⁴. The Gold standard was able to stabilize the inflation but only in the long period, that is, at least 10 years. In the short period, indeed, it could produce huge inflation or deflation, since the money supply depended on the quantity of gold.

For instance, if in California a new deposit of gold was discovered, the quantity in the economy increased and this produced inflation. In the other hand if the economy grew up, it would be produced deflation. This volatility penalized, in particular, people that had linked their revenues to the production and sale of goods. During the deflation, the market price continued to decrease but the debt with the bank remained stable⁵.

These problems were one of the reasons that point to the creation of the Federal Reserve.

In 1913, the Congress approved the Federal Reserve Act which assigned to the new Central Bank two important functions, that is, being the lender of last resort, in order to smooth the bank runs, and to control the Gold Standard, reducing the interest rate fluctuations.

The Federal Reserve, anyway, was the positive result of the third tentative. The first and second, indeed, did not have the support of the entrepreneurial world, i.e. Main Street, which believed that the Central Bank was created just to help the financial system, i.e. Wall Street.

The President Wilson’s solution, therefore, was to create twelve Federal Reserve Banks located in the same number of U.S cities, as shown in Figure 9⁶, subjecting all the system to the supervision of the Board of Governors, which meets in Washington D.C.

This structure had the advantage to create a Central Bank in which all the regions could participate by sending economics information to Washington, which set a monetary policy based on the whole country opinion.

⁴ That is, the UK Central Bank had few reserves and everybody believed in its capacity to defend the Gold Standard. When the speculators had some doubts about its soundness, the country was obliged to exit from the regime.

⁵ Ben S. Bernanke, “La Federal Reserve e la crisi finanziaria, Quattro lezioni”, Chapter 1. Taking the example of a farmer that links its income to the products sale. If the selling price decreases, the income decreases as well but the debt with the bank remains the same.

⁶ Source: The Federal Reserve System: Purpose and Functions, System Publication.

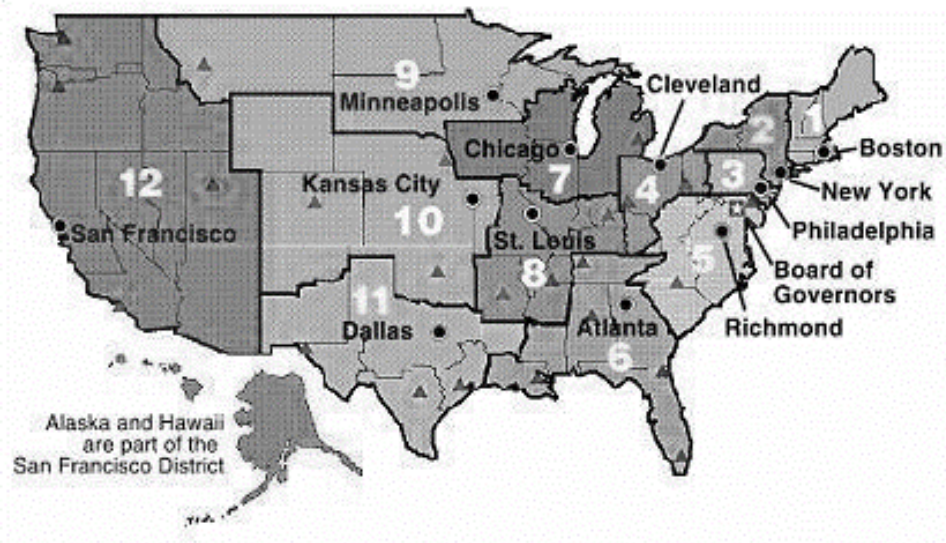


Figure 9 The Federal Reserve districts (Δ), the Federal Reserve seats (\bullet) and the Board of Governors (\square)

1.1.2 The Great Depression and the World War II

The twenties were a prosperity period for the United States being, indeed, the main economic force after the First World War, which destroyed the principal European cities.

The Federal Reserve, then, had the time to grow up in a positive climate until the 1929 Great Depression, as shown in Figure 10⁷.



Figure 10 The Index S&P Composite, 1929-1933

⁷ Source: Center for Research in Securities Prices, Index File on the S&P 500. The stock market Index reached almost 130 points before the Great Depression which, instead, reduced it by almost 60 points in a short period. The lowest pick is recorded in 1932 when the stock market Index was lower than 20.

In this period the national GDP constantly decreased and the unemployment, vice versa, constantly increased, reaching a pick of almost 25% in 1931-1932, as shown in Figure 11⁸.

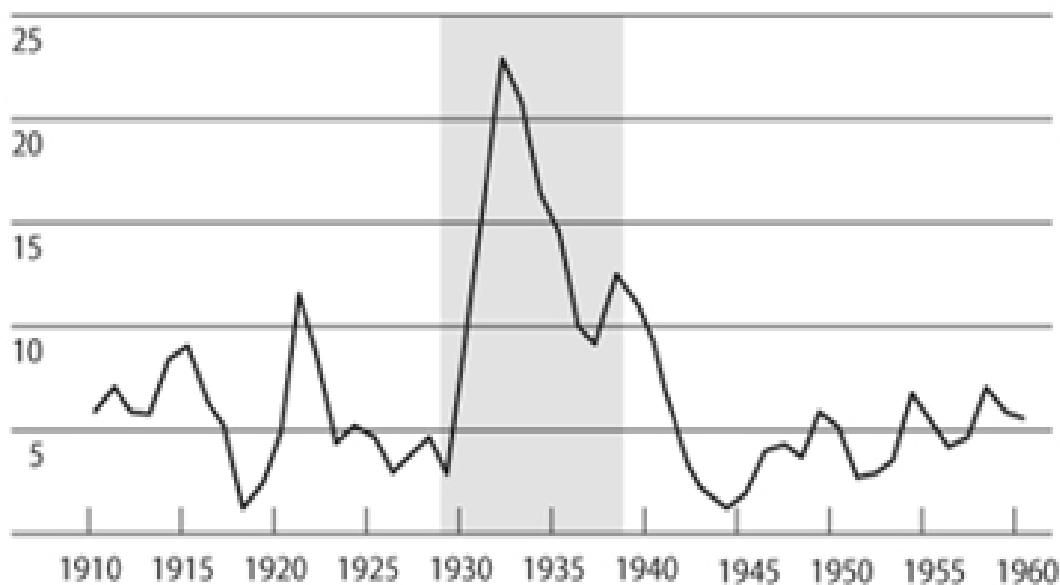


Figure 11 *The unemployment rate from 1910 to 1960*

The recession stopped in 1941, following the Pearl Harbor disaster, when the United States of America entered into the Second World War.

The Fed, in front of its first emergency, failed to set a right monetary policy and to stabilize the financial system.

About monetary policy, the Central Bank did not implement an expansionary action that today is common during a period of huge recession. This lack of intervention had, as consequence, a sharp deflection of the price and, probably, this occurred on the basis of the UK 1931 experience.

In addition, the Federal Reserve increased the interest rate, instead of decreasing it, in order to attract foreign capitals and to not exit from the Gold Standard. In 1933, the president Franklin Delano Roosevelt abandoned the regime and the economy of the country restarted.

⁸ Source: Historical Statistics of the United States, Millennial Edition. The shadow area represented the Great Depression period.

About the financial stability, the Federal Reserve failed to be the lender of last resort. During the bank run, indeed, the authority did not intervene and a huge number of institutions went into bankruptcy⁹.

In 1934, then, was introduced the Federal Deposit Insurance Corporation (F.D.I.C.), that had to grant the bank's deposits, neutralizing the bank run.

The World War II interrupted the Great Depression and the unemployment decreased due to a massive hire of workers by the firms sustaining the national army.

During a conflict the country government, usually, financed the military operations through the increasing of the public debt and, indeed, the USA one sharply increased. This time the Fed used its power to move the interest rate, keeping the public debt at a low level and reducing the cost of the war. At the end of the global War, the American government tried to convince the Fed to maintain the low interest rate but the Central Bank was afraid that such level could increase the inflation. After many negotiations with the Treasury, in 1951 it obtained to set independently the interest rate.

This fundamental agreement was called the "Fed-Treasury Accord" and for the first time the government recognized the operative independency of the American Central Bank.

Today, almost all the economists of the world believe that the independent Central Banks could achieve better results if they are not influenced by the Government authority. In particular, an independent organism can ignore the political pressure to stimulate the economics during the elections and, then, to assume a longer term prospective and a more efficient action.

2.1.3 The stagflation and the great moderation

In the 50ies and 60ies, the Federal Reserve first aim was to maintain the macroeconomic stability. In this period was not difficult to conduct the monetary policies since, after the World War II, the U.S.A. economics was growing fastly.

From 1951 to 1970, the Federal Reserve President William Machesney defined the inflation a "thief in the night", which had to be stabilized increasing the interest rates when the economics grew too fast and, when necessary, decreasing them in order to avoid a recession. This anticyclical monetary policy was called by the authority "leaning against the wind".

⁹ Source: Federal Reserve, Banking and Monetary Statistics, 1914-1941, table 66. The highest pick was reached in 1933-1934, when the number of failed banks raised to 4000.

From the first half of the 60ies, though, the monetary policy was too expansive bringing to a sharp increase of the price growth and the expected inflation. As shown in figure 12¹⁰, it was on an average of 1% but, during the Vietnam war (1965-1969), it started to increase until it reached a pick of 13% at the end of the 70ies.

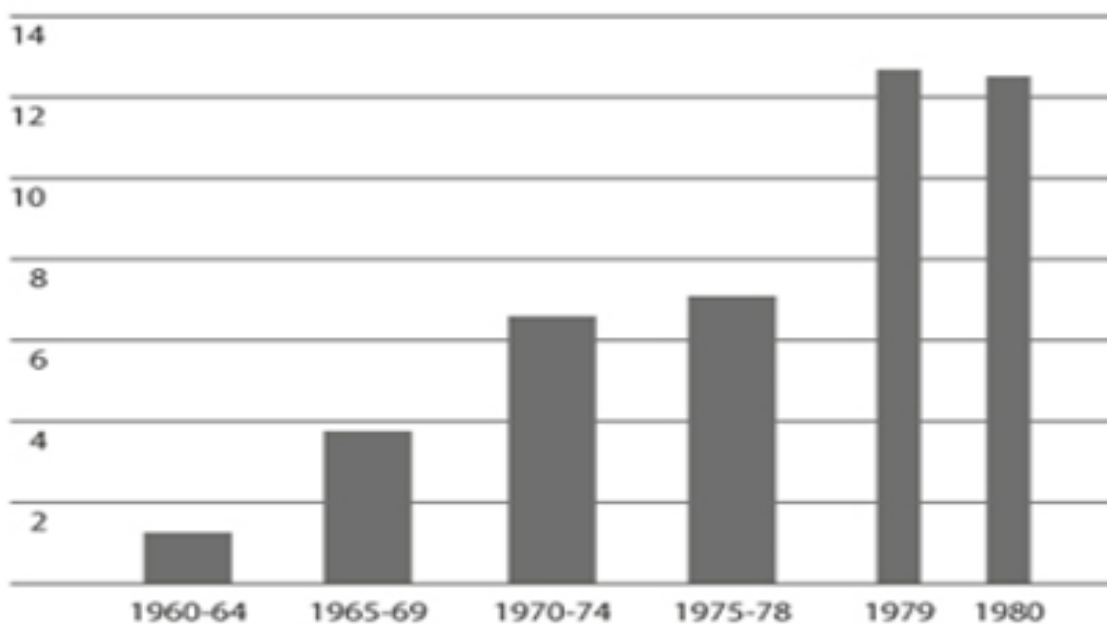


Figure 12 *The Consumer Price Index (CPI) Inflation from 1960-1964 al 1980*

The main reason of setting a so huge expansionary monetary policy was related to the optimism that the monetary authority had about the possibility of stimulating the economics without causing inflationism pressure. The Federal Reserve, indeed, following this approach, believed that the employment could permanently increase, maintaining the inflation level a little bit higher than the average.

In particular, the economists based their conclusions on the so called “fine tuning theory”, that is, the monetary and fiscal policies could maintain perfectly stable the economic. This approach, though, has brought to a sharp increase of the inflation without favoring the unemployment decreasing.

¹⁰ Source: Bureau of Labor Statistics

In 1979, the authority president Paul Volcker and the “Federal Open Market Committee”, the organism which has to formulate the monetary policies, raised the interest rate breaking the inflation loop and diminishing the price growth, as shown in Figure 13¹¹.

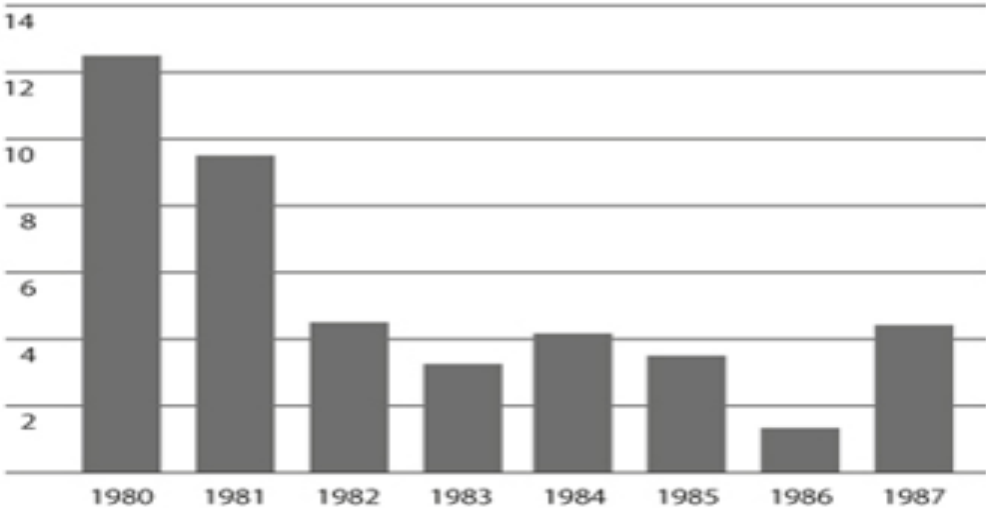


Figure 13 Consumer Price Index (CPI) Inflation from 1980 to 1987

The inflation decreased but had some consequences. The economic contracted and the unemployment increased reaching a level of 11% in the 1982, Figure 14¹².

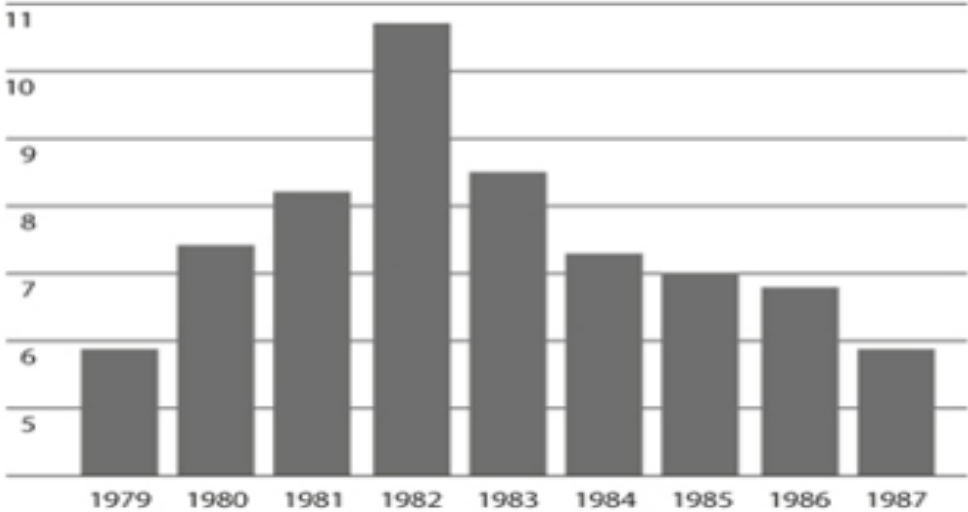


Figure 14 The unemployment rate from 1979 to 1987

¹¹ Source: Bureau of Labor Statistics. We can see a sharp decreasing of the Index due to the Fed president’s decisions. The percentage variation is computed from the end of the periods.

¹² Source: Bureau of Labor Statistics. The variation is percentual and the values are taken at the end of each period.

This episode highlighted the importance of being an independent organism. Indeed, it would be not possible to achieve the inflation lower level, if the Central Bank had received political pressure by the Government.

In the 1987 Volcker was substituted by Alan Greenspan who was the president until the Financial Crisis in 2007-2008.

This period was called “Great moderation” due to an incredible economic stability, opposite to the “Great Depression” of the 30ies and the “Stagflation period” of the 70ies.

In Figure 15¹³ was reported the inflation and economics growth volatility. During this period, they were stable due, in particular, to the Volcker’s monetary policy, which had some negative consequences in the short period, i.e. unemployment and economic contraction, but that had a huge success in the long period.

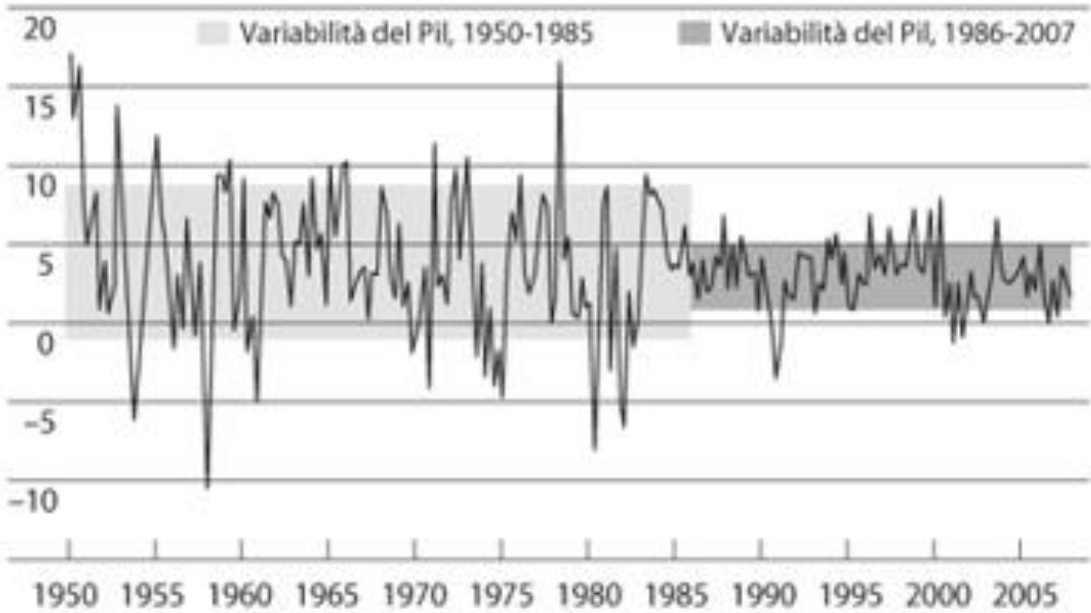


Figure 15 The real GDP growth from 1950 to 2010

Until the Financial Crisis, the U.S.A. economics was stable. Only the 2001 dot-cum bubble created a little recession, which was nothing compares to the following Crisis that hit the whole World.

¹³ Source: Bureau of Economic Analysis. The dates are quarterly and the shadow areas represent the ± 1 standard deviation interval around the average of the period considered.

2.2 THE FINANCIAL CRISIS

One of the main causes of the 2007-2008 financial crisis was the sharp raise of the real estate prices. As shown in Figure 16¹⁴, from the beginning of the 90ies until the 2008 the house prices trend raised up of almost 130%. Furthermore, the mortgage supply deteriorated.

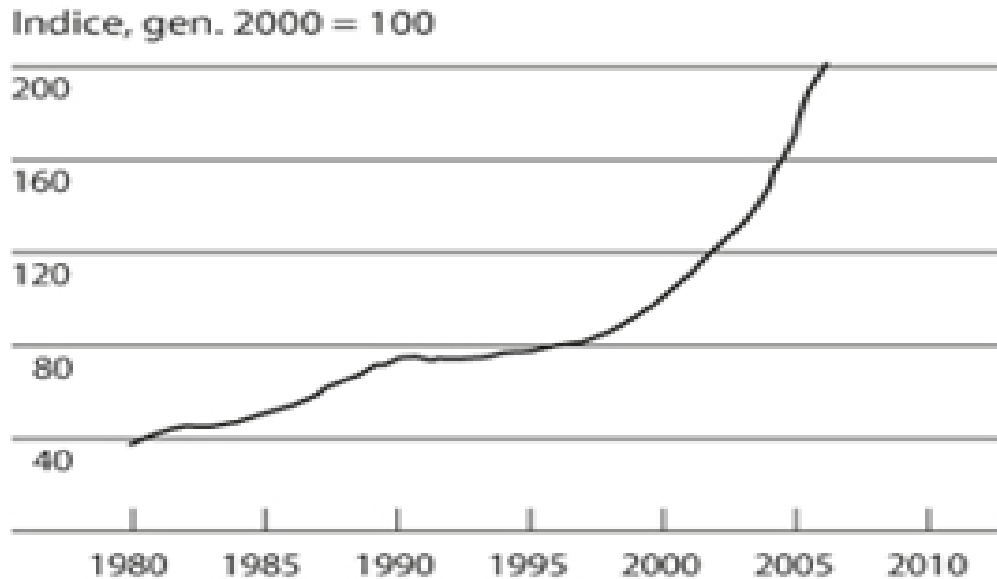


Figure 16

The single-family house price from 1980-2005

The real estate bubble was, especially, a psychological consequence due to the huge optimism deriving from the previous years. People, indeed, started to believe that the house prices continued to increase and, then, purchasing houses was a free-risk investment.

In addition, the mortgage constraints became weaker.

For instance, at the end of the 90ies, to purchase a house, a borrower had to give an anticipation of 10%, 15% or 20% of the real estate value and had to present a detailed documentation of its own financial situation.

At the beginning of the 2000, though, the credit institutions granted mortgages also to borrowers less qualify, so called “non-prime”, that, often, did not have the sufficient documentation.

¹⁴ Source: CoreLogic.

Figure 17¹⁵ showed the percentage of the new “non-prime” mortgages.

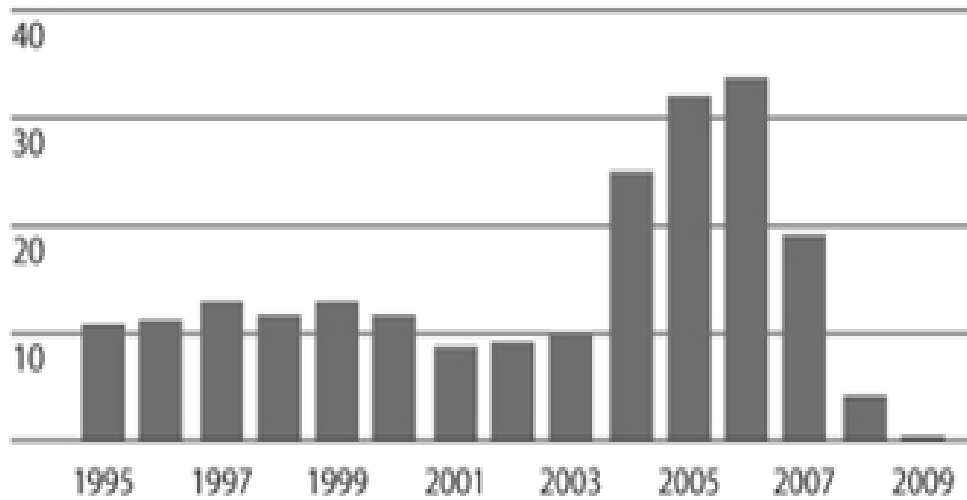


Figure 17 The percentage of new “non-prime” mortgages on the total real estate mortgages from 1995 to 2009

Figure 18¹⁶ showed the level of the income with respect to the mortgage monthly payment. As we could see, the monthly payment absorbed a huge part of the income available of the families, raising the house prices until its highest level in 2006 when the demand started to decrease.



Figure 18 The income level with respect to the mortgage monthly payment

¹⁵ Source: Federal Reserve specialists' estimations, based on the “Inside Mortgage Finance” dates. The percentage of new “non-prime” mortgages on the total real estate mortgages from 1995 to 2009.

¹⁶ Source: Federal Reserve Board. The values are expressed as a percentage of the available income.

The demand diminishing burst the bubble and the price of the real estate collapsed. As shown in Figure 19¹⁷, the house prices decreased of almost 30% from 2006.

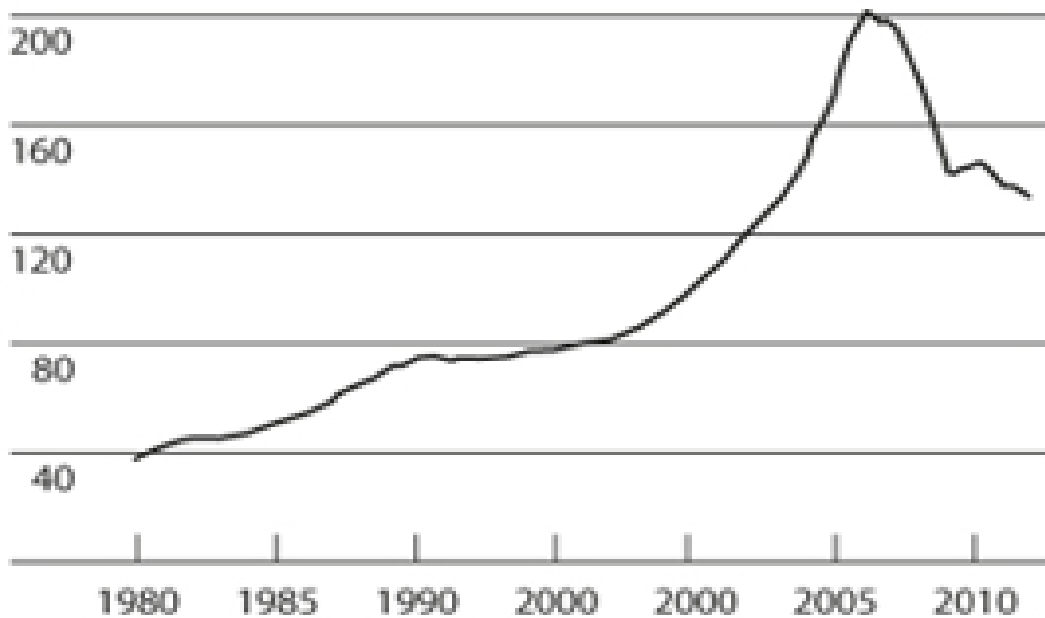


Figure 19 *Single-family house prices from 1980 to 2010*

People who believed being rich became, immediately, poor since the residual debt due to the banks was higher than the house value. Furthermore, the bubble hit the credit institutions as well and the banks lost a huge amount of richness in term of stock value.

In particular, the amount lost was similar to the one that incurred during the dot-com bubble burst, but the 2007 recession consequences were extremely higher.

In order to understand this point, it was useful to analyze the factors which burst the bubble and the vulnerabilities of the system.

The triggers were the house prices fallen and the mortgage losses, instead the vulnerabilities involved both the private and the public sectors.

With respect to the private sector, too many borrowers had too many debts. In addition, banks were not able to monitor and to value the risks linked to the new and more sophisticated financial operations.

A third problem was related to the banks massive use of the “commercial paper”, that is, instruments that could have maturity the day after and no more than three months.

¹⁷ Source: CoreLogic. The Index is built taking as main pillars January 2000 = 100.

The credit institutions, then, recorded in their balance sheets a huge quantity of these kind of debt instruments which could be claimed in any time.

The last private weakness was the use of the “Credit Default Swap”, C.D.S., by the AIG Financial¹⁸ products corporation. AIG, indeed, granted an insurance to the investors over securities investments but, when the bubble burst and the system collapsed, it suffered a huge lost.

In addition, the public sector had some important vulnerabilities.

The financial regulations were, still, based on the Great Depression structure. It did not change during the years and, then, many big institutions, as AIG, or big investment banks, as Lehman Brothers, were not subject to an adequate supervision.

Furthermore, the Federal Reserve did not urge the holding banks on developing new risk measurers, in order to limit their risk operations and it did not sufficiently protect the consumers. The American Central Bank, indeed, had the power to guarantee some particular protection forms which, if used efficiently, would have counteracted the bad credit practices actuated until the bubble burst.

The new authority President Ben S. Bernanke actuated this power only in 2007, when it was too late¹⁹.

2.2.1 Consequences

About the consequences, the 2007-2008 crisis had huge negative effects on the economy.

Figure 20²⁰ represents an index of financial intensity whose highest pick is registered in 2007-2008.



Figure 20

Financial Intensity Index from 1994 to 2012

¹⁸ A.I.G., that is, the American International Group. One of the biggest and most important U.S.A. insurance company.

¹⁹ Ben S. Bernanke, “La Federal Reserve e la crisi finanziaria, Quattro lezioni”, Chapter 2.

²⁰ Source: St. Louis Federal Reserve.

The stock market collapsed, Figure 21²¹, together with the real estate market, which had a huge reduction of new houses building sector. Figure 22²², indeed, highlighted that the house market value in 2012 is still far away from the one reached before the system collapse, in 2005-2006.



Figure 21 *S&P 500 Composite Index from 1992 to 2012*



Figure 22 *The building sector of new houses*

The unemployment reached a pick of 10%, as shown in Figure 23²³. In 2012 the unemployment decreased to 8,3% but it is still much higher than the pre-crisis level, that was, around 5%.

²¹ Source: Bloomberg.
²² Source: Census Bureau. Value expressed in millions.
²³ Source: Bureau of Labor Statistics. The shadow areas highlight the Dot-Com bubble burst and the Financial crisis.

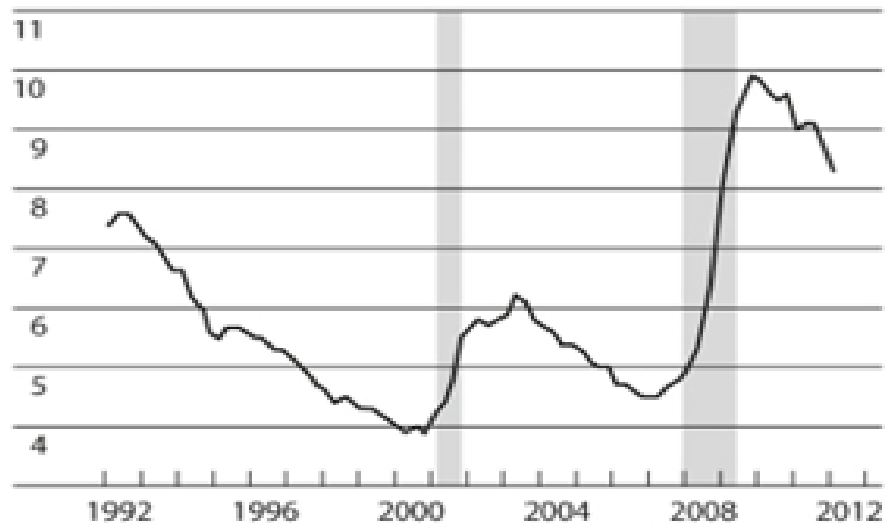


Figure 23

The unemployment index from 1992-2012

As we can see, the Financial crisis had a bigger effect on the real estate market and on the unemployment than the Dot-Com bubble burst in 2001-2002.

2. THE FEDERAL RESERVE MONETARY POLICY TOOLS

2.1 THE FEDERAL RESERVE CONVENTIONAL MONETARY POLICY

The Federal Open Market Committee (FOMC) was the Federal Bank organism, which enacted the monetary policy strategies²⁴.

The conventional instruments used during the financial stability were:

- The Open Market Operations;
- The Discount Rate;
- The Reserve Requirements.

Their implementation moved to the target level, set by the FOMC, the current Federal Funds rate, that is, the interest rate at which depository institutions lend reserve balances with overnight maturity to other depository institutions. It was extremely important because it affected other United States interest rates, including the prime rate, home loan rates, and car loan rates.

2.1.1 The Open Market Operations (OMOs)

The Federal Reserve could use various forms of Open market Operations, but the most common were defined as the central banks purchases and sales of government securities in the open market²⁵, in order to expand or contract the amount of money in the banking system. OMOs were a key tool used by the Central Bank in the implementation of monetary policy due, in particular, to its flexibility.

They were conducted by the New York Federal Reserve Trading Desk and regulated by section 14 of the Federal Reserve Act which, moreover, limits the quantity to be sold or purchased. In addition, the New York Central Bank had to publish a detailed explanation each year in its Annual Report. Each open market operation affected differently the Federal Reserve's balance sheet, depending on its size and nature.

The Open Market Operations could be divided into two types, i.e., permanent and temporary. Permanent OMOs (POMOs) involved outright purchases or sales of securities for the System Open Market Account (SOMA), i.e., the Federal Reserve's portfolio.

Traditionally, these instruments were used to boost the longer-term factors driving the expansion of the Federal Reserve's balance sheet, that is, in particular, the growth trend of the currency in

²⁴ Source: The Federal Reserve website, the "Federal Open Market Committee".

²⁵ Source: The Federal Reserve website, Policy tools section.

circulation. When the Federal Reserve bought or sold securities outright, indeed, it could permanently add to or drain the reserves available to the U.S. banking system.

In 2009, for instance, a POMO was announced consisting in a longer-dated Treasury purchase program. This program aimed to improve the private credit markets conditions after an unprecedented contraction due to the Financial Crisis²⁶.

Temporary Open Market Operations, instead, were the opposite of the POMOs. It could be implemented, indeed, to add or drain reserves available to the banking system on a temporary basis, influencing, then, the Federal Funds rate.

These operations could be either repurchase (REPO) or reverse repurchase agreements.

Considering a REPO operation, the Trading Desk bought a security setting an agreement to resell it in the future. The difference between the purchase and sale prices reflected the interest.

Vice versa, considering a reverse REPO agreement, the Trading Desk sold a security and repurchased it in the future²⁷.

The Federal Reserve's approach to the implementation of monetary policy changed during its history, in particular from the financial Crisis, when the FOMC set the Federal Funds rate target close to zero. Aiming to create a more favorable financial environment and to support the economic activity, from the end of 2008 to October 2014, the Federal Reserve greatly increased its holding of longer-term securities through open market purchases, reducing the pressure on longer-term interest rates.

Traditionally, though, buying and selling government bonds allowed the Federal Reserve to adjust the supply of reserve balances held by the banks and to increase or decrease the Federal Funds rate around its target level. In order to reach it, the FOMC was able to use Open Market Operations either to implement an expansionary monetary policy or a contractionary monetary policy.

The Expansionary Monetary Policy

The Federal Reserve actuated an expansionary monetary policy when the FOMC aimed to decrease the Fed Funds rate. The Central Bank purchased government securities, through private bond dealers, and deposited payment into the bank accounts of the individuals or organizations that sold the bonds. The deposits became part of the commercial banks cash and, therefore, increased the amount of money available to be lent.

²⁶ The main aim, as we said before, was to reduce pressure on longer-term interest rates.

²⁷ Source: The Federal Reserve website, Policy tool section.

Commercial banks, then, actively tried to attract borrowers by lowering interest rates, reducing, also, the Federal Funds rate²⁸.

When the amounts of funds available increased, the interest rates dropped down decreasing the cost of borrowing, which meant that more people and firms had access to funds at a cheaper rate, as shown in Figure 24.

This lead to less savings and more spending, that is, to an economy boost, lowering the unemployment.

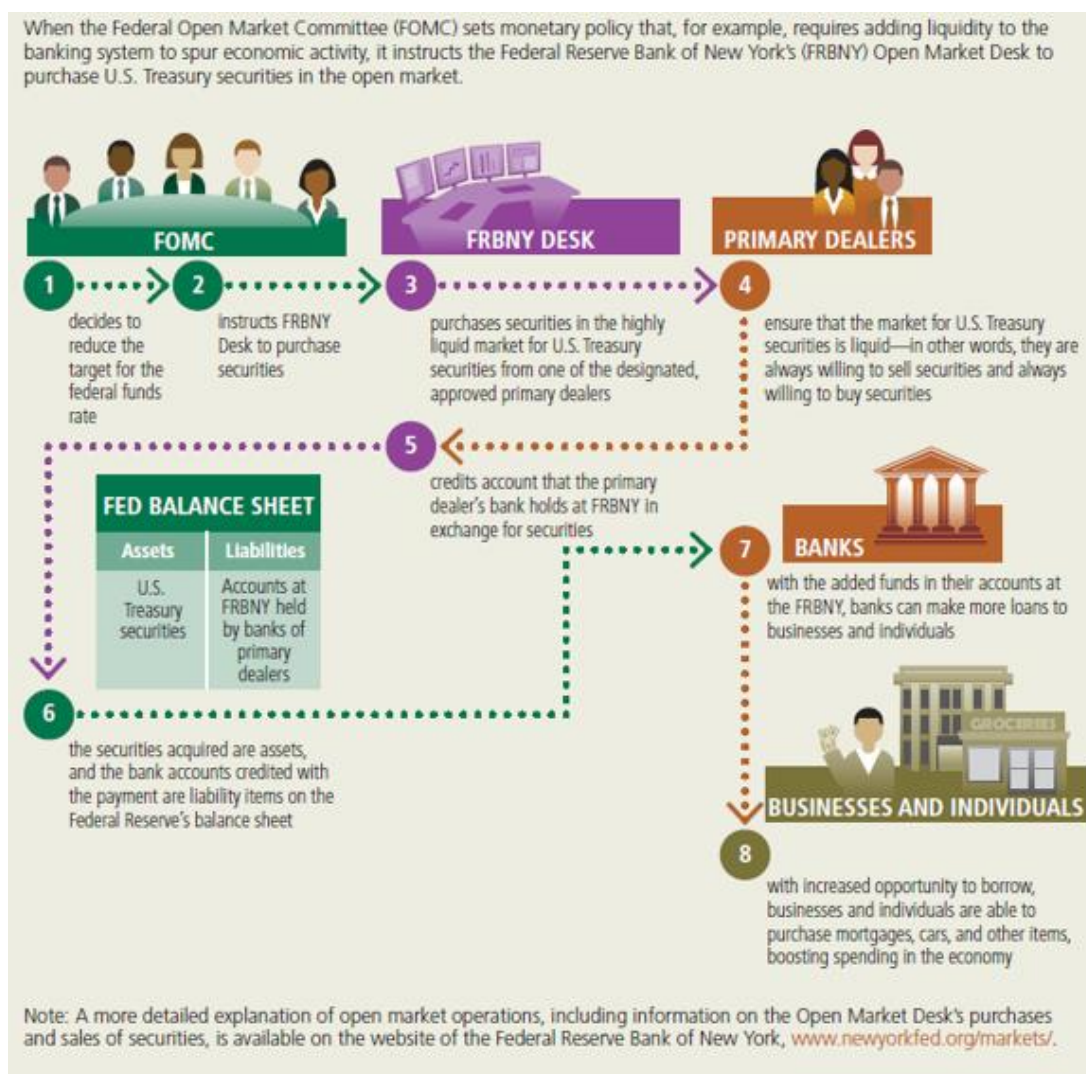


Figure 24 How the Federal Reserve conducts open market operations

²⁸ Source: The Federal Reserve System Purposes & Functions, 10th edition October 2016.

The Contractionary Monetary Policy

The Federal Reserve set a contractionary monetary policy when the FOMC aimed to increase the Federal Funds rate and slow down the economy. By selling government securities to individuals and institutions, the commercial banks amount of money diminishes, increasing the cost of borrowing and the interest rates, including, then, the Federal Funds rate²⁹.

When the cost of debt raised, individuals and firms were not incentive to borrow. They wanted to save their money since also the savings accounts interest rates and certificates of deposit (CDs) were higher. Entities spent less in the economy and invested less in the capital markets that means reducing the economic growth.

2.1.2 The Discount Rate

The Discount Rate was not a market rate but an administered rate set by the Boards of the Federal Reserve Banks and approved by the Board of Governors³⁰.

The Central Banks' twelve regional branches, indeed, offered very short-term, generally overnight, loans to banks that were experiencing funding shortfalls, aiming to prevent liquidity problems or, in the worst-case scenario, bank failures.

This lending facility was known as the “deposit window” that was different from the interbank borrowing, governed by the Federal Funds rate, actuated among the institutions which had deposits to the Federal Reserve.

The Central Banks offered three discount window rates to depository institutions, each fully secured:

- Primary credit rate;
- Secondary credit rate;
- Seasonal credit rate.

Under the primary credit rate, loans to depository institutions showing a sufficient financial soundness were extended for a short-term period, usually overnight. Since it was the main discount program, The Federal Reserve called the primary credit rate simply the “discount rate”.

Furthermore, depository institutions, that were not eligible for primary credit, had the possibility to access to the secondary credit, in order to satisfy their short-term liquidity needs or to support severe financial difficulties. In this case, the discount rate was above the rate on primary credit³¹.

²⁹ Source: The Federal Reserve System Purposes & Functions, 10th edition October 2016.

³⁰ Source: The Federal Reserve System Purposes & Functions, 10th edition October 2016.

³¹ Source: The Federal Reserve website. The secondary rate is set 50 basis points higher than the primary rate.

Both of these rates were set without regard to the market rates.

In the end, seasonal credit was extended to relatively small depository institutions that had experienced predictable intra-year fluctuations in funding needs, such as banks in agricultural or seasonal resort communities. It was set every fourteen days averaging the daily effective Federal Funds rate and the three-month Certificate of Deposits rate over the previous fourteen days³².

Moreover, the three lending programs rates were the same across all Reserve Banks.

The discount window implementation increased during the Crisis due, in particular, to the sharply deterioration of the financial environment and the necessity of liquidity injection in the system.

In August 2007, for instance, were actuated some temporary measures. The Board of Governors, indeed, reduced the primary discount rate from 6.25% to 5.75%, diminishing the spread over the fed funds rate from 1 percentage point to 0.5.

In March 2008, furthermore, it was extended also the lending period from overnight to 30 days and, lastly, to 90 days³³.

As shown in Figure 25³⁴, following the 2008 Lehman Brothers collapse, the discount window borrowing reached a \$403.5 billion pick, after being on an average of \$0.7 billion from 1959 to 2006. The Federal Reserve were not the only Central Bank that implemented these kinds of measures. In general, other central banks have lending facilities similar to the American Central Bank discount window such as, for instance, the European Central Banks standing facilities.

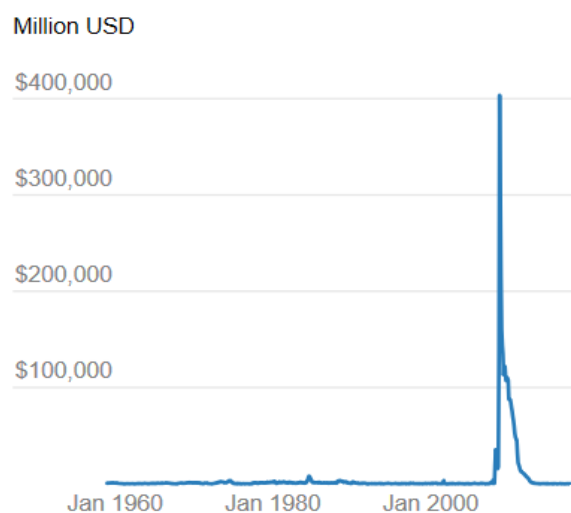


Figure 15

Discount window borrowing

³² Meaning it is affected by the market interest rates.

³³ Nowadays it is once again used for overnight lending.

³⁴ Source: St. Louise Federal Reserve.

2.1.3 The Reserve Requirements

The reserve requirement was a further tool that the Federal Reserve actuated to control the liquidity in the financial system. By reducing the reserve requirement, an expansionary monetary policy was implemented, and vice versa, when it raised the requirement, a contractionary monetary policy was actuated since it was cutting the liquidity in the system, causing an economy slow down.

The Reserve requirements were defined as the amount of funds that a depository institution must hold, as reserve, against specified deposit liabilities. With respect to the law, the Board of Governors had the authority to change the reserve requirements and the depository institutions must hold reserves in form of vault cash or deposits with Federal Reserve Banks.

The amount of a depository institution's reserve requirement was determined by applying the reserve ratios³⁵ to an institution's reservable liabilities, defined as:

- Net transaction accounts;
- Non-personal time deposits;
- Eurocurrency liabilities.

Liability Type	Requirement	
	% of liabilities	Effective date
Net transaction accounts ¹		
\$0 to \$16.0 million ²	0	1-18-18
More than \$16.0 million to \$122.3 million ³	3	1-18-18
More than \$122.3 million	10	1-18-18
Nonpersonal time deposits	0	12-27-90
Eurocurrency liabilities	0	12-27-90

Table 1

Liabilities Types and reserve requirements

As shown in Table 1³⁶, Non-personal time deposits and Eurocurrency liabilities had a zero percent reserve ratio since December 1990.

The reserve ratio on net transactions accounts, instead, depended on the amount of net transactions accounts at the depository institution.

³⁵ The ratios are detailed explained in Regulation D of the Federal Reserve Board.

³⁶ Source: The Federal Reserve website, monetary policy tools section.

The 1980 Monetary Control Act³⁷ set a reserve requirement ratio of 3% for a net transaction account value of \$25 million. This “low tranches value” was adjusted each year, that is, from 18 January 2018 the 3% reserve requirement was applied to reservable liabilities³⁸ value between \$16 and \$122.3 million and a 10% ratio if it exceeded the previous value³⁹.

The 1982 Garn-St Germain Act⁴⁰, instead, exempted the first \$2 million of reservable liabilities from reserve requirements. As reported in Table 2⁴¹ also the “exemption amount” was adjusted each year, according to a formula specified in the Act.

Nowadays, indeed, banks which had a liabilities value lower than \$16 million were exempted by any reserve requirements.

Effective date (beginning of maintenance period)	Low reserve tranche amount (millions of U.S. dollars)	Exemption amount (millions of U.S. dollars)
December 22, 2005	48.3	7.8
December 21, 2006	45.8	8.5
December 20, 2007	43.9	9.3
January 1, 2009	44.4	10.3
December 31, 2009	55.2	10.7
December 30, 2010	58.8	10.7
December 29, 2011	71.0	11.5
December 27, 2012	79.5	12.4
January 23, 2014	89.0	13.3

Table 2 2005-2014 Changes in Low reserve tranche amount and Exemption amount

³⁷ Source: The Federal Reserve website, monetary policy tools section. “The Monetary Control Act” is a two-title act enacted in 1980 that modified the manner in which the banking industry operated, by deregulating the interest rates paid by banks, revising reserve and deposit requirements, and raising the Federal Insurance Deposit Corporation (FDIC) insurance protection from \$40,000 to \$100,000 per account.

³⁸ That is, just to the Net transaction account liability type.

³⁹ Additional details on reserve requirements can be found in the Reserve Maintenance Manual and in the Federal Reserve Bulletin, the appendix of which reported historical reserve ratios.

⁴⁰ Source: The Federal Reserve website, monetary policy tools section. “The Garn-St. Germain Depository Institutions Act” was enacted by Congress to decrease the high pressure on banks, savings and loans which incurred after the Federal Reserve raised the interest rates in order to combat the inflation.

⁴¹ Source: The Federal Reserve website, monetary policy tools section. The table is considering a time period from 2005 to 2014.

The Interest on Required Reserve Balances and Excess Balances

The Federal Reserve Banks paid an interest rate on required and excess reserve balances according to Regulation D⁴², prescribed by The Board of Governors that reported the rules governing the payment of interest by Central Banks.

The 2006 Financial Services Regulatory Relief Act authorized the Federal Reserve Banks to pay interest on balances held by or on behalf of depository institutions. The effective date was set on October 2011 but, through the Emergency Economic Stabilization Act, it was advanced to October 2008.

The interest rate on required reserves (IORR rate) was determined by the Board of Governors aiming to eliminate the implicit tax that reserve requirements used to apply on depository institutions.

The interest rate on excess reserves (IOER rate) was also determined by the Board, but, furthermore, it gives to the Federal Reserve an additional tool for the monetary policy implementation.

According to the Policy Normalization Principles and Plans adopted by the Federal Open Market Committee (FOMC), indeed, during the monetary policy normalization, the American Central Bank intended to move the Federal Funds rate primarily by adjusting the IOER rate⁴³. The Board of Governors continued to adjust the interest rates on reserve balances according to the market conditions changes, as shown analytically in Table 3⁴⁴ and graphically in Figure 26⁴⁵, which reported the Interest Rate on Excess Reserves and on Required Reserves evolution since their first issue in 2008 to the most recent one in 2018.

⁴² Reserve Requirements of Depository Institutions, 12 CFR Part 204.

⁴³ For the current setting of the IOER rate, see the most recent implementation note issued by the FOMC. This note provides the operational settings for the policy tools that support the FOMC's target range for the Federal Funds rate.

⁴⁴ Source: The Federal Reserve website, policy tools. The data were selected by the authors to have a clearer historic trend of the rates. The table is generally updated each business day at 4:30 p.m., Eastern Time, with the next business day's rates. This table will not be published on federal holidays.

⁴⁵ Source: Personal graphic elaboration of the historical IOER IORR Federal Reserve data.

Time Period	Interest rate on excess reserves (IOER) %	Interest rate on required reserves (IORR rate) %
2008-10-09	0,75	1,4
2009-01-01	0,25	0,25
2010-01-01	0,25	0,25
2011-01-01	0,25	0,25
2012-01-01	0,25	0,25
2013-01-01	0,25	0,25
2014-01-01	0,25	0,25
2015-01-01	0,25	0,25
2016-01-01	0,5	0,5
2017-01-01	0,75	0,75
2018-01-01	1,5	1,5

Table 3

IOER and IORR Adjustments

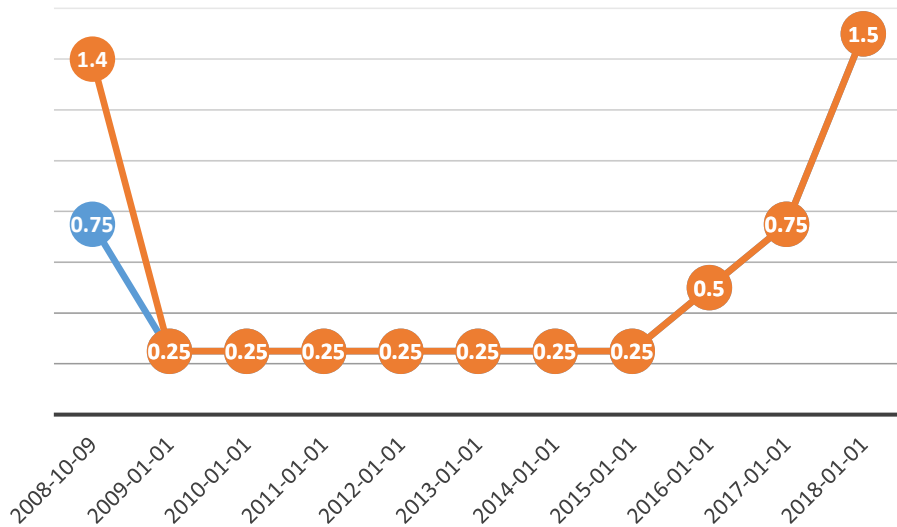


Figure 26

Interest rate on excess reserves (IOER rate)

2.2 THE FEDERAL RESERVE MONETARY POLICY DURING THE CRISIS

The crisis in the global financial markets became particularly severe in 2008, leading the Federal Reserve to counter it, by implementing some particular measures, that is:

- The Federal Funds rate cut,
- The Extraordinary Liquidity provisions,
- The Large Scale Assets Purchases (LSAPs),
- The Forward guidance.

2.2.1 The Federal Funds rate cut

During a recession the Federal Reserve had to cover two important roles⁴⁶ in order to counter the environment collapse. The first one was being the lender of last resort, that is, it had to provide liquidity to the system. Furthermore, it had the power to implement the monetary policy, that is, to manage the overnight interest rate, also called the Federal Funds rate.

Manipulating the short-term interest rate, the American Central Bank could influence many other rates. Indeed, it could affect the private spending such as the consumption, the house purchases and the firm investments, increasing, then, the demands and stimulating the economy growth.

The monetary policy was conducted by the Federal Open Market Committee (FOMC), which met in Washington 8 times per year. It was composed by 19 participants, that is, the 7 members of the Board of Governors, nominated by the USA president and confirmed by the Senate, and the 12 Federal Reserve branches presidents, nominated by each bank Board of Directors and confirmed by the Washington Board of Governors.

All the 19 members participated to the Monetary Policy discussion but just 12 could vote. The permanent right of vote, indeed, owned to the 7 members of the Board of Governors and to the NY Federal Reserve president⁴⁷, while, 4 of 11 Federal Reserve branches presidents, instead, rotated their right of vote each year.

As shown in Figure 27⁴⁸, starting from the left side, at the beginning of 2007 the Federal Funds rate level was still high. The previous year, indeed, the American Central bank started to increase it, aiming to normalize the monetary policy, following the expansionary period which conducted the USA out from the 2001 dot-cum bubble burst recession.

⁴⁶ Source: "La Federal Reserve e la crisi finanziaria, quattro lezioni", S. Bernanke, Chapter 4.

⁴⁷ A custom that reflected the financial authority of New York, considered the financial USA capital.

⁴⁸ Source: Personal graph elaboration, based on the New York Federal Reserve database.

Then, in August 2007, the Federal Funds rate target was set to 5,25 %. As the financial market worsened in September, it was reduced by 50 basis points⁴⁹.

During the spring of 2008, the economy became weaker and the FOMC decided to reduce its target rate by a cumulative 325 basis points, leaving it at 2%⁵⁰. The Committee held the rate constant over the summer, monitoring the economic and financial conditions.

In October, though, the financial collapse intensified sharply, causing a further 100 basis points reduction in the target for the Federal Funds rate.

In the end, in December 2008, as evidence of a dramatic economic scenario, the Committee reduced its target to a range of 0 to 25 basis points.

In sixteen months the FOMC reduced the Fed funds rate close to zero, thereby entering in the unfamiliar territory of having to conduct monetary policy with the policy interest rate at its effective lower bound. That target range remained in place today, demonstrating the unusual severity of the recession and the continuous worsening of the financial markets.

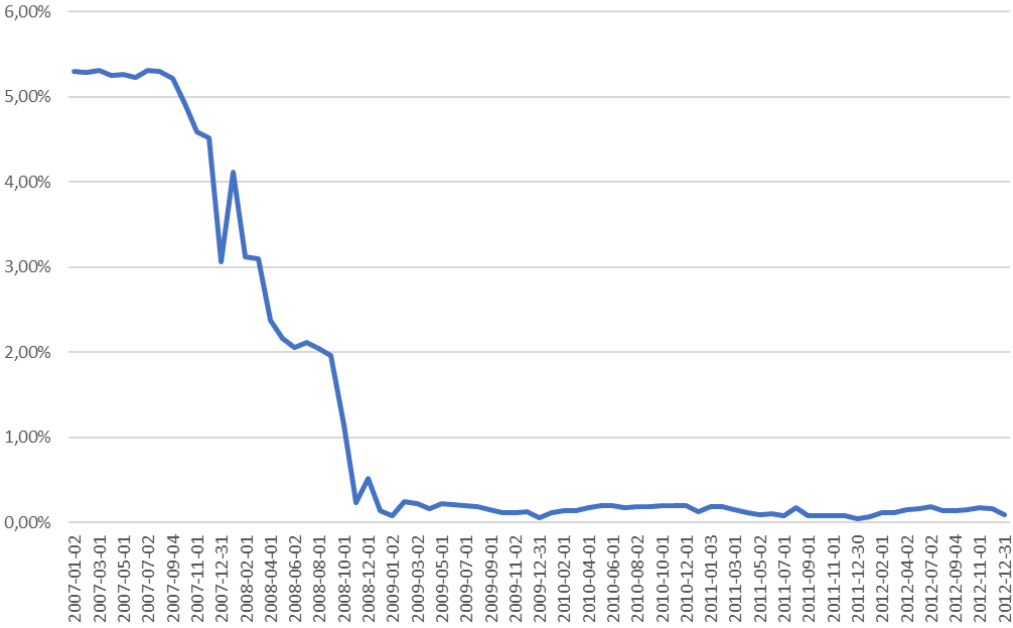


Figure 27 Effective Federal Funds rate (%)

⁴⁹ One basis point equals one-hundredth of 1 percentage point, that is 25 basis point corresponded to 0,25%.
⁵⁰ Source: Monetary Policy since the Onset of the Crisis. August 2012 Ben S. Bernanke, Chairman Board of Governors of the Federal Reserve System at the Federal Reserve Bank of Kansas City Economic Symposium Jackson Hole, Wyoming.

2.2.2 The Extraordinary Liquidity Provisions

The American Central Bank implemented various unconventional tools, whose main aim was to satisfy the institutions liquidity short term needs by providing it directly to the borrowers and investors. In particular, the extraordinary provisions were:

- The Primary Dealer Credit Facility
- The Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility
- The Term Asset-Backed Securities Loan Facility
- The Commercial Paper Funding Facility
- The Central Bank Liquidity Swaps
- The Money Market Investor Funding Facility
- The Term Securities Lending Facility
- The Term Auction Facility

As shown in Figure 28⁵¹, the extraordinary liquidity provision had sharply boosted the Federal Reserve balance sheet. Moreover, in 2009 and 2010 many actuated programs were expired following the financial markets improvements.

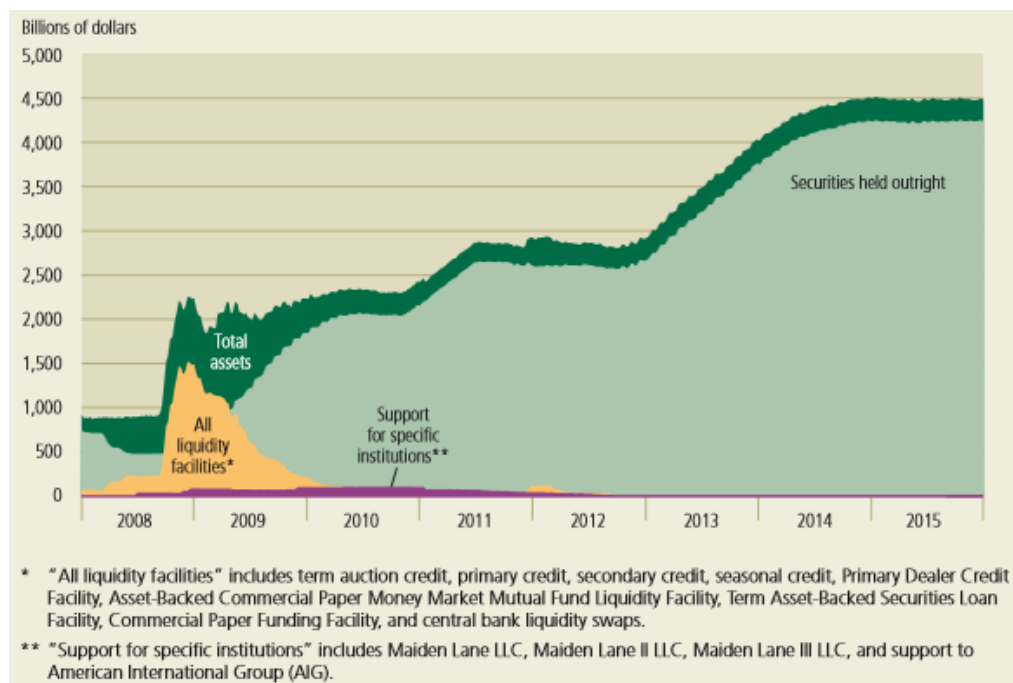


Figure 28

Selected assets of the Federal Reserve, August 2007–December 2015

⁵¹ Source: Board of Governors of the Federal Reserve System, statistical release H.4.1, "Factors Affecting Reserve Balances," www.federalreserve.gov. As the 2007-09 crisis intensified, the Federal Reserve introduced a variety of programs, expanding its balance sheet in the process, in order to address financial institutions' need for short-term liquidity and strains in many markets.

The Primary Dealer Credit Facility

The Primary Dealer Credit Facility (PDCF) was an overnight loan facility that provided liquidity to primary dealers, in exchange for a specified eligible collateral. The main aim was to support the financial markets functioning, through the supply of loans with maturity the next business day the conclusion of the contract⁵².

Primary dealers, then, could borrow overnight loans through their clearing banks at the primary credit rate offered by the Federal Reserve Bank of New York.

The program was implemented on March 2008, and was closed on February, 2010.

The Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility

The Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF) implementation provided liquidity to U.S. depository institutions and bank holding companies⁵³.

The main objective was to support their high-quality asset-backed commercial paper (ABCP) purchases, from the money market mutual funds. The Federal Reserve program supported the money funds, which held such papers, to satisfy the investor reimbursement demand and, furthermore, it provided liquidity in the money markets, in particular, in the ABCP market.

The program was implemented on September 2008 and closed on February 2010.

The Term Asset-Backed Securities Loan Facility

The Term Asset-Backed Securities Loan Facility (TALF) implementation fostered the market participants to meet the households and small businesses credit needs, through the issue of asset-backed securities (ABS), fully collateralized by various types of loans, to consumers and businesses of all sizes⁵⁴.

Under the TALF, the Federal Reserve Bank of New York (FRBNY) lent more than \$200 billion, on a non-recourse basis, to certain AAA-rated ABS holders, collateralized by recent consumer and small business loans.

⁵² Source: The Federal Reserve System Purposes & Functions, 10th edition October 2016.

⁵³ Source: The Federal Reserve System Purposes & Functions, 10th edition October 2016.

⁵⁴ The Federal Reserve website, Policy tools section

The Commercial Paper Funding Facility

The Commercial Paper Funding Facility (CPFF) implementation aimed to provide a liquidity backstop to U.S. issuers of commercial paper. The American Central Bank improved the liquidity in the short-term funding markets and increased the credit availability for firms and households.

The Federal Reserve Bank of New York, indeed, financed the purchase of highly rated unsecured and asset-backed commercial paper from eligible issuers.

The program was implemented on October 2008 and closed on February 2010.

The Central Bank Liquidity Swaps

The Federal Reserve also established some dollar liquidity swap arrangements with several foreign central banks. The collaboration main aim was to smooth the global financial tension, to support financial stability and to serve as a prudent liquidity backstop, by providing dollars to the foreign Central Banks⁵⁵ in exchange of their currencies. In this way the Europe financial institutions were able to issue findings to firms, which needed dollars for their activity and, vice versa, the USA financial institutions could offer foreign currency liquidity to their borrowers.

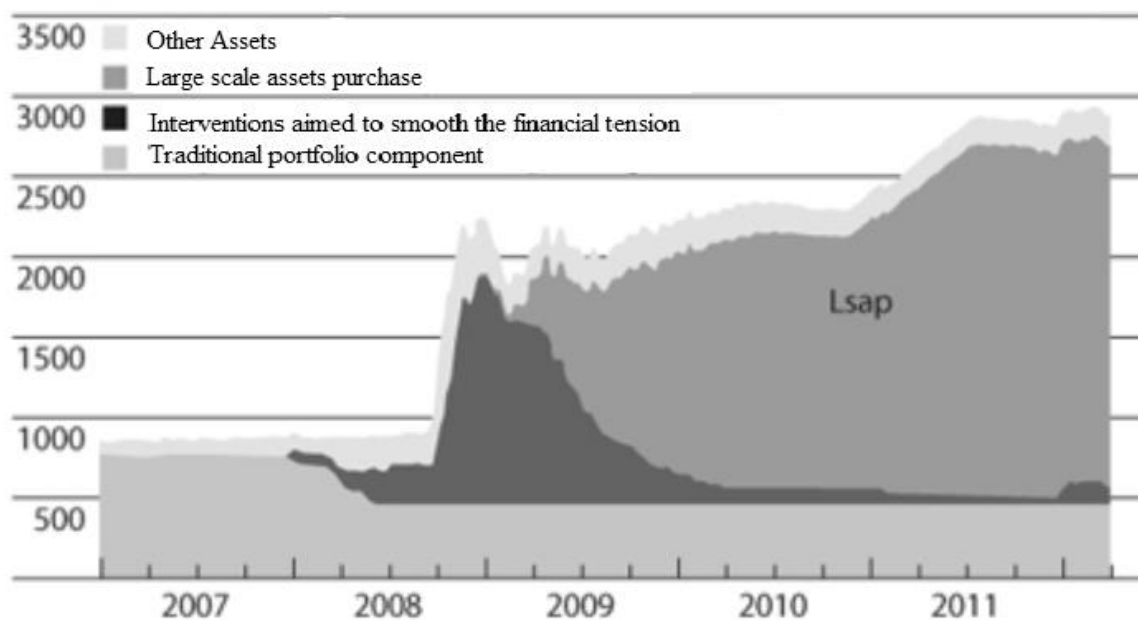


Figure 29

Federal Reserve Balance Sheet, Assets, 2007-2011

⁵⁵ Source: "La Federal Reserve e la crisi finanziaria, quattro lezioni", S. Bernanke, Chapter 4.

As shown in Figure 29⁵⁶, the dark grey right side corresponded to the item “Interventions aimed to smooth the financial tension”, that is, it represented the liquidity swap between the Federal Reserve and the European Central Bank and other monetary authorities.

Two types of liquidity swap lines⁵⁷ were designed:

1. The dollar liquidity lines,
2. The foreign-currency liquidity lines.

The Dollar Liquidity Swap Lines

Aiming to smooth the huge pressure on bank funding markets, the FOMC authorized several dollar liquidity swap lines with foreign Central Banks, following the worsening financial system conditions.

Indeed, in December 2007 and in May 2010 the policy tool was implemented towards the European Central Bank and the Swiss National Bank in order to provide in U.S. dollars liquidity. Subsequently, it was authorized dollar liquidity swap lines with other financial institutions including the Reserve Bank of Australia, the Banco Central do Brazil, the Bank of Canada, Denmark National Bank, the Bank of England, the Bank of Japan, the Bank of Korea, the Banco de Mexico, the Reserve Bank of New Zealand and the Monetary Authority of Singapore⁵⁸.

Furthermore, the Central Bank dollar liquidity swaps involved two transactions.

Firstly, when a foreign central bank set its swap line with the Federal Reserve, it sold a specified amount of own currency in exchange of dollars, at the applicable market exchange rate.

The Federal Reserve, thus, held the foreign currency in a foreign Central Bank account, while the dollars provided were deposited in a New York Federal Reserve Bank account owned by the foreign Central Bank.

Secondly, the Federal Reserve and the foreign central bank were involved into a binding agreement that imposed to the foreign central bank to buy back its currency on a specified future date, whose maturity could be from overnight to three months, at the same exchange rate. At the conclusion of

⁵⁶ Source: Federal Reserve Board. Billions of dollars.

⁵⁷ Source: The Federal Reserve official website. The Federal Reserve operates these swap lines under the authority of section 14 of the Federal Reserve Act and in compliance with authorizations, policies, and procedures established by the Federal Open Market Committee (FOMC).

⁵⁸ Source: The Federal Reserve official website. Furthermore, in October 2013, the Federal Reserve and these central banks announced that their existing temporary liquidity swap arrangements, including the dollar liquidity swap lines, would be converted to standing arrangements that will remain in place until further notice.

the second transaction, the foreign central bank paid the interests, computed at a market-based rate, to the Federal Reserve.

When the foreign central bank borrowed the funds obtained to its jurisdiction institutions, the dollars were transferred from its account at the New York Federal Reserve to the bank which the borrowing institution used to conduct its dollar transactions.

The American Central Bank, moreover, was not a counterparty in the transaction between the foreign central bank and its borrowers, that is, it did not bear the credit risk associated to the probability of default of the institutions in foreign jurisdiction.

In the end, the foreign currency held by the Federal Reserve was recorded in the asset side of the American Central Bank Balance Sheet. Since the swap had to be reimbursed at the same exchange rate used in the initial draw, the dollar value of the asset was not affected by the changes in the market exchange rate.

The dollar funds deposited in the accounts that foreign Central Banks maintained at the Federal Reserve Bank of New York, instead, were a Federal Reserve liability.

The Foreign-Currency Liquidity Swap Lines

The second liquidity swap line was the so called “foreign currency”, aiming to provide foreign liquidity to U.S. institutions. The Federal Reserve, indeed, in April 2009 announced the implementation of this toward the Bank of England, the European Central Bank, the Bank of Japan, and the Swiss National Bank, providing to the American economy an amount of 30 pounds billion, 80 Euro billion, 10 Yen trillion, and an amount of CHF 40 Swiss francs billion. The program expired in February 2010.

In November 2011, the Federal Reserve authorized a temporary swap lines toward the previous Central Banks adding, moreover, the Bank of Canada.

The Federal Reserve lines, then, constitute a part of a network of bilateral swap lines among the six central banks which allowed the liquidity provision in any of the six currencies.

North American Framework Agreement Swap Lines

A third swap line was implemented in 1994 toward the Bank of Canada and Bank of Mexico, authorized through the North American Framework Agreement (NAFA⁵⁹).

⁵⁹ The Federal Open Market Committee is asked annually to renew the Federal Reserve's NAFA swap agreements; draws on the lines also are subject to its approval.

The agreement foresaw a bilateral currency swap lines of 2 dollar billions with the Bank of Canada and \$3 billion with the Bank of Mexico, aiming the promotion of an orderly currency exchange markets. These lines were established under the North American Framework Agreement (NAFA). The country of Canada has never drawn on its line, while the country of Mexico used its line in 1995⁶⁰.

In 1994, the U.S. Treasury established a 3 dollar billions NAFA swap line with Mexico, and

The Money Market Investor Funding Facility

The Federal Reserve implemented the Money Market Investor Funding Facility (MMIFF), for answering to the liquidity needs of money market and mutual funds investors, who suffered of an unusual high number of short-duration investments.

The Central Bank, indeed, aimed to expand the secondary-market sales of medium-term instruments, such as certificates of deposits, bank notes and highly rated commercial paper, by offering an additional and longer term source of liquidity.

In particular, the Federal Reserve Bank of New York authorized and supported⁶¹ five special purpose vehicles (SPVs) to purchase 600 dollar billions of short-term debt eligible instruments, from private financial institutions. Thereafter, the liquidity from the SPVs was used to support 50 designated financial institutions, which were considered as short-term debt high-quality issuers by the industry leaders, maintaining, then, the funds liquidity conditions at an appropriate level.

The MMIFF was announced on October 2008 and expired on October 2009.

The Term Securities Lending Facility

The Term Securities Lending Facility (TSLF) was a weekly loan tool, which allowed primary dealers, by pledging eligible collateral⁶², to borrow U.S. Treasury securities, on a 28 day term, held by System Open Account (SOMA).

Its implementation supported the liquidity in the Treasury and other collateral markets, fostering, then, the financial markets functioning without affecting the currency or manipulating the security prices.

⁶⁰ In 2018, it was increased the swap line with Mexico to 9 dollar billions.

⁶¹ Source: The Federal Reserve website, Policy tools section. The Federal Reserve Bank supported the SPVs by loaning 90 percent of the purchase price of each asset to the SPVs, which issued [asset-backed commercial paper](#) to cover the remainder of the cost. As the debt matured, the MMIFF used the proceeds to repay both the Federal Reserve Bank and the MMIFF's outstanding ABCP debts.

⁶² Source: The Federal Reserve website, Policy tools section. The eligible securities under the TSLF included AAA- to Aaa-rated mortgage-backed securities not under review for downgrade, and all securities available for tri-party repurchase agreements.

The program was operated by the Federal Reserve's open market trading desk, which held weekly auctions. In exchange of collateral, the primary dealers submitted competitive bids and received a Treasury collateral basket, which included Treasury bills, notes, bonds and inflation-indexed securities⁶³.

The Federal Reserve initially pledged \$200 billion to this facility aiming to decrease the liquidity pressure in the credit markets, specifically the mortgage-backed securities one.

The TSLF implementation allowed institutions, including Fannie Mae, Freddie Mac and major banks to access to highly liquid and secure Treasury securities, in exchange for lower safe and liquid eligible securities.

The Federal Reserve tool was a bond-for-bond lending alternative to the Term Auction Facility (TAF) which, instead, was a cash-for-bond program which, indeed, injected cash directly into the market, affecting Federal Funds rate and negatively the value of the dollar.

Furthermore, the TSLF was also an alternative to the mortgaged investments direct purchases, which counter the Federal Reserve main aim of avoiding the direct effect on security prices.

TSLF was announced on March 2008⁶⁴ and was closed on February 2010.

The Term Auction Facility

After the Federal Reserve failed to achieve the wished result through the discount rate cut implementation, it collaborated with other Central Banks around the world and created the Term Auction Facility (TAF) instrument, whose main aim was to prevent a worst financial situation.

The program, indeed, allowed the Federal Reserve to auction a fixed amount of collateral-backed short-term loans. The participants were depository institutions, such as savings banks, commercial banks, savings and loan associations and credit unions, which are judged to be in sound financial condition⁶⁵, by their local Reserve Banks.

The express tool purpose was to address "elevated pressures in short-term funding markets"⁶⁶, allowing financial institutions to borrow funds at a rate that is below the discount rate.

The participants was able to bid through the Reserve Banks, with a minimum bid set at an overnight indexed swap rate, relating to the loans maturity.

⁶³ At the Federal Reserve's discretion, primary dealers were allowed to borrow up to 20 percent of the announced amount.

⁶⁴ The first auction was conducted on March 27, 2008.

⁶⁵ All depository institutions that were eligible to borrow under the primary credit program were eligible to participate in TAF auctions. All advances were fully collateralized

⁶⁶ According to a press release from the Federal Reserve System Board of Governors in 2007.

The first Term Auction Facility (TAF) was actuated in December 2007⁶⁷, in coordination with other Central banks, such as the Bank of Canada, the Bank of England and the European Central Bank, responding to the 2007 subprime crisis.

The final Term Auction Facility auction was conducted on March 2010, expiring, then, the program.

2.2.3 The Large Scale Assets Purchase

In December 2008 the Fed Funds rate policy tool finished its effectiveness, since it reached a close to zero value and it was not possible to reduce it anymore. The economy, though, needed another boost because it was sharply contracting. The Federal Reserve, then, implemented a less conventional tool, that is, the Large-scale assets purchases (Lsap), also called, balance sheet tool or quantitative easing.

The quantitative easing is an expansionary monetary policy, whose main aim was to influence the long-term interest rates, through the purchase of USA Treasury bonds and agencies Mortgage Backed Securities, granted by the government, such as Fannie Mae and Freddie Mac⁶⁸.

The Federal Reserve, thus, implemented two quantitative easing, that is, the first one in March 2009, also called Qe1, and the second one in November 2010, Qe2.

As shown in Figure 30⁶⁹, during the financial stability, the Central Bank traditional portfolio was already composed by a considerable amount of Treasury bonds, that is, more or less, 800 billion dollars. Following the Large-scale assets purchase implementation, though, the balance sheet assets boost was estimated in more of 2000 dollar billions.

⁶⁷ The first two auctions conducted in released a combined 40 dollar billions of liquidity into the market.

⁶⁸ Source: "La Federal Reserve e la crisi finanziaria, quattro lezioni", S. Bernanke, Chapter 4. All these securities were granted by USA government since they represented the federal debt, in the case of Treasury bonds, or they were issued by agencies that were granted by the government after went into administration.

⁶⁹ Source: Federal Reserve Board. The value are expressed in billions of dollars

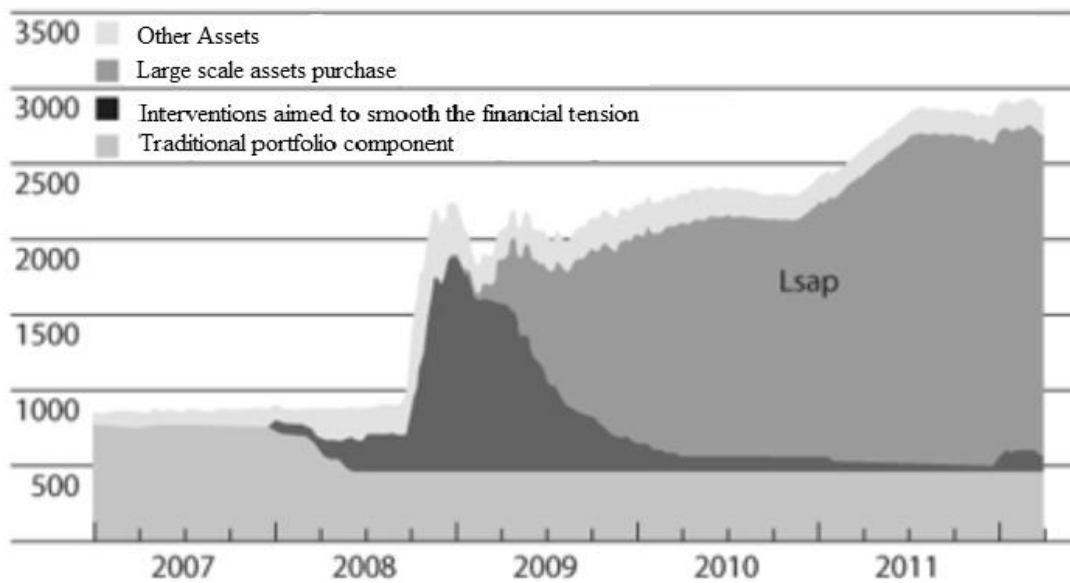


Figure 30

Federal Reserve Balance Sheet, Assets, 2007-2011

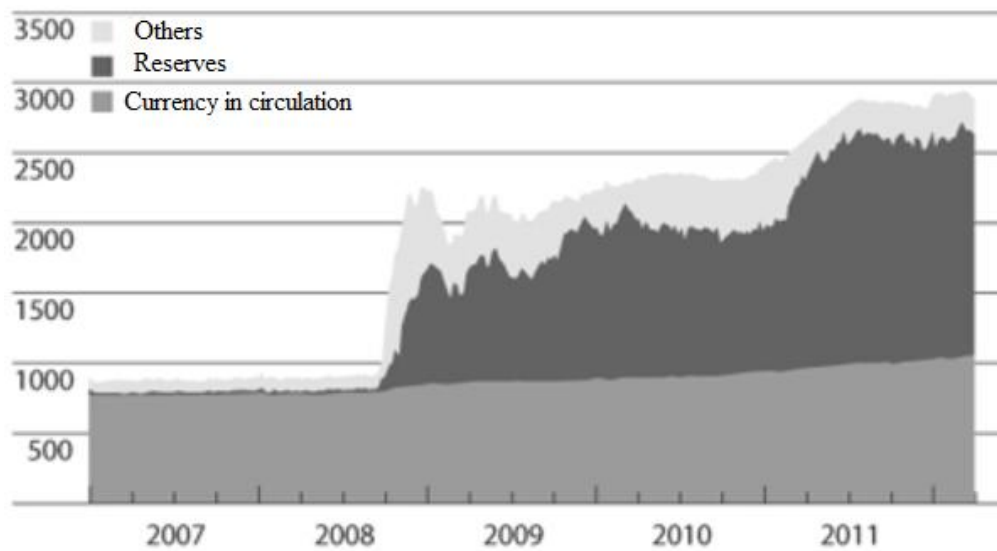
The basic idea of the program is originated by the American economist Milton Friedman, who suggested that, through the securities purchase, the Federal Reserve was able to reduce their quantity on the market, binding the investors to have a lower yield and, furthermore, to diversify its own portfolio. In other words, if the instruments supply decreased, the investor must pay a higher price to buy them, but the securities price and yield were inverse correlated. Implementing this tool, then, the Federal Reserve reduced the long-term interest rate on the Treasury bonds and on the Mortgage Backed Securities.

In addition, the lower quantity on the market induced the investors to purchase other types of title, such as the corporate securities, reducing also their yield.

A general interest rates reduction, then, boosted the entire economy.

The Federal Reserve was able to purchase this huge securities amount by increasing the reserves that institutions hold to the Central Bank. Figure 31, indeed, shows the balance sheet liabilities side and, indirectly, illustrates how the Lsap program was financed.

The liabilities increased to, almost, 3000 dollar billions but the currency in circulation, instead, remained flat during all the quantitative easing operations, that is, the supply of currency did not change. The light grey area, indeed, was stable while the dark area represented the reserves which cover almost all the policy implementation.



70

Figure 31

Federal Reserve Balance Sheet, Liabilities, 2007-2011

Furthermore, looking at the entire Federal Reserve balance sheet, Table⁷¹ reported the major asset and liability categories. The conventional Open Market Operations and Large-scale asset purchases affect similarly the Federal Reserve’s balance sheet. Indeed, when the Open Market Desk at the New York Federal Reserve Bank purchased a security in the open market, the Central Bank assets side increased by its value. In order to balance the payment, a corresponding rise is recorded on the liability side, that is, the item “Deposits of depository institutions” increased⁷².

Simplified view of the Federal Reserve balance sheet, as of January 20, 2016

The Federal Reserve publishes data weekly regarding its balance sheet.

Assets (millions of dollars)		Liabilities (millions of dollars)	
Treasury securities held outright	2,461,396	Federal Reserve notes in circulation	1,369,051
Agency debt and mortgage-backed securities holdings	1,750,275	Deposits of depository institutions	2,412,078
Other assets	277,169	Capital and other liabilities	707,711
Total	4,488,840	Total	4,488,840

⁷⁰ Source: Federal Reserve Board. The value are expressed in billions of dollars.

⁷¹ Source: www.federalreserve.gov/monetarypolicy/bst.htm. More detailed information on the balance sheet is available on the website.

⁷² The Federal Reserve’s balance sheet is published weekly reporting a great deal of information about the scale and scope of its operations. Market participants closely studied the evolution of the Federal Reserve’s balance sheet to understand important details about the implementation of monetary policy.

The effect of the Large-scale assets purchase tool was, in general, positive since all the interest rates decreased, in particular the 30 years mortgage one. But the monetary policy impact on the real estate market, instead, was weaker than the expectations because it did not sufficiently incentive the house purchase and, as consequence, the economy recovery.

The Lsap implementation benefits, though, must be considered alongside its potential costs⁷³.

One possible cost can be related to the securities market functioning impair. The Federal Reserve, indeed, is law limited in the purchase of Treasury and agency securities, that is, the supply of those securities is large but finite. If the Federal Reserve became too dominant, the trades amount among private agents could decrease, leading to a liquidity degrade and to a price discovery. Since the global financial system depends strongly on the markets liquidity for U.S. Treasury securities, a significant impairment would be costly, and, in particular, could negatively influence the monetary policy transmission.

For example, the market disruptions could lead to higher liquidity premiums on Treasury securities, which would counter the policy objective of yields reducing.

However, even if market capacity could become an issue, during the policy implementation there were not any problems in the markets for Treasury or agency securities. Indeed, private-sector holdings of securities and trades between participants remained robust.

A second potential cost related to the balance sheet tools implementation, was a possible reduction in the Federal Reserve ability to exit smoothly from its policies at the appropriate time. Such possible scenario might increase the risk of a costly distance from the inflation and its expectations, leading to a financial and economic instability. Anyway, the Federal Reserve avoided this possibility by greatly emphasizing to the public the tools develop, in order to ensure the future monetary policy normalization, even if the securities hold by the Central Bank remained large⁷⁴.

In particular, the FOMC demonstrated that it was able put upward pressure on short-term interest rates, by raising the interest rate paid to the banks holding reserves to the Central Bank or by using reserve-draining tools, that is, by selling securities from the Federal Reserve's portfolio. In this way, it would be neutralized the Lsap effect.

⁷³ Source: Monetary Policy since the Onset of the crisis. 2012 Chairman Ben S. Bernanke

⁷⁴ Source: Monetary Policy since the Onset of the crisis. 2012 Chairman Ben S. Bernanke

In general, Non-traditional monetary policies are uncertain instruments and will probably change over the time, depending on the future economic scenario. In particular, the potential cost associated to their implementation could be more relevant than those considered for the traditional policy tools but, in the end, these were manageable, implying that a further future use should not be ruled out.

2.2.4 The Forward guidance

In the end, the Federal Reserve started to issue an additional tool to the investors, that is, the “forward guidance” which provided no-binding information about the Federal Funds rate future trend, in order to influence the public expectations about the course of monetary policy. It is also called “communication tool”, which, giving more information to the financial market agents, reduced the uncertainty and, furthermore, increased the Federal Reserve credibility⁷⁵.

The forward guidance language assumed different forms and changed many times since the onset of the financial crisis.

In December 2008 the Committee reduced the Federal Funds rate target close to zero and published its expectations in the post meeting statement, that is, “weak economic conditions are likely to warrant exceptionally low levels of the Federal Funds rate for some time.”

As the economic impact of the crisis worsened, the FOMC changed its forward guidance helping, thus, the public to understand the Committee’s the future expectations about the policy course.

In March 2009 the forward guidance was changed, disclosing that the Federal Funds rate could remain at exceptionally low levels “for an extended period.”

In August 2011, the Committee used calendar dates in its policy statement, indicating the period over which the Federal Funds rate was maintained close to zero. As economic conditions did not improve in line with the Committee’s expectations, the forward guidance calendar date was extended.

Later, in the December 2012 post-meeting statement, the FOMC replaced the last calendar date forward guidance with a language indicating the economic conditions and a variety of economic factors, that the Committee expected to see before it would raise the Federal Funds rate target.

The FOMC’s communications about likely future settings of its target for the Federal Funds rate and its other policy tools have continued to evolve. In particular, since the Committee began to normalize monetary policy by modestly raising its target for the Federal Funds rate in December

⁷⁵ Source: The Federal Reserve System Purposes & Functions, 10th edition October 2016.

of 2015, it has indicated that monetary policy is not on a predetermined path and that its policy decisions will depend on the policymakers conclusions about whether a change in policy is necessary to move the economy toward the two main final aims, that is maximum employment and 2% inflation.

The forward guidance was effective, since increased the public and private sector trust in the Federal Reserve monetary policy and furthermore, reduced the possibility to have a panic wave that was able to worsen the economic condition⁷⁶.

⁷⁶ Source: "La Federal Reserve e la crisi finanziaria, quattro lezioni", S. Bernanke, Chapter 4.

2.3 THE FEDERAL RESERVE MONETARY POLICY AFTER THE CRISIS

The recession, that is, the phase of most economic contraction was declared officially concluded⁷⁷ in June 2009. In the United States of America, the organism which set the official date was the National Bureau of Economic Research (Nber)⁷⁸.

As shown in Figure 32⁷⁹ the recovery was very slow and weak. Considering the dark line, it represented the GDP trend from 2007 while the shadow area highlighted the recession period with respect to the Nber decision. The GDP real contraction, then, started in December 2007 and continued in the following months. In the half of 2009 the recession was officially over and the dark line, indeed, started to grow up because the economy expanded.

Considering, instead, the past, the light grey line represented which would be the trend of the GDP, if, starting from 2009, the economy was growth following the average rate recorded after the Second World War recession.

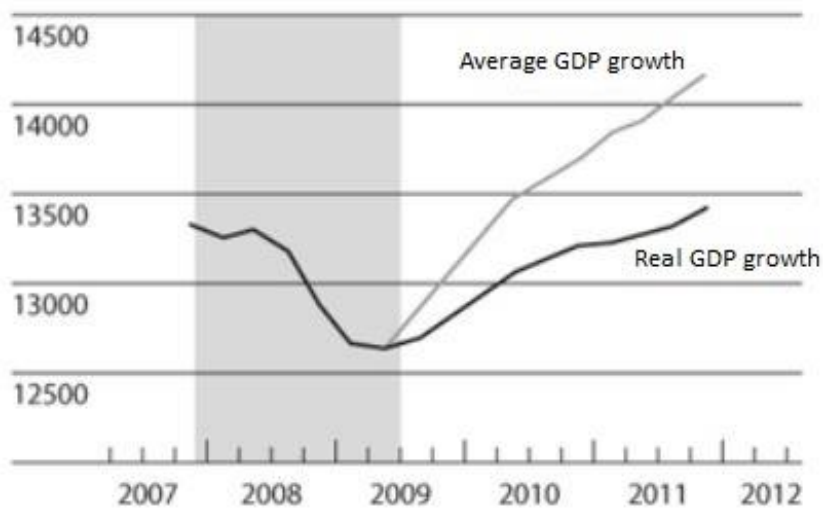


Figure 32

Average GDP and Real GDP growth

It was immediately possible to understand that the recovery of the last year was slower than the previous recessions.

⁷⁷ When a recession is considered over it does not mean that the situation came back to the previous level but that the economic has stopped to contract and started again to grow.

⁷⁸ Source: "La Federal Reserve e la crisi finanziaria, quattro lezioni", Ben S. Bernanke, Chapter 4.

⁷⁹ Source: "La Federal Reserve e la crisi finanziaria, quattro lezioni", Ben S. Bernanke, Chapter 4. The value are expressed in dollar billions.

For many economics, indeed, the 2007-2009 recession was the worst in the last 60 years, that is, they predicted a slow recovery, which, though, was even slower than the prediction resulting, further, in a sluggish resumption of the job market⁸⁰.

The Federal Reserve, then, implemented some other tools whose main aim was to stimulate the economy and, moreover, to drive the Federal Funds rate to its previous value.

2.3.1 The Maturity Extension Program and Reinvestment Policy

From September 2011 to December 2012, the Federal Reserve implemented a further balance sheet tool in order to provide additional support for the economic recovery.

Under the “Maturity Extension Program” (MEP), indeed, the Federal Reserve purchased a total amount of 667 dollar billions of Treasury securities with remaining maturities of 6 to 30 years and sold an equivalent value of Treasury securities with remaining maturities of 3 years or less⁸¹.

Its implementation was conducted by the Federal Open Market Committee (FOMC) which announced a 400 dollar billions program in September 2011, completed several months later.

From June 2012 until the end of 2012, the FOMC continued the program purchasing an additional 267 dollar billions in Treasury securities.

The Maturity Extension Program, thereby, extended the average maturity of the securities in the Federal Reserve portfolio contributing to reduce the pressure on longer-term interest rates, without affecting the size of the its balance sheet

2.3.2 The Open-ended asset purchases program

In September 2012 the FOMC implemented first purchase program of MBS for an amount of 40 dollar billions per month⁸².

In January 2013, moreover, it was actuated a second operation for 45 dollar billions per month of longer-term Treasury securities.

Subsequently the implementation and the conclusion of its first two asset purchase programs and the Maturity Extension Program, the FOMC to issue a third task that, instead, was open-ended, that is, it would continue to purchase assets until the labor market had improved substantially.

In December 2013, assets purchase pace was reduced and the program expired in October 2014.

⁸⁰ Source: “La Federal Reserve e la crisi finanziaria, quattro lezioni”, Ben S. Bernanke, Chapter 4.

⁸¹ Source: The Federal Reserve System Purposes & Functions, 10th edition October 2016.

⁸² Source: The Federal Reserve System Purposes & Functions, 10th edition October 2016.

Since the summer of 2010, then, the Federal Reserve has continued to reinvest the securities that mature. Maturing Treasury securities are reinvested in Treasury securities, while principal payments on holdings of agency debt and agency MBS are reinvested in agency MBS.

By reinvesting, the Federal Reserve continues to hold a large amount of longer-term securities and thereby maintains downward pressure on longer-term interest rates, stimulating the economy.

2.3.3 The Policy Normalization process

The implemented Monetary Policy during the Financial Crisis was absolutely accommodative, aiming to support the economy recovery.

In 2015 the unemployment rate was close to the levels that policymakers judged positively⁸³. The Federal Reserve, then, started to actuate some steps to “normalize” the monetary policy, in order to continue to foster its macroeconomic objectives. The main aim, indeed, was to drive up the short-term interest rates and reduce the size of the Federal Reserve’s balance sheet.

In December 2015, then, the FOMC started to raise its target range for the Federal Funds rate by 0, 25% percentage point, bringing it from 25 to 50 basis points. This was the first change since December 2008, based on considerable improvement in labor market conditions and reasonable confidence that inflation would rise to 2 percent over the medium term.

In order to maintain the Federal Funds rate in its target range, the Federal Reserve used two administered rates. Indeed, the interest rate the Federal Reserve pays on excess reserve balances (IOER⁸⁴) is set equal to the top target range for the Federal Funds rate while the interest rate it pays on overnight reverse repurchase agreements (ON RRP) is set equal to the bottom range.

Increasing them, the FOMC was able to put upward pressure on short-term market rates, including the Federal Funds rate.

The Overnight Reverse Repurchase Agreement Facility

In the Policy Normalization Principles and Plans issued on September 2014, the Federal Open Market Committee (FOMC) announced an overnight reverse repurchase agreement facility would be used, as supplementary policy tool, in order to control the Federal Funds rate and keep it in the target range⁸⁵.

⁸³ Source: The Federal Reserve System Purposes & Functions, 10th edition October 2016.

⁸⁴ We have already talked deeply about the IOER rate in point 2.1.3 of this Chapter.

⁸⁵ The Committee stated that it would use an ON RRP facility only to the extent necessary and will phase it out when it is no longer needed to help control the funds rate.

When the Federal Reserve conducts an overnight RRP, it sells a security to an eligible counterparty and simultaneously agrees to buy the security back the next day.

This transaction did not affect the size of the System Open Market Account (SOMA) portfolio, but, in particular, reduced the reserve balances on the liability side of the Federal Reserve's balance sheet and a corresponding increase in reverse repo obligations. The FOMC set the ON RRP offering rate, which is the maximum interest rate that the Federal Reserve was able to pay in an ON RRP operation⁸⁶.

The Term Deposit Facility

The Term Deposit facility was an additional tool whose main aim was to support the Federal Reserve monetary policy, by managing the aggregate quantity of reserve balances held by depository institutions⁸⁷.

The funds placed in term deposits were removed from the reserve accounts of participating institutions and transferred into a term deposit account at the Federal Reserve for the life of tool⁸⁸, draining, then, the reserve balances from the banking system.

The program was offer to all the institutions that are eligible to receive earnings on their balances account to the Reserve Banks.

As the, the FOMC announced in the Policy Normalization Principles and Plans that the Term Deposit Facility (TDF) would be implemented to facilitate the control of the Federal Funds rate. The main objective was, indeed, to put upward pressure on it and to move it into the established target range.

⁸⁶ Source: The Federal Reserve System Purposes & Functions, 10th edition October 2016.

⁸⁷ Source: Source: The Federal Reserve website. Policy Tools section.

⁸⁸ Source: The Federal Reserve System Purposes & Functions, 10th edition October 2016.

3. LITERATURE REVIEW

One of the thesis pillars was the BIS Working Papers No 514 “The influence of monetary policy on bank profitability”, developed in October 2015 by Claudio Borio, Leonardo Gambacorta and Boris Hofmann. The paper analyzed the link between monetary policy and bank profitability, focusing on the relationship between the interest rate structure⁸⁹ and bank performance. The database taken by the authors was composed by 109 large international banks headquarters in 14 advanced economies for the period 1995-2012 looking at the following variables: Net interest income, Non-interest income, Loan loss provisions and overall Return on assets (ROA).

The analysis, moreover, is analytically supported by an adapted version of the Monti-Klein model and by an econometric model that provide the following results.

3.1 The impact on Net Interest income

The relationship with the interest rate structure was concave, that is, the impact on NII was stronger, in particular, at very low levels of nominal interest rates and, vice-versa, was weaker as interest rates move higher.

Moreover, we had to consider four relevant mechanisms:

- i The “retail deposits endowment effect”;
- ii The “capital endowment effect”;
- iii The “quantity effect” that counterbalances the “price effect”; and
- iv The “dynamics effect”, including repricing lags and credit-loss accounting.

The “retail deposits endowment effect” was related to the bank deposits, which were typically priced at the market rates. If their value became smaller as interest rates declined, then monetary policy tightening would increase the net interest income.

The “capital endowment effect” was an extreme case of the previous effect. Thus, as interest rates dropped, the return on assets covered by capital automatically declined.

Changes in the level of market rates had also a “quantity effects”, notably influencing the volume of bank loans and deposits. Moreover, the demand for loans was more elastic to interest rates than the demand for deposits then, at some point, higher interest rates would erode profitability.

“Dynamic effects” can assume two forms:

⁸⁹ Monetary policy operates primarily through its proximate effect on interest structure, that is, on the short-term interest rate through a direct effect, and the slope of the yield curve, through an indirect effect.

- i The first relates to lags in price (rate) adjustments, possibly reflecting views that the changes in market rates were only temporary.
- ii The second form, which was more relevant, was related to the accounting practices. Any interest margin on new loans also covered expected losses. However, provisions, in contrast to interest rates, were not forward-looking. As a result, extending new loans raised profitability temporarily, since losses normally materialize only few years later, at which point loans also become non-performing, eroding the interest margin. This also means that if lower market rates induced more lending, they temporarily boosted the net interest margins.

Beyond the level of interest rates, the slope of the yield curve should also influence the net interest income. Specifically, a steeper yield curve should have a positive effect on banks' net interest income.

As shown in Figure 1⁹⁰ the impact on Net interest income was stronger as the interest rate declined and considering the slope curve yield⁹¹, the impact was statistically different from zero until the slope reaches a value of three.



Figure 2

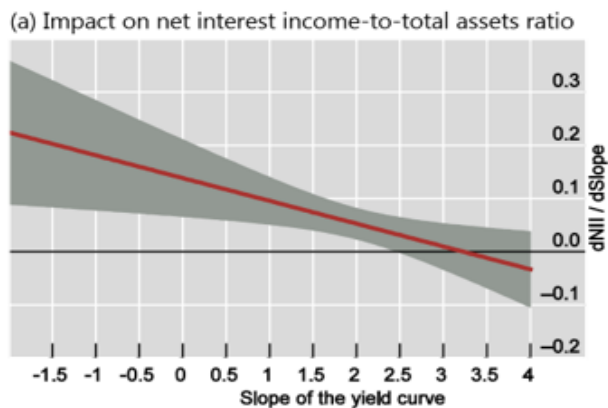


Figure 3

The econometric results, moreover,⁹² confirmed the previous graphical analysis.

⁹⁰ Source: Claudio Borio, Leonardo Gambacorta and Boris Hofman calculations. The shaded area indicates 95% confidence bands.

⁹¹ Source: Claudio Borio, Leonardo Gambacorta and Boris Hofman calculations. The shaded area indicates 95% confidence bands.

⁹² Source: Claudio Borio, Leonardo Gambacorta and Boris Hofman calculations.

Explanatory variables:	(I) Net interest income to total assets
Lagged dependent variable	0.8255*** (0.0747)
Short-term rate	0.5327*** (0.0682)
Short-term rate ²	-0.0270*** (0.0073)
Slope of the yield curve	0.1385*** (0.0370)
Slope of the yield curve ²	-0.0214** (0.0084)

3.2 The impact on Non-Interest income

Three components of non-interest income are relevant:

- i Valuation effects on securities;
- ii Hedging through derivatives;
- iii Fees and commissions.

The relation with the interest rate structure was convex. This means that for lower value of the interest rate structure, the Non-interest income impact was higher, offsetting partially the Net-interest income boost, as shown in Figure 3⁹³, Figure 4⁹⁴.

The econometric results⁹⁵, further, reported the negative impact of the short-term interest rate over the dependent variable, that is, the higher the short-term interest rate, the lower the Non-interest income.

⁹³ Source: Claudio Borio, Leonardo Gambacorta and Boris Hofman calculations.

⁹⁴ Source: Claudio Borio, Leonardo Gambacorta and Boris Hofman calculations.

⁹⁵ Source: Claudio Borio, Leonardo Gambacorta and Boris Hofman calculations.

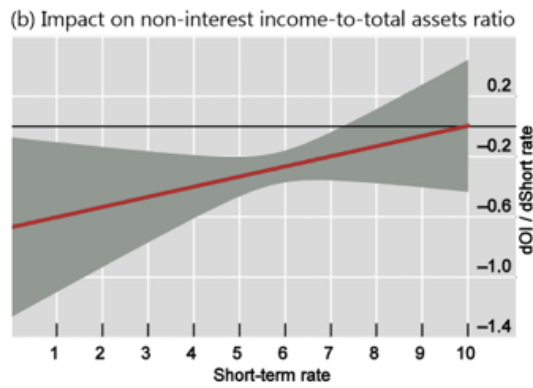


Figure 4



Figure 5

Explanatory variables:	(II) Non-interest income to total assets
Lagged dependent variable	0.7406*** (0.0546)
Short-term rate	-0.6693** (0.3035)
Short-term rate ²	0.0337* (0.0172)
Slope of the yield curve	-0.9782*** (0.3315)
Slope of the yield curve ²	0.2030*** (0.0763)

3.3 The impact on Loan Loss provisions

For given macroeconomic conditions, higher interest rates and a steeper yield curve slope should be expected to go with higher loan losses.

Moreover, higher interest rate was likely to have at least two effects, which were partly offsetting. First, it boosted the default probability on the existing stock of variable-rate loans, by increasing debt service burdens. Second, they might induce less risk-taking on new loans through the so-called risk-taking channel.

Indeed, a key way in which monetary policy was transmitted was by influencing banks' perceptions and attitudes towards risk, i.e. by influencing the market price of risk.

Since the stock of variable-rate loans was going to be larger than the flow of new loans, then, the overall impact on provisions should decrease the profitability.

Furthermore, the sensitivity of loan loss provisions to interest rates should be expected to be especially high at very low interest rates, as shown in Figure 5⁹⁶. This was because, given central banks' typical reaction function, such low rates were likely to prevail following financial crises, when banks', as well as their customers', balance sheets were in bad shape and then it made reluctant to accept further losses. The relationship between the slope of the yield curve and loan losses was likely to be qualitatively similar⁹⁷, as shown in Figure 6. Both the results, moreover, were confirmed by the econometric analysis⁹⁸.

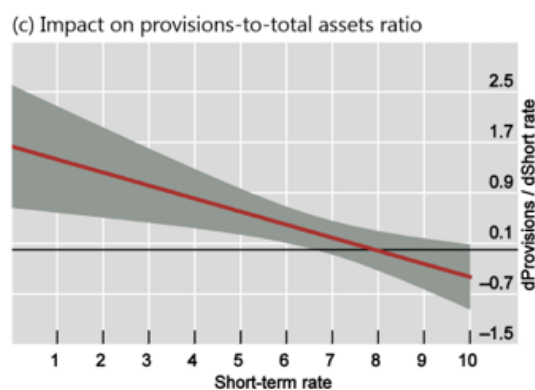


Figure 6

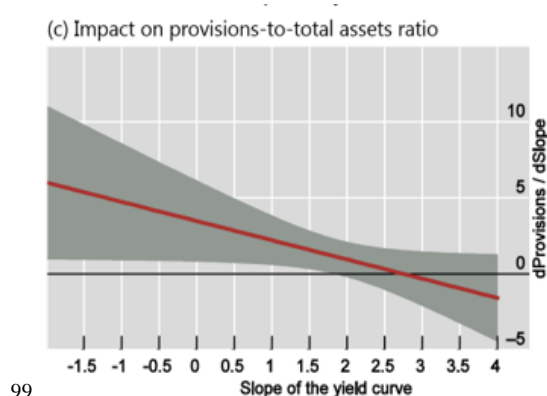


Figure 7

Explanatory variables:	(III) Provisions to total assets
Lagged dependent variable	0.5682*** (0.0609)
Short-term rate	1.6369*** (0.4953)
Short-term rate ²	-0.1033*** (0.0350)
Slope of the yield curve	3.4794** (1.3576)
Slope of the yield curve ²	-0.7896** (0.3204)

⁹⁶ Source: Claudio Borio, Leonardo Gambacorta and Boris Hofman calculations.

⁹⁷ That said, empirically, in this case, controlling well for background macroeconomic conditions is even more important: it is well known that a positive slope is normally associated with an expanding economy, possibly because of the anticipated central bank response. See Benati and Goodhart (2008) for a historical cross-country assessment of the predictive power of the yield spread for output growth and an assessment of different competing explanations for this stylized fact.

⁹⁸ Source: Claudio Borio, Leonardo Gambacorta and Boris Hofman calculations.

⁹⁹ Source: Claudio Borio, Leonardo Gambacorta and Boris Hofman calculations. The shaded area indicates 95% confidence bands.

3.4 The impact on Profitability

The regression supported the analytical framework yielding the following main results.¹⁰⁰

First, it highlighted a positive relationship between the interest rate structure and bank profitability resulting from two contrasting forces. On the one hand, the level of short-term interest rates and the slope of the yield curve were positively associated with banks' net interest income, reflecting their positive effect on bank margins and on returns from maturity transformation.

On the other hand, higher interest rates boosted the loan loss provisions, affecting debt service costs and default probabilities, and depressed non-interest income, working on securities' valuations.

Second, we also found that the impact of interest rates on bank profitability was particularly large when they were low. All this suggested that, over time, unusually low interest rates and an unusually flat slope erode bank profitability.

In the end, the impact on ROA was positive. That is, increasing the interest rate and the steep of the slope curve boosted positively the profitability until it reached a level in which the boost is equal to zero.

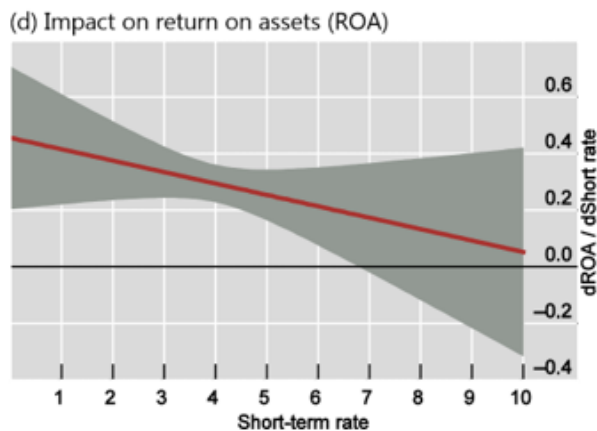


Figure 8

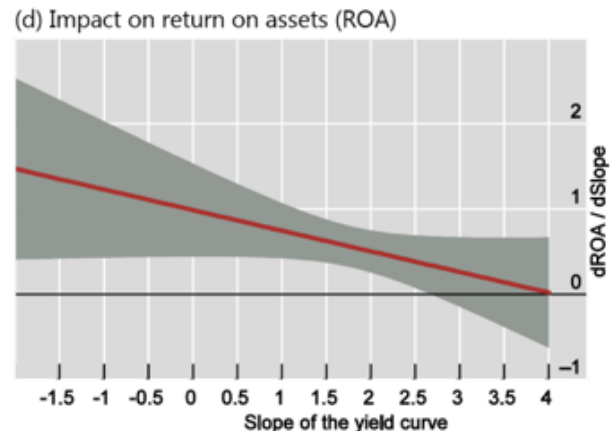


Figure 9

In addition, it was reported the econometric results¹⁰¹ which confirmed and supported the graphical analysis.

¹⁰⁰ It was used a System Generalized Method of Moments (S-GMM) to estimate the regression in order to control for potential endogeneity. ¹⁰⁰ Source: Claudio Borio, Leonardo Gambacorta and Boris Hofman calculations. The shaded area indicates 95% confidence bands.

¹⁰¹ Source: Claudio Borio, Leonardo Gambacorta and Boris Hofman calculations.

Explanatory variables:	(IV)
	ROA: profit before taxes to total assets
Lagged dependent variable	0.2739*** (0.0609)
Short-term rate	0.4556*** (0.1284)
Short-term rate ²	-0.0191*** (0.007)
Slope of the yield curve	0.9878*** (0.2770)
Slope of the yield curve ²	-0.2417*** (0.0694)

3.5 Econometric framework

Indexing individual banks¹⁰² with k , countries where banks were headquartered with j and years with t , it was carried out the econometric analysis using the following benchmark model:

$$Y_{k,j,t} = \delta Y_{k,j,t-1} + \alpha_0 r_{j,t} + \alpha_1 r_{j,t}^2 + \beta_0 \theta_{j,t} + \beta_1 \theta_{j,t}^2 + \gamma \sigma_{j,t} + \Phi' C_{k,j,t} + \Psi' X_{k,j,t-1} + \vartheta_k + crisis + \varepsilon_{k,j,t}$$

Where Y was the relevant profitability variable as a ratio of total assets.¹⁰³ The monetary policy indicators were the three-month interbank rate (r), and the slope of the yield curve¹⁰⁴ (θ), i.e. the difference between the 10-year government bond yield and r . These indicators were set in the equation also in quadratic form.

Furthermore, several control variables were introduced:

- The macroeconomic indicators in the vector C , that is, the growth rate of nominal GDP, stock market indices and house prices, have been weighted based on banks' exposures to different countries.

¹⁰² The authors used bank-level data from Bank Scope, a commercial database maintained by Fitch and Bureau van Dijk. The data are annual.

¹⁰³ The analysis of the pre-tax profits is preferable in order to exclude possible effects due to different taxation regimes (Albertazzi and Gambacorta (2010)).

¹⁰⁴ The yield curve slope allows us to control for the effects of unconventional monetary policy.

- The coefficient of variation of the three-month interbank rate (σ) in order to capture perceived uncertainty about financial conditions.
- A dummy crisis took the value of 1 in the period 2008-2012.

In order to consider bank characteristics, we included a set of bank fixed effects (ϑ_k) and a vector of time-varying bank-specific indicators (X). The latter, in particular, were crucial in order to control for loan supply and loan demand factors. Indeed, this approach was based on the hypothesis that certain bank-specific characteristics, such as size, liquidity, short-term funding, cost to-income ratio and capitalization, only influenced the loan supply.

Furthermore, it was assumed that banks differ in their ability to prevent a contraction in their loans or experience a drop in the availability of total deposits, i.e. from shocks following, in particular, a monetary tightening.

In addition, small and less capitalized banks, which were penalized by markets, suffering asymmetric information, facing higher cost in raising non-secured deposits and may therefore have to cut their lending more substantially. Similarly, illiquid banks had less possibilities to shield their customers by drawing down cash and securities.

Vector X , then, contains:

- i bank size, that is, the natural logarithm of total assets;
- ii bank leverage, that is, the equity-to-total assets;
- iii bank liquidity, that is, the liquidity-to-total assets ratio;
- iv the share of short-term liabilities;
- v the cost-to income ratio; and
- vi asset volatility

One possible identification problem was endogeneity. Bank profitability could have an impact on the balance sheet items listed above as well as on monetary policy decisions. In order to overcome this potential firstly, all bank-specific characteristics were lagged. Secondly, dynamic System Generalized Method of Moments (S-GMM) panel methodology was used, which should yield consistent and unbiased estimates.

In the end, understanding the link between interest rates and bank profitability was important for evaluating the effect of the monetary policy on the soundness of the financial sector. While

monetary policy was not, of course, the only influence on the interest rate structure, it has a major impact on it, since the central bank set the short-term rate and influences longer-term rates through direct purchases of securities and by guiding market participants' expectations about the short-term rate.

The link between monetary policy and bank profitability became more relevant following the Great Financial Crisis. In the major advanced economies, indeed, the short-term and long-term interest rates were set to historically low levels but it is an under-researched area.

Many papers analyzed the link between bank profitability and business conditions, producing results on the link between the interest rate structure and bank profitability only as a by-product. In particular, Demirgüç-Kunt and Huizinga (1999) found that high real interest rates are associated with higher interest margins and profitability, especially in developing countries. Other examples include Albertazzi and Gambacorta (2009), who used aggregate data for the banking sector in 10 OECD countries, found a significant relationship between net interest rate income and the yield curve slope. They also highlighted a positive relationship between bank loss provisions and the short-term interest rate.

Only few studies have focused specifically on the impact of interest rates on bank profitability. English (2002) studied the link between interest rate risk and bank interest rate margins in 10 industrialized countries. He understood that, as the average yield on bank assets was more closely related to long-term rates than the average yield on liabilities, a steep yield curve raises interest margins. Recently, Alessandri and Nelson (2014) established a positive long-run link between the level and slope of the yield curve and bank profitability in the United Kingdom.

The contribution of the Borio, Gambacorta and Hofman work, thought, was meaningful.

First, it was analyzed the link in a deeply way considering a large set of international banks and all the main components of banks' balance sheets. Second, for the first time it was assumed the non-linearity in the relationship between interest rates and bank profitability.

This aspect had so far been neglected in empirical work but, if it was significant and ignore, it underestimated the effects of very low interest rates.

A second important thesis' pillar is represented by four seminars conducted by the former Federal Reserve Chairman Ben S. Bernanke to the Washington University in March 2012. The seminars were reported and translated by Adele Olivieri into a book entitled "La Federal Reserve e la crisi finanziaria, quattro lezioni". In this work the author described the Federal Reserve from its origin to the Financial Crisis, trough the Second World War, analyzing successes and fails. In particular

the last two chapters are dedicated to the crisis consequences and the Federal Reserve reaction to the system collapse which, in addition to the work paper “The Crisis and the Policy Response”¹⁰⁵, helped to understand the trend and the role played by the Fed funds rate cut that is analyzed deeper in Chapter 4.

In the end, the Federal Reserve official website is used to argument the Central Banks policy tools during the period of financial stability¹⁰⁶. Moreover, the sample data used have origin from the “Federal Financial Institutions Examination Council”¹⁰⁷ (FFIEC), that is, a formal interagency body empowered to prescribe uniform principles, standards, and report forms for the federal examination of financial institutions by, between others, the Board of Governors of the Federal Reserve System and the Federal Deposit Insurance Corporation (FDIC).

¹⁰⁵ Chairman Ben S. Bernanke, January 2009

¹⁰⁶ <https://www.federalreserve.gov/monetarypolicy/policytools.htm>

¹⁰⁷ <https://www.ffiec.gov/>

4. THE DETERMINANTS OF BANKS PERFORMANCE

4.1 THE FEDERAL FUNDS RATE CUT

As deeply analyzed in the previous chapter, the Federal Reserve implemented many instruments in order to stop the financial crisis.

One of the most important tools was to decrease the Federal Funds rate close to zero, that is, to implement an expansionary monetary policy, in order to boost the recovery of the economy.

The reduction of the interest rate, indeed, aimed to reduce the pressure on the financial environment and to affect positively the other rates, such as, for instance, the ones applied to the car or house loan.

The main aim, then, was to support the banks credit activity, in order to maintain liquid the system and to avoid banks run, due to the people panic.

Its implementation, though, was not sufficient to smooth the great crisis consequences and, then, the American Central Bank used many other unconventional tools to face the collapse of the economic system.

Aiming to understand the effect of the Federal Funds rate cut, it is analyzed its performance over four particular variables, which represent the profitability indicators of the institutions sample chosen.

The benefit brought by the sharply reduction of the interest rate on the whole system is, firstly, represented graphically and, then, analyzes through an econometric model, considering the four dependent indicators.

4.2 THE DATABASE CONSTRUCTION

The sample is composed by the 50¹⁰⁸ major American Banks¹⁰⁹ with respect to the average assets, recorded on each 31 December 2017 balance sheet. The main source of the analysis is the “Federal Financial Institutions Examination Council” (FFEIC) database.

It is analyzed deeply each single “Uniform Bank Performance Report” (UBPR), which is an analytical tool created for bank supervisory, examination, and management purposes, showing the impact of management decisions and economic conditions on a bank's performance and balance-sheet composition¹¹⁰.

¹⁰⁸ The complete list is reported in the Annex.

¹⁰⁹ Source: “Federal Financial Institutions Examination Council” website. From the website 19 institutions of the sample had an average asset recorded on the 31 December 2017, higher than 100-dollar billions while the other 31 was between 10 and 100-dollar billions.

¹¹⁰ Source: “Federal Financial Institutions Examination Council” website.

The data contained in the report can be used to evaluate the performance of the institutions reported and, furthermore, the adequacy of earnings, liquidity, capital, asset and liability composition. In order to smooth and to adequate the sample, some constraints are set.

It is not considered, indeed, banks which have a number of offices less than one hundred, aiming to avoid the possibility to include in the analysis also the institutions, which main activity is investment banking.

A second constraint is to delete the banks which don't report some or all the financial statements related to the time period chose. We exclude, then, the Santander Bank of Delaware and the New York Sterling Bank from the database, reducing it to 48 banks¹¹¹.

The time period considered is from 2003 to 2012, that is, from the end of the bubble burst crisis to some year after the end of the 2007-2009 financial collapse¹¹², when the Fed Funds rate was set at a low but stable level.

Regarding to the dependent variable, four profitability variables are chosen, which could be mostly influenced by the Federal Reserve decisions, that are:

1. The Net Interest income (NII)
2. The Non-interest income
3. The Net Credit Losses
4. The Return on Assets (ROA)

4.2.1 The Net Interest Income (NII)

The Net interest income is defined as the difference between the revenues, which are generated from the assets of a bank and the expenses associated with its liabilities. Typical assets are represented by all forms of commercial loans, such as car loans, mortgages and securities.

The liabilities, instead, are linked to the clients' deposits.

Regarding to the interest rate sensitivity, the Net Interest income is affected by its changes according, in particular, to the type of assets and liabilities held by the banks and, further, to the type of rate applied. Over loans of the same type, indeed, can be charged a variable or a fixed rate

¹¹¹ It was not possible to find the Balance Sheet from 2003-2011. Just the available one, 2012, was included in the analysis.

¹¹² The period selected was chosen after an important analysis of the Fed funds trend. As is possible to check in Figure Chapter 2, the Interest rate reached a higher value immediately after an end of a crisis and is cut during a collapse.

and, of course, if the first one is applied, assets and liabilities are more influenced by its fluctuation than a fixed rate application.

This environment was common during the years before the financial collapse. On mortgage loans, indeed, banks offered fixed rate but, further, adjustable rate. When the economy deteriorated and worker lost their job, it was not possible for them to repay the installments and, as consequences, banks Net Interest income had a huge reduction.

Moreover, if banks held in their portfolio liabilities which repriced quicker or more frequently than the assets, it probably influenced negatively the profitability indicator.

Regarding to the income statement of the institutions, the Net Interest income is computed as follow¹¹³:

A) Interest and Fee on Loans
B) Income from Lease Financing
C) Estimated Tax Benefit
D) Income on Loans & Leases (A+B+C)
E) Us Treasury and Agency (Excluded MBS)
F) Mortgage Backed Security
G) Estimated Tax Benefit
H) All other Securities
I) Investment Interest Income (E+F+G+H)
J) Interest on Due from Banks
K) Interest on Fed Funds Sold & Resales
L) Trading account income
M) Other interest income
O) Total Interest Income (D+I+J+K+L+M)

The total interest expenses on liabilities, instead, is computed as follow¹¹⁴:

¹¹³ Source: "Federal Financial Institutions Examination Council" website – "Uniform Bank Performance Report", income statement.

¹¹⁴ Source: "Federal Financial Institutions Examination Council" website – "Uniform Bank Performance Report", income statement.

P) Interest on Deposit in Foreign Off
Q) Interest on Domestic Deposits
R) Interest on Fed Funds Purchases and Repos
S) Interest Trading Liabilities & Other Borrowings
T) Interest on Sub Notes & Debentures
U) Other Interest Expenses
V) Total Interest expenses (P+Q+R+S+T+U)

The difference between the Total Interest income and the Total Interest expenses, produces the Net Interest Income:

W) Net Interest Income (O-V).

4.2.2 The Non-interest income

The Non-interest income is defined as the income derived primarily from banks fees, including deposit and transaction fees, insufficient funds (NSF) fees, annual fees, monthly account service charges, inactivity fees, check and deposit slip fees, and penalty fees on credit card issuers¹¹⁵.

When the institutions cover the role of the borrower, they charge fees on the loans issued.

This is, then, considered an income, which generate revenues. The fees, indeed, represent the banks operating income, that is, the profit from daily and common business operations.

The economic environment determines the degree to which banks rely on fees to make profit. The market interest rates, as we said many times, are driven by benchmark rates such as the Federal Funds rate. This rate determines the rate applied on the excess reserve (IOER) held to the Central Banks by the institutions. If it increases, banks make profit in term of interest income, but in this way, at a certain point, it could be more strategic to reduce the level of fees and charges, in order to attract new deposits than to invest in the excess reserves.

During the Federal Funds rate reduction period, indeed, banks and financial institutions relied on non-interest income since it was considered as a strategic line item on the income statement.

¹¹⁵ Source: The definition of the profitability variables derived from personal studies, materials and from the common website.

The non-interest income is computed as follow¹¹⁶:

A) Fiduciary Activities
B) Deposit Service Charges
C) Trading Venture Capital Securitization Income
D) Investment Banking Advisory Income
E) Insurance and Commerce fees
F) Net Servicing Fees
G) Loan & Leases Net Gains/Loss
H) Other Net Gains/losses
I) Other Non-interest income
J) Non - Interest Income (A + B + C + D + E + F + G + H + I)

4.2.3 The Net Credit Losses

The Net Credit Losses is defined as the difference between the Gross Credit Losses and Recoveries held each year. Since the credit environment sharply deteriorated, this is an indicator of the creditworthiness of the bank’s debtors. That is, the higher the level of subprime loans is hold in the portfolio institutions, the higher will be the Net Credit Losses since the recoveries decrease and, vice-versa, the Gross Credit Losses increase.

The following Net Credit Losses computation is available in the “Federal Financial Institutions Examination Council” analysis through its section called “Allowances and Loan Mix”:

A) Gross Credit Losses
B) Recoveries
C) Net Credit Losses (A - B)

¹¹⁶ Source: “Federal Financial Institutions Examination Council” website – “Uniform Bank Performance Report”, income statement.

4.2.4 The Return on Asset

The Return on assets (ROA) is a company profitability ratio, reporting an indication about the player efficiency in using its assets to generate earnings.

The Return on assets, then, explains to the institutions, which is level of earnings, which derive from the invested capital.

The indicator could differ between private and public companies, that is, when it is used as a comparative measure, it is more efficient to implement it among companies with similar structure.

Deeply, the Return on assets is a ratio, which considers the Net income over the total assets. A higher ROA ratio is an important value for any kind of institution or company since it means that the assets held generate profit.

The Net income is computed as follow¹¹⁷:

A) Net Interest Income	
B) Non - Interest Income	
	C) Adjusted Operating Income (A+B)
D) Non-Interest Expenses	
E) Provision: Loan & Lease Losses	
	F) Pretax Operating Income (C-D-E)
G) Realized G/L Held to maturity Securities	
H) Realized G/L Available for Sale Securities	
I) Unrealized G/L Equity Securities	
	J) Pretax Net Operating Income (F+G+H+I)
K) Applicable income Taxes	
L) Current Tax Equivalent Adjustment	
	M) Applicable Income Taxes (K+L)
	N) Net Operating Income (J-M)
O) Net Discontinued/ Extraordinary Items	
P) Net Income Noncontrolling Minority Interests	

¹¹⁷ Source: "Federal Financial Institutions Examination Council" website – "Uniform Bank Performance Report", income statement..

Q) Net Income (N+O+P)

Dividing each institutions Net income value by its total assets, it is reported the banks ROA in the model:

$$ROA = Net\ Income / Total\ Assets$$

4.3 THE HYPOTHESIS

The thesis research question is to understand the effect of the Federal Funds rate cut implementation over the variables previously explained. Before the analysis through the econometric model, we have to summarize the hypothesis regarding to the tool effect:

- On the Net interest income, the reduction of the rate have to act as expansionary policy in order to boost the economy. All the rates such as the car and house loan rates should decrease, reducing, then, the cost of borrowing. The bank, subsequently, could start to be a lender again causing an increase in the Net Interest Income. The Federal Funds rate and the Net Interest Income, then, should have a negative correlation, that is, when the rate decreases the NII increases.
- On the Non-interest income, instead, it is hypnotized a positive correlation between the Federal Funds rate changes and the variable considered.
The rate reduction, indeed, should affect the banks income deriving from fees related to the normal business operation, eroding the Non-interest income variable.
- The Net Credit Losses is linked to the ability of the borrowers of repaying their debt. As the market condition improves the variable value should be lower. The Federal Fund rate cut, as we said, drives all the other rates improving the market conditions. That is, a positive correlation between the independent and the dependent variable is expected.
When the rate is reduced, also the losses from borrowers' default is limited, improving the Recoveries and smoothing the Gross Credit Losses.

- The Return on Assets, in the end, should be positive influenced by the Federal Funds rate reduction. From the income statement, indeed, we can understand that the Net income is composed by the Net Interest income and the Non-interest income. Furthermore, we must add the potential realization of the Available for Sale Security and the Fair Value increases, due to the market improvement, that should drive up the Net income and, then, at least in the short period, the banks' profitability.

4.4 THE MODEL

In order to understand the relationship among the Net Interest income, Non-interest income, Net credit losses, the Return on assets and the Federal Funds rate changes, it is set an econometric model.

Since our sample is composed by 48 players and the time period considered is 10 years, we set a panel data model for each dependent variable.

Moreover, in order to complete our analysis, other independent factors are considered, which have influenced our regression, that are, the quadratic Federal Funds rate, the USA GDP growth rate and Bank size, which could have a significant effect on the profitability variables. In particular, the GDP growth rate represents the richness of the country and if a recession, as the 2007-2009, happens, all the economy sectors are influenced, such as the credit market which, consequently, constrained the banks to be not more a money lender and, then, people can not have access to the credit, breaking the GDP growth, as shown in Figure 33¹¹⁸.

A recession, then, reduces the banks' profitability and increase the borrower's probability of default.

¹¹⁸ Source: <https://www.thebalance.com/us-gdp-by-year->

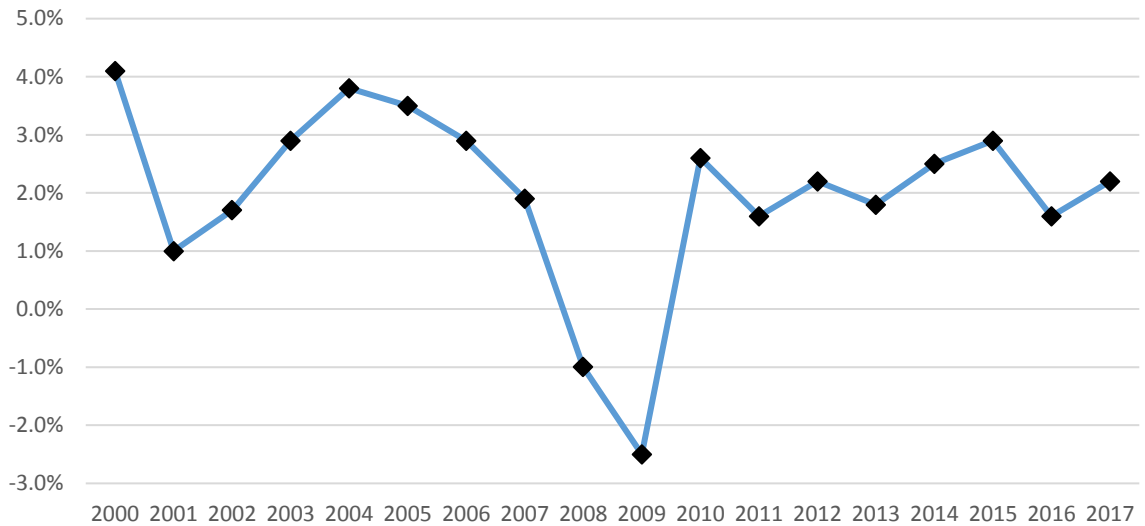


Figure 33

USA GDP Growth rate

Regarding to the banks size, it is important to consider the changes in the sample total assets since, as said before, the financial crisis started as a real estate crisis but sharply became a financial crisis, deteriorating all the financial institution that had in their portfolio subprime loans and toxic assets which was not possible to be sold on the collapsed market.

This, subsequently, affected the banks size and its growth with respect to the assets representing a contraction, as reported in Figure 34.¹¹⁹

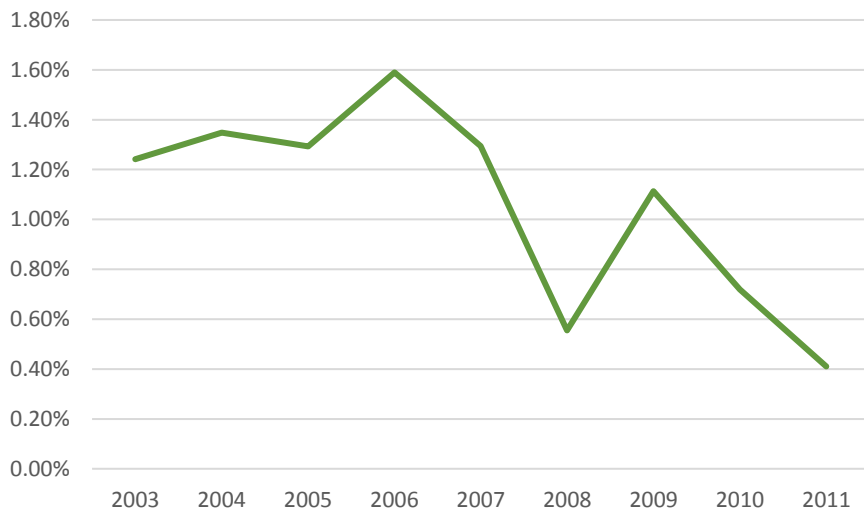


Figure 34

Sample Average Bank Size Growth YoY

¹¹⁹ Source: The graph is elaborated by the author, using the database.

Moreover, in order to have stationary variables, all the profitability indicators are divided by the total assets and are taken the logarithm of the bank size.

That are, our expressions are:

$$NII = \alpha_0 + \alpha_1 Fed.rate + \alpha_2 Fed.rate^2 + \alpha_3 GDP + \alpha_4 Size$$

$$NON = \beta_0 + \beta_1 Fed.rate + \beta_2 Fed.rate^2 + \beta_3 GDP + \beta_4 Size$$

$$NET = \delta_0 + \delta_1 Fed.rate + \delta_2 Fed.rate^2 + \delta_3 GDP + \delta_4 Size$$

$$ROA = \gamma_0 + \gamma_1 Fed.rate + \gamma_2 Fed.rate^2 + \gamma_3 GDP + \gamma_4 Size$$

4.5 RESULTS AND COMMENTS

4.5.1 Impact on Net Interest Income



Figure 35

Average Net Interest Income

Graphically it was reported in Figure 35¹²⁰ the average Net Interest Income trend of our sample for the 2003-2012 period, which highlights a significant increase during the financial collapse and an important reduction before.

The average Net Interest income of our sample is, then, extremely influenced by the Federal Funds rate trend both positively and negatively, confirming than the hypothesis of negative correlation between the dependent and independent variable.

¹²⁰ Source: The graph is elaborated by the author, using the database.

Subsequently the bubble burst crisis, when the interest rate increased, indeed, the Net Interest Income decreased and vice versa during the financial crisis.

The theory is supported by the econometric results¹²¹, which reports the Fed Funds rate coefficient significant at a 5% level. Furthermore, the analysis shows an interesting other factor effect. The GDP growth rate is more significant, i.e., at 1% level. It is then possible to understand how the Net Interest Income is positively influenced by the reduction of the interest rate but it is smoothed by a decrease in the USA GDP growth rate, which reduces the monetary policy benefit. The Bank size variable coefficient, instead, is not significance, that is, a change in the total assets of the sample don't have any effect on the Net Interest Income variable.

```

Coefficients:
              Estimate Std. Error t-value Pr(>|t|)
XFED.Funds.Rate -0.1729788  0.0554593 -3.1190  0.001953 **
XFed.Funds.Rate2  2.0397856  1.0400698  1.9612  0.050585 .
XGDP.Growth.Rate  0.0603482  0.0146806  4.1108  4.835e-05 ***
XLog.Bank.size    -0.0014560  0.0010505 -1.3861  0.166536
---
signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Total Sum of Squares:    0.00876
Residual Sum of Squares: 0.0081676
R-Squared:               0.067628
Adj. R-Squared:         -0.15565
F-statistic: 6.89067 on 4 and 380 DF, p-value: 2.3087e-05

```

In Figure 36, it is reported the GDP growth rate and Federal Funds rate trends, which both show a significant reduction during the crisis period.

¹²¹ Source: Personal elaboration of the author, using R studio and the function “plm” which produced a Panel Data within model.



Figure 36

USA GDP growth rate trend and Federal Funds Rate trend

4.5.3 Impact on Non-interest income

Looking at the Non interest income trend, the initial hypothesis of a positive correlation between the profitability variable and the policy tool is confirmed both by the graph and by the econometric regression.

Graphically it is reported in Figure 37¹²² the average trend of our sample for the 2003-2012 period, which record a down trend from 2006-2008, that is, the during the financial crisis and the implementation of the Federal Funds rate cut.

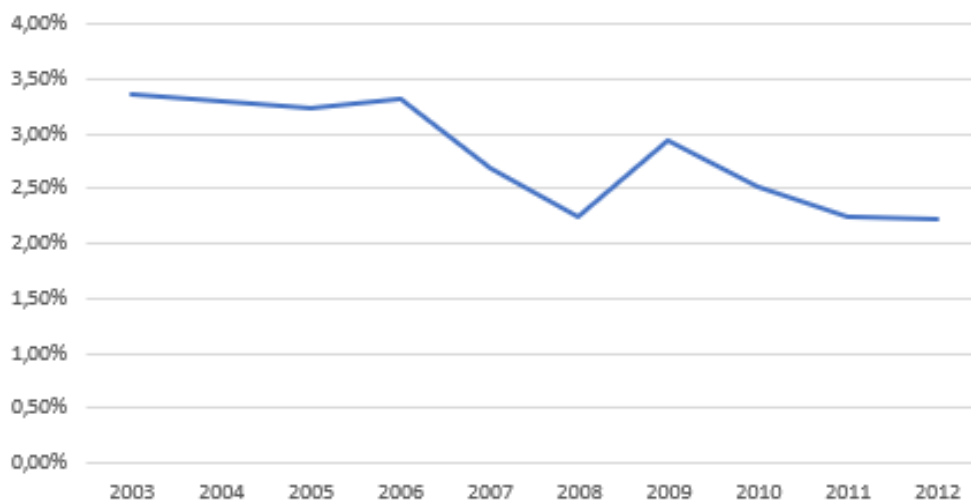


Figure 37

Average Non-Interest Income

¹²² Source: The graph is elaborated by the author, using the database.

Furthermore, the profitability indicator start to increase when the interest rate was stabilized by the authority.

The econometric results¹²³ confirm a 5 % level significant coefficient of the Fed funds rate which have driven the Non-interest income.

Furthermore, we have an interesting result with respect to the Bank size. A reduction in the institutions total assets have a statistically significant a 1% level that have negatively influenced the profitability variable together with the implementation of the monetary policy, reported also by the Figure 38¹²⁴ below. The GDP growth rate variable coefficient, instead, is not significance, that is, a change in the independent variable don't have any effect on the sample Non- interest income.

```

Coefficients:
              Estimate Std. Error  t-value  Pr(>|t|)
XFED.Funds.Rate -1.3285036  0.4061828  -3.2707  0.001171 **
XFed.Funds.Rate2 22.6107887  7.6174567   2.9683  0.003184 **
XGDP.Growth.Rate -0.0197474  0.1075201  -0.1837  0.854376
XLog.Bank.size   -0.1026599  0.0076936 -13.3435 < 2.2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Total Sum of Squares:    0.64877
Residual Sum of Squares: 0.43812
R-Squared:               0.3247
Adj. R-Squared:         0.16298
F-statistic: 45.6777 on 4 and 380 DF, p-value: < 2.22e-16

```

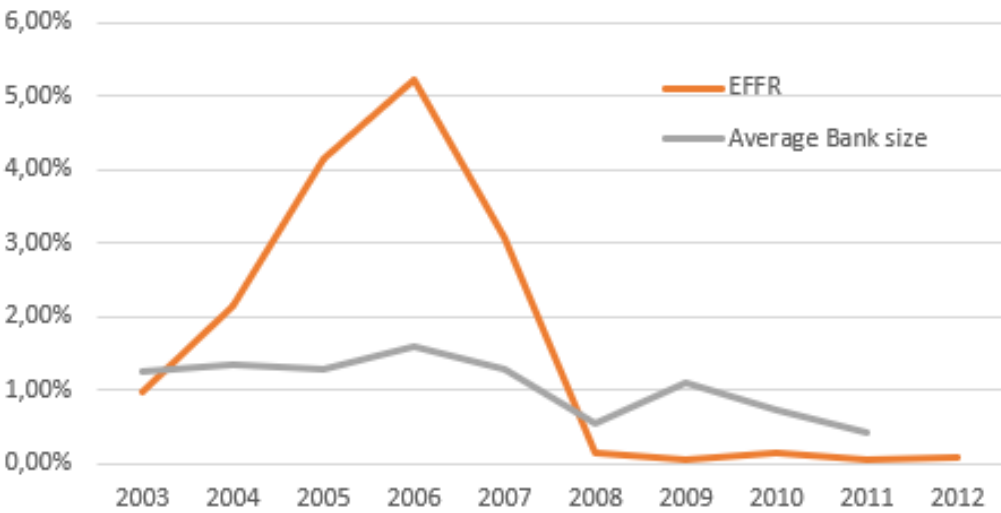


Figure 38 Fed Funds rate trend and Average Bank size trend

¹²³ Source: Personal elaboration of the author, using R studio and the function “plm” which produced a Panel Data within model.

¹²⁴ Source: The graph is elaborated by the author, using the database.

4.5.4 Impact on Net Credit Losses

In this case, it is not confirmed the hypothesis of a Federal Funds rate cut positive influence. Graphically it is reported in Figure 39¹²⁵ the average trend of our sample for the 2003-2012 period. The highest pick was reach in 2009, when the system started to recover and people, then, could find a job and repay their loans.

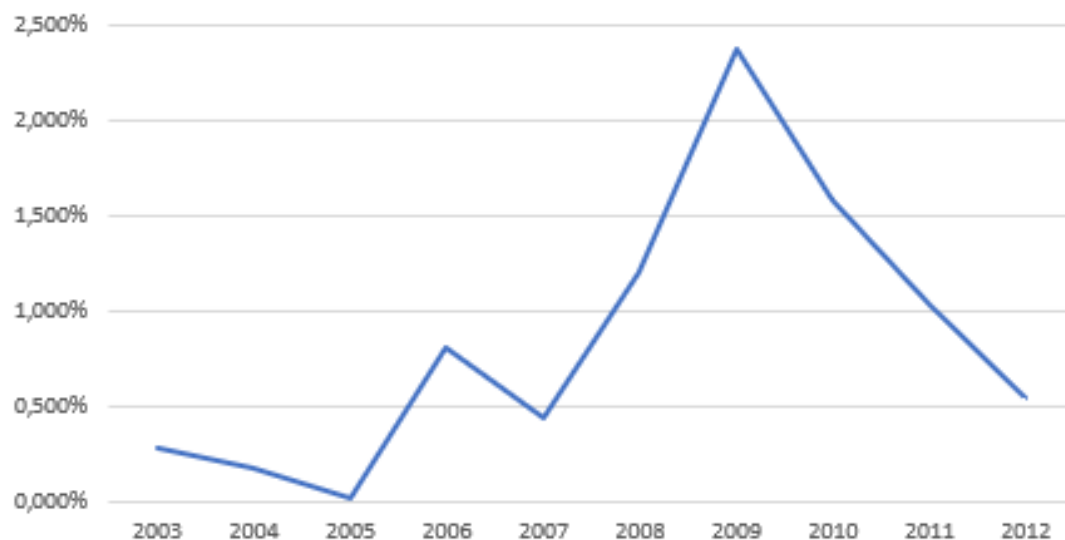


Figure 109

Average Net Credit Losses

This behavior is justified by the econometric regression¹²⁶ that illustrate a 10% significant level regarding to the monetary tool but, also a 5% significant on the GDP growth rate coefficient. That is, the Net Credit Losses is reduced by a cut of the Federal Funds rate but this is nullified and exceed by the sharply USA economic contraction. The Bank size variable coefficient, instead, is not significance, that is, a change in the total assets of the sample don't have any effect on the Net Credit Losses variable.

¹²⁵ Source: The graph is elaborated by the author, using the database.

¹²⁶ Source: Personal elaboration of the author, using R studio and the function "plm" which produced a Panel Data within model.

Coefficients:

	Estimate	Std. Error	t-value	Pr(> t)
XFED.Funds.Rate	-0.6316757	0.2836103	-2.2273	0.026515 *
XFed.Funds.Rate2	10.8470843	5.3187606	2.0394	0.042101 *
XGDP.Growth.Rate	-0.2090975	0.0750741	-2.7852	0.005617 **
XLog.Bank.size	-0.0048416	0.0053719	-0.9013	0.368012

 Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Total Sum of Squares: 0.23135
 Residual Sum of Squares: 0.21359
 R-Squared: 0.07674
 Adj. R-Squared: -0.14436
 F-statistic: 7.89624 on 4 and 380 DF, p-value: 4.0194e-06

In the Figure 40¹²⁷ below is reported again the graphical relation between the Federal Funds rate trend and the GDP growth rate highlighting the higher down trend of the USA economic indicator.



Figure 40

USA GDP growth rate trend and Federal Funds Rate trend

¹²⁷ Source: The graph is elaborated by the author, using the database.

4.5.2 Impact on Return on Assets

Graphically it is reported in Figure 41¹²⁸ the average trend of our sample for the 2003-2012 period, which record a sharply down trend probably due to the deterioration of the assets held in the portfolio banks and, then, by a reduction in the Net Income.

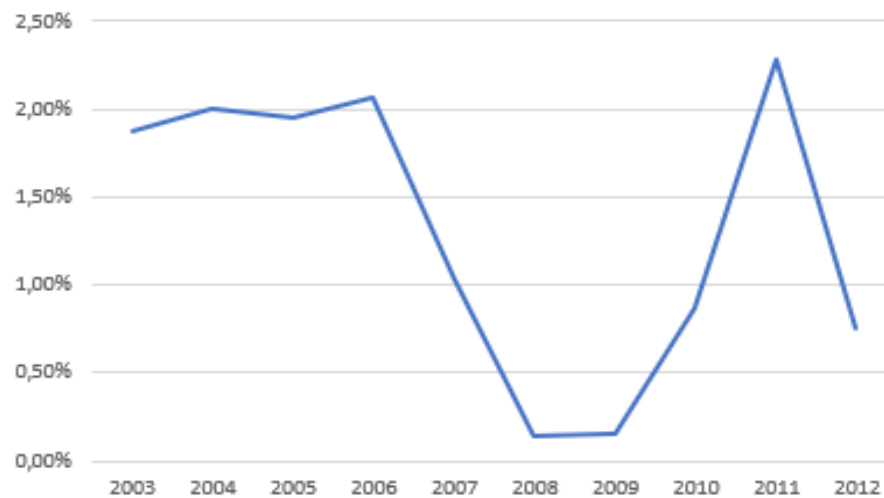


Figure 111

Average Return on Assets

This refutes the hypothesis of the Fed funds rate reduction positive influence and might suggest that the monetary policy implemented by the Federal Reserve negatively affected the Return on assets variable.

To understand this interesting result and what really influences the profitability indicator, it is necessary to look at the regression results¹²⁹.

From the coefficient results it is possible to understand that the Federal Reserve tool implementation is not statistically significant.

What is significant, instead, is the GDP growth rate at 10% but, further, the bank size at 1% level highlighting that the down trend of the the Return on assets is determined by the reduction in the institutions balance sheet with respect to the total assets.

¹²⁸ Source: The graph is elaborated by the author, using the database.

¹²⁹ Source: Personal elaboration of the author, using R studio and the function "plm" which produced a Panel Data within model.

Coefficients:

	Estimate	Std. Error	t-value	Pr(> t)
XFed.Funds.Rate	-0.6316175	0.4548410	-1.3887	0.16575
XFed.Funds.Rate2	11.7262617	8.5299807	1.3747	0.17003
XGDP.Growth.Rate	0.2854265	0.1204004	2.3706	0.01826 *
XLog.Bank.size	-0.0346410	0.0086153	-4.0209	6.995e-05 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Total Sum of Squares: 0.59027

Residual Sum of Squares: 0.54937

R-Squared: 0.069298

Adj. R-Squared: -0.15358

F-statistic: 7.07348 on 4 and 380 DF, p-value: 1.6799e-05

The negative trend of the independent variables is also proved by the following Figure 42¹³⁰, which isolates the sharply deterioration of the GDP growth rate and the bank size.

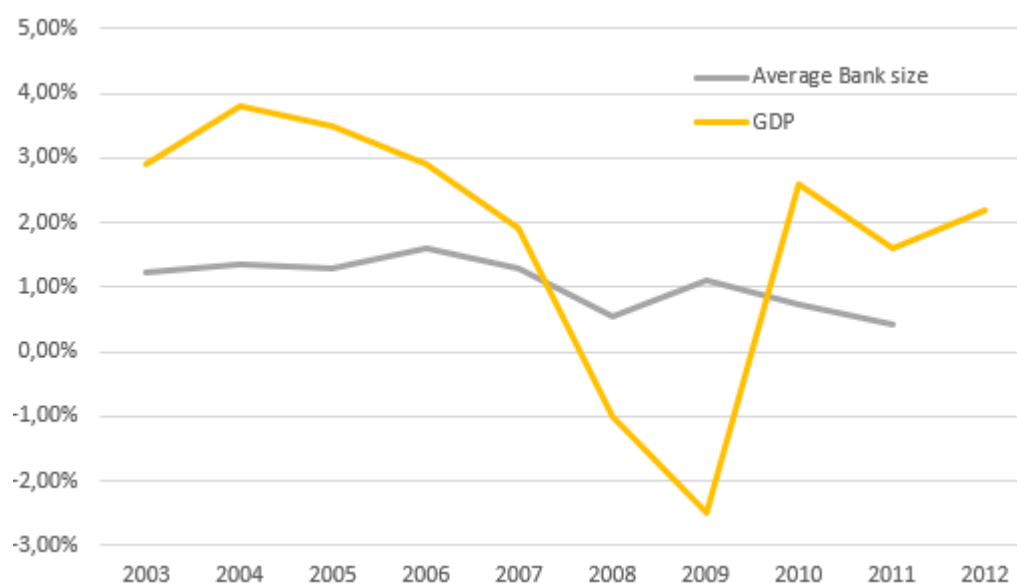


Figure 42

USA GDP growth rate trend and Average Bank size trend

¹³⁰ Source: The graph is elaborated by the author, using the database.

4.6 Conclusion

The Federal Funds rate trend, during the period analyzed, covered a significant role in the recovery of the economy and greatly affected the profitability variables considered.

Not all them, though, were influenced. As the results showed, the Net interest income and the Non-interest income of the sample were mostly touched, while a lower impact was reported regarding to the Net Credit Losses and no effect was recorded over the Return on Assets.

Focusing on the 2007-2009 period the produced results were interesting, since reflected the real weakness of the monetary policy implemented during the Financial Crisis.

The history and the literature, indeed, reported several documents, relations and real experiences about the disaster due to the collapse of the system.

The monetary policy implementation was not sufficient to smooth the consequences and, then, the Federal Reserve implemented many other unconventional tools, deeply illustrated in Chapter 2. Their implementations showed the limitation of the conventional monetary policy, due, in particular, to the dimensions and to the characteristic of the crisis, which were unique.

The Federal Reserve and the whole world, indeed, considered the 2007-2009 financial crisis, the greatest faced since the Great Depression years.

The base of the collapse could be individuated in the 70ies, when it was created the process so called “securitization”, which allowed the banks to pool the mortgages held in their balance sheet and to create a particular asset, so-called, Mortgage Backed Securities (MBS). This new tool was sold on the market to the investors, allowing the institutions to lend many other mortgages. This created a diabolic loop. The buyers, indeed, considered the investments free risk, since the underlying was the real estate market, always considered safe and unwavering.

Moreover, the soundness of the market and the prospect of huge profits, often brought the institution to apply less tighten condition and to accord mortgages to not qualify borrowers.

Figure 43¹³¹ reported a mortgage offers advertising example of the period prior the system collapse. Considering the poster characteristics, it is easier to understand the degree of confidence owned by the financial institutions. The type of mortgages offered, indeed, were:

- The “1% low start rate”, that is, the first years just the 1% interest rate was charged on the loan issued. Nevertheless, nothing was declared about the following rates.
- The “Stated income” granted to the borrowers the possibility to declare their income, without the constraints of providing any kind of documentation.

¹³¹ Ben S. Bernanke, “La Federal Reserve e la crisi finanziaria, Quattro lezioni”, Chapter 3.

- The “no documentation loans” meant that the lender would not have carried out any type of checks.
- The “100% finance available” characteristic allowed the borrower to not provide an anticipation on the loans.
- The “interest-only loans” stated the reimbursement just of the interest and not of the principal for the first years.
- The “debt consolidation” let the borrower the possibility to consolidate their new mortgage with all their debt, such as the one on the credit loan, and to pay just the 1% overall.



Figure 12 The credit constraints deterioration

In addition, also the rating agency were less severe and granted the highest rate, that is the “AAA”, almost to all the banks pooled loans, which appeared free risk on the market.

The Mortgage Backed Securities obligations, then, were not composed by the “AAA” loans but by lower rate mortgages, often “CCC”.

When the borrowers could not pay the installments, though, the banks were not concerned, since the real estate market and the house prices continued to raise. They could, indeed, distrained the building and resold it without recording any type of loss.

Nevertheless, the house price dropped down in 2007 and it was the trigger of the bubble burst, which had disastrous consequences.

Banks started to be concerned about the borrowers who could not pay the installments, since it was not possible to resell them on the second market without recording a huge loss of value.

Moreover, also the prime borrowers, who could repay the mortgages, stopped to pay the installments, since their houses value were lower than the banks founding.

Since the underlying assets value decreased, also the obligations worth sharply reduced to zero and the investors lost everything together with the banks, which had in the balance sheet a significant number of defaulted Sub-Prime loans.

The securitization process was used by all the biggest banks in Wall Street and, as consequences, in the entire world, affecting the whole system.

This is a brief and not exhaustive explanation regarding to the reason why all the economics and all the people life aspects were hit. The difference, indeed, with the previous crisis was related to the dimension of the “contagion”, which affected and put on the knees the USA, before, and, later, the global economic.

As we said many times, one of the pillars of the collapse was the conviction of the soundness of the real estate market on which the USA economy was based.

Further, this behavior brought to another fundamental cause. The authority and institutions, indeed, were more focused on promote the monetary and economic stability, instead of the financial stability.

This consideration remembers the original mission of the Federal Reserve, which was created to reduce the financial panic episodes and to stabilize the system.

During the Great depression, as deeply exposed in Chapter 3, the American Central Bank failed to be the lender of last resort and to reduce the pressure on the market. This time, instead, the Federal Reserve implemented many other unconventional tools in order to provide liquidity, avoiding a worst global scenario.

Concluding, the Crisis and, in particular, the financial collapses will happen again together with the speculative bubbles, which will cause other instability situations.

Nevertheless, according to the authority statements, the most important aspect is to remember, always, the experience and the potential damages, which could inflict not only to the financial world but, further, to the real life.

It is fundamental, then, to implement and apply all the regulations needed, not only to prevent the crisis, but further, to relieve the effect ensuring the soundness of the system to sustain the impact.

5. ANNEX

Bank	Offices	Average Assets
Jpmorgan Chase Bank, National Ass.	5161	2.130.627.250,00
Wells Fargo Bank, National Association	5746	1.731.097.750,00
Bank Of America, National Association	4510	1.703.665.750,00
Citibank, N.A.	1056	1.400.615.000,00
U.S. Bank National Association	3094	441.942.589,00
Pnc Bank, National Association	2455	359.455.210,00
Capital One, National Association	615	286.392.319,00
Td Bank, N.A.	1246	273.518.135,00
Branch Banking And Trust Company	2015	215.457.944,00
Suntrust Bank	1282	200.158.145,00
Hsbc Bank Usa, National Association	231	196.202.747,00
Fifth Third Bank	1154	137.990.947,00
Keybank National Association	1196	133.167.310,00
Regions Bank	1398	123.091.546,00
Manufacturers And Traders Trust Co.	784	120.316.899,00
Citizens Bank, National Association	796	118.662.163,00
Mufg Union Bank, National Association	356	117.810.474,00
Bmo Harris Bank National Association	538	105.037.642,00
Huntington National Bank, The	982	101.063.559,00
Bank Of The West	541	85.971.932,00
Compass Bank	647	84.258.874,00
Santander Bank, National Association	648	78.812.725,00
Comerica Bank	437	71.546.569,00
Zb, National Association	441	64.996.562,00
People's United Bank, National Ass.	399	42.300.936,00
East West Bank	119	35.781.842,00
First-Citizens Bank & Trust Company	530	34.156.909,00
First Tennessee Bank National Ass.	341	32.920.037,00
Bokf, National Association	124	32.761.915,00

Synovus Bank	246	30.658.319,00
Frost Bank	131	30.369.937,00
Associated Bank, National Association	217	29.479.977,00
Sterling National Bank	128	29.064.474,00
First National Bank Of Pennsylvania	397	28.942.716,00
Iberiabank	210	27.005.194,00
Webster Bank, National Association	167	26.264.925,00
Whitney Bank	198	26.176.836,00
Umpqua Bank	297	25.106.844,00
Commerce Bank	174	24.876.685,00
Valley National Bank	208	23.437.615,00
Prosperity Bank	244	22.325.816,00
Tcf National Bank	321	22.082.531,00
Bank Of The Ozarks	238	19.663.495,00
First National Bank Of Omaha	102	19.275.343,00
United Bank	144	19.017.965,00
Pinnacle Bank	112	18.727.848,00
Chemical Bank	201	18.421.622,00
Firstbank	118	17.121.240,00
Arvest Bank	250	16.966.984,00
Old National Bank	192	15.203.205,00

6. REFERENCES

Albetrazzi, U., Gambacorta, L., “Bank profitability and the business cycle”. Bank of Italy Economic Working Papers No. 601, 2006.

Altavilla Carlo, Boucinha Miguel and Peydò Josè-Luis, European Central Bank, Working Paper Series “Monetary Policy and bank profitability in a low interest rate environment”, October 2017.

Ashcraft, Adam B. The American Economic Review, “Are banks really special? New evidence from the FDIC-induced failure of healthy banks”, 2005.

Baglioni, A., “Monetary policy transmission under different banking structures: The role of capital and heterogeneity”. International Review of Economics and Finance, 2007.

Bartolini, L., Bertola, G., & Prati A., “Day-to-day monetary policy and the volatility of the fed funds rate,” Journal of Money, Credit, and Banking, 2002.

Bernanke Ben S., “La Federal Reserve e la crisi finanziaria. Quattro lezioni”. Traduzione Di Adele Olivieri, Titolo Originale “The Federal Reserve and the Financial Crisis”. Il Saggiatore, Milano 2014.

Bernanke Ben S., Chairman Board of Governors of the Federal Reserve System at the Federal Reserve bank of Kansas City. “Monetary Policy since the onset of the Crisis”, August 2012.

Bernanke Ben S., Chairman “The Crisis and Policy Response”, Federal Reserve Board, 2009.

Bianchi Javier, Bigio, National Bureau of Economic Research 1050 Massachusetts. “Banks, Liquidity Management and Monetary Policy”, September 2014.

Bindseil, Ulrich, “Monetary Policy Operations and the Financial System”, Oxford University Press, 2014.

Board of Governors of the Federal Reserve System, “The Federal Reserve System: Purposes and Functions,” 1963.

Borio Claudio, Gambacorta Leonardo And Hofmann Boris, Bis Working Papers No 514,” The Influence of Monetary Policy on Bank Profitability”. Monetary and Economic Department, October 2015.

Borio, Claudio and Haibin Zhu, BIS Working Paper 268, “Capital Regulation, Risk-Taking and Monetary Policy: A Missing Link in the Transmission Mechanism?”. Monetary and Economic Department, 2008.

Brissimis and Delis, “Bank-specific, industry-specific and macroeconomic determinants of bank profitability”. Journal of International Financial Markets, Institutions and Money 18, 2008.

Brissimis N. Sophocles, Bank of Greece and University Of Piraeus, Delis D. Manthos, University of Ioannina. “Bank Heterogeneity and Monetary Policy Transmission”, August 2010.

Campbell, Jeffrey R., Charles Evans, Jonas D. M. Fisher, Alejandro Justiniano, “Macroeconomic Effects of Federal Reserve Forward Guidance”, Federal Reserve Bank of Chicago, 2012.

Carpenter, Seth and Demiralp, Selva, “Anticipation of Monetary Policy and Open Market Operations,” International Journal of Central Banking, 2006.

David López-Salido, Edward Nelson, and Tack Yun (2010). “Limitations on the Effectiveness of Forward Guidance at the Zero Lower Bound”, International Journal of Central Banking, 2010.

Dell’ Ariccia Giovanni, Laeven Luc, “Monetary Policy and Bank Risk Taking”, IMF Staff Position, Washington: International Monetary Fund, 2010.

Den Haan, W.J., Sumner, S.W., Yamashiro, G.M. “Bank loan portfolios and the monetary transmission mechanism”. Journal of Monetary Economics 54, 2007.

Donald L. Kohn, Vice Chairman Board of Governors of the Federal Reserve System at Carleton University, Ottawa, Canada. “The Federal Reserve’s Policy Actions during the Financial Crisis and Lessons for the Future”, October 2010.

Demirguc-Kunt, A., Huizinga, H., “Determinants of commercial bank interest margins and profitability: Some international evidence”. World Bank Economic Review, 1999.

Hamilton, James D., and Jing C. Wu, “The Effectiveness of Alternative Monetary Policy Tools in a Zero Lower Bound Environment,” Journal of Money, Credit and Banking, vol. 44 supplement (February), 2012.

Hancock, Diana, and Wayne Passmore, “Did the Federal Reserve’s MBS Purchase Program Lower Mortgage Rates?” Journal of Monetary Economics, 2011.

Ihrig, Jane E., Ellen E. Meade, and Gretchen C. Weinbach, “Monetary Policy 101: A Primer on the Fed’s Changing Approach to Policy Implementation,” Finance and Economics Discussion Series. Washington: Board of Governors of the Federal Reserve System, 2015

Ioannidou, V.P., Ongena, S., Peydro, J.L., “Monetary policy and subprime lending: A tall tale of low federal funds rates, hazardous loans, and reduced loan spreads”. Center-Tilburg University, Mimeo, 2008.

International Monetary Fund, 2013a, “Do Central Bank Policies since the Crisis Carry Risk to Financial Stability?” Global Financial Stability Report, World Economic and Financial Surveys, Washington, April 2013.

Judson, Ruth, and Klee Elizabeth, “Whither the Liquidity Effect: The Impact of Federal Reserve Open Market Operations in Recent Years”, Journal of Macroeconomics, 2010.

Kashyap K. Anil, Stein C. Jeremy, “The Impact of Monetary Policy on bank Balance Sheets”, Working Paper No. 4821, National Bureau of Economic Research, Cambridge, August 1994.

Kroeger Alexander, McGowan John, Sarkar Asani, Staff Report No. 809, “The Pre-Crisis Monetary Policy implementation framework”, Federal Reserve on New York, March 2017.

Kuttner, Kenneth N, “Monetary Policy Surprises and Interest Rates: Evidence from the Fed Funds,” *Journal of Monetary Economics*, 2001.

Li, Canlin, and Min Wei (2012). “Term Structure Modelling with Supply Factors and the Federal Reserve’s Large Scale Asset Purchase Programs,” *Finance and Economics Discussion Series*, Washington: Board of Governors of the Federal Reserve System, 2012

Meaning, Jack, and Feng Zhu (2011). “The Impact of Recent Central Bank Asset Purchase Programs”, *Bank of International Settlements Quarterly Review*, December 2011.

Mishkin S. Frederic, Columbia University and National Bureau of Economic Research and White
Rutgers N. Eugene, University and National Bureau of Economic Research. “Unprecedented Actions: The Federal Reserve’s Response to The Global Financial Crisis in Historical Perspective”, October 2014

Osborne Matthew, Fuertes Ana-Maria and Milne Alistar, “Capital and Profitability in banking: Evidence from Us Banks”, UK Financial Services Authority, Cass Business School, City University, London, Loughborough University School of Business and Economics, 2013.

Petria Nicolae, Capraru Bogdan, Ihnatov Iulian, “Determinants of Banks’ Profitability: Evidence From EU 27 Banking Systems”. 7th International Conference on Globalization and higher Education in Economics and Business Administration, Geba 2013

Rosa Carlo, “How unconventional are large-scale asset purchases? The impact of Monetary policy on asset prices,” *Federal Reserve Bank of New York Staff Reports 560*, 2012.

Stein, Jeremy C., “Evaluating Large-Scale Asset Purchases,” *Speech delivered at the Brookings Institution*, October 2012.

The Federal Financial Institutions Examination Council Website “[Https://Www.Ffiec.Gov/](https://www.ffiec.gov/), Section “Uniform Bank Performance Report”, “Income Statement”, Net Interest Income, Net Income and Non-Interest Income.

The Federal Financial Institutions Examination Council Website <https://www.ffiec.gov/>, Section “Uniform Bank Performance Report”, “Allowances & Loans Mix”, Net Credit Losses.

The Federal Funds Rate Trend, “<https://apps.newyorkfed.org/markets/autorates/fed-funds-search-result-page>”.

The Federal Reserve Bank of San Francisco, “The Economy: Crisis & response”.

The Federal Reserve Website “<https://www.federalreserve.gov/>”, section “Policy Tools”.

The Federal Reserve Website “<https://www.federalreserve.gov/>”, section “Expired Policy Tools”.

The Federal Reserve Website “<https://www.federalreserve.gov/>”, section “Historical Data”.

“The Federal Reserve System Purposes & Functions”, 10th Edition, 2016.

The Financial Crisis Inquiry Commission, “The Financial Crisis Inquiry Report”, final report of the National Commission on the causes of the Financial and Economic Crisis in the United States. Official Government edition submitted by, January 2011

Thornton L. Daniel “The Federal Reserve’s response to the Financial Crisis: What It did and what it should have done”, Federal Reserve Bank of St. Louis, Working paper n° 050A, October 2012.

Yener Altunbas, Gambacorta Leonardo, and Marqués-Ibáñez David, “Does Monetary Policy Affect Bank Risk-taking?”, European Central Bank Working Paper 1166, Frankfurt 2010.