

Monetary Policies in the US and the Eurozone

Bachelor Thesis

Thesis supervisor:

Ing. Aleš Franc, Ph.D.

Dominik Holásek

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Abstrakt

Holásek, D. Monetární politika ve Spojených státech amerických a eurozóně. Bakalářská práce. Brno: Mendelova univerzita v Brně, 2015.

Bakalářská práce se zabývá rozdíly v tvorbě monetární politiky v zemích eurozóny a Spojených státech amerických. Tuto významnou hospodářskou politiku bakalářská práce popisuje jak v teoretické, tak praktické rovině. Především se tím myslí specifikace aspektů jednotlivých politik a následná analýza protikrizových opatření, která byla podniknuta monetárními autoritami v USA a eurozóně v průběhu hospodářské krize, jež postihla svět v roce 2007-8.

Klíčová slova

Monetární politika, rozdíly, Federální rezervní systém, Evropská centrální banka, Eurosystem, Spojené státy americké, eurozóna, světová hospodářská krize, regulace bankovního sektoru, Řecká republika, Lehman Brothers, Merrill Lynch & Co., Bear Stearns, americká hypoteční krize, dluhová krize v Evropě.

Abstract

Holásek, D. Monetary Policies in the US and the Eurozone. Bachelor thesis. Brno: Mendel University, 2015.

Bachelor thesis engages in the differences of the monetary policy's performance in the Eurozone and the United States of America. These policies, which are conducted by the monetary authorities in the Eurozone and the U.S., are described by the bachelor thesis in both theoretical and practical ways. Special attention is paid to the description of both monetary policies and analysis of the measures conducted by the monetary authorities of the Eurozone and the United States during the global economic crisis, which started in 2007-8.

Keywords

Monetary policy, differences, Federal Reserve System, European Central Bank, United States of America, Eurozone, Eurosystem, Global Financial Crisis, regulation of banking system, Republic of Greece, Lehman Brothers, Bear Stearns, Merrill Lynch & Co., subprime mortgage crisis, European debt crisis.

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Abbreviations and Acronyms

ABCP	asset-backed commercial paper
ABSPP	Asset-Backed Securities Purchase Program
ACH	Automatic Clearing House
AIG	American International Group
AMLF	Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility
CBPP	Covered Bond Purchase Program
CDO	collateralized debt security
CPFF	Commercial Paper Funding Facility
CRA	Community Reinvestment Act
ECB	European Central Bank
EFSF	European Financial Stability Facility
ESCB	European System of Central Banks
ESM	European Stability Mechanism
ERM	European Exchange Rate Mechanism
FDIC	Federal Deposit Insurance Corporation
FED	Federal Reserve System
FFIEC	Federal Financial Institutions Examination Council
FFR	federal funds rate
FFS	Fedwire Funds Service
FOMC	Federal Open Market Committee
GDP	gross domestic product
GLB	Gramm-Leach-Bliley Act
HICP	Harmonised Index of Consumer Prices
MBS	mortgage-backed security
NCB	National Central Bank
NCUA	National Credit Union Administration
OCC	Office of the Comptroller of the Currency
OMO	open market operation
OMT	Outright Monetary Transactions
OTS	Office of Thrift Supervision
PDCF	Primary Dealer Credit Facility
SMP	Security Markets Programme
SSM	Single Supervisory Mechanism
TAF	Term Auction Facility

TALF	Term Asset-Backed Securities Lending Facility
TARP	Troubled Asset Relief Program
TLTRO	Targeted Long-Term Refinancing Operations
TSLF	Term Securities Lending Facility

1 Introduction

Monetary policy is a key factor for the conduction of economic policy in any country in the world. The reason of its importance lies in the possibility to influence monetary base and interest rates, which in many cases have an impact on the value of real aggregate indicators and thus the whole economy.

In the past, monetary policy experienced many changes and turnabouts that were not only caused by different economic theories, but also by specific aspects of political systems. These aspects contain characteristics of legal system, traditions, customs and institutions that represent a particular country. Consequences of the latter can be seen in different ways of monetary policies' approval processes, appointments of monetary authorities' representatives or their independence. Other important influence has been performed by political ideologies. The latter's consequence can be observed in the economic views that monetary authorities in different countries favored. In particular, we talk about either Classic or Keynesian economics. However, nowadays, most of monetary policies in the world combine both views and thus try to use the best of them.

All the mentioned has explained us why monetary policy is such an important economic policy and why it differs across countries. Now, it shouldn't surprise us that countries, in general, want to have a complete sovereignty as regards the conduction of monetary policy. This sovereignty is sometimes called as the political and legal sovereignty in monetary issues (Goodman, 1992, p. 5).

Despite the latter, in the past, we saw many times that countries decided to share this sovereignty with other countries. An example of the latter are the member countries of the Eurozone, which lost their monetary sovereignty when accepted the single currency euro. Nowadays, the role of the Eurozone's monetary authority plays the European System of Central Banks (ESCB), which consists of the European Central Bank (ECB) and the National Central Banks (NCBs). Its policies will be the base for this thesis because of their importance in the worldwide economy and the fact that every European Union member country, except Denmark and the United Kingdom, is required to accept the common currency in the future, including the Czech Republic.

In general, the authority that conducts monetary policy in a country is a central bank. Its examples in the world are the Federal Reserve System (FED) in the United States of America, the Bank of England in the United Kingdom, the ESCB in the Eurozone, the Czech National Bank in the Czech Republic and the People's Bank of China in the People's Republic of China. In this moment it's appropriate to mention and characterize one term – monetary autonomy. This autonomy is born by central banks that are able to conduct monetary policies whose effects are not significantly distorted by international financial markets or exchange rate regimes (Goodman,

1992, p. 5). That's why it's probable that smaller and economically less developed countries will have lower monetary autonomy than more developed and bigger countries. Regarding the latter, we can mention a central bank that bears one of the highest monetary autonomies in the world – the Federal Reserve System of the United States of America. The policies conducted by the Federal Reserve have a significant impact on the global economy and therefore will also be the base for this thesis.

In consequence, will talk about the European Central Bank as a part of the ESCB and the Federal Reserve System. In particular, we will describe these institutions, their policies and then the differences that lie between them.

1.1 Methodology and purpose

Methodology

The description of both monetary authorities will be divided in a theoretical and practical part. A theoretical and practical comparison will be contained at the end of each part.

We will start with the theoretical part. During the description, we will consult official documents, statements, professional literature from universities all around the world and regulations issued directly by central banks or legislative authorities from the United States, Eurozone and, when appropriate, European Union. Especially, we will focus on monetary instruments and tools, specific ways of their use, conduction of monetary policy and indicators used for its assessment. As follows, a comparison will summarize the facts described previously and point out the most important differences that lie in the factual point of view.

The second part will concern about monetary policy in reality. In particular, we will describe it in context of the financial crisis that affected the world in 2008. The policies will be sorted chronologically, described and their impacts analyzed using a variety of financial, monetary and aggregate indicators, such as interbank interest rates, key central bank interest rates, gross domestic product (GDP) growth, inflation, unemployment, government bond yield spreads and stock indices. Also, ratings created by Fitch, Standard & Poor's and Moody's will play an important role for us and we will mention them when appropriate. As follows, a comparison will summarize the information provided in the previous description and point out the differences in the conduction of the monetary policy. This comparison will connect the practical differences with the theoretical ones and therefore will be the most important part of the whole text. The latter, consequently, could be used for the purpose of this thesis.

During the descriptions and analysis, we will use a variety of figures and terms. Basic characteristics of some of them we will already describe in this Chapter. Re-

Regarding the figures, they will show interest rates per annum and monthly performance, unless otherwise specified. The unit on the Y-axis will be percent, unless otherwise specified. With regard to the Eurozone, it consists of countries that, in a particular moment, were its members. Regarding the European Union, the same rule is applied.

In continuation, we won't pay attention to swap operations conducted by both institutions. The reason of the latter lies in the nature of this thesis, which concerns about differences. Although the swaps improved liquidity of Euro in the U.S. and vice versa, these are mutual actions whose performance cannot differ.

Purpose

The purpose of this thesis is to identify the differences that lie in the conduction of monetary policies in the United States and the Eurozone. The reason of the latter is the fact that, so far, there is no complex comparison of both monetary policies in a theoretical as well as a practical way. In other words, this thesis will be unique in the way it connects factual and practical points of view.

The usefulness of the comparison is, however, even more important than just its description. Nowadays, financial markets all around the world and especially in the U.S. and the Eurozone are connected and interdependent. In addition, as we mentioned in the previous subchapter, institutions in the U.S. and the Eurozone are located in very developed countries and thus bear high monetary autonomy. These two mentioned facts mean that if one of these central banks conducts a policy, it will probably affect the economy on the other side of the Atlantic. Therefore, the differences could serve as a basic knowledge for a prediction of how will differ the policies of the U.S. and Eurozone's central banks in the future, how these differences could affect the respective countries' financial institutions and how these changes could influence financial stability and economic activity on both sides of the Atlantic. Also, it can serve as a very useful source of information for investors in the U.S. who want to invest in the Eurozone and vice versa. With this knowledge, they will know how these two institutions differ and what to expect from them, which could improve their anticipations and thus prepare them for policies that they wouldn't expect in their home countries.

The third use concerns the factual information provided in both theoretical and practical parts, which can be very interesting for financial and non-financial companies' managers from all around the world that want to learn more about how the central banks' policies in the U.S. and the Eurozone might influence their businesses.

2 Monetary policies in the United States and the Eurozone

2.1 Monetary policy in the United States

The Federal Reserve System is the central bank for the United States of America. Likewise central banks in other countries, the Federal Reserve plays the role of a monetary authority.

2.1.1 History and functions of the Federal Reserve System

During the nineteenth century and the beginning of the twentieth century, the banking system of the US was affected by many bank failures and business bankruptcies. The latter contributed to the economy's vulnerability to financial panics and decreased the amount of short-term credit available to banks, which is an important source of banks' liquidity. This was the reason why the Congress of the U.S. in 1907 decided to put proposals to create an institution that would prevent financial disruptions of this kind and in 1913 passed the Federal Reserve Act (Board of Governors, 2005, p. 1-2).

The Federal Reserve Act states in the official title that the main purpose of the new central bank is "to furnish an elastic currency, to afford means of rediscounting commercial paper and to establish a more effective supervision of banking in the United States". Over the years, however, the functions have expanded. Today, the System also issues currency, represents the U.S. in some international institutions and provides financial services to the U.S. government and depository institutions, such as the payment system.¹

2.1.2 Objectives and independence of the U.S. monetary policy

Objectives

The objectives of the Federal Reserve are mentioned in the Federal Reserve Act. In the Section 2A is stated that "the Board of Governors of the Federal Reserve System and the Federal Open Market Committee shall maintain long run growth of the monetary and credit aggregates commensurate with the economy's long run potential to increase production, so as to promote effectively the goals of maximum employment, stable prices, and moderate long-term interest rates". However, other acts modifying the objectives of the Federal Reserve have been passed as well. Among them, Humphrey-Hawkins Act in the Section 2 (c) states that the US Gov-

¹ Depository institutions are financial institutions that make loans and accept deposits generally from the public. They include commercial banks, savings and loan associations, savings banks and credit unions (Board of Governors, 2005, p. 111).

ernment, Congress and the Federal Reserve System should create policies that “promote full employment and production, increased real income, balanced growth, a balanced Federal budget, adequate productivity growth, proper attention to national priorities, achievement of an improved trade balance, and reasonable price stability”. Therefore, objectives of the Federal Reserve and other nation’s institutions are similar. In January 2012, the Federal Open Market Committee issued a statement regarding its monetary policy. In the latter is mentioned that the inflation of 2 % is most consistent with the main long-term objectives of the Federal Reserve. This implies that although price stability is not the only goal, it bears a special status.

Independence

Regarding the independence, the Federal Reserve’s decisions do not have to be ratified by anybody. The System is, however, overseen by the Congress.² The Federal Reserve must work within the framework of the overall economic and financial policy set up by the Government. Therefore, the System is independent within government (Board of Governors, 2005, p. 3).

2.1.3 Structure of the Federal Reserve System

The Federal Reserve consists of a variety of institutions that together function as a monetary authority for the United States of America. We can divide the institutions into two groups – the governing institutions and the member banks.

Governing institutions

Board of Governors

The Board of Governors is the most important governing body of the System. It is composed of seven members that are appointed by the President and confirmed by the U.S. Senate. The same procedure is used for the Chairman and the Vice Chairman of the Board.³

The Board supervises and regulates the Federal Reserve Banks, exercises broad responsibility in the nation’s payments system, administers most of the nation’s laws regarding consumer credit protection, approves any change in the discount rate initiated by Federal Reserve Banks and plays an important role in the supervision and regulation of the banking system in the U.S. (Board of Governors, 2005, p.4). Other responsibilities are the representation of the U.S. at some international institutions, elaboration of statistics and coordination of currency shipments. The Board also issues regulations that influence the whole U.S. economy. Some of them “apply to the entire banking sector, whereas others apply only to member banks, that is, state banks that have chosen to join the Federal Reserve System and na-

² See the Section 108 of the Humphrey-Hawkins Act of 1978

³ For current composition of the Board, see:

<http://www.federalreserve.gov/aboutthefed/bios/board/default.htm>

tional banks, which by law must be members of the System” (Board of Governors, 2005, p. 5). Since the law requires the Federal Reserve to work within the framework created by the government, members of the Board are in close contact with representatives of the U.S. government. In particular, the Chairman of the System frequently meets with the President and the Secretary of Treasury.⁴

Regarding regulatory responsibilities, one member of the Board represents the System in the Federal Financial Institutions Examination Council (FFIEC), which is responsible for coordinating, at the federal level, examinations of depository institutions and related policies. Further information about the regulatory responsibilities will be provided in Chapter 2.4.

Reserve Banks

Another important institutions are the Reserve Banks. The territory of the U.S. is divided into 12 districts that are governed by a correspondent Reserve Bank. The Banks carry out many “System functions, including operating a nationwide payments system, distributing the nation’s currency and coin, supervising and regulating member banks and bank holding companies, and serving as banker for the U.S. Treasury” (Board of Governors, 2005, p. 6). The Banks have also right to issue currency and set the discount rate.⁵ In other words, the Reserve Banks are operating arms of the Federal Reserve. Regarding their board, it consists of nine directors chosen from outside. The directors “are intended to represent a cross-section of banking, commercial, agricultural, industrial, and public interests within the Federal Reserve District” (Board of Governors, 2005, p. 10). These directors are divided into 3 groups. The first group represents the commercial member banks from the correspondent district, the second and third group represent the public. The commercial member banks elect directors from the first and second group, whereas the third group is elected by the Board of Governors (Federal Reserve System, 2013).

The Banks and the Board are public entities. Their earnings, therefore, are sent to the U.S. Treasury. In 2013, the Federal Reserve paid \$79.6 billion to the Treasury (Appelbaum, 2014).

Federal Open Market Committee

The Federal Open Market Committee (FOMC) is the main governing body for open market operations (OMOs). The open market operations are the most important monetary policy instrument used by the Federal Reserve (Harvey, 2001, p. 1). The

⁴ Sometimes, however, the Chairman meets with the representatives of the U.S. government more frequently and sometimes less. During the Clinton administration, Alan Greenspan, the former Chairman of the Federal Reserve, met with Treasury officials more frequently than during the Bush administration. The reason of the latter is the international economic policymaking that in Clinton administration was concentrated more at the Treasury (Henderson, 2004).

⁵ Nowadays, it’s possible to see what Reserve Bank one-dollar notes come from. The front side of these notes indicates the name of the Reserve Bank that issued the particular note.

FOMC consists of the seven Board members and five of twelve Reserve Bank presidents. “The president of the Federal Reserve Bank of New York is a permanent member; the other presidents serve one-year term on a rotating basis” (Board of Directors, 2005, p. 12). The FOMC meets eight times a year in Washington, D.C. to decide the nation’s monetary policy. It includes the Federal Funds Rate target and operations on foreign exchange markets.

The member banks

The member banks are national commercial banks and also state banks that decided to join the Federal Reserve System. Whether a particular bank is a state bank or a national bank depends on which institution was the bank chartered by. The national banks are chartered by the Office of the Comptroller of the Currency and provide services throughout the United States. These banks, by law, have to be members of the Federal Reserve System. The state banks are chartered by state governments and can decide whether to join the System.

Once a bank decides (or is required) to become a member of the Federal Reserve, it must subscribe to stock in its regional Reserve Bank. Therefore, the Federal Reserve is owned by commercial banks. However, it’s a legal obligation and the holding of stocks doesn’t bear any special right. Political science professor Michael D. Reagan said in 1961 that “the ownership of the Reserve Banks by the commercial banks is symbolic; they do not exercise the proprietary control associated with the concept of ownership nor share, beyond the statutory dividend, in Reserve Bank profits”. As mentioned before, the member commercial banks vote for their Reserve Bank’s directors of the first and second group. In addition, the law states that the member commercial banks receive a 6 percent dividend on their stock annually (Board of Governors, 2005, p. 12).

2.1.4 Instruments and tools used by the Federal Reserve System

The U.S. monetary policy is generally conducted through the federal funds rate (FFR). Commercial banks that are members of the Federal Reserve hold balances at the Federal Reserve Banks. The FFR is then the rate at which commercial banks trade their balances held at the Federal Reserve Banks with other member banks. The conduction of monetary policy has been evolving since the System was founded in 1913. The System always has to decide whether it wants to target the price of the balances (the federal funds rate) or the amount of balances. For instance, if the System wants a low FFR, the quantity of reserves will increase. This conflict can be also seen between the objectives of output and inflation. If the System wants inflation to be low, it increases the FFR and thus reduces the quantity of reserves. If it wants to boost the economy, it lowers the FFR and therefore increases the quantity of reserves. Doing so, *ceteris paribus*, the long-term interest rates are supposed to decrease and the output together with the level of inflation in short-run are supposed to increase. However, in long-run it will only have effect on the price level (Bank of England, 1999, p. 3). From 1979 to mid-1980s, the System targeted the

quantity of reserves. However, the link between monetary aggregates and monetary policy's objectives had weakened and since 1980s the System focused on the FFR. Finally, in 1995 the FOMC began to announce its target for FFR (Board of Governors, 2005, p. 27-29).

The balances held by commercial banks at the Reserve Banks serve to various functions. The member commercial banks use their balances to make and receive payments on behalf of their customers. Therefore, the balances are incorporated in the payment systems, such as the Automatic clearinghouse (ACH) or Fedwire Funds Service (FFS). Likewise in other countries, if a bank's balance at the end of the day is higher than required, it can lend it to other bank that has the opposite problem. The banks' balances are also used for the reserve requirements set by the Federal Reserve System.

The main monetary instruments used by the Federal Reserve are as followed:

- Open market operations
- Reserve requirements
- Contractual clearing balances
- Discount window lending
- Foreign currency operations

Open Market Operations

Open market operations are the most important instrument used by the System. The System can buy and sell securities through either permanent operations or temporary operations. The OMOs, conducted by the Trading Desk at the Federal Reserve Bank of New York, are generally used to adjust the supply of reserve balances so as to keep the effective FFR close to the target established by the FOMC⁶ (Board of Governors, 2015).

Counterparties and eligible assets

As mentioned before, the Reserve Bank of New York conducts the open market operations under the authorization of the FOMC. Those operations are conducted through the Open Market Trading Desk with so-called primary dealers. In other words, if the FOMC decides to conduct open market operation, the Desk cannot purchase or sell securities from everybody. It can only collaborate with few dealers that are authorized by the System. The dealers have to meet requirements, such as minimum net capital requirement of \$150mln and 1-year experience in relevant markets (Flitter, 2010). As of February 2015, there are 22 primary dealers that can take part in the open market operations of the Federal Reserve.⁷ In theory, the System can use any type of asset to conduct the open market operations (Board of Governors, 2005, p. 36). However, in practice, the Federal Reserve buys and sells

⁶ The difference between the targeted FFR and effective FFR is explained in Chapter 2.1.5

⁷ For more information, consult: http://www.ny.frb.org/markets/pridealers_current.html

U.S. Treasury securities and some mortgage-backed securities (MBS). Regarding the operations with U.S. Treasury securities, those can be purchased or sold only in the open market. This implies that the System cannot buy the securities directly from the U.S. Treasury.

Short and long-term OMOs

Each day, the staff of the System evaluates whether the demand for balances is likely to exceed the supply. If this is the case, the Desk must decide whether to conduct short-term or long-term open market operations. Short-term operations are much more common than the long-term ones “because daily fluctuations in autonomous factors the demand for excess reserve balances can create a sizable imbalance between the supply of and demand for balances that might cause the federal funds rate to move significantly away from the FOMC’s target” (Board of Governors, 2005, p. 38). Autonomous factors can be, for instance, the demand for Federal Reserve notes.

Regarding the long-term OMOs, they are generally used to accommodate the growth of currency in the economy.

Tools used by OMOs

Short-term OMOs are, as mentioned before, the most frequent operations used by the Desk.⁸ They involve the following tools – repurchase agreements or reverse repurchase agreements. A repurchase agreement is an agreement between a primary dealer and the Desk to buy and resell a security in the future. The repurchase agreements are normally conducted overnight. However, agreements of maturities of two to thirteen days are also arranged (Board of Directors, 2005, p. 39). The reverse repurchase agreements are conducted when the System wants to drain the supply of reserve balances. In this case, the Desk sells and repurchases a security in the future (usually overnight). In September 2014, the FOMC announced that it started to conduct reverse repurchase agreements in order to test their ability to keep the FFR close to its target.⁹ As of February 2015, the interest rate paid on reverse repurchase agreements is 0.05 %.¹⁰ Another way how to drain reserve balances is to sell or redeem the securities bought through outright operations.

Long-term OMOs generally use outright operations, i.e. purchases or sales of securities for the System Open Market Account (Board of Governors, 2015). Rarely, the Federal Reserve also uses long-term repurchase agreement to increase supply over a long period. Generally, it uses outright operations that are conducted through small portions of securities of different maturities in order to minimize the impact

⁸ For information about Short-term OMOs that have been conducted today, see <http://www.newyorkfed.org/markets/omo/dmm/temp.cfm>

⁹ For more information about the press release, see: <http://www.federalreserve.gov/newsevents/press/monetary/20140917c.htm>

¹⁰ For more information about this statement, see: http://www.newyorkfed.org/markets/opolicy/operating_policy_141029.html

on market prices (Board of Governors, 2005, p. 39). Outright operations were the main tool used by the System for the quantitative easing policy started in November 2008.

Reserve requirements

Reserve requirements are another instrument used by the Federal Reserve System. They apply to all depository institutions and require them to hold reserve requirements in the form of either vault cash or deposits in the Reserve Banks. The reserve requirements held in the Reserve Banks are also called the required reserve balances. The required reserve ratio set by the Board of Governors in the Federal Reserve Board's Regulation D applies to net transaction accounts, nonpersonal time deposits, and eurocurrency liabilities. Since 1990, only net transaction accounts have a non-zero required reserve ratio. In addition, since October 2008, the Reserve Banks have paid interest on required reserve balances (Board of Governors, 2014). If a depository institution fails to meet the requirements, the deficiency is subject to a charge. The following table shows the current reserve requirements:

Tab. 1 Reserve Requirements in the U.S.

Liability Type	% of liabilities	Effective date
Net transaction accounts ¹¹		
\$0 to \$14.5 million	0	1-22-15
More than \$14.5 million to \$103.6 million	3	1-22-15
More than \$103.6 million	10	1-22-15
Nonpersonal time deposits	0	12-27-90
Eurocurrency liabilities	0	12-27-90

Source: Board of Governors

The table shows that the last change was made on January 22, 2015. The reason why the change was made is because of the so-called Low-Reserve Tranche Amounts and Exemption Amounts. The amount of net transaction accounts subject to 0 % required reserve ratio is the Exemption Amount. The amount of reserve

¹¹ For more information about the types of accounts incorporated in Net transaction accounts, see: <http://www.federalreserve.gov/monetarypolicy/reservereq.htm#fn1>

subject to the 3 % required reserve ratio is the Low-Reserve Tranche Amount. Both Low-Reserve Tranche Amounts and Exemption Amounts are adjusted annually. As we can see, the burden of required reserves ratio is structured to be lower for small institutions. As regards the eurocurrency liabilities and nonpersonal time deposits, those are liabilities denominated in other currency than the official currency of the territory where the bank is located and deposits held by depositors other than individuals respectively.

The Monetary Control Act from 1980 states that the reserve requirements apply to all depository institutions regardless of the membership. This implies that the non-member state banks are also subject to the reserve requirements. Those banks usually use accounts of other member banks to satisfy the required reserve balances (balances that complete the amount of reserve requirements missing in the vault cash).

Depository institutions don't have to meet the reserve requirements every single day. There is a period called maintenance period that gives the institution considerable flexibility. The required reserves are then calculated as the mean of the balances in one maintenance period.¹² It implies that if a bank has an excess of balances in its account, it doesn't have to lend it to other depository institutions. It can choose to hold less balances another day and still meet the requirements. The latter shows one of the functions of the reserve requirements – to stabilize the money market interest rates. Changes of the required reserve ratios are connected with another function. If the Board decides to increase the ratio, it obligates depository institutions to hold more reserve requirements and thus they have less resource for providing credit. The latter is connected with monetary tightening policy.

Contractual Clearing Balances

Likewise required reserve balances, contractual clearing balances help the System to create a stable, predictable demand for balances, which is important for the conduction of open market operations (Board of Governors, 2005, p. 44). Since the reserve balances are used for many priced services of the System, institutions that are required to meet zero or low reserve balances could have hard time to clear financial transactions. Therefore the System allows the depository institutions to agree on holding higher balances in addition to their required reserve balances. If a depository institution's contractual clearing balance is lower than the agreed one, the difference is subject to a charge. A depository institution may hold extra balances in addition to its required reserve balances and contractual clearing balances to have a protection against an overnight overdraft or insufficient balances for required reserve balances and contractual clearing balances. These voluntary amounts are called Excess Reserve Balances and from 2008 the Reserve Banks

¹² As of February 2015, the maintenance period is 14 days long.

have paid interest on them (Board of Governors, 2014). This rate is another tool that can be used to move the effective FFR to the target.¹³

Discount window lending

The discount window lending serves two functions. First, acting in line with open market operations, it helps to keep the effective FFR close to the target by providing balances to depository institutions when the supply falls short of demand. Second, it provides emergency credit to depository institutions and thus works as a back-up source of liquidity – lender of last resort (Board of Governors, 2005, p. 45). However, depository institutions usually use the discount window for emergency credit as the last option. If a depository institution asks for an emergency credit at the discount window, it's considered as a financial weakness and thus its creditworthiness declines. Therefore, banks are usually reluctant to use this source of liquidity, because the consequences could be worse than the reason of asking for the emergency credit (Armantier, 2014). This phenomenon is called DW Stigma.

The window offers three types of credit – primary, secondary and seasonal. The primary credit, typically overnight, is available to all depository institutions that are subject to reserve requirements and are in sound condition. Since the window credit is considered as a backup, the discount rate at which the primary credit is offered is usually 1 percentage point above the FFR, which motivates depository institutions to ask other institution for credit using the effective FFR. The secondary credit is available to institutions that don't meet the requirements for the primary credit. Generally they don't meet the requirement of sound financial condition. Therefore, the secondary credit interest rate is higher than the primary one. The seasonal credit is a special kind of credit used for institutions that have temporary liquidity problems. These problems generally affect small depository institutions that face seasonal swings in their loans and deposits (Board of Governors, 2005, p. 48). As of February 2015, the current interest rates are 0.75 % for the primary credit, 1.35 % for the secondary credit and 0.15 % for the seasonal one.¹⁴

As mentioned, the eligibility for discount window credit depends on whether a depository institution is subject to reserve requirements (Federal Reserve System, 2012). Those institutions that are not subject to reserve requirements cannot participate in the window's credit operations. By law, all discount window loans must be secured by collateral. In practice, many securities held by deposit institutions can be used as collateral.

¹³ Current interest rates paid on required reserve balances and excess balances are published on the H.3 Statistical release each Thursday. As of February 2015, the interest rate is 0.25 %. For more information, see: <http://www.federalreserve.gov/releases/h3/current/>

¹⁴ For current information, consult: <https://www.frbdiscountwindow.org>

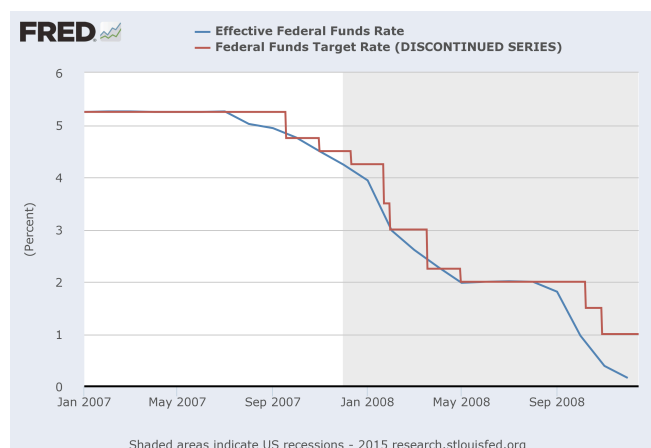
The System also allows depository institutions, which are subject to reserve requirements, to offer interest-bearing term deposits. The floating interest rate is daily deducted from the effective FFR.

Foreign Currency Operations

Foreign Currency Operations are another instrument available for the Federal Reserve. The System shares responsibility for these operations with the Department of Treasury that has the overall responsibility for U.S. international financial policy. These operations can be used, for instance, to change the value of U.S. dollar. However, since 1995, U.S. authorities have rarely intervened (Board of Governors, 2005, p. 54).

2.1.5 Conduction of the U.S. monetary policy

The U.S. monetary policy is conducted by influencing the effective FFR. The FOMC sets a FFR target that is most consistent with the goals of the U.S. monetary policy. Using the instruments described in the previous sub-chapter, the System moves the effective FFR close to the target. As of February 2015, the FFR target is 0.00 %–0.25 %.¹⁵ However, in the past, the FFR target was set as a single rate. Let's take a look at how the effective FFR differs from its target. In the graph below, you can see the performance of the effective FFR from 1-1-2007 to 12-31-2008:



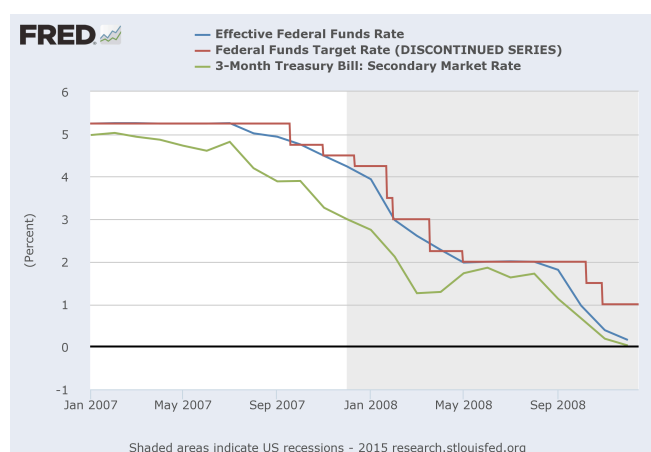
Img. 1 Effective Federal Funds Rate in the period of 2007-2008.

Source: FRED database (Federal Reserve Bank of St. Louis).

As you can see, the effective rate copies significantly its target. In the period of 2007-2008, the FFR target was changed ten times. Since it's hard to manage the effective rate that is also influenced by the market, from December 16, 2008, the FOMC decided to set two FFR targets. These two rates consist of an upper and lower limit. As expected, since then, the effective FFR has been floating between the two FFR target limits.

¹⁵ For historical FFR targets, see: <http://www.federalreserve.gov/monetarypolicy/openmarket.htm>

However, the System's goal is not to influence the effective FFR. The latter is only an operational criterion that influences other short-term interest rates, such as 3M Treasury Bills. By doing so, the long-term interest rates are supposed to change as well. However, the effect on long-term interest rates is not so clear, because there are more factors, such as expectations, that influence long-term interest rates. In continuation, a decrease in long-term interest rates can boost investments, consumption and therefore the aggregate demand. This process is called the interest rate channel. In the following graph you can see the performance of the interest rate born by the 3M Treasury Bills, effective FFR and FFR target from 1-1-2007 to 12-31-2008:



Img. 2 Performance of some short-term interest rates in the period of 2007-2008.
Source: FRED database (Federal Reserve Bank of St. Louis).

The graph shows that the impact of the changes of effective and target FFRs on 3M Treasury Bills is clear. However, for instance, the impact on the 30-Year Conventional Mortgage Rate is not that clear, because the latter reflects also expectations, risk connected with real estates and other considerable factors.

Credit channel

Although there are other considerable monetary policy's channels, such as foreign exchange channel and financial assets channel, we will pay special attention to the credit channel. The latter is not any new type of channel that works separately from the others. It works in tandem with the interest rate channel and gives us a different view to the performance of the monetary policy. Bernanke and Blinder (1988) show that monetary policy affects the economy not only through money market via short-term interest rate but also through credit market, where bonds and loans are not perfect substitutes. If the System wants to decrease the inflation, it "reduces the volume of reserves, and therefore of loans, spending by customers who depend on bank credit must fall, and therefore so must aggregate demand. This provides an additional channel of transmission for Federal Reserve policy to the real economy, over and above the usual liquidity effects emanating from the

market for deposits” (Bernanke and Blinder, 1992, p. 901). The credit channel works via the external finance premium, which is generally the interest reflecting the cost of the credit. Therefore, if the System reduces the volume of reserves, the external finance premium rises and “the risk that some borrowers cannot safely pay back their loans may increase to a level such that banks will not grant a loan to these borrowers. As a consequence, such borrowers, households or firms, would be forced to postpone their consumption or investment plans” (Scheller, 2006, p. 78). The Federal Reserve System, as states the Federal Reserve Act, must keep the long-run growth of monetary and credit aggregates. Changes of these credit aggregates reflect the change in credit available to the public. Example of such aggregates used by the Federal Reserve is Consumer Credit G19 that estimates the outstanding loans to individuals.¹⁶

Indicators used for economic assessment

When performing economic assessment, the System uses variety of indicators. Among them, the most important are the monetary aggregates, inflation, interest rates, foreign exchange rates and the Taylor rule.

Monetary aggregates are indicators used by many central banks in the world. However, their importance is lower, since the link between GDP and money has become more complex. The Federal Reserve even stopped publishing some of them (Bénassy-Quéré et al., 2010, p. 254). The theory says that the growth of money should reflect the growth of nominal GDP. Even the Federal Reserve Act states that the System should maintain long-run growth of the monetary and credit aggregates reflecting the economic potential to increase production. The latter is also called as the monetary golden rule. In general, the System uses two basic aggregates – M1 and M2. The first one contains currency, demand deposits and other NOW interest-bearing checking accounts. M2 contains M1 plus saving deposits, money market deposit accounts, small-time deposits up to \$100,000 and retail money market mutual funds. Finally, M3 is not used in the U.S., because of the discontinuation in mid-March 2006 (O’Brien, 2007, p. 19).

Inflation is another indicator that is often used to assess the performance of monetary policy. Since 2000, the Federal Reserve uses the chain-type price index for personal consumption expenditures. This index, produced by the Department of Commerce, covers the widest range of goods and services purchased by consumers. However, the System also uses other price measures, including customer price index and producer price index produced by the Department of Labor.

Interest rates and foreign exchange rates play an important role because they are also considered as operational criterions in the interest rate channel and foreign exchange rate channel respectively. Among them, the prime rate, mortgage rates,

¹⁶ For current data, see: <http://www.federalreserve.gov/releases/g19/>

Treasury Bills and Treasury Bonds rates and foreign value of U.S. dollar play an important role. The prime rate is an important benchmark for banks. It's published by the Wall Street Journal as a survey of the 30 largest banks in the economy. The prime rate is then used as an index for many loans, such as car loans or other consumer loans.¹⁷ Regarding the mortgage interest rates, some examples of them are 30-Year Fixed Rate Mortgage Average in the U.S. and 30-Year Conventional Mortgage Rate. Foreign exchange rates are a good benchmark as well, because they reflect changes in the FFR (Board of Governors, 2005, p. 24).

2.2 Monetary policy in the Eurozone

The European Central Bank is the central bank for the Eurozone. Together with the National Central Banks, the ECB constitutes the European System of Central Banks that carries out central banking functions for the euro area countries.

2.2.1 History and functions of the European Central Bank

The European Central Bank was created in 1998 by the amendments to the EC Treaty called Protocols. Among them, the most important is The Statute of the European System of Central Banks and of the European Central Bank (Statute of the ESCB) that is amended as the Protocol 4. The most important reason of the common monetary policy's creation was the fact already stated in the so-called Marjolin Memorandum. The latter mentioned that a single currency would have improved the stability of the planned custom union, which later became the single market. In other words, a single currency was aimed to eliminate distortions between member countries, such as exchange rate risk.

Regarding the basic tasks of the ESCB, they are written in the Article 105(2). However, since the ESCB doesn't contain all European Union's Member States, the term ESCB should be read as Eurosystem, which only contains the member states of the Eurozone. "The Eurosystem will therefore coexist with the ESCB as long as there are EU Member States outside the Eurozone" (European Central Bank, 2015a). The Article states that the tasks are as followed:

- to define and implement the monetary policy of the Community;
- with the EU Council as the ultimate decision maker, to conduct foreign exchange operations;
- to hold and manage official foreign reserves of the Member States;
- to promote the smooth operation of payment systems.

However, the tasks stated in the Article 105(2) are not a complete summary. Other related tasks also include the issue of euro banknotes¹⁸, representation of the Eurozone and collection of statistical information (Scheller, 2006, p. 48). Since No-

¹⁷ For current data, see: <http://www.bloomberg.com/quote/PRIME:IND>

¹⁸ Euro coins are issued by Member States and are subject to approval by the ECB.

September 4, 2014, the ECB has a supervisory and regulatory responsibility for banks based in countries participating in the Single Supervisory Mechanism (SSM), which contains all Eurozone countries participating on an obligatory basis and non-member countries participating on a voluntary basis.¹⁹

2.2.2 Objectives and independence of the Eurozone's monetary policy

As of February 2015, the European Central Bank is the central bank for nineteen European Union countries. The last joining country was Lithuania on January 1, 2015. However, as the Article 4(2) of the EC Treaty states, this number is not final because all European Union countries are required to adopt euro as a legal tender.²⁰ Countries that haven't met the requirements for admission yet are deemed to have a derogation (Scheller, 2006, p. 39). This implies that they can use their own currencies and conduct their own monetary policy until they adopt the single currency.

Objectives

The objectives of monetary policy conducted by the Eurosystem are meant to further the fundamental objectives of the Community. As Article 2 of the EC Treaty states, these objectives include a harmonious, balanced and sustainable development of economic activities, a high level of employment, sustainable and non-inflationary growth and a high degree of competitiveness and convergence of economic performance.

The European Central Bank is only responsible for monetary aspects of the Eurozone. The economic aspects, such as fiscal policy, are in hands of the member states' governments because they are connected with the principle of subsidiarity mentioned in the Article 5 of the EC Treaty. In addition, the "no bail out" clause states that the member states are not liable and cannot assume the debts incurred by another member state (Article 103).

The primary objective of the Eurosystem is to maintain price stability. If this goal is fulfilled, the Eurosystem may support general economic policies of Member States and thus contribute to the general objectives of the Community mentioned before.

In addition, in 1998, the ECB announced to conduct its policy via a quantitative definition of price stability. The Governing Council defined price stability as "a year-on-year increase in the Harmonised Index of Consumer Prices (HICP) for the euro area of below 2 % and added that price stability was to be maintained over the medium term" (Scheller, 2006, p. 80). Therefore, the Eurosystem's goal is to maintain inflation close to 2 % and this also implies a rejection of deflation. In ad-

¹⁹ For more information, see Chapter 2.4

²⁰ This sentence doesn't apply to Denmark and the United Kingdom of Great Britain and Northern Ireland. These countries obtained a special status that allows them not to enter to the stage three.

dition, the medium-term wants to express that short-term volatility in inflation is unavoidable.

Independence

Regarding the independence of the Eurosystem, its parts, the ECB and NCBs, are independent institutions. When conducting their policies, they don't have to seek or take instructions of any Community or member state institution. In addition, the ECB has its own budget that is independent from that of the EU (Scheller, 2006, p. 126).

2.2.3 Structure of the European Central Bank

The Eurosystem is composed of two main institutions – the European Central Bank and the National Central Banks. Briefly, the ECB ensures that the operations performed by the NCBs are uniform.

European Central Bank

The ECB is the decision-making center of the ESCB and the Eurosystem. It's formed of the Governing Council, the Executive Board and the General Council.

Governing Council

The Governing Council is the main decision-making body of the ECB. Its decisions are generally long-term or, in other words, strategic. Its competences are very wide and include all those that are not reserved for the Executive Board. Generally, the Governing Council defines the monetary policy strategy and its operational framework. In accordance with the latter, it also takes necessary decisions, such as setting of the key ECB's interest rates (Scheller, 2006, p. 53). Other responsibilities include authorization of the issuance of banknotes and coins, initialization of Community legislation and setting of the ECB's budget. The Governing Council consists of six members of the Executive Board and the governors of the NCBs. As of February 2015, there are nineteen NCBs' governors. Since Lithuania joined, the governors of the NCBs participate in meetings on a rotating basis. Under this principle, the governors are divided into two groups respecting the size of their economy and financial sector. The first group is formed of the five largest countries according to the criteria sharing a total of four votes. These countries are Germany, France, Spain, Netherlands and Italy. The second group contains the rest of countries with a total of eleven votes. The voting rights in both groups rotate monthly, which means that each month there is one president in the first group and three presidents in the second group that won't have right to vote. This system will be used as long as there are less than 22 countries in the euro area. Once the number exceeds 22, the countries will be divided in three groups (Deutsche Bundesbank, 2014). The Governing Council, therefore, operates on a very similar basis to the FOMC's one.

Executive Board

The Executive Board is an operational body of the ECB. Its responsibilities include organization of Governing Council meetings, implementation of monetary policy in accordance with the orders of the Governing Council and other responsibilities, such as regulatory and sanction imposing ones. The term “implementation of monetary policy” implies that the Executive Board adopts instructions addressed to the NCBs (Scheller, 2006, p. 60). It is also responsible for the internal structure of the ECB. The Executive Board has six members appointed on a full-time basis. They include the President and the Vice-President of the ECB.²¹ Appointments are made at the level of Heads of State or Governments on a recommendation of the EU Council.

General Council

The General Council is more connected with the ESCB than with the Eurosystem. It provides a connection with the NCBs that are not members of the euro area. Its responsibilities include monitoring of European Exchange Rate Mechanism (ERM) II, contribution to the collection of statistical information and tasks that belonged to the European Monetary Institution. The ECB President is required to inform the General Council of the decisions taken by the Governing Council so that the governors of non-member NCBs receive direct information about the planned euro area policies (Scheller, 2006, p. 62).

National Central Banks

The NCBs are operational arms of the Eurosystem. In their countries, they carry out functions delegated to them by the ECB. These functions include realization of monetary policy by using monetary instruments and tools, supervision and regulation of less significant financial institutions, collection of statistical information and other minor tasks. Once a NCB joins the Eurosystem, it becomes a shareholder of the ECB and endows the ECB with capital and foreign reserve assets (Scheller, 2006, p. 44). Therefore, the ECB is owned by the National Central Banks. The NCBs' shares reflect their EU share of population and GDP.²² The share percentage is especially important for voting on financial matters, redistribution of the ECB's monetary income and the processing of monetary policy.

²¹ For information about today's composition of the Executive Board, see: <https://www.ecb.europa.eu/ecb/orga/decisions/eb/html/index.en.html>

²² For information about the each country's share in percent, consult: <https://www.ecb.europa.eu/ecb/orga/capital/html/index.en.html>

2.2.4 Instruments and tools used by the Eurosystem

When conducting its monetary policy, the Eurosystem uses a variety of instruments and tools. Respecting their nature, they can be divided into four groups:

- Open market operations
- Standing facilities
- Minimum reserve requirements
- Foreign exchange operations

Open market operations

The open market operations are the most important instrument of the Eurosystem. They are conducted on money market by the NCBs on the initiative of the ECB. They also play an important role when the Eurosystem decides to steer short-term interest rates (Scheller, 2006, p. 89). The OMOs contain four groups of operations – the main refinancing operations, longer-term refinancing operations, fine-tuning operations and structural operations. In tandem with the latter, the Eurosystem can use five tools to conduct its OMOs – reverse transactions, outright transactions, the issuance of ECB debt certificates, foreign exchange swaps and the collection of fixed-term deposits (The Governing Council, 2011, p. 10).

Operations

The main refinancing operations are short-term liquidity providing operations. They play a pivotal role in steering interest rates. Longer-term refinancing operations are aimed at providing longer-term refinancing to the financial sector. Accordingly, they are also defined as liquidity-providing. Next group of operations, fine-tuning operations, is generally used in order to smooth the effects on interest rates caused by unexpected liquidity fluctuations, such as the counter liquidity imbalances on the last day of the maintenance period. They are liquidity-providing and absorbing operations. In addition, the Eurosystem may elect specific counterparties to whom it centers these operations for its fine-tuning operations. The last operations are structural reverse operations. They are aimed to adjust “the structural position of the Eurosystem vis-à-vis the financial sector” (The Governing Council, 2011, p. 19).

Tools

Reverse transactions are the most important Eurosystem’s tool and can be used for all OMOs. The Eurosystem generally buys or sells eligible assets under repurchase agreements, which implies their repurchase or resale in the future. The OMOs are generally conducted by the NCBs either in the form of repurchase agreements or as collateralized loans. All loans to financial institutions provided by the Eurosystem must be collateralized. The reverse transactions used in the main refinancing operations have usually maturity of one week and are defined as liquidity-providing. In contrast, the longer-term refinancing operations usually use the reverse transactions with maturity of three months and are executed in the form of variable rate tenders (The Governing Council, 2011, p. 18). Regarding the reverse transactions of fine-tuning operations, their maturity is not standardized.

Outright transactions are only used for structural operations. They consist of purchasing and selling of eligible assets on the market. These transactions are usually conducted by the NCBs. In addition, there are no restrictions on the range of counterparties and only marketable assets can be used as underlying assets in these transactions (The Governing Council, 2011, p. 20).

The issuance of ECB debt certificates is used for structural operations and to create a liquidity shortage in the market. It is, therefore, only used to absorb liquidity from the market. Having maturity of less than 12 months, the issuance is performed on money market.

The last tools, foreign exchange swaps and the collection of fixed-term deposits, are generally used in fine-tuning operations. In contrast of the deposits that only absorb liquidity, the swaps can absorb and provide liquidity to the market.

Eligible assets and counterparties

Regarding the counterparties, they must meet certain criteria to be able to participate in the OMOs. In brief, these criteria require institutions to be subject to minimum reserve requirements and financially sound. The only exception are the outright transactions that are a priori addressed to everybody.

All eligible assets are mentioned in the so-called Single list that plays the role of a “single framework for eligible assets common to all Eurosystem credit operations” (The Governing Council, 2011, p. 38). The Single list contains two types of assets – marketable and non-marketable. There is no difference between them regarding the quality, except the non-marketable ones cannot be used for outright transactions.

Standing facilities

The Standing facilities are generally used to provide and absorb short-term liquidity. They contain two types of tools – the marginal lending facility and the deposit facility.

The marginal lending facility serves to provide overnight liquidity from NCBs at a pre-specified interest rate against eligible assets. They may be provided in the form of either overnight repurchase agreements or collateralized loans. Only eligible counterparties for OMOs can take part in standing facilities operations. The marginal lending facility is also used for debit positions on counterparties’ Target 2 account.²³ The interest rate at which these transactions are made is called marginal lending facility rate. As of February 2015, this rate bears interest of 0.30 %.

²³ For instance, “at the end of every business day, counterparties debit positions on their settlement account with their NCBs are automatically considered to be a request for recourse to the marginal lending facility” (The Governing Council, 2011, p. 24).

The deposit facility is another tool used in standing facilities. They allow counterparties to deposit overnight deposits with their NCB. Accordingly, the counterparties have to meet the requirements mentioned in this Chapter. The interest rate at which these transactions are made is called the deposit facility rate. As of February 2015, this rate bears negative value of 0.20 %.

The interest rates of marginal lending facility and deposit facility are published on the website of the European Central Bank.²⁴

Minimum Reserve Requirements

The minimum reserve requirements are defined as required balances that credit institutions must hold on accounts with their NCB. The main function of the reserve requirements is to “help stabilize money market interest rates and to enlarge the structural liquidity shortage of the banking system, increasing the demand for central bank refinancing” (Scheller, 2006, p. 89). The first objective is connected with the maintenance period. Credit institutions do not have to meet the reserve requirements every single day. They have to hold enough money “determined by applying the reserve coefficients to the reserve base, which is the sum of a sub-set of liability categories”, on the institution’s central bank account during the maintenance period, which is approximately one month long (Banco de Portugal, 2015). In addition, whether an institution meets the requirements depends on the mean of daily balances during the mentioned period. Therefore, reserve imbalances of one day can be offset by a reserve surplus of other day. Institutions thus can lend money and run reserve deficit whenever “the shortest money market rates are above those expected to prevail for the remainder of the maintenance period” (Scheller, 2006, p. 90). This makes it unnecessary for the central bank to intervene in the market often.

The ECB requires all credit institutions established in the euro area to hold minimum reserves. In addition, euro branches of credit institutions established outside the euro area are also subject to minimum reserves. However, branches of euro area institutions that are located outside the euro area are not subject to reserve requirements (European Central Bank, 2015b). Institutions that are subject to reserve requirements are mentioned in the list developed by the ECB.

As of February 2015, the ECB applies 1 % reserve coefficient to overnight deposits, deposits with agreed maturity or period of notice up to 2 years, debt securities issued with maturity up to 2 years and money market paper. Deposits with agreed maturity or period of notice over 2 years, repos and debt securities issued with maturity over 2 years are subject to a 0 % reserve coefficient.²⁵ However, a par-

²⁴ For more information, see:

<https://www.ecb.europa.eu/mopo/implement/sf/html/index.en.html>

²⁵ For today’s values, consult: <https://www.ecb.europa.eu/mopo/implement/mr/html/calc.en.html>

ticular minimum reserve requirement calculated by multiplying the reserve coefficient with the reserve base has to be lowered by €100,000 in order to get the actual minimum reserve requirement value.

All reserve balances are subject to remuneration. In other words, institutions' reserve balances bear interest. As of February 2015, the remuneration's interest rate is 0.05 %.²⁶

If an institution doesn't meet the minimum requirements, the deficiencies are subject to a charge.

Foreign exchange operations

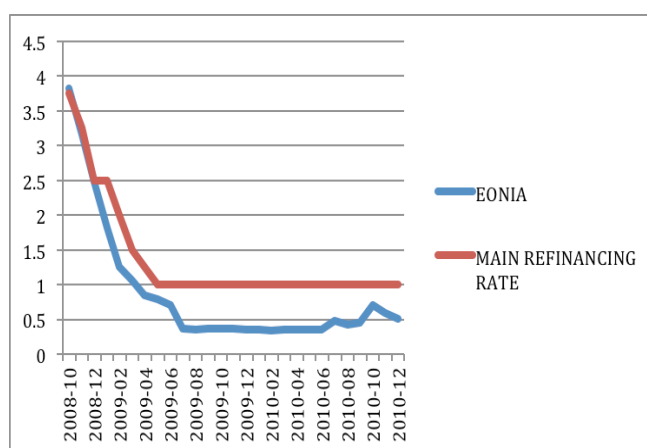
The foreign exchange operations and its most important tool – interventions on foreign exchange markets – are effected “solely through the foreign reserves held by NCBs” (Scheller, 2006, p. 91). They may be conducted through both extra and intra ERM II currencies. General responsibility and adoption of frameworks lie in hand of the European Council that formulates general orientations for exchange rate policies. However, these policies must respect the primary goal of the Eurosystem – price stability.

2.2.5 Conduction of the Eurozone's monetary policy

The Eurosystem's monetary policy is based on the changes of main interest rates and the use of main refinancing operations. When it wants to change short-term interest rates, the Eurosystem generally changes the main refinancing rate and thus makes pressure on other short-term interest rates, such as interest rates of the member states' bills and EURIBOR. In tandem with the main refinancing rate, the Eurosystem also changes the deposit facility rate and the marginal lending rate. The following graph shows the performance of EONIA and the main refinancing rate during the period 2008-2010:

²⁶ For today's values, consult:

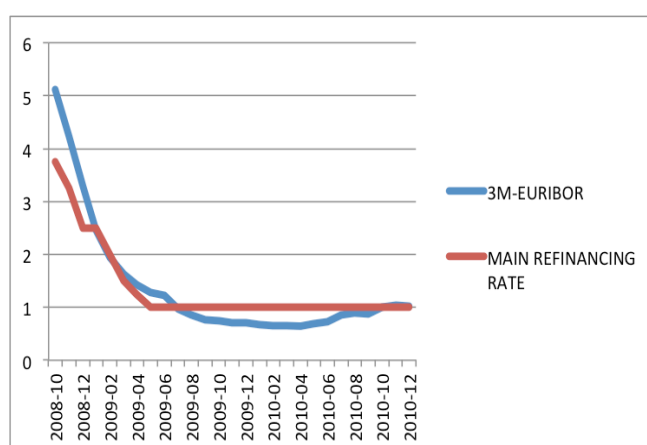
<https://www.ecb.europa.eu/mopo/implement/mr/html/index.en.html>



Img. 3 Performance of EONIA and the main refinancing rate in the period of 2008-10.
 Data source: European Central Bank.

The graph shows that EONIA was most of the time below the main refinancing rate. From October 2008, the ECB has been using a fixed rate for its main refinancing operations, which explains the steady performance of the main refinancing rate. In contrast, EONIA is an interest rate for overnight operations between banks. Therefore, it also includes other sources of liquidity than just main refinancing operations, which explains the performance on the graph. The coefficient of correlation for both rates in this period is 0.9819, which confirms the influence of the main refinancing rate on EONIA.

The next graph shows the performance of 3M-EURIBOR and the main refinancing rate during the period 2008-2010:



Img. 4 Performance of 3M-EURIBOR and the main refinancing rate in the period of 2008-10.
 Data source: European Central Bank.

The graph shows that there is a correlation between the main refinancing rate and 3M-EURIBOR. In addition, it's interesting that from June 2009 to November 2010 the 3M-EURIBOR was few basis points below the main refinancing rate. The reason of the latter is an increase in long-term and other types of open market operations that began in 2009, such as Cover Bond Purchase Program. Also, 3M-EURIBOR includes market expectations and other criteria that are typical for interbank interest rates.

Economic assesment

When evaluating economic situation, the Eurosystem uses the so-called two-pillar approach. This approach is based on two perspectives:

- The first perspective (economic analysis) is used to assess the short to medium-term determinants of price development
- The second perspective (monetary analysis) is mainly used as a cross-check, from a medium to long-term perspective

The two-pillar approach “ensures that appropriate attention is paid to different perspectives to be able to make an overall judgment of the risks of price stability” (Scheller, 2006, p. 83).

The economic analysis assesses economic and financial development in connection with price stability. The ECB reviews development in output, unemployment, price and cost indicators, fiscal policy, balance of payment for the euro area, financial market indicators and exchange rates (Sheller, 2006, p. 84). The main purpose of the economic analysis is to prevent demand-supply imbalances and stabilize short-term interest rates. Regarding the monetary aggregates, the ECB uses M1, M2 and M3. M1 contains currency in circulation and overnight/similar deposits. M2 contains M1 plus short-term savings and time deposits, such as savings deposits redeemable up to 3 months and time deposits with maturity of up to 2 years. The last one, M3, contains M2 plus money market funds shares and units, repurchase agreements and debt securities with maturity of up to 2 years (O'Brien, 2007, p. 18). When assessing inflation rates, the Eurosystem uses the Harmonized Index of Consumer Prices developed by Eurostat. The HICP measures the average change in the prices paid by households for a specific, regularly updated basket of consumer goods and services. The basket contains expenditures, such as “everyday items such as food, newspapers and petrol, durable goods such as clothing, PCs and washing machines, and services such as hairdressing, insurance and rented housing” (European Central Bank, 2015c). However, only transactions conducted directly by households are included. This helps the Eurosystem, for instance, to offset effects of state provisions addressed to health-care and educational sectors. Therefore, when a student pays for tuition, only the sum that is actually debited from a household account and credited to a university account is reviewed in the HICP. That implies that the full sum of tuition is not incorporated (European Central Bank, 2015c). The ECB also reviews important interest rates in the Eurozone.

Some examples are 1M and 3M-EURIBOR, EONIA and the member states' bond rates. EONIA is an overnight interest rate and therefore it's sometimes called as 1D-EURIBOR.

Monetary analysis relies on the fact that "monetary growth and inflation are closely related in the medium to long run" (Scheller, 2006, p. 85). In other words, it exploits the long-run link between money supply and prices. This link comes from the quantity theory of money. In long-run, an increased money supply does not have any effects on real aggregate variables. However, it does have effects on the level of prices. Since the primary goal of the Eurosystem is to maintain price stability, it's especially important to examine variables that reflect the evolution of prices and money. The Eurosystem uses the mentioned HICP for level of prices and monetary aggregate M3 to assess monetary developments. The M3 aggregate is used as a benchmark for monetary developments because its growth is well compatible with price stability over medium-term (Scheller, 2006, p. 85). In October 13, 1998, the Governing Council set a reference value for the M3 growth at 4.5 % per annum considering the GDP growth of 2-2.5 % and a decline in money circulation of 0.5-1 %.²⁷ The latter helps the ECB to keep monetary growth with GDP growth.²⁸

2.3 Comparison of the monetary policies in the U.S. and the Eurozone

Since both monetary institutions and their policies have been described, we can now proceed to describe the differences between them. During this Chapter, we have realized that there are distinctions in many aspects and thus we will divide it into four sections in order to keep the text organized. The first section called "Institutional structure and independence" will talk about the main legal differences between the institutions. The second section called "Goals" will refer to the differences between the aims of the Federal Reserve and the Eurosystem. The third section called "Instruments and tools" will point out the differences that can be seen in the use and nature of the monetary instruments and tools. Finally, the last section will describe the different ways of assessing and conducting monetary policies in the U.S. and the Eurozone.

²⁷ For more information about the press release, see:

http://www.ecb.europa.eu/press/pr/date/1998/html/pr981201_3.en.html

²⁸ The easiest way to understand the concept is to use the equation of exchange developed by Irving Fischer in 1911. Using the formula, if a central bank decides to increase money supply by boosting the money base, it will only influence level of prices, unless money supply and GDP growth grow at the same rate. If this is the case, there will be no pressure on level of prices. Therefore, the monetary golden rule recommends increasing the money supply by 2 % per year since it considers the growth of M to be 2 % per year and money circulation to be unchanged.

Institutional structure and independence

When the European Union was establishing the European Central Bank, it also drew inspiration from the Federal Reserve System. Therefore, many institutional aspects of the ECB do not differ significantly from the Federal Reserve. However, it does not mean that these institutions are similar.

First difference can be found in the composition of the FOMC and the Governing Council. The FOMC consists of twelve members with seven of them being from the Board of Governors. Therefore, when voting, members of the Board can outvote other members making the monetary policy development and management more centralized. In the case of the Governing Council, this currently consists of six Executive Board members and presidents of the NCBs. The latter implies that the implementation of new monetary policies is more influenced by the member states than by the Executive Board making the monetary policy development and management less centralized. This might be connected with the reason why the European Central Bank doesn't publish minutes from its meetings. Since the Governing Council is not supposed to work in a nationalistic way, published minutes would show members that did not support a particular monetary policy and thus encourage their countries to feel obligated to do something their representatives did not agree with. In contrast, the Federal Reserve does not have problems with publishing minutes of its meetings, which makes it more transparent. The publishing of minutes has, however, other effects. Ehrmann and Fratzscher (2005) found out that "the reaction of US markets to the statements by Chairman Greenspan was significantly stronger than to the statements made by other FOMC members; this differs from the euro area, where the markets respond similarly to communication by the ECB President and other Governing Council members."

Next difference lies in the ownership of both central banks. The Federal Reserve is owned by member private banks. Once a bank wants to join the System, it has to subscribe to the capital of the closest Federal Reserve Bank. Although this ownership does not bear any special rights, it allows member private banks to vote one part of the Board of the closest Reserve Bank. Since Federal Reserve Banks can set the discount rate, private banks have some influence on the conduction of monetary policy in the U.S. However, once a Reserve Bank changes its discount rate, it is subject to approval by the Board of Governors. In contrast, the European Central Bank is owned by the National Central Banks. According to their share, the NBCs conduct the Eurosystem's monetary policy and vote in financial matters.²⁹ This implies that the Eurosystem is not owned by private sector.

Another difference exists in the membership. Regarding the banks in the U.S., only national banks and state banks that decided to join are members of the Federal

²⁹ For instance, the bigger the share of a particular NBS is, the higher amount of open market operations it conducts.

Reserve System. Therefore, state banks that are not members of the System have a more complicated access to the FED's paid services, such as Automatic Clearing House. In contrast, the Eurosystem covers all banks in the Eurozone. The control is done by NCBs that are responsible for their respective countries.

Finally, there is also one difference in the independence. As stated in this Chapter, the Federal Reserve is "independent within the government." The latter implies that the System is supposed to accommodate its monetary policies to the fiscal policies conducted by the government, which might affect the conduction of monetary policy in the United States. In addition, the goals of both fiscal and monetary policies are similar. In the Eurozone, the situation is different. The ECB is completely independent and the EC Treaty even forbids other institutions to give orders to the ECB. In conclusion, the European Central Bank enjoys higher independence than the FED. This fact is confirmed by the observation of Paul de Grauwe (2005, p. 177), who mentioned that the ECB is a central bank with a highest independence in the history followed by the Bundesbank and the FED.

Goals

The previous sub-chapters also talked about the objectives of both monetary authorities. The difference between them is very clear; as stated in the Humphrey-Hawkins Act, the Federal Reserve has more than one main objective. In contrast, the Eurosystem has only one main objective – price stability. Therefore, the objectives and predictability of Federal Reserve System are extremely unclear. Although the System set a reference value for annual inflation of 2 % and tries to teach the public about advantages of price stability, it's still required to cooperate with the U.S. Government having in mind that price stability is not the only System's main objective. In 1994, Alan Greenspan, the former Chairman of the Federal Reserve, said that the U.S. "will be at price stability when households and businesses need no factor expectations of changes in the average price level into their decisions".³⁰ In continuation, one might wonder what policy would the System conduct if the U.S. suffered from high inflation rate and low GDP growth. Using the interest-rate channel, the System would have to sacrifice one goal in order to achieve the other. However, in Eurozone, this situation would be undoubtedly solved by increasing the main Eurozone's interest rates. As stated in this Chapter, the Eurosystem uses inflation targeting in order to fulfill its main objective. Once there is no conflict between reality and the target, the ECB is supposed to conduct policies that would contribute to economic policies conducted by the member states' governments. This all makes the Eurosystem more predictable.

Another difference lies in a coexistence of fiscal and monetary policies. The United States is a federation and thus there is a central government that conducts fiscal

³⁰ In Cecchetti, S.G., O'Sullivan, R. *The European Central Bank and The Federal Reserve. Oxford Review of Economic Policy*. vyd. 19. Oxford: Oxford University Press, 2003, no. 1. ISSN 0266-903X.

policy. In other words, there is only one entity that is allowed to conduct fiscal policy at the federal level. The latter makes it easier for the Federal Reserve to collaborate with the U.S. Government. In contrast, there are currently nineteen sovereign governments in the Eurozone. As the EC Treaty states, economic policies are conducted by national governments. Therefore, there are nineteen fiscal policies in the Eurozone that make it extremely difficult for the ECB to conduct policies that would conform to all fiscal policies in the Eurozone. The latter might have also been a reason why the Eurosystem was entitled to a sole main objective. Also, price stability is a goal that is desirable by everybody regardless of the part of economic cycle that the member states are at.

Instruments and tools

One part of the previous sub-chapters has been dedicated to the instruments and tools that both institutions use. At first sight, it might have seemed that they are similar. If we look at this topic closer, we find many differences that we will describe in the next paragraphs.

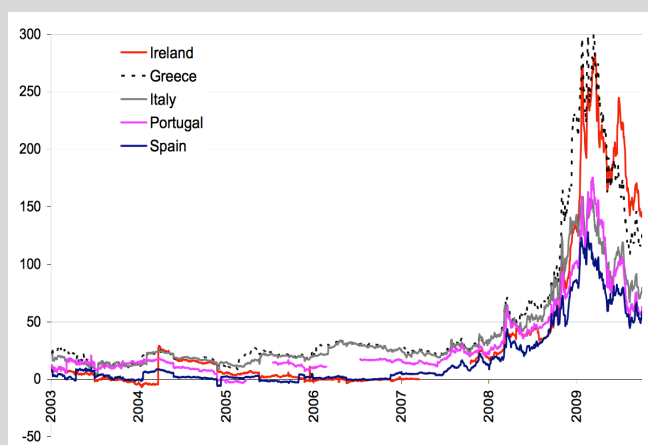
We will start with open market operations. In general, short-term repurchase agreements used by the FED have a maturity of 1-5 days. Also, there is only one institution that is allowed to conduct them – The Federal Reserve Bank of New York. In contrast, the Eurosystem generally uses short-term repurchase agreements with maturity of 7 days. These agreements are conducted through all 19 NCBs and thus their conduction is very decentralized. In some transactions, each NCB conducts only a part of all repurchase agreements according to its capital subscription. The latter might have an impact on the efficiency of some monetary policies because they are conducted with the same interest rate but the risk in all Eurozone's countries might not be similar. Regarding the refinancing interest rates, they also differ. The ECB uses its main refinancing rate for all short-term agreements. This rate is generally published in advance and is valid for a long time. The Federal Reserve, however, generally publishes the rate for a short time and changes it periodically even if the FFR target remains constant.

The last paragraph has led us to another difference that lies in the eligibility of counterparties and collaterals for both long and short-term OMOs. Regarding the counterparties' eligibility, they differ significantly. In the U.S., there are only few institutions that are allowed to participate in OMOs. Therefore, majority of U.S. banks are not allowed to receive liquidity from OMOs and thus are dependent on other sources. In the Eurozone, the situation is different. The Eurosystem allows many financial institutions to become a counterparty. Although there are requirements that the institutions must meet, the number of them is incomparably higher. In the case of outright purchases of securities, there are even no restrictions and all institutions can participate. As regards the eligible collaterals, the situation is also different. In the U.S., the System accepts two types of securities – government bonds and mortgage-backed securities. In the Eurozone, the ECB has a list of eligi-

ble collaterals that can be used in its OMOs. The list is very extensive and contains many government bonds, mortgage-backed securities and other securities as well. However, some government bonds are not included in the list because of a high risk.³¹ Since the Eurosystem's members are sovereign countries, the latter might provoke a feeling that some countries whose bonds are not eligible could be considered as less important and problematic. Also, it makes it more difficult for their governments to get liquidity. This situation is, however, very unlikely to happen in the U.S. where the Federal Reserve is required to cooperate with the U.S. government and reach similar goals.

Box 1 Heterogeneity of the Eurozone's government bonds

For a better illustration, the next graph shows the heterogeneity of the Eurozone member states' bond yields. Especially significant are the spreads in 2009 when the government bonds of Ireland and Greece had interest rates that differed by almost 3 percentage points from the German one:



Img. 5 Spreads (in basis points) of 10-year government benchmark bonds to German Bund. Source: Barrios et al., 2009, p. 4.

Next instrument used by both institutions is the discount lending window/standing facilities. In the U.S., the Federal Reserve conducts these operations via its Reserve Banks. There are three categories of credit that are available for financial institutions. However, institutions are not allowed to use any type they want and the interest rates of the primary and secondary credit are not similar. The result of the latter is that institutions whose financial situation has gotten worse are allowed to ask for a more expensive secondary credit. Regarding the interest rates that the Reserve Banks offer credit at, they can differ because each

³¹ In some parts of the Sovereign Debt Crisis, Greek bonds could not have been used as a collateral.

Reserve Bank is allowed to set its own value. However, as of February 2015, the rates are uniform. In the Eurozone, the situation is different. The ECB offers its credit via the NCBs. Financial institutions are either allowed or obligated to ask for credit. In the first case, financial institutions can decide to ask for credit when they need it. However, only institutions in sound conditions can do so and thus those that do not meet this requirement have to look for other source of liquidity outside the ECB's standing facilities. In the second case, institutions ask for credit automatically when the balance of their Target 2 account is negative. In this moment, it's appropriate to mention that the Target 2 account is not connected with the reserve requirement account, which differs from the U.S. In conclusion, the ECB uses its marginal lending rate in more situations than the Federal Reserve its discount rate.

Both institutions also use minimum reserve requirements to steer the short-term interest rates and sometimes to drain or increase balances that banks have available for their own business. In both countries, minimum reserves apply to all depository institutions. However, the liabilities they apply to are not similar. In the U.S., the minimum reserve requirements do not apply to certificates of deposit but do apply to ineligible bankers acceptances. Therefore, they do not apply to all time deposits. Since the value of U.S. small-denomination time deposits in January 2015 was \$506.1 billion, a considerable part of M2 is not subject to minimum reserve requirements.³² However, the latter might be balanced by the value of reserve ratios. In the U.S., the ratios are higher. Although there is some exemption amount, the ratios are either 3 % or 10 % of liabilities. In contrast, the ECB's reserve ratio bears a value of 1 % and the reserve requirements apply to all personal time deposits with maturity less than 2 years.

Conduction of monetary policy

If we wanted to point out the biggest difference between the U.S. and the Eurozone, we would probably look at the conduction of monetary policy. The latter differs significantly because of many reasons, such as tradition and a different structure of financial system.

The Federal Reserve performs policies that influence the effective federal funds rate, which is the main non-central bank interest rate in the U.S. To show better its purposes, the System publishes a target for this rate. When the effective FFR is supposed to leave its target, the Federal Reserve generally uses short-term operations, such as short-term repurchase agreements, to avoid it. Lately, the System has been using reverse repurchase agreements to assess whether this tool keeps the effective FFR close to the target more efficiently. When the System wants to change the FFR target and adjust the effective FFR, it generally uses outright purchases of securities. Long-term repurchase agreements are used rarely.

³² For more information about the M2 aggregate, see Fed's H6 release:
<http://www.federalreserve.gov/releases/h6/current/>

In the Eurozone, the situation is different. The ECB does perform its policies to steer short-term interest rates but does not pay any special attention to just one rate. Therefore, there is no exact alternative to the U.S. FFR. The ECB publishes three rates that play the role of the main central bank interest rates in the Eurozone. A special position has the main refinancing rate that is used for short-term repurchase agreements. These agreements are used to steer short-term interest rates, which is similar to the Federal Reserve. However, when the ECB wants to change short-term interest rates, such as EONIA or 3M EURIBOR, it primarily changes the main refinancing rate. If we take a closer look at EONIA, we find out that it doesn't differ significantly from the FFR in the U.S and could be considered as the main interbank interest rate in the Eurozone. However, the ECB does not publish any target for this rate. In addition, the ECB can also use long-term repurchase agreements to change short-term interest rates. Outright transactions are used less frequently.

The consequence of the latter is a different transparency of central banks and a different predictability of policies' final effects on interest rates. In the U.S., the System focuses its policies to a rate that is not used in transactions with a central bank. This rate is overnight and thus is supposed to be lower than other short-term interest rates, such as the 3-month or 6-month ones. The Federal Reserve therefore directly influences and targets one of the lowest interbank interest rates in the economy. In contrast, the ECB does not influence or targets any particular interbank interest rate. Its main refinancing rate is generally used for 7-day repurchase agreements that have only a general impact on short-term interest rates. Therefore, this impact on, for instance, EONIA is indirect. In addition, EONIA can also change because of other central bank operations. Since the ECB does not publish any target for EONIA and publishes only the main refinancing rate, the final effect is unknown.³³ As a consequence, the ECB's transparency and predictability regarding this phenomenon are lower, expectations might not be correct and thus ECB's policies might not be as efficient as the Fed's ones. Regarding the permanent OMOs, outright transactions are supposed to be more efficient in steering interest rates because counterparties know that they are not required to perform a reverse transaction in future and thus can use the money for a higher variety of financial operations.³⁴ Also, their impact on inflation is supposed to be higher, which is the

³³ Imagine a situation when the ECB decreases the main refinancing rate to lower short-term interest rates. Since it does not mention any value for short-term interest rates and also it does not mean that other operations, such as long-term repurchase agreements, will not be conducted, the public doesn't know the final effect of this policy. This implies that the expectations might not be correct. If the same did the Fed, it would publish its new FFR target and thus the public would know Fed's purposes. In continuation, Fed would accommodate its discount rates, repurchase agreements rates and perform outright transactions to move the effective FFR to the new target.

³⁴ An assessment of the efficiency of long term repurchase agreements and outright purchases of securities will be performed in Chapter 3.

reason why central banks in countries that are facing deflation decided to conduct them.

Box 2 Comparison of long-term tools used by the FED and the ECB

Let's compare the value of long-term repurchase agreements and outright transactions performed by the ECB and the Federal Reserve respectively. The data of the ECB states that in 2014 it settled a total of €437 billion in its long-term repurchase agreements. In contrast, the Federal Reserve data shows that it conducted a total of 408 outright transactions purchasing securities worth \$478 billion. Therefore, we see that both institutions provided the financial markets with almost the same amount of money. However, in the U.S. it was permanent. The ECB also used some outright transactions under its Covered Bond Purchase Program 3. In total, it settled €52.2 billion. The latter was already permanent.

While performing economic assessment, there are differences in monetary aggregates and also in other indicators. In the U.S., the Federal Reserve attaches less importance to monetary aggregates.³⁵ The reason why it stopped paying a special attention to them lies in the link between money supply and the monetary base. In 1970s, this link started to get weaker and thus didn't serve as a good indicator anymore. However, in the Eurozone, the ECB still uses monetary aggregates as an important benchmark and even publishes a reference rate for money growth. As a consequence, the future steps of the ECB seem more predictable, which is also connected with the sole objective of the Eurosystem. In reality, the reference rate for money growth should not be understood as a target and therefore its importance is lower. Regarding other indicators, the ECB and the FED don't use the same inflation indicators. The Federal Reserve currently uses the so-called PCEP or also PCE price deflator. This indicator is a deflator that is derived from the largest component of the Gross Domestic Product – personal consumption expenditures. Therefore, it does not contain only prices of goods and service that are in a basket. In contrast, the ECB uses the so-called HICP. This indicator is a consumer price index that is compiled according to a common methodology used in all Eurozone's countries. Comparing these two indicators, the FED one contains prices of higher range of products and services that might not completely reflect what consumers often purchase. In conclusion, when comparing inflation in the Eurozone and the U.S., we should have the latter in mind.

³⁵ For instance, the M3 aggregate was even stopped being published.

2.4 Characteristics of the U.S. and the European financial system with an emphasis in the regulation of banks

Financial system is the most important element for a conduction of monetary policy. All monetary authorities, therefore, control it and also rely on it. Regarding the financial systems in the U.S. and the Eurozone, their structure is not similar. In the U.S., 75 % of the monetary policy is conducted through financial markets and only 25 % through banks. In the Eurozone, it is the opposite (de la Dehesa, 2012, p. 5). However, this information is not anything surprising. Banks have always played an important role in Europe because Europeans are more conservative. The latter is also reflected in the ratio of bank finance to bond finance and the debt to equity finance in the following table:

Tab. 2 Ratios regarding companies' preferred ways of financing

Ratio	U.S. data	EA data
Bank to bond finance	0.74	7.3
Debt to equity	0.41	0.61

Source: Fiore and Uhlig, 2005, p. 32

As we see, in the U.S., both ratios are lower than in the Eurozone. Very surprising is the ratio of bank finance to bond finance that is even ten times higher in the Eurozone. All that implies that the European businesses have to rely more on banks than their American colleagues. In addition, it makes the regulation of European banks even more important.

Since this thesis always describes the conditions in the U.S. first, this section won't be different. Five institutions conduct the regulation and supervision of banks in the United States: Federal Reserve System, Federal Deposit Insurance Corporation (FDIC), Office of the Comptroller of the Currency (OCC), Office of Thrift Supervision (OTS) and National Credit Union Administration (NCUA). The Federal Reserve is responsible for the supervision and regulation of financial holding companies (under the Gramm-Leach-Bliley (GLB) Act of 1999), foreign banks with U.S. operations, state chartered banks that are members of the Federal Reserve and U.S. branches of foreign banks. National banks, i.e. banks chartered by the Office of the Comptroller of the Currency, are supervised and regulated by the OCC. State banks that are not members of the Federal Reserve are regulated by the FDIC. In continuation, the Office of Thrift Supervision supervises and regulates thrift holding companies, saving banks and savings and loan associations. Finally, credit unions are supervised and regulated by NCUA. The latter is also responsible for insurance of credit unions' deposits. As regards the state member banks that are supervised

and regulated by the System, they must have an on-site examination at least once every twelve months, unless they meet requirements that allow them to have an on-site examination once every eighteen months (Board of Directors, 2005, p. 61-62). The off-site examination is performed through automatic screening systems and reports. All regulatory and supervisory institutions participate in FFIEC and coordinate their steps in order to develop uniform federal standards for supervision and regulation of the financial system's subjects.

Since the GLB Act was ratified in the U.S., banks are allowed to engage in a broader range of financial related activities. However, the broad banking that GLB Act "permits U.S. financial holding companies to conduct is more restrictive than European "universal" banking, in that universal banks tend to have more freedom to own and be owned by nonfinancial companies" (Barth et al., 2000, p. 2). As regards mergers and acquisitions, those are subject to approval by the Federal Reserve. In 2010, President Barack Obama signed into federal law the so-called Dodd-Frank Act that improves regulation of financial markets and aims to prevent realization of a systemic risk. This Act also contains the Volcker Rule that prohibits depository banks from proprietary trading again. This rule has some similarities with the Glass-Steagall Act from 1933 that divided the U.S. banking system in two parts – investment and commercial banking.

In Europe, the banking regulation and supervision have changed significantly in last few years. After the beginning of the financial crisis in 2008, the euro area Member States saw that there was a need to unify the banking supervision and regulation at the Community level. The result of the latter was the Banking Union.

The Banking Union consists of three elements:

- Single Supervisory Mechanism
- Single Resolution Mechanism
- Single rulebook

Single Supervisory Mechanism is a new supervisory mechanism at the Community level. After few years of preparation, it entered into operation in November 2014. The supervision is conducted by both the ECB and NCBs. Participating countries are all euro area countries and those EU Member States whose currency is not euro but voluntarily joined the SSM. However, as of February 2015, there is no non-euro country participating in the SSM. The approach used by the SSM is risk-based that "takes into account both the degree of damage with the failure of an institution could cause to financial stability and the possibility of such a failure occurring" (European Central Bank, 2014, p. 8). The SSM builds on data and experience of NBCs because they have a long-established knowledge in banking supervision. Currently, the SSM is responsible for around 4,700 entities.

To ensure efficient supervision, credit institutions are divided in two groups – significant and less significant. This division is based on few criteria that reflect the importance and total value of assets. In particular, significant institutions are those that either have assets worth more than €30 billion or exceeds 20 % of national GDP or are the most important credit institution in a Member State. However, there is also other data to be considered.³⁶ The significant institutions are supervised directly by the ECB. The rest remains in the hands of the NCBs. In addition, the ECB is also involved in the supervision of cross-border institutions.

Supervisory planning is conducted through two-step process: strategic planning and operational planning. The first one contains assessment of risk and vulnerabilities in the financial sector. The operational planning is generally conducted by Joint Supervisory Teams and focused on a need for on-site examinations, analysis of the supervisory reports, financial statements and internal documentation of credit institutions. If a credit institution doesn't meet the SSM requirements, it has to develop a recovery plan and can be subject to a penalty (European Central Banks, 2014, p. 36-38).

Regarding the Single Resolution Mechanism, it will apply to banks participating in the SSM. The SRM will allow an effective resolution of bank failures through the Single Resolution Board and Single Resolution Fund created by the banking sector. However, as of February 2015, this system is not operational yet.

Finally, the Single rulebook is a legal base of the banking union. It consists of rules regarding capital requirements for banks, better protection for depositors and prevention of bank failures. All participating countries are obligated to have their legislation compatible with the Single rulebook.

³⁶ For a summary of all criteria, see:

<https://www.bankingsupervision.europa.eu/banking/list/criteria/html/index.en.html>

3 Monetary policy in context of the financial crisis

The financial crisis that affected world in 2008 was one of the biggest crises since the Great Depression in 1929. Both fiscal and monetary policies were especially important to ease the consequences that in the U.S. had generally impact on financial market and in the Eurozone on sovereign bonds. In the following sub-chapters we will describe the policies conducted by both monetary authorities and explain their influence on a wide range of monetary, financial and other aggregate indicators.

3.1 Subprime banking crisis in the United States

In the U.S., the financial crisis manifested itself as a subprime banking crisis, which referred to a lack of liquidity and mistrust spread out in financial markets.

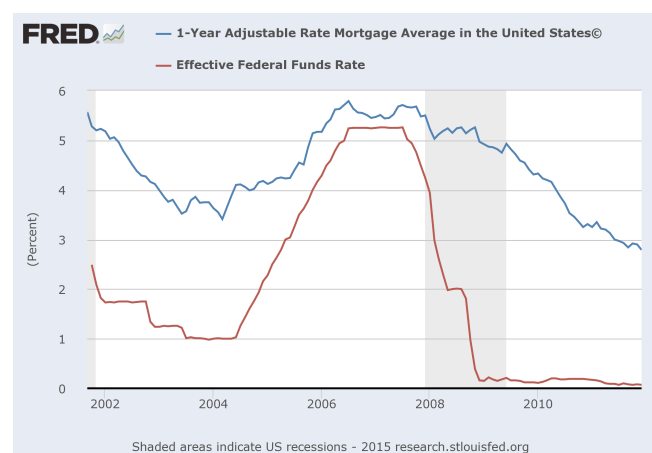
Causes of the financial crisis

Although it's possible to find alternative scenarios to the causes of the financial crisis, most economists agree that it was caused by a real estate bubble. The first impulse that influenced the demand for houses was the so-called Community Reinvestment Act (CRA). This act, passed already in 1977, was designed to encourage depository institutions to help meet the needs of borrowers in all segments, including the lowest ones. To enforce the rules, when a bank wanted to set up a new branch or filled an application for mergers and acquisitions, federal regulatory agencies assessed, among other criteria, whether it complied with CRA. The final decision, therefore, depended also on the latter factor. Although CRA did not have an immediate effect on house prices once it was passed, it might have been one of the factors that motivated financial institutions to lend more subprime loans before the financial crisis started.

In 2001, the U.S. economy experienced a short recession. In order to avoid it, the Federal Reserve lowered the FFR target 11 times ending in December 2001 at 1.75 %, which created a significant amount of liquidity in financial markets. In continuation, this cheap money motivated consumers to take more loans, especially mortgages. In 2003, the System lowered the FFR target again to 1 %, which was the lowest value in 45 years (Singh, 2015). Many depository institutions increased the amount of mortgages and started to sell them in a form of either mortgage-backed securities or collateralized debt obligations (CDOs) in order to get liquidity for more loans. Investment banks, such as Bear Stearns or Lehman Brothers, were willing to buy these securities not only for their yield and value, but also for their low risk because rating agencies gave them the highest ratings. The latter motivated depository institutions to conduct even more mortgages because they knew that they would sell them immediately on the secondary market and get their

money back. In continuation, government agencies like Fannie Mae and Freddie Mac decreased the risk requirements for the mortgages they were buying because otherwise they wouldn't be competitive.

However, in 2004, the Federal Reserve started to increase the FFR target that immediately changed the cost of adjustable-rate mortgages. Low-income communities, therefore, started to have a hard time to pay their bills back and many of them started defaulting on their loans. In continuation, the home prices reached their peak and started to fall, which decreased the value of houses that served as a mortgage collateral. The following graph shows the performance of the 1-year Adjustable Rate Mortgage Average and the effective FFR:



Img. 6 Performance of U.S. adjustable mortgage rates and the effective FFR from 2002 to 2012. Source: FRED database (Federal Reserve Bank of St. Louis).

The first bank that is considered to have problems related to the financial crisis was PNB Paribas, which, in 2007, blocked withdrawals from three hedge funds because of a complete evaporation of liquidity. In continuation, many investors decided to withdraw their deposits from highly leveraged financial institutions in order to keep their money safe. This affected the demand for MBSs and CDOs, which led to many bank failures because they couldn't sell their subprime mortgages and get liquidity. Once rating agencies changed ratings of a majority of subprime lenders, these institutions couldn't get liquidity even in financial markets. An example of these banks is IndyMac, which filed for Chapter 7 bankruptcy in 2008.

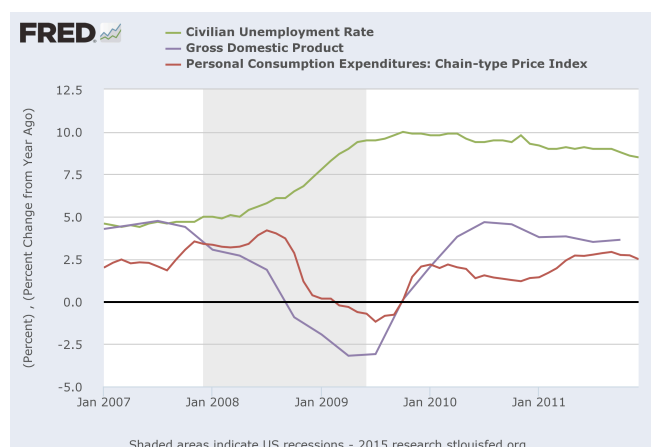
Later, this lack of confidence and liquidity affected non-financial institutions. Since many of them used commercial papers as a source of liquidity, they couldn't effectively finance their activities. In addition, those that used asset-backed commercial papers (ABCP) faced even a more stressful situation because their commercial papers were generally backed by mortgage pool assets (Cecchetti, 2008, p. 8).

In consequence, mistrust appeared in financial markets and banks started to be more careful and even reluctant to lend and invest money. The Federal Reserve realized that it transitioned from being a lender of last resort to the lender of only resort and together with the U.S. government and other government institutions started to conduct policies in order to stabilize the U.S. economy (Chang, 2010, p. 19).

Elected indicators for the financial crisis assessment in the U.S.

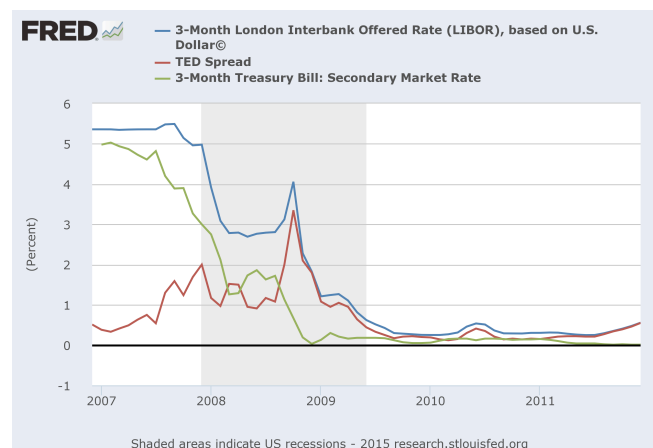
In the next sub-chapter we will describe steps taken by the Federal Reserve in every year from January 1, 2007 to January 1, 2012. Although, as of February 2015, the financial crisis still reverberates, we can say that the worst is over. Therefore, we decided to focus on the period 2008-2012, which we consider the most problematic. The policies conducted by the System will be sorted by the month they happened in. However, when necessary, we will also take a look at the policies conducted by the U.S. Government and other government institutions. Once the policies are described, we will evaluate their impact using a variety of indicators.

First indicators will be the unemployment, inflation rate and GDP growth. The following graph shows their performance from 2007 to 2012:



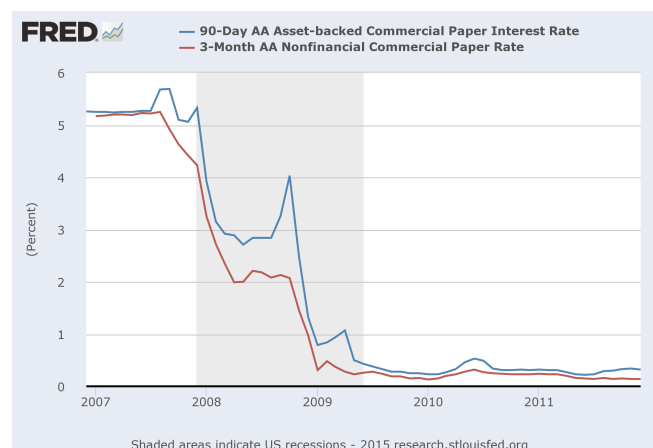
Img. 7 The U.S. unemployment, inflation rate and GDP growth in the period 2007-12.
Source: FRED database (Federal Reserve Bank of St. Louis).

The performance of all three indicators is as we expected; the unemployment rate hit a value of 10 %, inflation rate reflected the decrease in oil prices caused by the recession and GDP growth bore a negative value. Next indicator will be the TED spread, which shows the difference between 3M LIBOR based on U.S. Dollar and 3M Treasury bills rate on the secondary market. This indicator is especially important for evaluating the market confidence:



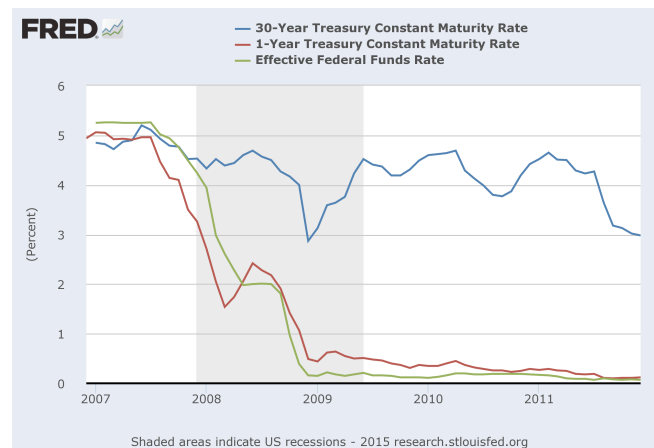
Img. 8 TED spread in the period of 2007-12 in the U.S.
 Source: FRED database (Federal Reserve Bank of St. Louis).

As we see, the TED spread rose significantly during the financial crisis, which reflects the lack of confidence. The performance of 3M LIBOR copies significantly the performance of asset-backed commercial paper rate. Since the latter is generally backed by mortgage pools, it “can be viewed as a proxy for losses occurring in real estate markets” (Cecchetti, 2008, p. 8). Its performance is as followed:



Img. 9 Commercial paper rates performance in the U.S. in the period of 2007-12.
 Source: FRED database (Federal Reserve Bank of St. Louis).

In continuation, next indicators are the Treasury securities yields and the effective FFR:



Img. 10 U.S. securities yields and the effective FFR in the period of 2007-12.
 Source: FRED database (Federal Reserve Bank of St. Louis).

Among other indicators, we will also use the performance of S&P 500, which is a sign of companies’ current and future performance and thus a sign of the performance of the whole economy:



Img. 11 Performance of S&P 500 in the period of 2007-12.
 Source: S&P Dow Jones Indices LLC, FRED database (Federal Reserve Bank of St. Louis).

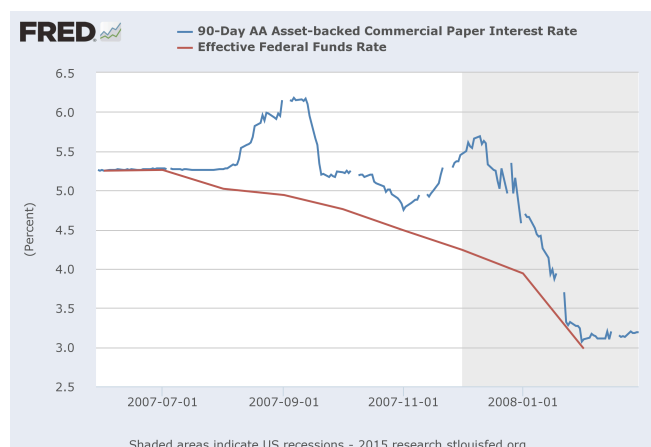
This content of indicators is not, however, complete. When it’s appropriate to use other indicators, we will do so.

3.1.1 Anti-crisis policies conducted by the Federal Reserve System

2007

We will start with what happened in February. In this month, Freddie Mac announced that it would no longer accept the most risky subprime mortgages. Four months later, Standard and Poor's and Moody's Investors Service downgraded over 100 bonds backed by subprime mortgages. Later, in August, the 10th biggest mortgage lender, American Home Mortgage Investment Corporation, filed for Chapter 11 bankruptcy protection. Increasing risk of mortgage securities can be seen in the performance of asset-backed commercial papers in Image 9. Compared to normal commercial papers, the asset-backed one's interest rates increased by 82 basis points.

In September, the System, facing an increasing uncertainty in financial markets, reduced its FFR target to 4.75 %. The reaction was immediate. The effective FFR, commercial paper rates and short-term Treasury securities rate started to decrease. However, ABCP rate and 3M LIBOR rate didn't decrease significantly. The latter can be seen in Images 8, 9, 10 and the following graph that shows daily performance of the effective FFR and 90-day ABCP rate in the period of June 2007-February 2008:



Img. 12 Daily performance of ABCP rate and the effective FFR from June 2007 to February 2008. Source: FRED database (Federal Reserve Bank of St. Louis).

It's appropriate to mention that the effective FFR started to fall before the announcement of the FFR target decrease possibly because of expectations.

However, the decrease of FFR target stabilized the interbank rates only for a little while. Soon after, in November, financial market pressures intensified again diminishing liquidity in interbank markets. This is reflected in Image 12 and also in the TED spread in Image 8. The missing liquidity in financial markets was underlined by the Discount Lending stigma, which was described in Chapter 2. The Federal

Reserve, knowing it was becoming the lender of only resort, decided on December 12, 2007 to create a Term Auction Facility (TAF).³⁷ This program counted with \$20 billion to be lent against a wide range of collateral to institutions that are in sound condition and have access to the Discount Window Lending. These loans were planned to be 28 days long. In addition, institutions that participated in TAF could ask only for 10 % of the total being auctioned and received their money 2 days after the actual auction, which eliminated the Discount Window stigma (Cecchetti, 2008, p. 14). Therefore, institutions having trouble to receive liquidity could have done so. As you can see in Image 8, the 3M LIBOR started to decrease. The same performance shows the ABCP rate in Images 9 and 12. In consequence, the program eased the stress that had been accumulating in the economy.

The year 2007 was the beginning of the financial crisis and thus wasn't reflected significantly in the unemployment rate. However, as we can observe in Image 7, in mid-2007, GDP growth hit its first extreme and started to decrease. The reason of the latter is, certainly, the worsening situation in the financial markets that started to affect also non-financial companies. Regarding the inflation rate, it generally reflected the increase of oil prices.

2008

January 2008 started with a decrease in FFR target by 75 basis that was followed by another decrease by 50 basis points to 3 percent. The latter, therefore, underlined the effects of TAF and contributed to the decrease of short-term interbank interest rates. As we can see in the graphs, all short-term rates were decreasing in this month.

However, the market was about to suffer from another problem. Since T-bills started to be seen as the only low-risk security in the economy, the Treasury securities market became illiquid. The latter can be seen in the culminating decrease of 3M Treasury bills at the beginning of 2008 in Image 8.³⁸ In addition, Image 11 shows that from March S&P 500 index started to decrease, which can be considered as a sign of the beginning of financial crisis in the whole U.S. economy. In the same moment, the U.S. GDP had already been decreasing for 4 months. These were the reasons why, in March, the Federal Reserve announced the creation of a new program called Term Securities Lending Facility (TSLF).³⁹ This program aimed to improve liquidity in Treasury securities money market by lending up to \$200 billion of Treasury securities for 28-day terms against federal agency debt, federal agency residential mortgage-backed securities, non-agency AAA/Aaa private label

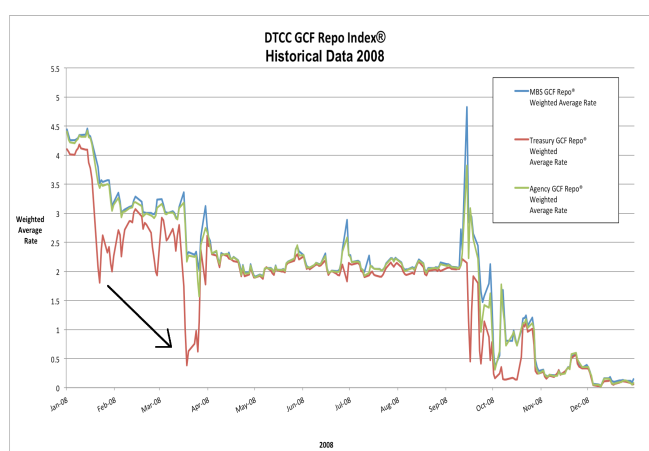
³⁷ For more information about this program, see:

http://www.federalreserve.gov/newsevents/reform_taf.htm

³⁸ The most critical situation was in February 2008. In this month, 3M LIBOR decreased by 30 basis points contrasting the 3M T-Bills that decreased by 86 basis points.

³⁹ For more information about this program, see: <http://www.newyorkfed.org/markets/tslf.html>

residential MBS, and other securities (Federal Reserve Bank of St. Louis, 2015). In other words, the program generally offered very demanded Treasury securities for very illiquid MBS. While TAF “was aimed at the gap between term and overnight interbank lending rates; the Term Securities Lending Facility is directed toward the premium paid to hold U.S. Treasury securities relative to mortgage-backed securities” (Cecchetti, 2008, p. 17). The effect of this policy was immediate. Image 8 and 10 show a complete turnabout in the performance of T-Bills in the first quarter of 2008. Further observations could be seen in the Treasury repo rate that refers to the interest, which a borrower has to pay in order to get an overnight loan collateralized by a Treasury security. Normally, the rate differs by 5-10 basis points from the effective FFR, which refers to non-collateralized overnight loans:



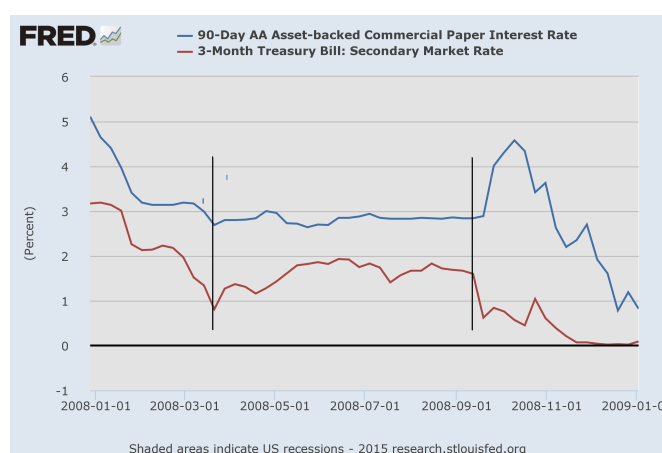
Img. 13 Performance of the DTCC GCF Repo Index for the U.S. in 2008, edited by author. Source: Depository Trust & Clearing Corporation.

The graph confirms the high effectiveness of the TSLF. As we see, from January 2008, the Treasury repo rate tent to be more than 25 basis points bellow the effective FFR ending up being more than 150 basis points bellow the effective FFR in mid-March.⁴⁰ Right after the announcement of TSLF, the rate moved back to its normal value.

However, TSLF was not the only program announced in March 2008. As mentioned in Chapter 2, U.S. OMOs conducted by the Federal Reserve Bank of New York are addressed to a limited number of institutions called primary dealers. These dealers are not, however, only depository institutions and thus some of them didn't have access to Discount Window Lending and TAF. Since those institutions were also critical for the U.S. economy, the Federal Reserve decided to set up another pro-

⁴⁰ In order words, borrowers had to pay almost no interest in order to get short-term liquidity collateralized by Treasury securities because of the low risk and high demand for these securities. Once TSLF was developed, the availability of Treasury securities was higher, their interest rates increased and thus rates of other securities that use Treasury securities in some way did so as well.

gram called Primary Dealer Credit Facility (PDCF)⁴¹ in order to provide liquidity to all primary dealers.⁴² The intention to create such a program was the collapse of Bear Stearns that culminated few days before the announcement of PDCF. Since Bear Stearns was an investment bank and many primary dealers as well, the fear of a collapse of other investment banks was increasing. PDCF functioned on a similar basis as Discount Lending operations and thus primary dealers could have asked for overnight loans collateralized by a wide range of securities. However, there was also another aim of PDCF. Since a wide range of securities could have been used in PDCF, it contributed to the effects of the TSLF (Cecchetti, 2008, p.19). The latter can be seen in the following graph showing the performance of ABCP rate and 3M T-Bills rate:



Img. 14 Performance of 90-day ABCP rate and 3M T-Bills rate in 2008, edited by author.
Source: FRED database (Federal Reserve Bank of St. Louis).

Although the PDCF and TSLF contributed to the stability of Treasury securities market and decreased the gap between T-Bills and MBS, this effect last only 5 months. The latter is shown by Image 14.

In March, the FOMC also voted to decrease the FFR target by 75 basis points to 2.25 percent. However, this time, the latter's impact on short-term Treasury rates was offset by the mentioned System's programs. The FFR target was decreased again in April to 2 percent.

In July, the situation started getting more stressful. The Office of Thrift Supervision closed IndyMac Bank, whose problems were described at the beginning of this sub-chapter. In addition, the System authorized the Federal Reserve Bank of New York to lend to Fannie Mae and Freddie Mac. A similar policy was conducted by the U.S.

⁴¹ For more information about PDCF, see: http://www.newyorkfed.org/markets/pdcf_faq.html

⁴² This program is completely unique in comparison with the Eurozone, where no such program could be created because of the wide number of participants in Eurosystem's OMOs.

Treasury. These policies contributed to the continuing loss of confidence of agency MBSs. At the end of July, the System extended TSLF and PDCF through January 2009, increased amount of money traded in TSLF and introduced new 84-day TAF loans in order to stabilize the markets. The latter contributed to another decrease of 1M Treasury Bills rate and the programs finally had an impact on long-term interest rates, such as 30-year Treasury Bonds rate, as showed by Image 10. However, interbank interest rates remained unchanged because of the situation in the economy.

In September, problems in financial system culminated. On September 7, 2008, the Federal Housing Finance Agency placed both Fannie Mae and Freddie Mac in conservatorship making an extreme lack of confidence in interbank market. Images 8, 9, 13 and 14 show a dramatic increase in interbank interest rates, in particular 3M LIBOR, 90-day ABCP rate and agency and non-agency repo rate. The System reacted immediately expanding the list of eligible collateral for the PDCF and TSLF. Regarding TSLF, it increased the frequency of auctions and total offering to \$150 billion. Soon later, the Bank of America announced its intention to purchase Merrill Lynch & Co. In the same moment, Lehman Brothers Holdings filed for Chapter 11 bankruptcy protection. In continuation, the System authorized FRB of New York to lend up to \$85 billion to American International Group (AIG) and announced the creation of the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF).⁴³ This program aimed to provide non-recourse loans to U.S. depository institution and bank holding companies “to finance their purchase of high-quality asset-backed commercial paper from money market mutual funds” (Federal Reserve Bank of St. Louis, 2015). The System also announced its plan to purchase short-term obligations issued by Fannie Mae and Freddie Mac from primary dealers. The effects of these policies were, however, offset by more bankruptcies, such as the Washington Mutual Bank’s one on September 25, 2008. Four days later, the System increased the amount of money traded in TAF to the total of \$225 billion. The same day, FDIC announced that Citigroup would purchase Wachovia Corporation, which was, however, later sold to Wells Fargo & Co.

In October, situation started to get better. On October 3, President Bush signed into law the Economic Stabilization Act that established the \$700 billion Troubled Asset Relief Program (TARP). In continuation, FED announced that it would pay interest on depository institutions’ required and excess reserve balances and created another program called Commercial Paper Funding Facility (CPFF). This program differed from AMLF in the fact that it purchased commercial papers including ABCP directly from eligible issuers. CPFF, TARP, AMLF and the decrease of FFR target to 1.5 percent announced few days after the announcement of CPFF had finally an impact on interbank mistrust improving expectations and liquidity of

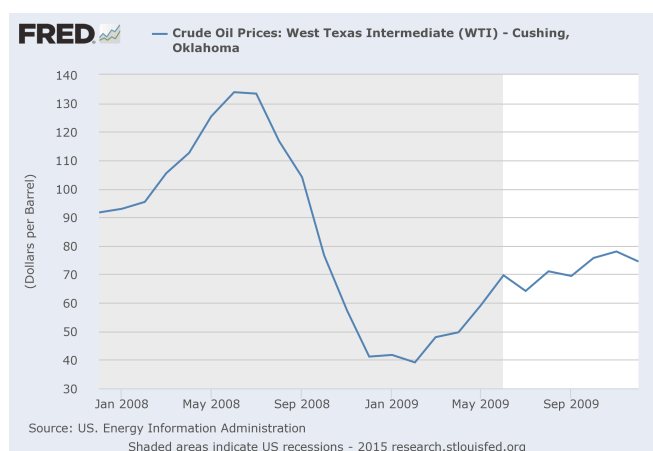
⁴³ For more information about this program, see:
http://www.federalreserve.gov/newsevents/reform_amlf.htm

many securities collateralized by mortgages. Images 8, 9, 13, 14 prove the latter statement and show a total turnabout in these interest rates. In the second half of October, the System decreased the FFR target again to 1 percent.

In November, the effects of the mentioned programs continued. At the end of the month, the System announced another program. The latter, called Term Asset-Backed Securities Lending Facility (TALF), was similar to the AMLF. It also provided non-recourse loans, but it did so to holders of AAA-rated asset-backed securities and recently originated small business loans. Its aim was to spur consumer credit spending. The amount of money in this program was set to \$200bn.⁴⁴ At the end of November, the FED also announced the purchase of agency MBSs worth \$600bn. The latter is sometimes called as the first quantitative easing.

In continuation, at the beginning of December, the System extended PDCF, AMLF and TSLF through April 2009. Later, it decided to change FFR target to a fluctuation zone with a lower and upper limit of 0 and 0.25 percent respectively.

The year 2008 was the most stressful year for the U.S. economy. This year, the gap between interbank and Treasury rates culminated, the GDP growth hit negative values, unemployment rate increased by more than 3 pp. and the recession finally hit the oil industry plunging prices and decreasing inflation rate dramatically. The following graph shows the performance of barrel prices in 2008-09:



Img. 15 Oil prices in 2008-2009 in the U.S.

Source: US Energy Information Administration, FRED database (Federal Reserve Bank of St. Louis).

Note that the decrease in oil prices was more than \$90 per barrel. Regarding the S&P 500, it decreased by more than 600 points.

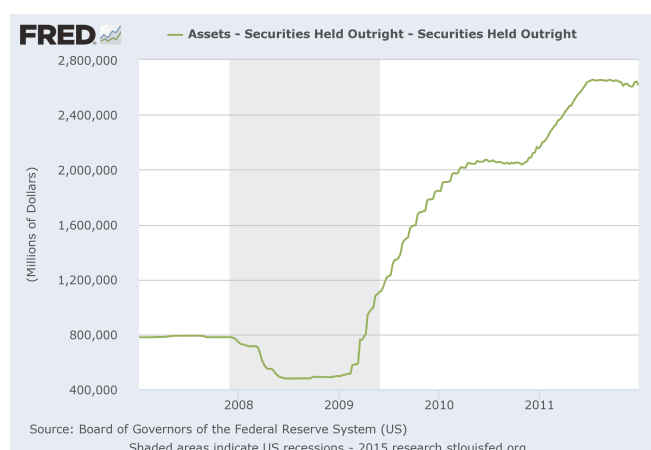
⁴⁴ In March 2009, when TALF became operational, it was one of the most important programs conducted by the System.

2009

The beginning of 2009 was characterized by changes in the ongoing programs. Probably, the most important change happened at the beginning of February, when the Federal Reserve Board published additional terms and conditions of its program TALF. The System planned to “lend up to \$200 billion to eligible owners of certain AAA-rated asset-backed securities backed by newly and recently originated auto loans, credit card loans, student loans and SBA-guaranteed small business loans” (Federal Reserve Bank of St. Louis, 2015). Same month later the System announced that it would extend TALF to as much as \$1 trillion and broaden eligible assets. The latter, therefore, aimed to spur even more consumer credit spending than before, improving expectations about U.S. industry and economy as a whole. In addition, President Obama signed into law the so-called American Recovery and Reinvestment Act that slowed down the increase of unemployment in the U.S.⁴⁵

At the beginning of March, TALF became operational. Possibly, the latter and policies conducted by the U.S. Treasury had the biggest contribution to the change in performance of S&P 500. In this month, GDP growth hit its lowest level and started growing too. On March 18, the FOMC decided to increase the System’s balance sheet by purchasing up to an additional \$750bn of agency MBSs, \$100bn of agency debt and \$300bn of longer-term Treasury securities, thus increasing the effects of the first quantitative easing (Federal Reserve Bank of St. Louis, 2015). The same month, the U.S. Government created the Auto Supplier Support Program that contributed to the economic recovery of car industry. The increase in the System’s securities purchase was enormous as showed in the following graph:

⁴⁵ Note that the unemployment rate became concave. However, it wouldn’t be appropriate to address this phenomenon just to the creation of American Recovery and Reinvestment Act.



Img. 16 Securities held outright by the Federal Reserve.

Source: Board of Governors of the Federal Reserve System, FRED database (Federal Reserve Bank of St. Louis).

In May, Standard & Poor's rating services lowered its outlook on the United Kingdom government debt from stable to negative due to the estimated fiscal costs of supporting the nation's banking system. The latter is one of the signs of the commencing sovereign debt crisis in the Eurozone.

In June, the System announced that it would extend the expiration date of AMLF, CPFF, PDCF and TSLF through February 1, 2010 (TALF's expiration was later extended to March 31, 2010). In addition, TAF's bi-weekly auction amounts were reduced from \$150bn to \$125bn and later in August were reduced again to \$75bn.

In October, the Dow Jones Industrial Average "closes above 10,000 for first since October 3, 2008" (Federal Reserve Bank of St. Louis, 2015).

The year 2009 was characterized by an increase in amount of money conducted through all ongoing programs. However, in general, these policies did not aim to stabilize interbank interest rates as those in 2008, because this problem had already been partially solved. They were conducted to support different sectors of the U.S. economy and also the economy as a whole by decreasing long-term interest rates. Also, a significant help came from the FDIC, U.S. Treasury and other government institutions. As we see in Image 7, the unemployment rate hit its upper extreme and inflation rate and GDP growth gained positive values. In addition, the TED spread became low proving that the System's policies were effective.

2010-2011

On February 1, 2010, the CPFF, AMLF, PDCF and TSLF programs expired. In the same month, the System announced an increase in primary credit rate from 0.5 to 0.75 percent. Also, it increased the minimum bid rate for TAF and planned the last auction of this program on March 8. In March, the TALF program finished as well.

In May 2010, the IMF approved a three-year Stand-By Arrangement for Greece. The same month, the Council of the European Union and the member states created a European Financial Stabilization Mechanism counting a total of €500 billion. The crisis started to move to the European continent.

In July 2010, U.S. President Obama signed into law the Dodd-Frank Wall Street Reform and Consumer Protection Act, which we talked about in Chapter 2.

In November 2010, the Federal Reserve announced that it would purchase another \$600bn of longer-dated Treasury securities, which is sometimes called as the second quantitative easing. This step generally aimed to lower unemployment rates, which is one of the goals of the System. Consequences of this policy on the amount of securities held by the System can be seen in Image 16, where the green line indicates another significant turnabout at the end of 2010. However, it would not be appropriate to connect the beginning of the decrease in unemployment rate just with this policy.

In January 2011, the Financial Crisis Inquiry Commission released its final report on the causes of the financial and economic crisis in the United States stating it was caused by the housing bubble and subprime lending conducted by American financial institutions.⁴⁶

3.2 Sovereign debt crisis in the Eurozone

In the Eurozone, the financial crisis generally manifested itself as a sovereign debt crisis, which refers to problems that affected few Eurozone countries' public finances and financial system. The consequence of the latter was the lack of confidence related to these countries.

Causes of the sovereign debt crisis

The financial crisis in the Eurozone is specific because, unlike in other countries, it consisted of two phases.

First phase was similar to the crisis in the U.S. Since financial markets all around the world are connected and considerably interdependent, the causes of the first phase do not differ significantly from the U.S. ones. However, in the Eurozone, only few countries suffered financial crisis because of subprime lending. In general, the first phase started because of the lack of confidence or even default of many U.S. securities that were owned by Eurozone financial institutions. Therefore, the mistrust spread out from the U.S. to the Eurozone.

⁴⁶ For more information, see:

<http://cybercemetery.unt.edu/archive/fcic/20110310173738/http://www.fcic.gov/report/>

Second phase was specific for the Eurozone and started at the end of 2009. Since the situation of many financial institutions was very problematic, European governments decided to perform specific policies in order to save them. Generally, we talk about banks, which are a key factor for Eurozone's financial stability. The latter's bailout, however, was for some governments too costly and thus they had to incur more debts, which started to increase their credit risk and decrease their rating.⁴⁷ These countries became risky and their bonds yields increased causing the debt financing more expensive or, in some cases, even impossible. Therefore, in situations when countries needed money to save their financial system, they had a hard time to receive it. In addition, the health of public finances in some southern Eurozone countries, such as Greece or Portugal, was low, which appeared to be a problem once the need to save their financial system began. The countries that were affected by the crisis the most were Greece, Ireland, Portugal, Spain and Cyprus.

This was the situation that the Eurosystem had to face. Therefore, it decided to conduct not only conventional policies, such as a decrease in key Eurozone interest rates, but also unconventional policies that aimed to stabilize interbank financial market, help governments to save their financial system and, in some cases, improve their public finances.

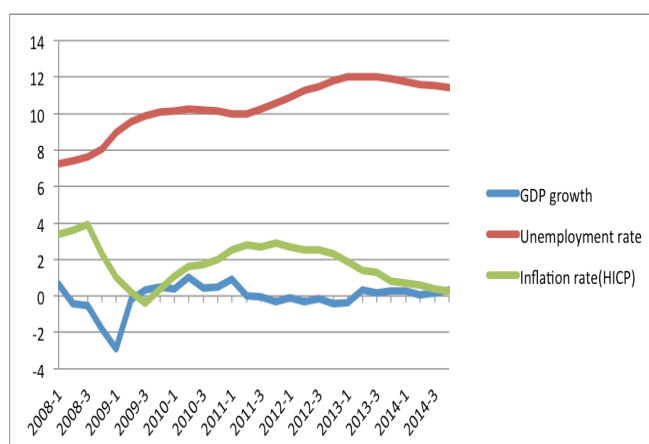
Elected indicators for the financial crisis assessment in the Eurozone

In the next sub-chapter we will describe the policies that were conducted by the Eurosystem from January 2008 to December 2014. Although the financial crisis started to manifest itself already in 2007 and, in Europe, continued till 2015, we won't pay attention to these years. In the first case, the year 2007 meant the beginning of the crisis that started in the U.S and has already been described in the U.S. section of this thesis. In addition, the Eurosystem didn't conduct any significant anti-crisis policy in that year. In the second case, as of February 2015, there are no available data about the development of financial, monetary and aggregate indicators yet.

Likewise in the U.S. sub-chapter, we will use a variety of indicators mentioned below.

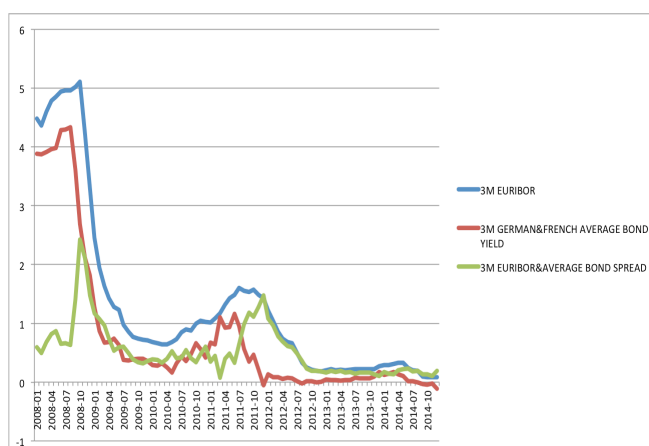
⁴⁷ An important role had also played the budget balance deficits before the crisis hit. Few Eurozone's countries, such as Greece, Portugal or Spain, performed expansionary policies during an economic expansion, which increased their public debts. Once the need for critical expenditures appeared, these countries faced an enormous increase of public debt that boosted their credit risk.

First indicators will be the unemployment, inflation rate and GDP growth in the Eurozone:



Img. 17 Unemployment, inflation rate and GDP growth in the Eurozone in 2008-2014, quarterly. Data source: FRED database (Federal Reserve Bank of St. Louis), OECD and ECB.

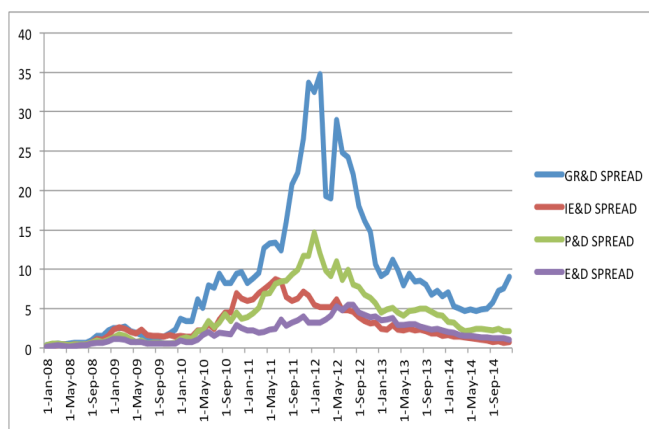
Next indicators will be the 3M EURIBOR, weighted average of German 3M bill and French 3M bill yields and their spread.⁴⁸



Img. 18 3M EURIBOR, weighted average of German and French 3M bills in 2008-2014. Data source: Investing.com.

⁴⁸ The weights are 0.3 for German bills and 0.7 for French bills. The reason of the latter is the performance of German bills, which reflected an excessive demand and thus a significant yield decrease. Therefore, the data would be distorted if we used a simple average of these two countries' bill yields. In addition, only few Eurozone countries issued 3M bills and thus we couldn't make an average from all of them. Weighted yield average of French and German bills seems, therefore, as the best choice.

Since we describe a bond crisis, we will need their yield spreads. They are as followed:

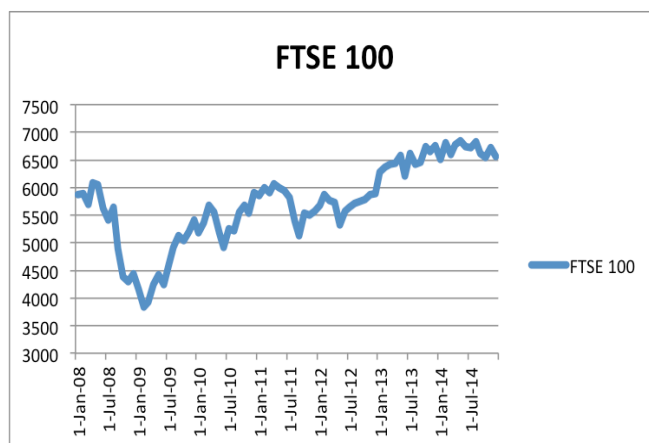


Img. 19 10-year government bond yield spreads in 2008-2014.

Legend: GR (Greece), D (Germany), IE (Ireland), P (Portugal), E (Spain)

Data source: Investing.com

The last indicator will be the FTSE 100. However, when necessary, we will also consult other data.



Img. 20 FTSE 100 index in 2008-2014.

Data source: Investing.com

3.2.1 Anti-crisis policies conducted by the Eurosystem

2008

This year started with problems spread out from the U.S. The ECB, facing the shortage of liquidity in interbank markets, decided, at the end of March, to introduce six-month longer-term refinancing operations in order to provide the liquidity needed. However, it lacked any specific effects on the interbank interest rates. In

addition, the financial crisis started to hit the economy as showed in FTSE 100 index.

In September, the crisis in the U.S. culminated. In the Eurozone, as showed in Image 18, the fear in the financial markets hit its extreme too. Therefore, the ECB decided to conduct a special term refinancing operation. However, this policy was offset by the situation in the financial markets caused by the events in the U.S.

In October, the ECB decided to change its main refinancing tenders from variable to fixed rate ones. It also stated that it would offer as much liquidity as banks needed, provided they use an appropriate collateral.⁴⁹ Few days later, the list of available collaterals was expanded, allowing banks to get liquidity easier. These steps together with the policies conducted in the U.S. calmed the world financial markets down. The impact in the Eurozone can be seen in Image 18 as the first extreme of the spread between EURIBOR and the average of German and French government bill yields.

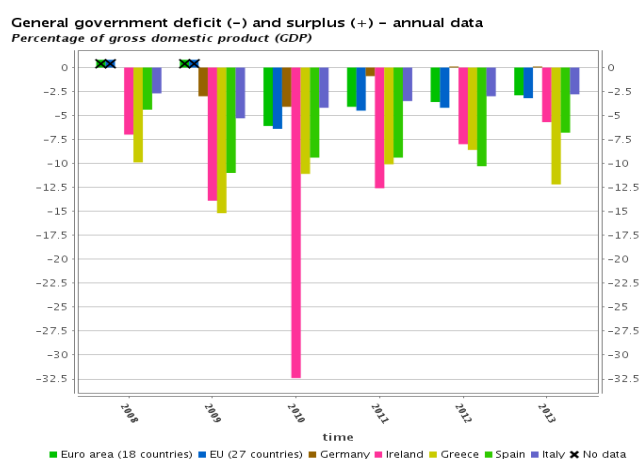
In November and December, the ECB continued performing similar policies as its colleagues in other countries, decreasing key interest rates by a total of 125 basis points with the main refinancing rate bearing a value of 2.5 %.

The year 2008 manifested itself by the same way as it did in the U.S. The mistrust culminated, FTSE 100 lost more than 2000 points, GDP growth gained negative values, unemployment rate gained values higher than 7 % and inflation rate suffered from the decrease of oil prices. Although the government bond spreads were not high yet, countries already started to incur more debts in order to save their financial system. This year belongs to the first phase of the Eurozone financial crisis.

2009

The first half of 2009 started with decreases in key interest rates totaling 150 basis points with the main refinancing rate bearing a value of 1 % and affecting EURIBOR and government bill yields, as showed in Image 18. Also, the FTSE 100 started to grow showing the same performance as S&P 500 in the U.S. However, the expenses that many European countries realized in order to save their financial system started to affect their budget deficits. The latter can be seen in the following figure:

⁴⁹ For more information about this ECB statement, consult:
https://www.ecb.europa.eu/press/pr/date/2008/html/pr081008_2.en.html



Img. 21 Government deficit to GDP of elected countries in 2008-2013

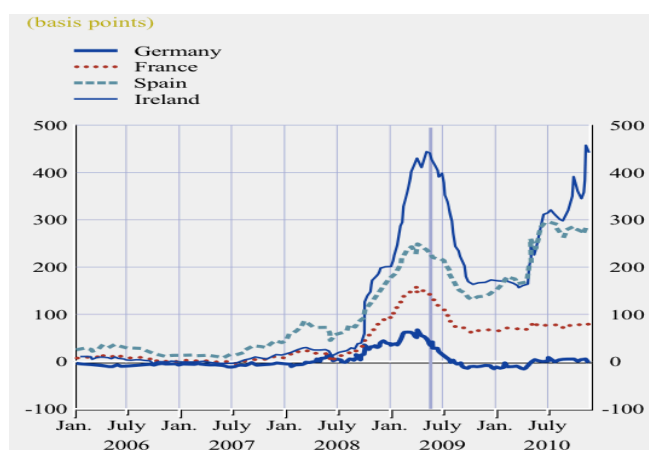
Source: Eurostat.

Note that deficits in Ireland and Greece already exceeded 10 % in 2009.

In May, the ECB launched its one-year refinancing operation and one month later its first Covered Bond Purchase Program (CBPP1).⁵⁰ This program, worth €60bn, was created to conduct purchases of covered bonds, such as Pfandbrief, which were, prior to the financial crisis, a key factor for banks' funding. Therefore, their purchases were supposed to stabilize banks' situation. CBPP1, once it became operational, did have effects on covered bond yields, as showed by the following Image, and thus helped banks with few problems, but its size and length were too small to have any longer-term effects. The beginning of the program is indicated in the next Image by a blue vertical line:

⁵⁰ For more information about this program, see:

<http://www.ecb.europa.eu/mopo/liq/html/index.en.html#portfolios>



Img. 22 Covered bond swap spread related to the covered bond iBoxx indices for the five-year maturity vis-à-vis the five-year swap rate, edited by author.

Source: Beirne et al., 2011, p. 19.

In the second half of the year, the first phase of the Eurozone financial crisis finished. At the end of the year, the interbank interest rates, such as EURIBOR, hit their first lower extreme, GDP growth hit a zero value and inflation rate started to show positive values. However, the countries' debts were increasing as showed by Image 21.

2010

At the beginning of 2010, problems in Greek economy came to the surface. In March, EU offered support to Greece if it needed, which was realized one month later. In May, the ECB created Securities Market Programme (SMP), which was supposed to purchase government bonds of Eurozone countries that had a hard time to get liquidity in financial markets. Therefore, the program aimed to improve liquidity of the most risky Eurozone members' bonds, lower their yields and thus improve their issuers' financial situation. However, the money conducted in this program was later sterilized by liquidity-absorbing operations and thus SMP shouldn't be considered as a quantitative easing program.

After its publication, SMP intervened in secondary markets of Greek, Irish and Portuguese bonds. However, the spread of these bonds related to the German ones continued growing.

In June, the EU authorities launched European Financial Stability Facility (EFSF), which provided financial help to Eurozone member countries in distress. At the end of the same month, CBPP1 was ended, which pressured covered bond swap spread up as showed in Image 22. Later in July, the ECB revised the list of collaterals accepted for its refinancing operations and published stricter rules, decreasing the credit risk taken.

In November, Ireland asked IMF and EU for financial support. In the same month, the government bond spreads of Greece and Ireland related to the German bonds were 10 % and 5 % respectively, as showed in Image 19. Increasing risk of few Eurozone countries led to a creation of a permanent facility called European Stability Mechanism (ESM) that would overtake future responsibilities of the EFSF.

This year meant a beginning of the second phase of the Eurozone financial crisis. The latter can be seen in Image 19 showing the increasing spreads of several Eurozone country bond yields. Also, the increasing fear about Eurozone's financial stability can be seen in Image 18, where EURIBOR and the average bond rate started increasing despite no changes in key Eurozone interest rates. GDP growth started to increase, but did not exceed 1 %. Image 21 shows that the general governments deficits bore the highest values.

2011

The worsening situation at the beginning of 2011 made the ECB conduct more unconventional policies. In March, the ECB announced that it would conduct longer-term refinancing operations as long as necessary. Few days later, Portugal asked for financial support. In April, the ECB, probably motivated by the inflation value bearing more than 2 %, increased its key interest rate by 25 basis points, which was later repeated in July. The main refinancing rate bore a value of 1.5 %.

From August to October, increasing tensions in financial markets made the ECB conduct supplementary six-month longer-refinancing operations. In these months, EURIBOR hit its other upper extreme and the ECB published its second CBPP program worth €40bn. However, it didn't stop the increase of interbank interest rates, as showed by Image 18, probably because of its small volume. Later, in November, the key rates were lowered by 25 basis points.

In December, the key rates were lowered again by 25 basis points and the ECB decided to support bank lending and purchase of government bonds by a conduction of two longer-term refinancing operations with a maturity of 36 months. The amount of money conducted in the first operation totaled €489bn, which is approximately twice as much as it was conducted in other ECB's OMOs. These operations had a significant effect as showed by Image 18, where EURIBOR started decreasing.

This year was a big challenge for the ECB. Generally, it had to decide what policy it should conduct in order to calm the financial markets down and decrease the yields of government bonds. The first 36-month longer-term refinancing operation was, related to this moment, the most important policy conducted by the Eurosystem.

2012

At the beginning of 2012, situation in bond yield spreads of Portugal seemed to be improving significantly. Image 19 shows a decrease in Portuguese bonds caused not only by the rescue programs and events that were going on in Portugal, but also by the 36-month refinancing operation, where bonds could have been used as a collateral. Later in February, Greek parliament approved austerity cuts to secure the Eurozone bailout and avoid debt default causing a complete turnabout in its bond yields, as showed by Image 19. However, in March, the Greek default came causing another turnabout in its bond yields. In addition, in March, the ECB conducted the second 36-month long refinancing operation allotting a total of €530bn. As we can see in Images 18 and 19, spreads, interbank interest rates and government yields continued to decrease, besides the Greek one. Also, Image 20 shows an increase in FTSE 100. Finally, after the Greek elections held on June 17, 2012 showed the victory of pro-bailout parties, Greek bond yields showed a turnabout as well.

In June and July, distress in Spanish economy culminated and thus Spain asked for financial support to stabilize its financial system. The latter immediately improved the expectations of Spain. As showed in Image 19, Spanish spread started to decrease. Later in July, the ECB cut its key rates by 25 basis points to a historical low.⁵¹

In August, the Governing Council announced the creation of a new program called Outright Monetary Transactions (OMT). This program, substituting SMP, aimed to buy government bonds on secondary market and was supposed to work within the framework of ESM/EFSF. As of February 2015, it hasn't been used yet. In October, CBPP2 was ended.

The rest of the year was characterized by the continuation of the on-going programs. In 2012, the unemployment rate hit a value of 12 % and GDP growth seemed to remain around zero for a long time. However, the situation in interbank as well as government bond market was improved.

2013

At the beginning of 2013, the ECB was reviewing financial and economic conditions of countries that participated in rescue programs. In May, the ECB decided to lower its key interest rates leaving the main refinancing rate at 0.5 %. In July, the ECB stated that it expected the key rates to remain at the same level or be even lower, trying to motivate banks to increase their lending and thus boost the economic activity. In September, the Single Supervisory Mechanism was created, which is described in Chapter 2. In November, main refinancing rate and marginal

⁵¹ For more information, see:

<https://www.ecb.europa.eu/press/pr/date/2012/html/pr120705.en.html>

lending rate were lowered again to 0.25 % and 0.75 % respectively. In December, Ireland left the rescue program without any additional financial help need.

The year 2013 lacked of new programs and thus conventional policies prevailed. The situation in many distressed countries was improving significantly, which led to the end of their rescue programs in 2013 and 2014. The turbulences that were characteristic for 2011 and 2012 didn't appear again and thus it seemed that the Eurozone had already crossed the worst part of the financial crisis. However, the unemployment rate and GDP growth didn't perform any significant changes.

2014

In January 2014, Spain left the rescue program without any additional financial help need. In May, the same step was performed by Portugal. In June, the key rates were lowered again with the deposit facility rate gaining negative values. However, the expansionary policies didn't have the planned effects, because the unemployment rate still bore values around 12 % and the GDP growth didn't increase significantly. The latter is showed by Image 17.

In order to improve the economic situation by easing the provisions of credit and move the inflation rate close to the value of 2 %, the ECB published the creation of Targeted Long-Term Refinancing Operations (TLTRO). These operations offered liquidity to financial institutions eligible for OMOs that would use it to provide credit to non-financial corporations and households. Later, in September, these operations were supplemented by another two programs – CBPP3 and Asset-Backed Securities Purchase Program (ABSPP)⁵², which aimed to boost financial institutions' lending by providing liquidity via purchases of asset-backed securities. The main difference between previous covered bond programs and CBPP3 is the fact that this program did not have a concrete size limit and would last at least two years. Regarding the effects of these programs, so far, they are not reflected significantly in the GDP growth or unemployment rates. As of February 2015, the amount conducted through both programs was approximately €60bn, which is not a high number compared to the quantitative easing programs in the U.S.

The year 2014 was specific for a new wave of unconventional policies aiming, unlike previous unconventional policies, to boost economic growth, because many countries that had taken part in rescue programs stabilized their situation. Regarding unemployment and inflation, they started to decrease. However, as of February 2015, the issues concerning GDP growth, unemployment and inflation have not been solved yet and thus it is likely that more unconventional policies are going to be conducted in the not so-distant future.

⁵² For more information about these two programs, consult:
<https://www.ecb.europa.eu/mopo/liq/html/index.en.html#portfolios>

3.3 Comparison of the anti-crisis policies in the U.S. and the Eurozone

Since the financial crisis in both the U.S. and the Eurozone has been described, we can now proceed to the comparison.

The financial crisis in the U.S. affected financial market and many financial institutions, most of them ending up defaulting. The U.S. economy lived a deep slump. However, the U.S. public finances and government securities did not fall in distress and therefore the main task of the Federal Reserve was to restore confidence in financial market and boost the economic activity. This differs significantly from the Eurozone, where the ECB's main occupation was to calm financial markets down by conducting policies that helped countries in distress to sell their securities and thus receive liquidity for their functioning. Also, since banks are a key factor for European financial stability, it was extremely important for the Eurozone to keep them safe. Regarding policies aiming to boost the economic growth, the ECB could not have counted with a single fiscal policy, which made it more difficult to spur economic activity.

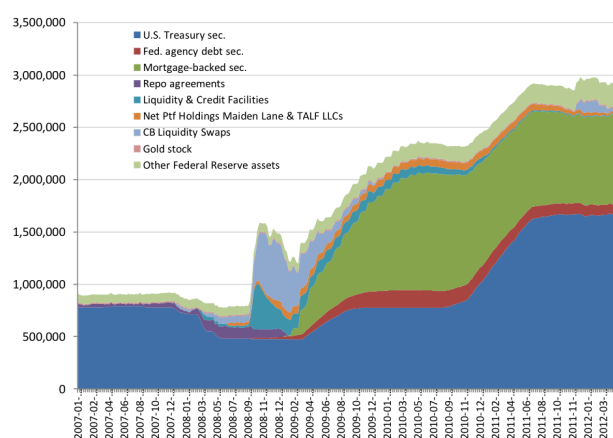
Regarding bailout actions, there are many differences. In the U.S., the System did not provide only rescue loans, but also organized takeovers of financial institutions that were in distress. Since a sound financial system is one of the duties of the Federal Reserve, the System played the most important role. In the Eurozone, banks generally received help from the member states' governments and NCBs. Loans that were provided by the ECB aimed to provide liquidity more to the economy as a whole than to a specific financial institution. The latter shows the decentralized functioning of the Eurosystem, which was discussed in Chapter 2.

As regard the conventional and unconventional policies, they differ in the credit risk taken by a monetary authority. At the beginning of the crisis, both central banks performed similar policies that provided liquidity to financial markets by short and long-term loans. In the case of the System, it even lowered the amount of money conducted in outright transactions and increased the amount of money conducted in loans, such as in TAF or PDCF. Image 16 shows a temporary decrease in securities held outright in 2008. However, the differences appeared later. In the second half of 2008, the Federal Reserve decided to conduct its first quantitative easing and the program TALF. In other words, the System decided to take credit risk in order to boost the economic activity by allotting an extreme amount of money in outright transactions. This differs significantly from the Eurozone, where the ECB conducted only CBPP1 worth just €60bn. Compared to the U.S. programs worth more than \$1 trillion, the amount was tiny. Later, when the members of the Governing Council changed, the ECB introduced CBPP3 and ABS showing that the ECB started willing to take more credit risk. In addition, the first quantitative eas-

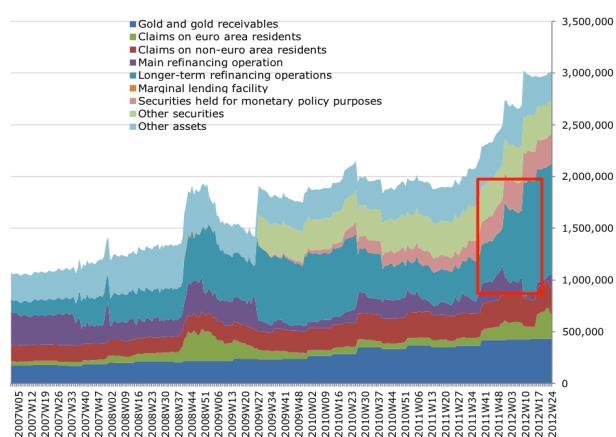
ing policy in the Eurozone, which Germany has been refusing for a long time, is expected to begin in March 2015.

The quantitative easing and TALF allowed the Federal Reserve to buy securities from different parts of industry. In other words, the latter was some kind of certainty that the money allotted went to non-financial institutions. In the Eurozone, a policy worth €1 trillion was, however, also conducted. The two 36-month longer-term refinancing operations aimed to have similar effects as TALF in the U.S., but since these loans went to banks, it was hard to estimate whether banks lent them to non-financial institutions. Therefore, the effect on non-financial institutions is doubtful. The latter might have been the reason why the ECB decided to conduct TLTRO in 2014. Regarding the U.S. policies conducted to influence commercial paper rates, they were also supposed to improve the situation of non-financial institutions.

The last fact, which we will mention in this Chapter, is about outright transactions and longer-term refinancing operations. As mentioned in previous paragraphs, the financial crisis proved that the Federal Reserve uses outright transaction more than its European colleague. We decided to strengthen this statement by the next two figures that represent the changes in the FED's and Eurosystem's balance sheet.



Img. 23 Federal Reserve's balance sheet changes from 2007 to 2012, in millions of USD
Source: Gros et al., 2012, p. 13.



Img. 24 Eurosystem's balance sheet changes from 2007 to 2012, red rectangle points at the increase of longer-term refinancing operations from the end of 2011, in millions of EUR
Source: Gros et al., 2012, p. 14.

Note that the increase of securities held outright in FED's balance sheet reflect the programs we mentioned in this Chapter. Especially apparent are mortgage-backed securities, which hadn't been present in it before the financial crisis started. Their increase is, therefore, a direct reaction of the System to the subprime lending crisis that affected exactly this kind of securities. Also, the government agency debt securities appeared in the FED's balance sheet after the financial crisis had started, which is connected with the financial help to Fannie Mae and Freddie Mac. Regarding the Eurosystem's balance sheet, it also shows the policies we mentioned, especially the two 36-month LTROs and government debt securities. However, the difference in its composition is not as high as in the FED's case. The latter confirms the more conservative behavior and credit risk taken by the ECB that we mentioned in this Chapter.

4 Conclusion

Overall, we conclude that there are many significant differences between the Federal Reserve System and the Eurosystem. Both Chapters 2 and 3 showed that although both institutions have many similar attributes and the fundamentals do not differ, the ways which they are not similar in do have a different impact on the performance of monetary policy and thus on the economic activity on both sides of the Atlantic.

Regarding Chapter 3, note that it showed us few theoretical differences that we mentioned in Chapter 2. With regard to commercial paper policies in the U.S., this duty is already mentioned in the official title of the Federal Reserve Act. Next, since the differences between the economic structure of southern and northern Eurozone countries are considerable and the Governing Council generally consists of NCBs presidents, the reluctance of Germany and other countries to conduct quantitative easing policies might have been difficult to outvote despite the obligation of NCBs presidents to act in a non-nationalistic ways. Also, since the main goal of the Eurosystem is to maintain price stability, quantitative easing could have been in conflict with it. In addition, the Eurosystem's main goal explains why the ECB decided to absorb the additional liquidity provided by the SMP.

During this thesis, we mentioned many times that the differences manifested themselves significantly in expectations, which have an impact on the quickness of country's recovery from an economic crisis. Since participants in financial markets in the U.S. know about the attitudes of the Federal Reserve from the last economic recession, they expect extensive expansionary policies to be conducted when the U.S. experiences another serious financial crisis. Also, they know that the Federal Reserve won't be concerned only about inflation, which in some cases can be an obstacle for expansionary policies, and will cooperate with the U.S. government that is always more concerned about economic growth. Therefore, expectations of a high liquidity support are foreseen, improving forecasts about the future financial and economic situation. In contrast, financial market participants in the Eurozone know that the ECB will be reluctant to conduct extensive expansionary policies if the inflation rate hits the value of 2 %. This fact is connected with the use of M3 aggregate and the quantitative definition of price stability. Therefore, the ECB's predictability is an obstacle during an economic crisis. Also, the lack of an explicit interbank interest rates' targeting mentioned in Chapter 2 makes it harder for European financial market participants to estimate the real intentions of the ECB. In other words, they don't know whether a decrease in main refinancing interest rates will be completed by an offer of high volume of liquidity in ECB's OMOs. In conclusion, during an economic crisis, financial institutions and other financial market participants in the Eurozone are supposed to act in a more careful way than their colleagues in the U.S, which impacts the amount of money available for loans and investments and thus slows down the Eurozone's economic recovery.

The ending of the previous paragraph led us to another observation, which will be the last and probably the most important difference. Although the Eurozone's economy is supposed to recover more slowly from a crisis, more careful policies conducted by the Eurosystem leave less space for a possible moral hazard, which might have played an important role in the decision taken by financial market participants in the U.S. before the crisis started and thus could have been one of the reasons why the financial crisis started in the U.S. Therefore, if we wanted to find out whether the U.S. or the Eurozone's way is better, we would realize that the answer on this question is not clear. The optimal solution probably lies in the middle.

At the end, we will consult the usefulness of this thesis described in Chapter 1. With regard to the prediction of the future steps of both institutions, the data in the second and third Chapter provides extensive information that could predict their behavior. Regarding the second use, previous Chapters and especially this one provide knowledge that will be basic for a more extensive evaluation. As regards the third use, Chapters 2 and 3 provide wide range of information about U.S. and Eurozone's monetary policies for financial and non-financial companies from all around the world.

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