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CONDUCT OF MONETARY POLICY AND FINANCIAL CRISES

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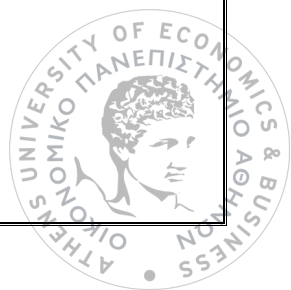

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1 Introduction

The aim of the present thesis is to highlight the basic facts of conducting monetary policy. Central banks are responsible for acting in a proper manner in times of normality as well as in times of economic turbulences accordingly. An attempt to outline the Central Bank's functioning has been made. In addition, the spotlight is turned on financial crises, focusing on their origins and on the way a Central Bank works to resolve them.

In the first chapter, the focus is on the role of a Central Bank. The set of possible Central Bank's targets that it can pursue is included, as well as a brief description of two major Central Banks: The European Central Bank and the Federal Reserve System.

In the second chapter, there is a description of the conventional and unconventional tools that a Central Bank has at its disposal.

In the third chapter, an attempt to highlight the proper conduct of the monetary policy in normal times has been made. It presents the basic transmission of the monetary policy.

In the fourth chapter, the focus is on the financial crisis: how they are created and how they are transmitted in other countries.

In the fifth chapter, there is a brief description on the way a Central Bank reacts on a financial crisis.

In the sixth chapter, three cases of financial crises throughout history are presented. Their origins, as well as the policy responses that were followed to resolve them, are in the center of the attention in this section.

2 The role of a Central Bank

Central Banks traditionally set two major objectives to pursue. The first one is that central banks aim to maintain a stable and efficient financial and payments system. This can be accomplished by following certain banking functions concerning the financial sector, such as providing a source for the liquidity that is needed (discount window). Other functions may involve the Central Bank to participate in the payments system or to regulate and supervise key sectors of the financial system. Secondly, central banks seek to stabilize the price level as well as the economic activity by carrying out monetary functions.

The choice that a central bank has to make is how much it would be involved in succeeding its goals. Evidence have shown that financial systems with liquid, securitized money and capital markets are more likely to suffer from liquidity crises. Therefore these financial systems need a central bank that could become the lender-of-last-resort. The central banks' role in the industrial countries emerged during the 19th and 20th century largely as a response to the need of centralizing interbank clearing and holding reserves. In times of crises, central banks supplied liquidity to financial markets and to individuals by using elastic currency supply. Central banking, nowadays, in the major industrial countries such as the United States and the United Kingdom, tends to support the hypothesis that liquid, securitized financial markets need to be supported by the central bank. Their objective is clear and it is to secure a stable banking and financial market, in addition to their monetary policy goal. In these cases, central banks have shown their willingness to act as lender of last resort.

On the other hand, in cases of countries with financial systems with predominantly bank-intermediated credit such as Germany, central banks do not consider acting as a lender of last resort. In case of Bundesbank, it has only limited supervisory and regulatory responsibilities. (Folkerts-Landau et al., 1992)

An effective monetary policy contributes to the financial stability by reducing inflation-related distortions that happen in the financial system and the economy. Interestingly, issues of conflict between monetary policy and price stability may occur in the short run. For example, there might be the case where the financial system conditions suggest an accommodative monetary policy, whereas the outlook for the risks to price stability would suggest otherwise. Implementing a new policy must be done in such a way and under a certain framework to raise the potential for synergies among them or to minimize potential conflicts that could jeopardize each policy's main objective. It is known that the link among financial, monetary and macroprudential stability differ between normal times and periods of crises. That raises the question, whether a national central bank could better deal with one or two main objectives, while each has clearly assigned their instruments like short-

term interest rates. The answer is complex, from policy issues perspective, the connection between financial stability and price stability is so strong that is impossible to make a distinction. Therefore, the coordination of monetary policy with financial stability is extremely important. On the other hand, from institutional perspective, that analyzes the adaption of the central bank to new realities, divides its opinion given the period of analysis. Before the crisis, under an orthodox monetary policy framework, the answer would have been simple. The national central bank runs as a monetary policy institute consisting of a limited number functions revolving around inflation regime, with a limited involvement in the financial system. On the contrary, after the crisis, that framework proved to be insufficient to support both financial stability and price stability. The idea of separating monetary policy and financial stability is questionable. In addition, the idea of securing price stability is a condition sufficient to promote financial stability by providing low levels of inflation. National central banks play a major role in financial stability and economic growth sustainability. Furthermore, price stability alone does not guarantee financial stability, mostly due to excessive increase of credit and with the appearance of asset bubbles. (Mihailovici, 2015)

2.1 Central Bank's Targeting

2.1.1 Inflation Targeting

It is being supported that fully-fledged inflation targeting consists of five elements. There is absence of other nominal anchors like exchange rates or nominal GDP. Furthermore, there is an institutional commitment to price stability and there is absence of fiscal dominance. Also, there is absolute policy independence and policy transparency and accountability. In practice only a handful of banks reach the ideal "fully fledged" inflation targeting. The main pillar of inflation targeting is the announcement made by the central bank, or the government at times, that in the future the central bank will try to withhold inflation rate at a certain level or at least near it. In most cases, central banks set a range that is established for a given horizon, up to four years. The announcement typically involves "price stability" and is defined as an inflation rate of about 2%. However, the level to which a central bank is accountable to achieve its target varies among countries. Despite the language that emphasizes on inflation control, inflation targeting allows for a short-term stabilization objectives, like output, exchange rates and financial stability. In order to succeed in these short-term objectives many ways are being used. These include a price index that excludes some extremely volatile goods like energy, a clear specification of the target as range and an adjustment to targets so that they reflect unusual events in economy like supply shocks. It must not be forgotten though, that even if central bank cares for short-term stabilization, inflation is still a primary

concern. In many cases of inflation targeting, central banks publish regular, detailed assessments of the inflation situation. It is known that inflation targeting is usually associated with law changes that increase central bank's independence. Central bank's independence makes it accountable to the financial markets and those who operate in them and less to the government. Those in favor try to draw the distinction between instrument independence, in which central bank selects the means of monetary policy, and goal independence, in which central bank chooses the goals of monetary policy. Many economists have expressed the idea that society, the government, sets the goal of monetary policy and the central bank should select the necessary instruments. However, in the end, this is meaningless considering that the point of inflation targeting is just a simple goal, a low inflation to be achieved. Yet, there is another distinction, between long-run inflation target, that should be set by the government and the medium-term inflation target that is an operational target. To sum up, the major benefits from inflation targeting are mainly three. Firstly, inflation targeting reduces the rate of inflation. Secondly, it aids to the credibility of a policy and lastly, it reduces the "sacrifice ratio" associated with a contractionary monetary policy. This means that it will lower the inflation with fewer costs in output or unemployment. (Epstein, 2002)

2.1.2 Context-appropriate monetary policy

Central bank's policy objectives and operations must be based on the structure and the needs of the particular economy at hand. There is no "one-size fits all" approach that can be used in every situation. (Epstein, 2002)

2.1.3 Real economy oriented monetary policy

A single-minded focus on inflation, when a country's level of unemployment, is wrong and a costly approach. The policy should recognize that very high rates of inflation can have significant costs, but that short of policy must also be oriented towards promoting investment and raising the employment level. Therefore, targets of monetary policy should not only include inflation, but also vital real variables such as employment growth and investment. (Epstein, 2002)

2.1.4 Transparency and accountability

Taking a leaf from the targeting approach, central banks should be made more accountable to the public by making their targets and operations more transparent. They should share with the public their monetary policy's targets. In addition, they should describe the economic assumptions underlying their plans to reach those goals. Not reaching them, calls for an explanation, and how they are going to be succeeded in the following period. Last but not least, the targets of the central banks should be determined by a democratic process. (Epstein, 2002)

2.1.5 Policy flexibility

A fundamental fact is that there is a lot of uncertainty as far as the underlying structure of the economy is concerned, as well as about the nature of national and global shocks at a given period of time. For that reason, adherence to any target has to be flexible. A rigid application of any target can lead to serious policy errors. (Epstein, 2002)

2.1.6 Supporting institutions

It is easily understandable that the establishment of other important supporting institutions is required in order to provide help to the central bank. For instance, policies that try to reduce massive surges of financial capital into and out of economies are often required to create the space to allow for productive central bank policy. Strong tax institutions are required to enable the government to raise the necessary revenues to fund public investments. Also, public financial institutions are needed to channel credit to support productive investment. Therefore, the central bank needs certain help to succeed its goals. (Epstein, 2002)

2.1.7 Stability of financial markets

Financial crises can interfere with the ability of a financial market to channel funds to people with productive investment opportunities, leading to a sharp contraction in the economic activity. Promoting a more stable financial system in which financial crises are prevented is an important target for a central bank. Federal Reserve System itself was created in response to a bank panic in 1907 in order to promote financial stability. (Mishkin, 2004)

2.1.8 Employment growth

An example of a useful target for monetary policy is employment growth. This target will be especially attractive in countries with high levels of unemployment or underemployment, a situation prevalent in many parts of the south. Under this approach, an employment growth rate target is chosen, subjected to an inflation constraint, where the inflation constraint remains necessary. (Epstein, 2002)

2.1.9 The targeting approach

Targeting approach consists of two components. The first one involves the concept of targeting itself. And the second one concerns the selections of targets. While inflation is certainly the wrong target in many cases, there are aspects of the targeting approach itself that can be a useful part of a progressive central bank approach. It is known that targeting can improve central bank's accountability and transparency. Again, a failure to achieve the goals calls for an explanation on central bank's behalf. (Epstein, 2002)

2.2 European Central Bank

After the second World War, there were two models of a Central Bank. The one could be referred to as an Anglo-French model and the other German. These two models differ with each other for two main reasons. The first reason concerns the number of objectives that a Central Bank must pursue, and the second reason is the relations with the government.

In the Anglo-Frank model of Central Bank, many objectives may be pursued at a time, such as the price stability, the stability of business cycle, high employment rate and economic stability. On the contrary, in the German model, the main objective is the price stability. Although a Central Bank can still try to succeed in other objectives but only if they don't undermine the primary one.

Furthermore, in the Anglo-Frank model, the Central Bank depends on the government's decisions, the government is responsible for the increase or decrease in the interest rates. On the other hand, in the German model, the Central Bank has independence. The decisions are taken by the Board of the Central Bank and not by the government.

In the design of ECB, the German model has prevailed. ECB has as a primary goal the price stability. In addition to this objective and as far as it is not being undermined, the ECB can still support economic policies of the EU. A high rate of employment is also an objective but it is secondary. ECB has independence in its functions and is not taking instructions from the Community, by other institutions or any other government of another member state. It is safe to say that Bundesbank has been the main influence on the organization and function of the ECB. There are of course some notable differences between them. ECB has stricter regulations regarding the inflation rate and the level of independence than Bundesbank has. The main reason is that a change in the ECB's regulations must be more difficult to occur and can happen only by Treaty revision.

ECB can be characterized as a "conservative" Central Bank, due to the increased importance that gives to price stability and less to the stability of the economy through the output and unemployment issues. A mechanism should be established in order to check whether ECB acts according to its initial role and if not measures should be taken. (De Grauwe, 2005)

According to Maastricht Treaty, the monetary policy of the European Monetary Union was invested in the Eurosystem. The Eurosystem consists of the European Central Bank and the National Central Banks of the member states that participate in the monetary union. The Eurosystem has two bodies that are in charge, the Executive Board and the Governing Council.

The Executive Board consists of the President, the Vice President, and four additional executive members. The Governing Council comprises the six members of the Executive Board and the governors of the National Central Banks of the euro area countries. The Governing Council is the prime body that takes the decisions. It designs the monetary policy and decides about the interest rates and the level of reserves. It is also responsible to secure the required liquidity for the Eurosystem. Its members meet every two weeks in Frankfurt. Also the members should promote the Eurosystem's interest and not their national ones. The Executive Board is responsible for applying the decisions that has been made by the Governing Council and, in addition, it provides guiding to the National Banks and organizes Governing Council's agenda. (De Grauwe, 2005)

2.3 Federal Reserve Bank

Federal Reserve Bank's mission, that was introduced by the Humphrey-Hawkins Act in 1978, is to achieve low midterm and long-term inflation rate, as well as to stabilize the economic activity in the short run.

FED consists of three parts. The first is a group of twelve regional Federal Reserve Banks. The main purpose of these banks is to manage the check clearing and to supervise the banking and financial activities of their region. The second part is the Board of Governors that is located in Washington D.C. It consists of seven members including the President of the Central Bank. Each of the governors, who are appointed by the President of the United States, serves a 14-month term. The President of the Central Bank, who is also appointed by the US President, serves a four-year term. Its duty is to design the monetary policy. The last part is the Federal Open Market Committee that is located also in the capital. Five Presidents of Central Banks and seven members of the Federal Reserve Board participate in the Committee. The main objective is to offer guidance and to oversee the open market services. (Blanchard, 2012)

3 Tools of monetary policy

3.1 Conventional means of monetary policy

3.1.1 Open Market Operations

It is the most important monetary policy tool. It concerns the selling or buying securities that affect the liquidity rate in the money supply. The open market operations can occur in various ways. European Central Bank can buy or sell securities directly from the "open market". That can be seen as the traditional way of Open Market Operations. The main practice that ECB follows is via bidding transactions. Through this way, interest rate plays a major role as a tool of monetary policy. The decision about the level of the reinvestment interest rate is the first important decision the ECB's Governing Council must take.

Following the decision, ECB announces a transaction procedure based on offers. These transactions are settled with a fixed or flexible interest rate. In case of fixed interest rate, the Governing Council selects the level of the interest rate and it is fixed for the banks' offers. Then, banks' are asked to place their bids and present their securities in order to receive the desired liquidity. The bids are gathered by the National Banks and are then forward to European Central Bank. ECB decides the total amount that is willing to dispose of and distributes it to each bank respectively to their initial offers. In case of flexible interest rates, that being used after June 2000, financial institutions are placing their offers including the desired interest rate. Then, ECB sets the lower acceptable interest rate for these offers and rejects any offer with lower interest rate. This is the reinvestment interest rate.

As mentioned earlier, open market operations are the European Central Bank's primary tool and can affect monetary conditions by increasing or decreasing interest rates it affects the interest rate of the market. Furthermore, by changing the amount of lending money, ECB affects directly the liquidity. (De Grauwe, 2005)

3.1.1.1 Treasury bills Vs Central bank bills

There is an extended debate on the academic level on which of these bills are more effective for monetary policy. However, it is concluded that the use of treasury bills should be preceded by the use of central bank bills. The issuance of its own bills is likely to harm the independence of the central bank. Issuing central bank bills may result in a reduction in its profits and therefore it may lead to a financial support by the government. Furthermore, using treasury bills before central bank bills gains insight into the public finance sector. It also contributes to the development of the short-term bond market and also creates new financial instruments based on treasury bills. Additionally, treasury bills can manage daily liquidity more easily, reduce the volatility of the short-term interest rate that affects the financial market

and apply money market instruments to be fine-tuning for liquidity. All of these reasons lead advance countries to enforce monetary policy through treasury bills. Nevertheless, some countries issue central bank bills to supply liquidity into the banking system to invigorate the transition process from centrally organized economies to free market. However, increased foreign exchange inflows and extended loan portfolios of banks create excessive liquidity that needs to be absorbed by open market operations. Under these circumstances, governments were discouraged to issue sufficient treasury bills fearing of extremely high fiscal surpluses. Given that, it appears that central bank bills are more popular in the developing countries rather than in advanced ones. When these two bills are combined, the decision concerning the priority of issuance depends on the independence and autonomy of the central bank. It is possible to issue central bank bills before treasury bills if the central bank can satisfy the concreteness and transparency to embark on bills issuance, maintain enough financial resources to pay the operating cost as well as the losses, and finally regulate on the earning distributions and the capital raising. The decision on the priority may also be affected by the development of the monetary market. If a country's treasury bill market is not developed, then it is more likely for central bank bills to be issued. Of course, the level of difficultness on how the central bank performs its monetary policy and willfulness of the money market to develop may affect the decision. It is claimed that a cooperation and share information between this two kind of bills is needed in order for financial stability to be achieved. Many believe that the cooperation between the two entities was one of the key factors to overcome the global financial crisis, and that leads to the fact that advanced countries tend to have more meetings in several levels between the government and the central bank than the emerging countries do. (Yi , 2014)

Central banks may issue treasury bills as well as central bank bills for implementing monetary policy in three types. Firstly, central bank issue only treasury bills, that are classified by their objective. They distinguish between bills for government funds and bills for monetary policy. Bills for government funds have relatively short-term maturity. They vary from one month or even less. The United States, for example, issues two weeks bills, called "cash management bills". Secondly, central banks issue central bank bills instead of treasury bills. Most of the central banks that issue these bills, they lend funds directly to the government when the latter suffers from a budget deficit. Central bank bills are used as a monetary policy tool while the central bank lends government on a temporary basis. An example of this kind of bills is the "monetary stabilization bond" that is issued by the Bank of Korea. Thirdly, a central bank may issue both treasury bills and central bank bills. Monetary policy is enforced involuntarily and automatically by the central bank with the usage of treasury bills, while with the use of central bank bills it enforces monetary policy intentionally and

deliberately. However, in a case like the one described it is more likely for several problems to occur, including market segmentation. (Yi , 2014)

3.1.2 Required Reserves

Central Bank sets as required reserves the minimum quantity of reserves a bank must hold depending on the deposits of each bank. Banks must hold this amount in order to be able to satisfy a demand for cash, but usually, the Central Bank sets the required reserves to be higher than the banks they would have chosen. The current level of required reserves is 10% of the bank accounts.

By changing the required reserves the Central Bank affects the amount of reserves banks should hold for a given deposits' demand and furthermore affects the Central Bank's money demand. An increase in required reserves leads to an increase in Central Bank's money demand and this will cause the interest rates to increase as well. On the contrary, a decrease in required reserves will lead to a decrease in Central Bank's money demand and therefore the interest rates will drop.

In addition, an increase in the required reserves may lead the banks to take drastic measures following the increase in their reserves. They may, for example, cancel some of their signed loans. For this reason, Central Banks have become less willing to use required reserves as a tool of monetary policy.

3.1.3 Lending to Banks

Central Banks can lend to other banks, the value and the conditions of this procedure, as well as the interest rate, is determined by the Central Bank's discount policy. The interest rate that is being used is called discount rate. Banks borrow from Central Bank through the discount window. From Central Bank's point of view, lending to banks is similar to buying bonds in an open market operation. In both cases, Central Bank generates money by increasing the monetary base.

Until the appearance of open market operation as a tool of monetary policy, the discount policy was the primary tool in Central Bank's armory that could affect the money supply. Central Bank generally discourages banks to borrow from it unless it is for a small period of time. Changes in the discount rate are often considered as a signal of Central Banks intentions. A decrease in the discount rate often is interpreted by the financial markets as a signal that Central Bank is going to follow a developing policy and thus the interest rates are going to drop in the future. Therefore, a decrease in the expected interest rates leads to an actual decrease in the long-term interest rates. (Blanchard, 2012)

3.1.4 Lender of Last Resort

In addition to its use as a tool to affect reserves, the monetary base, and the money supply, discounting is important in preventing financial panics. A central bank acts as a lender of last resort to prevent bank failures from spinning out of control, it provides reserves to the bank when no one else would, thereby preventing financial panics. Discounting is a particularly effective way to provide reserves to the banking system during a crisis because reserves are immediately channeled to the banks that need them most. Using a discount tool to avoid financial panics by performing the role of lender of last resort is an extremely important requirement of a successful monetary policy making. (Mishkin, 2004)

The welfare loss that is associated with the liquidity crises can be partly offset by a central bank acting as lender of last resort. However, in a credit operation that a central bank acts in that way, it will incur the credit risk and potential losses that are connected with the claims it acquires when expanding its liabilities to supply the required liquidity. These losses will occur when the market value of the collateral is less than the amount of the loan. In order to balance this credit risk, the central bank receives income from holding the reserve balances of the banking system. While the monetary effects of the liquidity operations can be sterilized, the central bank's losses on acquired bank assets fall to the taxpayers. These losses will have to be balanced against the benefits derived from liquid, securitized financial markets. Moreover, the moral hazard that is generated by the presence of a lender of last resort will have to be countered by supervision and prudential regulation of the financial system by the central bank. (Folkerts-Landau et al., 1992)

3.2 Unconventional means of monetary policy

Prior to the financial crisis of 2007, the empirical foundations of monetary policy appeared to be secured and robust. The aim of low and stable inflation under the inflation targeting framework, and the instrument of short-term interest rate at which the central bank provided funds to banks or the interbank market as well as the impact of this official rate to the market was reliably quantified. The settings of the interest rates were done using a wide variety of macroeconomic signals with reference to the Taylor rules, where interest rates responded more than one for one to changes in inflation and to fluctuations in the output gap. This framework can summarize what seemed to be the conventional monetary policy. This kind of policy led to an effective and predictable use of monetary policy with low inflation.

The aftermath of the financial crisis, the worst global recession since 1930, raised some questions for the monetary policy and the central banks in general. While conventional means of monetary policy achieved the goal of low and stable inflation,

it did not manage to prevent asset market bubbles from happening. Pre-crisis, a vast literature examined the role of monetary policy in containing these bubbles. The aim of these policies is to achieve financial stability and to prevent or at least moderate asset market bubbles. An additional challenge to the conventional monetary policy is its ability to mop up the effects of a financial crisis and at the same time to stimulate the economy into a sustainable recovery.

However, there is a number of issues that should be considered. The first one is that of the zero lower bound on nominal interest rates. In many countries, the recession was so severe that Taylor rule would recommend negative nominal interest rates, but market interest rates are effectively bound by zero, or close to zero, because agents can always hold non-interest bearing cash. Setting the interest rates at or close to zero, other interest rates or other forms of monetary policy needs to be examined. Secondly, a major problem occurs due to the disruption of the financial system itself. Given the scale of losses followed by the burst of the bubble, the solvency of many banks and borrowers was called into question. This resulted in breaking the once seemed reliable relationship between changes in the official interest rates and the market interest rates. Central banks had to consider alternative forms of intervention. Related to this, there were fears that banks holding onto funds for their viability rather than on lending to private sector leading some central banks to intervene with direct credit provision. The outcome was that conventional monetary policy proved ineffective, the usual official rate could not be changed in alignment with the Taylor rule.

Central banks believe that once the recovery is achieved, the conventional means of monetary policy and macroprudential tools will manage a price and financial stability. However, the challenge is on how to aid the economy towards its recovery point. In order to face this challenge, central banks turned to unconventional means of monetary policy.

The unconventional monetary policy takes many forms. In some cases, like in case of Denmark, it involves the use of negative interest rates. The more common forms of unconventional monetary policy involve a massive expansion of central bank's balance sheets, attempting to affect interest rates rather than the usual short-term official rates. In the United States, the Federal Reserve Bank implemented policies known as "Credit Easing" when it purchased mortgage-backed securities. By doing so, meant that FED's balance sheet expanded. Furthermore, the purchase of these assets provided liquidity to a market that had run out of it when the financial crisis started and helped lower mortgage interest rates as well as it provided credit lines to an important part of the economy. Additionally, Federal Reserve has also implemented "Operation Twist". Following this policy, the balance sheet of the central bank is not affected but the central bank tries to influence non-standard

interest rates. FED sells short-term government bonds and uses the proceeds to buy long-term bonds. Because its sales and purchases are of equal volume, the balance sheet remains unchanged, but through its purchases, it manages to drive the price of the long-term bonds up and lower long-term interest rates.

The most known form of unconventional monetary policy is the "Quantitative Easing (QE)". It was initially introduced in Japan. They applied quantitative easing in order to face the burst of a real estate bubble and the deflationary pressures that followed in the 1990s. It is known that conventional monetary policy focuses on short-term interest rates through open market operations. By either buying or selling securities from the banking system, they affect the level of reserves that banks hold. In normal times, these changes in the amount of reserves are merely a by-product and are not the main focus of the policy. These changes are a means to achieve desired changes in interest rates. The phrase "quantitative easing" was introduced as a signal that the main focus has shifted towards targeting quantity variables. With the interest rates reaching the zero lower bound, the Bank of Japan targeted to purchase government securities from the banking sector leading to a boost cash reserves the banks held in the system. The notion of targeting a high enough level of reserves was that it would be followed by a spill over into lending into the wider economy, helping to raise asset prices and removing deflationary forces. The central banks of the US, the Euro area, and the United Kingdom have all followed Japan's steps in adopting such policies that increased their balance sheets, even though there are differences among them concerning the terms that the QE have been implemented, as well as other unconventional tools. The Bank of England has excessively bought UK government bonds from the nonbank sector via QE operations. Federal Reserve Bank has bought US treasuries but also significant quantities of agency debt and agency-backed mortgage backed securities. Actually, there are not many differences between the assets bought by FED and the Bank of England, mostly because the majority of the mortgage-backed securities are guaranteed by the US agencies, which are to be considered as government agencies. Moving to the European Central Bank, the increase in its balance sheet happened through repo operations. By that, it is meant the provision of loans in exchange with collateral that most of them are bank loans and not government ones. The ECB's operations differentiate from the central bank purchases that are analyzed in most of the literature related to QE and credit easing. Facts are that there was a steady and vast outflow of euro deposits from banks in peripheral countries into other euro-area countries in 2011 and 2012. That caused a huge imbalance within the euro area banking system, in many cases up to a bank run on many institutions. ECB designed the long-term repo operations to alleviate the sharp funding difficulties that were created. On the other hand, Bank of England and FED did not have to design their asset purchasing operations in a way to handle liquidity issues within the banking system. Rather, these operations were

organized to affect the yields or the prices on a great range of assets, especially on bonds issued to finance lending to firms and households. (Joyce et al., 2012)

As mentioned earlier, due to the zero lower bound on interest rates and a disconnection between official rates and market rates the conventional monetary policy seemed to be ineffective in the aftermath of a financial crisis. So, for this reason monetary policy became more complex than setting the price (policy rate), it started to focus on the size of the central bank's balance sheet. In order to expand its balance sheet, the central bank buys assets, either government bonds, and bills or privet sector bonds. It is used given the ability of the central bank to create acceptable means of payment unlimitedly so that it could buy the assets. By expanding the balance sheet the central bank shifts the portfolio mix of assets possessed by the private sector who come to hold more claims on the central bank and fewer of the claims that the central bank has bought. Following this, the central bank's balance sheet rises, and its extra liabilities are matched by greater assets. It is known though, that there are certain conditions under which asset purchasing is completely neutral thus both QE and credit easing would be utterly ineffective. It is important to see what assumptions are needed to be made to make this work in an effective way. The first argument is that if private sector sees the assets held by the government and the central bank as the same with their own assets, then any swap of assets with the central bank cannot change anything. The representative agent assumption is a strong one as is the assumption of perfect substitutability between the assets. Although the last assumption is debatable in financial markets under financial crisis conditions. In addition, there must be no credit constraints, limited financial market participation, and distortionary taxes. As it has been examined, in a model with limited participation in the financial market and with agents with different preferences for government bonds, purchases by the central bank matter. Additionally, the impact of credit imperfections and heterogeneity should be considered to affect the demand and output.

Therefore, so as for an impact to be achieved all that is needed are portfolio switches to be a matter of preference for the investors. That is the main reason supporting the most natural view about the channel through which the QE can work, the so-called 'portfolio balance' channel. Models have been developed, to stress how central banks, by changing the relative supply of financial claims with different maturities and liquidity, could affect the pattern of yields on different assets because of the imperfect substitutability of the assets. That implying that quantities like the money and the government bonds held by the private sector, that the central bank could vary may influence asset prices and as a result the real investment decisions. It must be noted that heterogeneity across agents (some people may hold different portfolios and prices need to change in order to get in an equilibrium point. Someone may end up with more of one kind of a claim as a liability and more of

another as an asset, and someone else has taken the opposite position) plays a major role in this portfolio. (Joyce et al., 2012)

3.2.1 Mapping the impact channels of QE

It has been noted that massive asset purchases create two different kinds of effect. One is derived from the prospect of a 'supply scarcity' that comes as an ex-ante impact on the expectations on future prices and interest rates. The second is following as ex-post effect on the actual availability of the given assets in the market. This effect is known as portfolio rebalancing. The impact of the expectations on the term structure of the yield curve, which usually flattens depending on the targeted maturity, takes place via three main channels:

1. Signaling
2. Duration risk
3. Inflation expectations

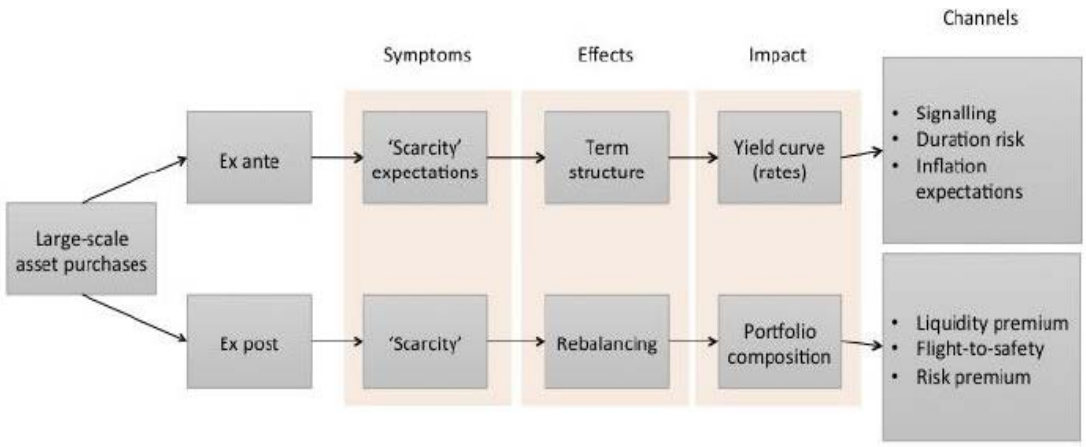
These channels, for example, impact on investors' expectations about the long-term rates by signaling further easing, they lower the duration risk and finally stabilizing inflation expectations. Furthermore, according to the 'preferred habitat' theory, the large-scale asset purchasing operations that lead to an actual shortage of instruments may reduce long-term interest rates even further. The signaling channel is really effective before the initiation of the program. It measures the credibility of the announced decision to bring down interest rates through market expectations about additional easing. This channel can be divided into the forward guidance and the announcement effect. Forward guidance occurs when a central bank gives signals to the market about the probability of a future policy intervention, allowing the market to discount it over a longer period of time thus reducing the market impact. The announcement effect happens once the program is announced and there is certainty that it will be implemented. Therefore, this effect measures the capability of the program to surprise the market. In addition, the expectations, via the forward guidance, about a large scale long-term asset purchases reduce the term premium leading to an alteration of the shape of the yield curve by flattening the long-term part. With the impact on the duration risk, the QE makes the long-term issuance cheaper, it gets more convenient for the public debt to be managed by increasing the averaged maturity of the government issued debt securities. Finally, long-term interest rates with less volatility will help to stabilize the inflation expectations, but there is no certain evidence supporting this channel in the cases of Europe, Japan, and the United States.

On the other hand, the market is led to rebalance the portfolio composition in favor of alternative assets. This operation occurs in three ways:

1. Liquidity Premium
2. Risk Premium
3. 'Flight-to-safety'

These three channels alter the preferences of investors in a given bundle of assets. Resulting in relieving the pressure on the targeted interest rates as the portfolio shifts towards investments with a higher risk premium. The liquidity channel plays a major role in asset allocation. When the benefit of the alternative use of the bank liquidity decreases, the excess liquidity follows a non-linear movement and therefore it expands at an increasing rate when the differential approaches zero. On the other hand, when the differential level goes above a given level, excess liquidity stays around or below zero. The result is that the liquidity premium is likely to drop down on many liquid bonds, having a relative increase of yields on short-term assets. Interestingly, it has a rebalancing effect on investment portfolio in favor of more long-term securities. In addition, the large-scale asset purchases generate a scarcity of long-term, safer asset, that it produces an impact on the risk premium in two ways. Firstly, some investors that prefer a near to zero default risk will continue to choose assets that are similar in terms of risk (triple A or double A) with the ones that were selected by the central bank. Secondly, these purchases decrease the risk premium on alternative securities by lowering the risk-free interest rate component of the risk premium. (Valiante, 2015)

Figure 1: large-scale asset purchases channels



(Valiante, 2015)

3.2.2 Operation Twist

In 1961, American economy was in need of a stimulation after a serious recession. A lower in the interest rates seemed the optimal solution, however, Europe had higher interest rates than those in the United States. Under the Bretton Woods fixed exchange rate regime, this interest rate differential led cross-currency arbitrageurs to convert US dollars to gold and invest the proceeds in European assets that had a higher yield. The resulting effect was a massive outflow of gold from the United States to Europe. J. F. Kennedy's Administration proposed a solution that involved lowering the longer-term interest rates while keeping short-term interest rates untouched. This approach was then known as "Operation Twist".

"Operation Twist" program has many similarities with the "Quantitative Easing". Both aimed to lower long-term interest rates without lowering short-term ones. Secondly, both programs involved purchasing large quantities of longer-term Treasury securities. Thirdly, they both financed those purchases by selling or issuing short-term government liabilities. (Alon et al., 2011)

4 Conducting monetary policy

Monetary policy can affect the real magnitudes of the economy. As it is believed, money is a really efficient tool. Without it, managing this high growth in the output and the level of living would not be attainable. Money, in contrast with the other tools, it has a feature that makes it special. Because its pervasiveness, when it gets out of order it affects the functioning of the other tools. Many major contractions were happened due to monetary disorder. The same applies for many major inflations caused by excess money supply. Another thing that money can do, is to keep the economy at a stable background. The economic system works best when producers and consumers, employers and employees, can operate on a fully – confident environment, knowing that the average price level will behave in a known way in the future and it will be stable. With any given conceivable institutional arrangements there is only a narrow width of flexibility in prices and wages. But this flexibility is essential in the pursuit of changes in relative prices and wages. Finally, monetary policy can help to overcome any major disturbance in the economic system that has been risen from other sources. Monetary policy can hold any inflationary dangers restrained by slower the rate of monetary growth below the otherwise desirable levels. This will temporally lead to higher interest rates enabling the government to borrow the amount needed to cover its deficit but by preventing the speeding up of inflation, leads to lower prices and lower nominal interest rates in the long run. All in all, monetary policy can help easing any transition towards lower or higher growth. On the other hand, monetary policy is not able to peg interest rates for more than a limited time. The same applies to the rate of unemployment. These two tasks are mainly assigned to the monetary policy, and it is widely believed that it has opposite effects. (Friedman, 1968)

There are nine elemental principles that are being outlined and that form the guided thinking at every central bank. These principles are derived from theoretical analysis and empirical evidence. First and foremost, inflation is always and everywhere a monetary phenomenon. Secondly, there are important benefits coming from price stability. Thirdly, there is no trade-off between unemployment and inflation in the long-run. Furthermore, expectations play a major role in the determination of inflation as well as in the transmission of monetary policy. Also, real interest rates increase with higher inflation and time – inconsistency problem is an issue for the monetary policy. In addition, the efficiency of monetary policy is improved by the independence of the central bank and a commitment to a strong nominal anchor helps producing good monetary policy outcomes. Finally, financial frictions are important in business cycles. The first eight principles are key elements in the neoclassical synthesis and agreed by all academic economists and central bankers whereas the last one was not originally part of any model even though it is well understood by many, but not all of the central bankers. (Mishkin, 2011)

As it has been mentioned earlier, the major objectives of the central bank are price stability, high employment and fast-paced growth. But it is believed that these goals are not mutually compatible and also there is a question about how these should be substituted for one another. Furthermore, there has always been a controversy on the role that the monetary policy tools should play in order to accomplish these tasks. Keynes tried to explain the reason why monetary policy was not able to stem the depression and also to offer an alternative. Keynes believed that in times of heavy unemployment, if the liquidity preference is absolute then interest rates cannot be lowered by monetary measures. When consumption as well as investment are not massively affected by interest rates then lowering of the interest rates, even if this was achievable, would do a little good. These views were widely accepted and for over two decades monetary policy was considered to be ineffective, money did not matter. The only role for it was to keep interest rates low in order to hold down interest payments in the government budget and stimulate investment to help government spending withhold a certain level of aggregate demand. New cheap money policies were created based on these views, but they received a big shock when these policies failed in country after country because central banks were not able to hold interest rates low indefinitely. (Friedman , 1968)

Monetary policy should be conducted based on magnitudes that the monetary policy authority can control. The three more appealing variables that the monetary policy authorities have at their disposal are price level , the money supply and the exchange rates. Price level though, should be considered as the most important. Moreover, the connection between the monetary policy and the price level is more indirect than the connection between other variables. In addition, there is a delay in the effect in the price level by the conduction of monetary policy than it happens for the money supply and both this delay and the magnitude of the effect varies from the circumstances. What is important is that the effect on price level is not easily predictable and accurate. Making an attempt to directly influence the price level may lead the monetary policy to become an economic disturbance. It is safe to say, based on the current knowledge that the best way to affect the outcome is the longer way. (Friedman , 1968)

It has been analyzed that there are four basic facts following the conduct of monetary policy. These facts guide the response of the economy to monetary policy shocks. Firstly, even though a sudden tightening in the monetary policy has transitory effects on interest rates, this tightening is followed by a certain declines in the real GDP as well as the price level. Secondly, the impact of this tightening is absorbed by the final demand, dropping relatively faster after the shock. In addition, production drops as well, only with a lag, meaning that inventory stocks rise in the short run. In the end though, inventories decline and disinvestment accounts for a large portion of the drop in GDP. Thirdly, investment and consumption are the ones

that decline earlier and with a big magnitude in the final demand. Lastly, fixed business investment declines as well followed by a lag. (Bernake et al., 1995)

4.1 Central bank's independence and communication

The independence of the National Central Banks is considered to be one of the ultimate accomplishments of the banking system, even though it is rarely accepted by politicians. Having its independence, the Central Bank has a boost in its influence and credibility in the financial world. But the main reason that politicians accept this is the flexibility that it is provided in order to adapt to innovations as a solution for an improvement in effectiveness of its transmission mechanism. Innovations were seeing as acting outside the conventional framework in certain areas. Firstly, that the monetary policy should focus on inflation and prudential policy should focus on financial stability. Secondly, the central bank should not obtain credit risk. Thirdly, safety measures to cover banks should not be expanded to non-banks, as well as bubbles should not be taken into consideration in monetary policy. It must be noted that flexibility is seen as the central bank's ability to cope with deflationary pressures given the zero lower bound for interest rates. All in all the National Central Bank's independence plays a very important role in unconventional times, formulating and implementing monetary policy as well as using the basic monetary tools (control of the money supply, set of the interest rates and required reserves) so that to achieve the target of maintaining medium-term price stability. (Mihailovici, 2015)

It was thought that monetary policy authorities should not be too open and communicative as far as their policies are concerned. The notion behind this was that in order to achieve an efficient monetary policy, surprising shocks must happen on the financial markets. According to some researchers, central bank's secrecy was a result of the pressure for excessively accommodative monetary policy placed on the policymakers by the politicians. It should be noted that the political cycle has shorter time horizon than the one needed for an optimal monetary policy. In other words, politicians desire implementation of short-term rather popular policies, whereas monetary policymakers should head for a long-term stability which means avoiding "popular" policies.

Under the inflation targeting framework, communication becomes vital in shaping expectations. Once the reaction function of the central bank be understood, expectations for the route of the monetary policy can be better organized. Communication has become a tool to form expectations concerning the long-term interest rates even though monetary policy directly affects short-term interest rates. In addition, credibility is also influenced by an effective communication plan. Transparency, which is an important factor for the central bank, can quickly be vanished so communication must be always be an ongoing process. Furthermore, the forward-looking plan demands transparency and efficiency in communication.

Monetary policy is molded by the medium term trends and goals rather than the current conditions. Finally, it must be clear that the effects of the monetary policy on the economy and on the inflation have a time lag. For this reason, many central banks that set inflation targets, publish reports to share the aims and the limitations of the monetary policy, the time horizons, the thinking behind the target, how it is going to be achieved and to explain any deviations from the target. All in all transparency and communication play a major role in inflation targeting central banks, and their value has been appreciated by other banks too. (Kahveci et al., 2016)

4.2 Central bank's transparency

Models have been developed to assess the value of transparency and its role in the private sector's forecasts. Many conclude that at low levels of transparency, providing the economy with more information might be desirable because it could improve private sector's forecasts concerning inflation. On the other hand, as the level of transparency increases, more information could worse these forecasts, mainly for two reasons. The first one, is that more transparency could lead to uncertainty. Providing with more information, people start to switch their focus on the complexity of the monetary policy and the uncertainty surrounding forecasts. People see the quality of their forecasts worse than what it actually is. The second reason is that a high level of transparency may lead to an information overload and confusion. It is not safe to say that people have the ability to understand, absorb and evaluate all the information that is shared by the central bank. While some level of transparency helps the agents to clarify the situation, a large amount of information is likely to lead to a confusion and worsen the quality of the inflation forecasts inevitably. Central banks need to find the optimal level of central bank's transparency where it is easier to conduct monetary policy because at this level steering inflation expectations is relatively effective and inflation can be in line with the set target. (van der Cruijsen et al., 2010)

As it is said, central bank's capability to stimulate real economy is highly dependable on its competence with respect to market expectations on the future development of interest rates. Shaping expectations is crucial for the effectiveness of monetary policy. Many claim that a strong communication channel besides increasing monetary policy's efficiency, it also sets central bank's actions to be predictable, as well as increasing its independence. Through strong communication, central bank's transparency is increased enabling effectiveness by amplifying central banks credibility via growing responsibility and self-discipline and improving anticipations on the medium term. (Tomuleasa, 2015)

When monetary tools are set, the central bank has the temptation to deviate from its original announcement in order to benefit from the inflation shocks. Due to the

way the economy is organized, the benefits from this deviation are generally end up to private agents. However, the tendency to cheat places a threat to the viability of the rules equilibrium and drives the economy towards an inferior equilibrium. An unanticipated monetary expansion reflects on an increase in the real economic activity. In other words, this shock decrease the unemployment rate below the natural level. Natural level is the value that would be ground out by the private sector in the absence of monetary deviations. The natural level can be affected by supply shocks, demographic changes, transfer programs and other. What else is affected by the surprise inflation is the governmental revenues. The expectation of inflation determines the people's decision for holding cash. A sudden change in the level of inflation depreciates the real value of this holdings, allowing for issuance of more money in real terms as a replacement. The existence of distortions such as income tax may result in an increase of revenues. So, the incentive for a surprise inflation is connected with governmental liabilities fixed in nominal terms, rather than to money. (Barro et al., 1983)

4.3 Sterilized Versus Unsterilized Intervention

A central bank may purchase domestic currency and as a response to sell foreign assets in the foreign exchange market. This will lead to an equal decrease of its international reserves and the monetary base. The other way around, a central bank's sale of domestic currency followed by a purchase of foreign assets in the foreign exchange market results in an equal rise in its international reserves and the monetary base. This kind of intervention, in which a central bank allows a purchase or sale of domestic currency to have an effect on the monetary base, is called an unsterilized foreign exchange intervention.

However, a central bank may not want to affect the monetary base. All it has to do is to counter the effect of the foreign exchange intervention by conducting an offsetting open market operation in the government bond market. This kind of action would leave the monetary base unchanged. Such an intervention is called sterilized foreign exchange intervention. (Mishkin, 2004)

4.4 Traditional Monetary Transmission Mechanism

The traditional transmission mechanism includes the interest rate channels which play a really important role in the literature for over fifty years. Interest rate channels are also the main transmission mechanism in the basic and popular Keynesian ISLM textbook model.

The traditional ISLM view of the monetary transmission mechanism suggests the upcoming effects following a monetary expansion. The given monetary expansion is going to lead to a decrease in the real interest rates which in turn lowers the cost of

capital, pushing an increase in investment spending, therefore leading to an increase in the aggregate demand and a concluded rise in the economy's output.

Even though Keynes initially emphasized this channel as operating through businesses' decisions about investment spending, updated research showed that consumer's decisions concerning housing and consumer durable expenditure also are considered as investment decisions. As a result, the interest rate channel of monetary transmission outlined above applies equally to consumer spending.

It is important to note the emphasis that is being given to real rather than the nominal interest rate as that which affects consumer and business decisions. Additionally, it is often the real long-term interest rate and not the short-term interest rate that is considered to have the major impact on spending. A central bank's induced change in the short term nominal interest rates results in a corresponding change in the real interest rate on both short and long-term bonds through sticky prices. An expansionary monetary policy that decreases the short-term nominal interest rate lowers, in addition, the short-term real interest rate, and this would still be a true fact in a world with rational expectations. The expectations hypothesis of the term structure, which suggests that the long-term interest rate is an average of expected future short-term interest rates, proposes that the lower real short-term interest rate leads to a fall in the real long-term interest rates. These lower real interest rates will lead to a rise in business fixed investment, as well as the residential housing investment, consumer durable expenditure and inventory investment, all of them producing an increase in the aggregate output.

Interestingly, the fact that it is the real interest rates that affect spending rather than the nominal one provides an important mechanism for the monetary policy to be able to stimulate the economy even if the nominal interest rates hit the floor of zero, supposing a deflationary episode. With nominal interest rates at zero level, an expansion in the money supply will increase the expected price level and therefore the expected inflation. This will lead to a decrease in the real interest rate and thus stimulate spending through the interest rate channel that explained above.

This mechanism indicates that monetary policy may still be effective even when nominal interest rates have already been pinned down to zero by the monetary authorities. Indeed, the given mechanism is a key factor explaining the reason why U.S. economy was not trapped in a liquidity trap during the Great Depression and why expansionary monetary policy could have prevented the sharp decline in the output during that period of time. (Mishkin, 1996)

4.5 Exchange Rate Channel

Furthermore, there are other channels as well that affect the economy following a monetary policy, like other relative asset prices and real wealth. There are two

assets apart from bonds that receive attention in the literature on the transmission mechanism, the exchange rate, and equities.

As the internationalization of the economies increases all over the world and with the advent of flexible exchange rates, more attention was needed to monetary policy transmission operating through exchange rate effects on the net exports. This channel, which is a standard feature in macroeconomics textbooks, involves interest rate effects because when domestic real interest rates decline, domestic currency deposits become less attractive relative to deposits denominated in foreign currencies. This will lead to a fall in the value of the domestic currency deposits in relation to the other currencies forcing it to depreciate. The lower value of the domestic currency makes the domestic goods cheaper than foreign goods, therefore causing an increase in the net exports and as a result, the aggregate output will also increase. (Mishkin, 1996)

4.6 The Credit Channel of Monetary Transmission

Arguably, it is hard to explain the level, the timing and the composition of the economy's response to a given monetary policy shock solely in terms of interest rate effects. The credit channel mechanism lends a helping hand in filling the missing parts of the traditional story. It is important to be mentioned that credit channel follows a basic notion. Whenever frictions like imperfect information interfere with the smooth operation of the financial markets, a wedge between the cost of external funds and the opportunity cost of internal funds is expected. This wedge is known as external finance premium, depicts the deadweight costs connected with the principal-agent problem existing among borrowers and lenders. External finance premium reflects the lender's expected costs of evaluation, monitoring, and collection. In addition, a premium that results from the fact that the borrower has better information about his prospects than the lender, and the fact that borrower may distort his behavior due to moral hazard.

As people supporting the credit channel may claim, monetary policy influence not only the general level of interest rates but also the magnitude of the external finance premium. This may help to understand the strength, timing, and composition of the monetary policy effects better than with a single reference to interest rates. Two mechanisms have been introduced to explain the connection between monetary policy and the external finance premium, these are the balance sheet channel and the bank lending channel.

4.6.1 The Bank Sheet Channel

The bank sheet channel is based on the premise that the external finance premium facing a borrower should depend on his financial position. His financial position is defined as his liquid assets and marketable collaterals. The greater his position is, the

lower the external finance premium should be. It is easily understandable that a stronger financial position enables the borrower to reduce his conflict of interest with the lender, by self-financing a greater share of the investment or by offering more collateral for a warrant. In addition, since the financial position of borrowers affects the external finance premium, fluctuations in the quality of their balance sheets should affect their investment and their consumption. A massive theoretical literature uses this notion to argue that endogenous procyclical movements in borrower's balance sheets can strengthen business cycles. This phenomenon is called "financial accelerator".

The balance sheet channel exists because changes in the central bank's policy affect market interest rates as well as the financial positions of borrowers, both directly and indirectly. A tightening in the monetary policy directly weakens borrowers' balance sheets in two ways. The first one, rising interest rates directly increase interest expenses, reducing net cash flows and thus weakening borrower's position. Secondly, increasing interest rates is connected with a decline in asset prices which causes a reduction in the borrower's collateral value. A tight monetary policy can also reduce net cash flows and collateral values in an indirect way. For example, a firm may be affected by the reduced spending of consumers followed by a tightening in the monetary policy. This will happen because firm's revenues will decrease but firm's fixed costs do not adjust, at least in the short run. The gap that is created may have a negative effect on the firm's net worth and credibility over time. We can obtain information on how monetary policy affects the financial positions of borrowers mostly by using the "coverage ratio" of a firm. The coverage ratio is the ratio of interest payments by nonfinancial corporations to the sum of interest payments and profits. It is easily measured and it is also highly correlated with the other firm's indicators. Moreover, another factor is that after a monetary tightening, short-run borrowing is increased, which further increases interest expenses.

4.6.2 The Bank Lending Channel

Monetary policy may also affect the external finance premium by shifting the supply of intermediated credit, especially loans on commercial banks. This is called the bank lending channel. Banks are the prime source of intermediated credit in the majority of countries and specialize in overcoming informational problems and other shorts of market frictions. A sudden disruption in the loan supply of banks may lead the borrowers, mostly small and medium-sized firms, to incur costs associated with finding a new lender and establishing a credit relationship. Therefore it is concluded that a decline in the bank's supply of credit, is highly likely to increase external finance premium and reduce real activity. On the other hand, it is a rather controversial issue whether monetary policy can affect the supply of loans in a significant manner. It has been examined that open market sales by the central bank would limit the supply of bank loans by reducing bank's access to loan related funds.

This effect, transmitting via the composition of bank assets, is over and above the traditional IS-LM money - supply and interest-rate effects, which are reflected in the reduced bank liabilities. Prior to 1980, the existence of the bank lending channel was caused by the inability of the banks to replace lost deposits with other sources of funds, like certificates of deposits (CDs) or new equity issues. But after 1980 banks' ability to raise funds on the margin, especially through the issuance of large CDs and other "managed liabilities" has become less limited. Nevertheless, the existence of bank lending channel wasn't challenged because it is sufficient that banks do not face a perfectly elastic demand for their open market liabilities. An open market sale by the central bank shrinks banks' deposits and forces them to rely more on managed liabilities. It also increases bank's relative cost of funds. Such an increase alters the supply of loans, pushing out bank-dependent borrowers and raising the external finance premium. It must be pointed out that the behavior of interest rate spreads and terms of lending are consistent with bank lending channel but they are also potentially consistent with the balance sheet channel. Following a tightening of monetary policy, there is a worse of both borrowers' and banks' balance sheets. Balance sheet effects could supposedly explain the reason why borrowing becomes more expensive and difficult and why banks have to promise higher interest rates to sell their CDs. Therefore it is extremely hard to conduct a test that could separate the bank lending channel from the balance sheet channel. It is safer to face the credit channel in general rather than trying to distinguish between its two mechanisms. (Bernake et al., 1995)

4.7 Term Structure of interest rates

The term structure of interest rates is frequently mentioned in the context of monetary policy. It plays an important role as an indicator of market expectations or of the stance of policy. Although it is rarely viewed as a policy target, it is generally conceded to contain some useful information for both market participants and the monetary authority. (Estrella et al., 1995)

It is important to examine the connection between the term structure spread and a direct instrument of monetary policy. Assuming a tightening of monetary policy this should have effects on both short-term and long-term interest rates. In the short run, there is a tightening in the credit supply, leading to a rise of the interest rates. In the long run though, changes in the expected inflation and in the real ex ante long-term rate are expected. Supposing the tightening of the monetary policy is perceived as credible then reduced long-term inflationary expectations would moderate the effect of the tighter initial credit conditions. The final result is that long-term rates have a tendency to rise by less than the short-term interest rates, meaning that the spread between these two interest rates declines. It could be described by the yield curve that "flattens".

However, it is possible that the short-term interest rate may increase more in the future or that the current increase is viewed as incapable to handle inflation and to drive down inflationary expectations. In both of these cases, the long-term rate might rise at the same level or even more than the short-term interest rate and the spread between them is expanding.

The importance of the informational content of the term structure is predicting real activity. The common factor explanation is one possible way to explain this predictive ability. The current monetary policy affects both the term structure and the future real activity. A tight monetary policy would tend to flatten the yield curve and lead to a slowdown in activity. It is theoretically claimed that the yield curve may be positively or negatively related to the future real output. The common factor explanation implies a positive relationship, based on empirical research. Other explanations based on real demand shocks are also consistent with the positive relationship, its notion could be translated by a future shift in the IS curve. On the contrary, expectations of a future tightening in the monetary policy could lead to higher interest rates and lower output especially in the short run, and this can be imagined as a future shift in the LM curve. (Estrella et al., 1995)

4.8 The role of term structure in the ECB

A traditional way of classification of the variables that a central bank examines in the conduct of monetary policy is to identify them as final targets, intermediate targets, indicators of policy stance or other economic indicators. It is generally accepted nowadays that the primary goal of the monetary policy is price stability. Even though other interrelated subjects may also be of some importance, it should be clear that real or potential control of the term structure is not a substitute for price stability. It could be the case that the role of the term structure is an intermediate target. In order to occur, however, would require the central bank to be able to exercise significant control over the term structure and also the term structure to bear a stable structural relationship to the future inflation rate. It has been examined and concluded that the term structure is affected by monetary policy and is connected with the future inflation rate. However, its lack of a clear structural basis for these relationships as well as the level of uncertainty opposes against the use of the term structure as an intermediate target. What is its best role in monetary policy is of an indicator. In order for a policy to be conducted, a wide range of indicators must be examined. These may include macroeconomic indicators for the output, the unemployment or inventories or macro-financial indicators like interest rates. In this context, term structure may hold information and contain useful supplementary signals. It provides a check of how accurate a macroeconomic forecast is. For instance, if a policymaker produce a prediction that is consistent with the view provided by the term structure, then the confidence in the forecast would be increased. European Central Bank, therefore, uses the term structure indicator that plays a major role in its policymaking. (Estrella et al., 1995)

4.9 Zero lower bound

There are questions in regard with the role of the zero bound on nominal interest rates as a possible impediment to the effectiveness of conducting monetary policy in order to cope with issues, and they are not new. These questions can be seen from the 1930s in the discussion of a liquidity trap. The notion of zero bound is plain. The bound exists because market players can avoid negative interest rates by holding money instead of interest-bearing assets. Straight from a theoretical point of view, what affects the interest rates in order to be pushed to zero, or near it, is the specification of preferences and the role of money in the economy. Practically, the experience in Japan, as well as the Great Depression, suggest and support the existence of the zero bound. Under normal conditions, when the short-term interest rate is well above zero bound, the central bank is able to ease monetary policy by expanding the supply of the monetary base and decreasing the short-term interest rate. Due to the fact that prices of goods and services are adjusted more slowly than the prices on financial instruments, a money injection like this reduces the real interest rates, at least over short maturities, thus stimulating the economy. Depending on the duration of the liquidity injection, real interest rates on longer maturities can be reduced as well.

The existence of the zero lower bound sets a limit on the process of the described mechanism. In principle, the central bank can inject such liquidity in the economy so as to push the overnight rate effectively to zero. Beyond that point, any additional expanding on the monetary base no longer affects short-term nominal interest rates. On the other hand, real interest rates may increase due to deflationary pressures. Therefore, when the interest rate channel is the main transmission of the monetary policy, the existence of the zero bound can pose serious obstacles on the process of monetary policy. (Orphanides et al., 2000)

5 Financial Crises

The classic explanation of the origins of a financial crisis is that is caused by excesses, mostly monetary excesses, that lead to a boom in the economy and inevitably to a bust. Following the recent global crisis, a boom in the housing sector that led to a bust, was the sparkle that ignited the financial distress in the United States and in other countries. From 2000 until 2006 monetary policy was too easy, deviating hugely from the Taylor rule. Actually, it is considered to be the biggest and more persistent deviation since the rough days of the 1970s. Therefore, there are clear evidence that there were excesses during that period leading to a housing boom. These unusual interest rate decisions were made by monetary policymakers. The FED used transparent language to describe these decisions. These actions were deliberately taken in order to address the problem of fear of deflation, similar to the one Japan faced in the 1990s.

Nevertheless, there are global connections to assess the root of the crisis. It is interesting that the interest rates in many other central banks deviated from their historical regularities, following the Taylor rule. The more the deviations the bigger the housing booms. In Europe, the deviations from the Taylor rule vary between countries because inflation and output differ. Spain was the country with the larger deviation and housing boom. On the other hand, Austria was the country with the smallest change in housing investment as a share of the GDP. It is rather important to question, whether these low-interest rates at some central banks were influenced by the decisions in the United States. Recent research has shown that there is a link between ECB and FED, based on concerns about the exchange rate or the influence of the exchange rate on inflation as well as changes in the global interest rates. (Taylor, 2009)

After 1980, accelerated deregulation accompanied by rapid financial innovation led to financial booms that always ended in financial crises. Governments responded with bailouts which allowed for new expansions to begin. In turn, there were new crises with more bailouts. Over time, financial markets grew even larger relative to the nonfinancial economy and financial products got more complex and system-wide leverage exploded. As a result, financial crises became more threatening. There are a few structural flaws in the new financial architecture that helped generate new crises. Firstly, the new financial architecture is built on a weak theoretical foundation. There is light regulation of commercial banks, even lighter regulation of investment banks and hardly any regulation of the ‘shadow banking system’. This happened due to the notion that capital markets could correct themselves with respect to expected risk and return. Buyers and sellers of financial securities were, as claimed, capable of making the optimal decisions for their actions. Secondly, the new financial architecture has widespread perverse incentives that create excessive risk, exacerbate booms and generate crises. The current financial system is puzzled with perverse incentives that affect all financial institutions, to take an excessive risk when financial markets are buoyant. These incentives affect commercial and investment banks, hedge and private

equity funds, insurance companies as well as pension funds. There are many examples of major financial firms operatives to take excessive risks even in times of financial bubbles because they were after high-risk, high-leverage strategies. But not only financial institutions were affected but also credit rating agencies. The recent global crisis might have been prevented if perverse incentives had not induced credit rating agencies to give absurdly high ratings to illiquid, nontransparent, structured financial products such as MBSs, CDOs, and collateralized loan obligations. Regulation of financial markets will not be effective at all unless it substantially reduces the perverse incentives that affect the system. Thirdly, due to innovation, new financial products are so complex that cannot be priced correctly. This may lead to illiquidity when the boom ends. Financial innovation has produced financial products that are extremely complex, may seem nontransparent and cannot be priced correctly, therefore they cannot be sold on markets. The huge spread of these complex products, offered large profits for big financial institutions but damaged the necessary transparency that was needed for the efficiency of the markets. Actually, the value of the securities that are not sold on markets may exceed the value of securities that are sold. Therefore it is easily understandable that the claim that competitive capital markets price risk optimally does not hold on these securities. (Crotty, 2009)

Recent analysis has shown some interesting facts about international monetary and financial system. A question on whether global economy has anchored itself to prevent the overall expansion of credit that fuels financial imbalances needs to be addressed. These imbalances support unsustainable expenditure in the aggregate, across expenditure sectors and even across borders. A useful approach is that of 'elasticity'. The degree to which the monetary and financial regimes constrain the credit creation process, as well as the availability of external funding. If constraints are weak, the elasticity is high. A high elasticity can facilitate expenditures more easily, but it can create imbalances when economic players are not well informed and their incentives are not in alignment with the public good. It is claimed that the reason for having more crises is a sign that the monetary and financial system's elasticity is too high. In other words, reducing elasticity may reduce the frequency and severity of the financial crises, and this is going to happen through prudential regulation and supervision. But alongside with the regulatory framework, monetary policy plays a major role because it underpins the term structure of interest rates. It is the monetary policy that sets the price leverage in any given currency area. Central bank's reaction function describes the way market interest rates are set in response to economic developments can be considered as the ultimate anchor in the monetary regime. This has certain implications at domestic and international level. Domestically, a monetary policy narrowly focuses on price stability which may disregard credit developments except when is near inflationary pressures, may not always be sufficient to promote macroeconomic stability over the medium term. When a credit booms occur together with asset price booms that is when a financial imbalance is created. At the international level, the interaction between different currency areas constrains countries' ability to insulate domestic monetary conditions from the ones prevailing

elsewhere. Large shifts of asset portfolios across currencies, can induce large shifts in exchange rates, especially for smaller countries. Gradual appreciation may inflict more portfolio shifts and capital inflows by reinforcing expectations of capital gains and providing incentives to maintain or add to given foreign currency positions. Countries that experienced an unwanted upward pressure on their exchange rate, most of the cases inconsistent with their domestic price stability objectives, face a difficult choice. They could reduce their policy rates but potentially putting their domestic targets at risk, at least where inflation was already too low or negative. On the other hand, they could resist that pressure by accumulating foreign exchange reserves, sterilizing the impact on domestic currency bank's reserves. Most of the times, a combination of both was selected, but the overall effect on the reserves was unprecedented. Reducing policy rates transmitted the policy stance from advanced countries to the rest. (Borio et al., 2011)

Another reason for a crisis to occur is the differential growth between countries. On the one hand, advanced industrial countries suffer from a more slow growth and economic slack. On the other hand, emerging countries have been growing rapidly and strongly after a short slowdown. These differential growth prospects along with the low interest rates may generate appreciation pressures on the exchange rates of the emerging countries, inducing large capital inflows and increasing credit and asset prices. This may lead to an increased possibility of a financial imbalance like the one occurred in 1997 in Asia. (Borio et al., 2011)

5.1 Liquidity Crises

Liquidity crises occur in two basic forms in the modern financial systems. The first one concerns a crisis that is triggered by the well known run on a bank or the banking system. The second type relates to illiquidity in securitized money or capital markets. A bank run is thought to happen when investors have certain doubts about the solvency of a bank or even a group of banks. Such an event may take the form of a sudden shift in portfolios. Investors tend to change bank liabilities in favor of short-term government securities or corporate assets. It is known that certain events may affect the value of some bank assets rising doubts about a bank's solvency due to the fact that the larger part of a bank's assets are non tradable and therefore are not subjected to market valuation at regular intervals. Following the precautionary portfolio shifts, the bank might find extremely difficult to refinance its short-term liabilities. A bank's failure may have a spill-over effect into the banking system, so it is easily understandable that central bank's intervention is required. Securitization of money markets has generally made it possible for banks to finance their assets in a large part with purchased funds like negotiable CDs, interbank funds, and repurchase agreements. It should be noted that the risk of being unable to refinance a great part of a bank's liabilities would have been notably less should the bank had operated without depending on wholesale money market funding of its liabilities.

In order to prevent a failure that could have a spill-over effect onto the banking system, the central bank can provide liquidity to the affected banks through its discount facilities and will wish to do it so that the bank can be solvent. Another way to act is to exploit its influence to induce a selected group of healthy banks to provide liquidity assistance to the suffered banks in return for an equity stake. Lastly, the central bank may let a bank to fail, while avoiding a general banking crisis by supplying liquidity to the rest of the banking system. Banking crises were a common phenomenon in most countries prior to 1940s, leading at times to harsh contractions of the money stock with significant negative effects on the economic activity. Since then, though, central banks learned to prevent general bank liquidity crises by supplying emergency assistance to the banking system at times of a crisis.

The second type of a liquidity crisis is illiquidity in key money or capital markets. It may occur as a direct symptom of increased securitization. In securitized money and capital markets, liquidity to nonbank participants is depended on banks. In addition, nonbank financial intermediaries also depend on banks. Dealers maintain credit lines in good funds and securities to finance inventory acquisition or short positions. The essential traits of a dealer in securities are low capitalization and high leverage. For that reason, they tend to be undiversified, highly leveraged and vulnerable to failure. The failure of a major money market borrower or dealer may lead to a liquidity crisis in the money market. Following a borrower's failure, investors' confidence may be undermined making it difficult for other money market borrowers to roll over their obligations, pushing them to draw on their bank lines. In that case, the banking system may be unwilling to cope with this sudden increase for the short term commercial credit due to a credit risk concern. It also may be afraid of a dealer's solvency or it may even be unable to generate sufficient funding because illiquidity may have been spread to the CD market due to investors' lack of confidence. The potential systemic nature of such a situation calls for a central bank's liquidity intervention. (Folkerts-Landau et al., 1992)

Throughout history, financial crises all share three precipitating factors. A mismanagement of the financial innovations, a bursting of an asset price bubble and a deterioration of the financial institution's balance sheets. The positive about financial innovation is that makes the financial system more efficient but in the recent crisis, innovations of subprime mortgages and structured credit wound up being destructive. They failed to cope with the serious agency problems and they also made financial products more complex making them more difficult to value. Along with the house pricing bubble, risky lending has been encouraged, because while the housing prices went up, the default on subprime mortgages was low. Following the burst of the bubble in 2007, the decrease in housing prices led to many subprime borrowers finding that their mortgages were "underwater", meaning that the value of the house drops down below the amount of the mortgage, and defaults on mortgages began to rise. Increase in defaults unveiled the problems concerning the structured credit products. There was a deterioration of the financial institutions' balance sheets that

led to a decrease in lending, in consumer spending, business investment and to a contraction in economic activity in general. Of course, this affected housing prices that inevitably declined, even more, leading to even more deterioration of the balance sheets, entering in a loop that has raised macroeconomic risk. The result was to have a sharp increase in the interest rates concerning household and business spending, as well as a tightening of the credit standards. (Mishkin, 2009)

One important factor about crises is that they may be contagious. The truth is that defining contagion varies across papers. One way to define contagion is that knowing the existence of a crisis in one place may increase the probability of a crisis to occur at "home". One way to explain this is by competitive devaluations. Once a country devalues, it makes it more costly in terms of loss of competitiveness and output, for other countries to maintain their parity. Another possible way to explain is due to information asymmetries among the countries. In addition, the fixed costs of gathering and processing information may raise the herding behavior even when investors are rational. Finally, it could be explained when focusing on the role played by investors that engage in cross-market hedging of macroeconomic risks. Whatever it may be the case, these models suggest that the transmitting channels derive from the global diversification of financial portfolios. These may lead to a conclusion that countries with more internationally traded financial assets and more liquid markets are likely to be more vulnerable to contagion. Another potential channel of transmission that has been ignored is the role of commercial banks. Banks in one country may have exposure to banks outside their country and this may transmit a crisis from one country to another. The need to rebalance the overall risk of an assets portfolio and to recapitalize after the initial losses may lead to a marked reversal in bank credit across markets where the bank has exposure. (Kaminsky et al., 2000)

5.2 Transmission channels

It must be noted that there are four channels considered to transmit shocks across borders. Two of them cope with linkages among financial markets, like foreign bank lending or globally diversified portfolios, and two deal with the trade in goods and services.

5.2.1 Common Bank Creditor

Studies that have been developed, found a prominent role for linkages on the basis of trade in goods and services but this does not explain why countries that engage in trade in these areas, also have strong connections through financial arrangements that facilitate trade, mainly through commercial banks. It is known that are regional trade blocs, just as the need for these regional blocs to rely on a single common creditor country. This may play a role in an attempt to explain the potential cross-border spillovers, since if a bank is confronted with a rise in non-performing loans in one country, it is likely to be called upon to reduce the overall risk of its assets by decreasing the risk of other high-risk projects in other countries. Additionally, it will be forced to recapitalize and adjust to its lower level of wealth, leading to less

lending. There are cases that provide evidence supporting this way of transmission like the Thai crisis in 1996, affecting Japan, Indonesia, Korea, Philippines, and Malaysia as well, and in South America in 1982.

5.2.2 Liquidity Channels, Mutual Funds, Cross-Market Hedging

While banks are important common lenders, they are not the only lenders to the emerging world. Portfolio flows to emerging markets play the same role. Therefore, a diversified investor may choose to sell bonds and equity holdings in a country after a given event in another country. In order to have a result though, this channel requires the sufficiency of liquidity in the asset market, otherwise, the portfolio flows are minor and the channel will not have any significant effect. It is suffice to say that if a country's bonds and equities are not subjected to international trade, such liquidations are not an issue.

5.2.3 Trade Links

Trade links have historically attracted the most attention when analyzing contagion. Trade in goods and services have a longer history plus there is better data availability supporting this fact. There are two kinds of links the first one is the bilateral trade among countries and the second one involves the competition in a common third market. It is considered though, after research that trade links underperform the financial sector links. (Kaminsky et al., 2000)

6 Conducting monetary policy under financial crises

It is known that crisis has changed the way people think in many aspects. For example, developments in the financial sector are now considered to have a much greater impact on economic activity than what was believed in the past. Also, nowadays macroeconomy is not being analyzed non-linearly and the zero lower bound has been proved to be problematic. Additionally, the cost of cleaning up after a crisis is really high and more importantly, price and output stability do not ensure financial stability. (Mishkin, 2011)

It has been acknowledged that in times of crises, central banks should act in a way to resolve panic from the financial markets. They also provide functionality of the credit markets and try to prevent the collapse of systemic financial institutions. It can be easily noticed that central banks reduce interest rates whereas the impairment of financial market conditions alters the perspective regarding financial stability. Another reason is the necessity for the lending activity to recover. Moving towards this direction, monetary authorities gradually decrease interest rates, in some cases around 0%. Facing the background that international financial crisis had set, central banks adopted and implemented a series of measures which aimed at reestablishing financial stability as well as the functionality of the financial markets. In this picture, financial stability revolves at the center of central banks' attention even though most of their statutes provide as fundamental objective price stability. Major examples can be considered the European Central Bank and the National Bank of Britain. Only these two central banks followed a restrictive monetary policy by increasing interest rates of the monetary policy. Central banks despite their reserved behavior a few years ago, communicate even more about their monetary policy, especially during the global financial crisis. In cases where the decision was not communicated so that there was a surprise for the market players, it was noticed a reduction in the efficiency of the followed strategy due to the time needed for the players to align their actions in line with the directions given by the central bank. Under conditions of crisis, communication policy should have as a target the restoration of confidence of financial market participants and also the maintenance of central banks' credibility. In times like these, the problem of information asymmetry, that exists on the financial markets gets more developed because of the volatility related to these markets and affects the clarity of the information provided, ending up with a financial uncertainty. It is obvious that, especially in times of distress, choosing the right words at the right time regarding monetary policy and financial stability have a positive outcome and thus is promoted by monetary authorities. (Tomuleasa, 2015)

In times of crises, central banks have been engaged in a significant effort to improve the credit environment for small businesses, by providing detailed guidance and extensive examiner training. Federal Bank, for example, along with policymakers around the globe, took extraordinary actions to cope with the financial crisis in 2008, and help to restore the proper functioning in key financial markets so that an

economic stabilization could be achieved. Additionally, important measures to ease the monetary and financial conditions have been taken. (Bernake, 2010)

6.1 Assessing financial assets

Market participants try to assess the fundamental worth of the financial assets. In order to be able to do this, they need a continuous flow of information so that they can process to discover prices. Unfortunately, during periods of financial crises, these flows are disrupted and price discovery is quite impaired. This kind of disruptions lead to high-risk spreads as well as to reluctance to purchase certain assets as a natural response. Two types of risk can be defined as a way to comprehend financial instability. The first type is known as valuation risk, according to this, the market finds it difficult to estimate the value of securities, given the complexity of the securities and the opaqueness of their creditworthiness. The second one is known as macroeconomic risk. This risk increases the probability that a financial disruption will lead to a significant shrinking in the real economy. Particularly, stains in the financial sector can have a spillover effect on the broader economy and have adverse consequences on output and employment. Such an economic deterioration may lead to even greater uncertainty regarding asset values, which in turn will initiate an adverse feedback loop. This phenomenon is widely known as financial accelerator. The quality of firms and households' balance sheets play a major role in financial accelerator mechanism, because some of the assets of each borrower might serve as collateral for its liabilities. The use of collaterals helps facing the problem of asymmetric information, because the borrower's incentive not to engage in a massive risk-taking is boosted by the threat of losing the collateral. However, a macroeconomic downturn tends to deteriorate the value of many of these collaterals reinforcing the probability of an adverse feedback loop. (Mishkin, 2009)

6.2 Adverse feedback loop

Implementing a tight monetary policy would keep valuation risk surely as high as it was because it would not have made it easier to value securities by reducing opaqueness of securities that were hard to value or making it easier to assess credit risk. Furthermore, tighter monetary policy would have led to higher macroeconomic risk, through its usual channels by constraining consumer spending and business investment. This may lead to harsher economic downturn and in return would increase uncertainty concerning asset values. This adverse feedback loop is more likely to contract economy even further and this will create even more uncertainty and so on. It is easily understandable that there is a need for active role of the monetary authorities in order to counter the effects of financial crises. As it is mentioned these effects are nonlinearly affecting the economy due to the adverse feedback loop. An alternative approach is for the monetary policy to engage in risk management by using monetary policy to take out insurance against tail risks. Monetary policy cannot offset valuation risk but can reduce macroeconomic risk. Using an aggressive monetary policy to face the negative effects of the financial distress on aggregate economic activity, including cutting interest rates, as well as using unconventional

monetary tools if interest rates fall close to the zero lower bound. Monetary policy can reduce the likelihood that a financial turmoil may create an adverse feedback loop. Reducing uncertainty may make it easier for markets to collect the necessary information to facilitate price discovery thus leading to normal functioning of the markets. On the other hand, one possible problem deriving from an aggressive monetary policy is that it might unset the anchored inflation expectations. This may lead to significant inflation in the future because the behavior of inflation is widely affected by public's expectations. Therefore, aggressive monetary policy could be counterproductive if these actions caused an increase in these expectations and the underlying rate of inflation. In order for the expectations to stay put, central bank's credibility is the key. Central bank needs to earn the credibility through a record of previous actions to maintain low and stable inflation. Additionally, expectation are more likely to remain anchored if central banks communicate they are flexible. In other words, central bank may seem eager to lose some of its acclaimed credibility providing monetary easing. (Mishkin, 2009)

6.3 Communication

Furthermore, clear communication is extremely important in central banking, particularly when economic conditions needs further stimulus but the policy rate is already at its efficient lower bound. Forward guidance may lower private sector's expectations related with future short-term rates should cause long-term interest rates to decline. Federal Reserve has made extensive use of forward guidance from March 2009 until June 2011. (Bernake, 2012)

Following the recent crisis , central banks struggled to stir the economy and to manage the monetary policy through the traditional tools. Central banks wanted to help their economies getting as little damage as possible by using unconventional tools. Recent studies on communication shown that one major factor that deepened the crisis was the not effective communication and it has been made clear to banks that communicating is really important. It is safe to say that in certain cases, communication becomes a policy on its own, that means more than just a plain means of transparency and accountability. It is claimed that increased transparency and reduced uncertainty coming from an effective set of communication strategy affects the volatility of financial markets. Better understanding of monetary policy and financial stability by the market leads the uncertainty to be reduced in the financial sector and thus influence the expectations and the market players' decisions. Given that, reaction of the assets prices and bond yields will be more in accordance with the targets of monetary policy. Additionally, greater transparency accelerates the harmonization of the private sector. (Kahveci et al., 2016)

Large-scale asset purchases can affect financial conditions and economy in general, though many channels as mentioned. For example, they can signal the central bank's intention to pursue a rather more accommodative policy stance, leading to a lowering of expectations for the future federal funds rate and pressuring long-term interest rates

downward, especially in real terms. This fact can affect household and firms' confidence in a positive manner. In times of distress, asset purchases may also improve the functioning of financial markets, thereby easing credit conditions in some sectors. (Bernake, 2012)

6.4 Flexible Inflation Targeting

Flexible inflation targeting, called the monetary policy that follows the eight principles of the new neoclassical synthesis, is still valid in case of a crisis since none of these principles are invalidated. Therefore, it is still supported that central bank should have strong, credible commitment to stabilize inflation in the long run by announcing a certain inflation target but also have the potential to work for policies to stabilize output around its natural level in the short run. However, following the financial crisis, the way the flexible inflation targeting is conducted, has changed. There can be two possible alterations to the given framework, the choice of level of inflation targeting and whether a price level targeting would affect positively the economic outcome.

The financial crisis has shown that the problem of zero lower bound is more serious than it was previously thought to be. Therefore, a question whether the optimal level for the selected inflation level should be higher than the typical value of around 2% has been raised. By choosing a higher target, the real interest rate can be driven down to lower levels in the face of adverse aggregate demand shocks. For example, it has been proposed a rise in the inflation rate to the level of 4%. While expectations stay anchored to the target, real interest rate could be lowered as low as negative 4%, rather than negative 2% with 2% inflation target. This would allow conventional monetary policy to ease monetary policy more than it could with the lower inflation target. A different way to say it is that the zero lower bound on the policy rate would be less binding with a higher inflation target. It is arguable, however, that inflation target lower than 2% may be undesirable. Setting a higher inflation target provides more flexibility as it is less binding, but it must be taken into consideration the costs as well. History has shown that in order for price stability to succeed and be believable, the inflation should be lower than 3%. Once inflation starts to rise above this level, the public is likely to believe that price stability is no longer a credible goal of the central bank. Furthermore, it has been noticed that inflation tends to keep rising once it passes the 3% level. One example is the Great Inflation period from 1970 to early 1980 in the United States. Therefore, it is easily understandable the argument surrounding the willingness on the policymakers' behalf to tolerate high levels of inflation. Additionally, decreasing the inflation rate again is really a costly procedure. A second consideration, benefits from the higher inflation targeting only accrue if the zero lower bound is binding. However, crises of great magnitude happen rarely. This means that benefits from higher inflation will not be large due to the fact that they will not be available frequently. On the other hand, the costs are ongoing. Although they may not be too great any given year, they add up and in present value they clearly outweigh the benefits.

Besides inflation targeting, some countries target a price level instead. It has been researched that a price level target is responsible for producing less output variance than it is produced with an inflation targeting, and in turn the economic outcome is improved. The reason is quite simple. A negative demand shock that lowers the price level will need a monetary policy to raise that level back in its initial targeting. This will mean that inflation will be expected to rise in the short term above the long-term inflation targeting embedded in the price level target path. An increase in the expected inflation rate is going to lower the real interest rate, so it will affect aggregate demand and economic activity. For that reason, a price level target is an automatic stabilizer, which means that a negative demand shock leads to stabilizing expectations that stabilize the economy. In addition, this mechanism is even more efficient when the negative shock is so large that the zero lower bound becomes binding. On the other hand, it is argued that price level may inflict more output viability due to the sudden shocks to the price level are not treated as minor issues and must be countered. As it is said, a price level target requires that overshoots or undershoots of the target must be reversed and this could impart significantly more volatility to monetary policy, and with prices be rigid, to the real economy in the short run. One more drawback with the price level target is that it is more difficult to communicate. However, even though communication difficulties are serious, the potential benefits of price level targeting suggest that central banks should better take a better look at how to fix these problems. For example, a central bank could indicate that when it undershoots its inflation target for a given time, it would be willing to tolerate a higher inflation rate in the short term so that the average inflation rate over a period of time would meet the initial target. In order for this to succeed it is vital for the central bank to convince the public that inflation is not going to keep on raising in the long run. (Mishkin, 2011)

6.5 Risk management approach

Monetary policy, in risk management approach, acts preemptively when there are financial disruptions. Especially, monetary policy would focus on the macroeconomic risk. In that case, monetary policy will aim at reducing that risk by decreasing interest rates to counter the negative effects on the aggregate economic activity. Acting like this, monetary policy can reduce the possibility for an adverse feedback loop. This reduction may also make it easier for markets to collect all the necessary information for facilitating price discovery, speeding the recovery in market's functioning. Monetary policy needs to be timely accurate, decisive and flexible. Timely accurate actions are valuable when a disruption gets severe and threatens the core macroeconomic targets of a central bank. A delay in that case may result in further deterioration and increase the amount of easing that is needed to get economy back in track. In case of a disruption, policy focuses on indicators of market liquidity, credit spreads, and other financial market measures that can provide information about changes in the magnitude of the tail risk. Even if macroeconomic indicators like production and inflation are currently strong, the monetary policy would act to counter the negative impact of the financial distortion. Secondly, policymakers

should be decisive when responding to financial disruptions. It is needed in order for a worsen of the negative outcomes of the crisis to be avoided. Central banks should act with an appropriate form of risk management that reduces the risk of adverse outcomes. Thirdly, policy flexibility is particularly precious throughout the evolution of a financial market disruption. Monetary policy should intend to forestall negative effects of this disruption as well as provide insurance against the downside risks to the economy. It is known, though, that markets can change the outcomes really fast, for that reason central bank must monitor the credit spreads and other important data for signs of financial market recovery and if needed, to take back some of the insurance. (Mishkin, 2011)

6.6 Lessons from crises

Among the many lessons learnt by crises, one of the most important is that price stability is not sufficient to maintain a financial and macroeconomic stability. Furthermore, monetary authorities must pay greater attention to the long-term effects of the monetary policy. Maintaining for too much time a low level of interest rate encourages an excessive risk-taking with a potential to affect financial stability. It has been outlined that transparency is crucial. Even in periods of crisis in which monetary policy faces limits, central banks manage to use monetary policy tools effectively. It is difficult for central banks to pursue both price and financial stability in times of crises. For example, when there is a vulnerable economic environment that requires a low level of interest rates, central banks are already facing inflationary incidents that requires an increase in the interest rates. For that reason it is clear that it is vital to select the proper tools that will allow both types of stability. On the other hand, taking into account the successfully coordinated actions of six major central banks on 8 October 2008 when it was the sharpest monetary reduction of interest rates almost 0.5% that manage to deal with the effects of the monetary crisis, highlights the importance of transparent cooperation and coordination between central banks. Another lesson that can be learnt from the recent crisis is that of moderation for both decision makers and the market participants. They were acting impulsively out of desire to accumulate fast earnings, taking excessive risks and not taking into account the rational agent pattern. A difficult task for both monetary and fiscal authorities is facing the growing sovereign debt crisis that comes as a continuation of the subprime crisis. It is a great problem that affects future generations as well. Therefore, a close cooperation must be established between monetary and fiscal authorities in order to increase financial stability and hence a good transmission of monetary policy into the financial sector and the real economy. Last but not least, another challenge rose by the financial crisis is that of the central bank's credibility. That is the damage in the central bank's image so monetary authorities must act prudently in disclosing information. (Tomuleasa, 2015)

7 Case Studies

7.1 Global financial crisis

It has been highlighted, that one reason for the global financial crisis was the strategies followed by the banks prior to the crisis. These strategies involved vast balance sheet expansions and increased mismatches between assets and liabilities. There is evidence that balance sheet growth is related with higher financial leverage, but the main reason for bank failures is lack of liquidity rather than insolvency. Prior to the crisis, banks suffered from a vulnerable liquidity structure. Banks held assets that paid high liquidity premium and funded these assets with liabilities that cost them low liquidity premium. With this setup, even some major banks could not be able to honor their obligations in the face of relatively small bank runs.

In the late 1980s and in 1990s two key regulatory changes weakened the existing regulations, permitting an increase in financial leverage and a more vulnerable liquidity structure. These two regulatory changes were the 'Basel I Capital Accord' which was fully implemented by 1992 and the 1990s reduction of banks minimum reserve requirements by the FED and other central banks as well. It is known that banks face two kinds of restrictions when they try to expand the size of the balance sheet, and these are the capital and reserve requirements. These apply separately to both sides of the balance sheet. Capital is associated with liabilities, but the minimum capital ratio requirements constrains the asset volume of the balance sheet. On the other hand, reserves are an asset, but the minimum reserves ratio requirement constrains the liabilities. Prior to the global financial crisis, banks worked for an expansion in the balance sheets accompanied by an increase in financial leverage. Banks were able to pursue this strategy mainly because the two constraints were lowered during the 1990s. (Cabral, 2013)

7.1.1 2007 – 2009 Subprime Mortgage Crisis

It is easily acknowledged that the rise and fall of nonprime mortgages in the U.S. market have in many aspects similar characteristics with the classic financial bubbles. One of the key similarities is that new innovations worked initially really well, yielding returns above normal values. Secondly, there was over-optimism about the returns that fueled an over-investment in the new product, increasing asset prices. Additionally, in order to support these factors, there was increased leverage and liquidity in the financial system. The belief that the innovation is fundamentally changing the structure of the market led to an amplification of the excess investment and asset prices appreciation. Combining these factors, led to the asset price bubble. After that there was an event that started a downward reassessment of the new asset and price expectations, that in turn unwinds the feeling of over-optimism and triggers the burst of the bubble. During 1990s prime U.S. borrowers obtained conventional mortgages from banks, that held loans in portfolio and funded them with deposits, or from originators who sold conforming loans to Freddie Mac and Fannie Mae. These government-sponsored enterprises packed loans into residential mortgage-backed

securities (RMBS), which these enterprises funded by issuing their own debt or selling them to investors, whom they were insured against mortgage default. Seeing the government-sponsored enterprises as backed by the US government, investors viewed this issued debt as low default risk. Furthermore, some subprime borrowers acquired loans from the Federal Housing Administration (FHA), that imposed a minimal down- payment, levied an insurance premium and limited debt service ratios. However, FHA loans were a small share of the mortgage market in the pre-subprime era. In recent years, private nonprime mortgages gained market shares peaking at 40% of the home purchase mortgage originations in 2006, owning to their much more lax limits on loan to value (LTV) and debt-service ratios.

The rising problem was how to fund subprime loans, many of which were too risky for regulated banks to hold in a portfolio or could expose investors to high and uncertain default risk, should packaged into homogenous securities. The problem was faced with two types of structured financial innovations. The issuance of nonprime mortgage-backed securities which were either packaged into collateralized debt obligations (CDOs) or had default insurance from credit default swaps (CDSs). Unfortunately, these attempts could not be successful as both CDOs and CDSs shared the same undermined fate.

It is easily understandable that the misjudgment of the probability of a subprime mortgage default and loss given default arose the difficulty of predicting default losses based on short history. This lead to an over-optimism about subprime and other innovations. In 2000s interest rates fell leading to a lower of the base interest rates, LIBOR, off which subprime mortgage rates are reset. This constrained any jumps in rates when initial teaser interest rates expired. Additionally, there was a fast increase in home prices, that allowed troubled payments by borrowing more against earlier capital gains.

The combination of the above factors along with the introduction of new financial instruments induced a peculiar weakening of credit standards in the form of subprime lending which pressured housing demand upwards in somewhat thin real estate markets. The boost in housing prices assisted the maintenance of quality of the earlier subprime mortgages, also increased the over-optimism and expectations of future gains. In turn, these factors further increased the demand for housing and the availability of nonprime mortgages, also boosted by increased RMBS financed leverage. This appreciation of house prices started to slowdown in 2006 and in 2007 the process was reversed due to a deterioration in the loans' quality. Of course, some noncredit housing factors played an important role as well. For example immigration, strong income growth after economic reforms and changes in family structures affected the housing boom and bust cycle in many countries like Ireland, the UK and Spain.

The effects of the housing bubble in the real economy differ from nation to nation and were reflected not only on housing construction, but also on three broader spillovers.

It affected the consumer spending, the conditions of the financial sector and thereby the availability of credit and created an international transmission of slowdowns in housing sensitive economies through net exports. (Duca et al., 2010)

There are many reasons that prolonged the crisis either by not addressing the problem or because they had unintended consequences. One reason involves the term auction facility. It was a way to make it easier for banks to borrow directly from FED and was introduced in December 2007. With this facility, banks could avoid going to the discount window enabling them to bid straight from the FED. Such facilities were introduced by other central banks as well. The main objective of the term auction facility was to narrow the spreads in the money markets and increase the flow of credit as well as lower the interest rates. Following the introduction of this facility, spreads declined a bit but after some time they started rising again. Therefore term auction facility failed to make any difference.

Another policy response was the Economic Stimulus Act introduced in February 2018. The major part of this package was to send cash over 100$ billion to individuals and families in the US so they would have more to spend on consumption to stir the economy. But was could have been easily predicted with the consumption theory, people spent only a little portion of the money and consumption was not increased as planned.

Lastly, a third policy used as a response to the financial crisis was the sharp reduction in the federal funds rate in the first year of crisis. The federal funds rate target went from 5 and a quarter percent to 2 percent in April 2008. Following the Taylor rule, a reduction was needed during this period, but not as sharp. It is hard to estimate the full impact of this extra sharp easing. The lower interest rates reduced the size of the reset of adjustable rate mortgages and thereby was addressed to some fundamentals causing the crisis. The most notable effect was the sharp depreciation of the dollar and the very large rise in oil prices. Econometric evidence supports the link between interest rates and oil prices. (Taylor, 2009)

7.1.2 Policy responses

In many countries that were hit by the global financial crisis, were observed official press releases. The United States, the United Kingdom, the Euro area as well as Japan made policy announcements that can be classified into five categories. There were fiscal policy announcements, monetary policy announcements, liquidity support, financial sector policy announcements and ad hoc bailouts and failures announcements.

At first, fiscal policy measures include actions that aim at stimulating domestic demand through increases in expenditures or reduction in taxes. Additionally, certain monetary measures were taken, including interest rate decisions and unconventional means like quantitative easing and credit easing. Quantitative easing involves the central bank's purchasing government securities, while credit easing

consists of purchases of private sector debt in primary or secondary markets, like mortgage-backed securities. Also, there was liquidity support, the provision of domestic currency liquidity through broadened access to central bank refinancing, extended collateral framework as well as the provision of foreign currency liquidity via swap agreements between central banks and central bank funding facilities for foreign currency liquidity. Lastly, there were financial sector policies that include the tools that were used to resolve the systemic banking crises. (Ait-Sahalia et al., 2012)

As far as the monetary policy is concerned, there were interest cuts associated with significant declines in the Libor-OIS spreads, with larger declines during the global phase of the crisis. More countries implemented interest rate cuts during that phase. These cuts may have reflected market's expectation that lower interest rates would increase liquidity in the financial system. Announcements regarding with unconventional monetary policy were followed by decreases in the interbank credit and liquidity risk premia. (Ait-Sahalia et al., 2012)

The global crisis showed that, at times of crisis funding liquidity through wholesale markets dries up. For that reason, there was a need for liquidity ratios to be introduced again after the 1970s. These ratios were the liquidity coverage ratio (LCR) and the net stable funding ratio (NSFR). In addition, the crisis proved the zero lower bound to interest rates to be real. Hence, there has been a call for unconventional expansionary monetary policy measures as mentioned earlier. The initial introduction of these means in 2009 led to a considerable immediate recovery to official interest rates on government debt as well as a reduction in the enhanced risk premia. However, with the official rates having already being reduced to levels near zero, it has not been clear whether subsequent rounds of these measures have actually done additional good to hit economies. (Goodhart, 2014)

Many central banks in the wake of the global financial crisis used the instrument of "forward guidance", announcing the future path of their monetary policy. This gave a guideline to the financial markets. (Breuss, 2016)

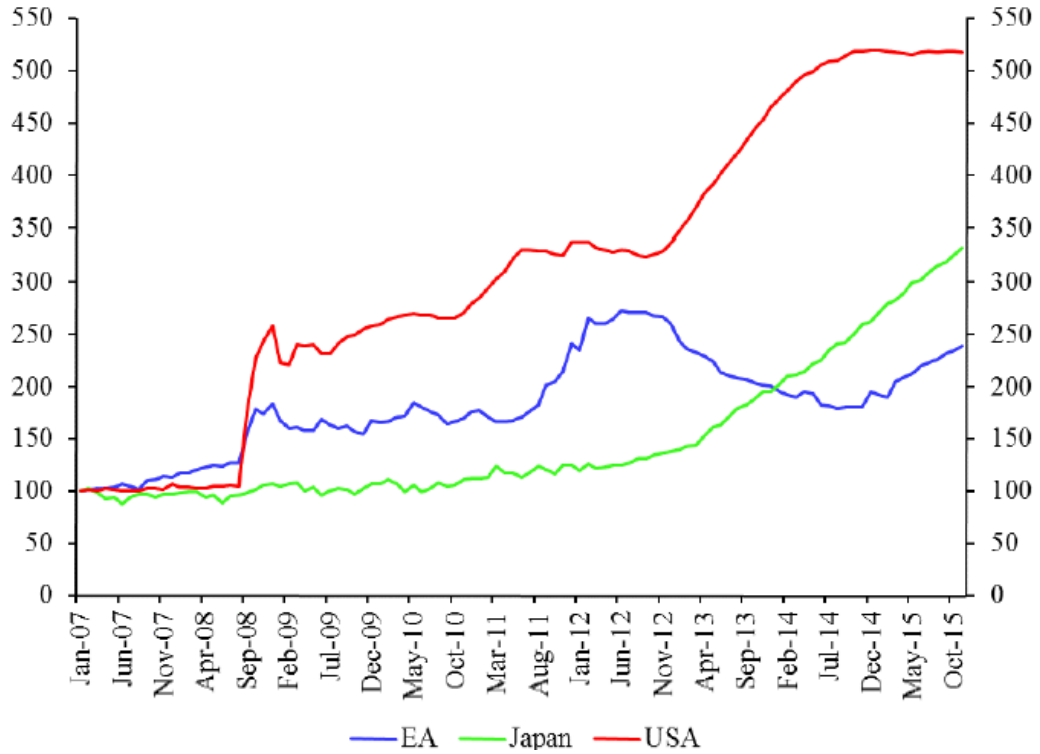
The table below shows the monetary tools that being used by the ECB, the FED, and the BoJ in the period from 2008 to 2017.

Table1: Monetary policy in the crisis– unconventional measures

ECB	Fed	BoJ
2008 – Fixe-rate full allotment – FRFA	2008 – Term-Auction Facility – TAF; Term Securities Lending Facility - TSLF	2008 – Securities Lending Facility - expansion
2008/2009/2011 – Long-term Refinancing Operations (6m, 1Y, 3Y) – LTRO	2008 – Primary Dealer Credit Facility – PDCF	2008 – Outright purchases JGBs
2009/2011/2014 – Covered Bonds Purchase Programme (s) – CBPP 2010 – Securities Markets Programme - SMP	2008 – Asset-Backed CP MMMF Liquidity Facility – AMLF (and MMIFF)	2008 – CP repo operations - expansion; Outright purchases CP
2012 – Outright Monetary Transactions (announcement) – OMT	2008 – Commercial Paper Funding Facility – CPFF	2008 – Special Funds-Supplying Operations to Facilitate Corp. Financing
2013 – Forward guidance	2009 – Term Asset-Backed Securities Loan Facility (ABS CMBS) – TALF	2009 – Outright purchases Corporate Bonds
2014 – Targeted Long-term Refinancing Operations - TLTROs	2009 – Liquidity to credit markets – consumer, small businesses CMBS – TALF	2010 – Asset Purchase Programme - APP
2014 – ABS and Covered Bond Purchase Programme – ABSPP, CBPP	2008/2010/2012 – Large-scale Asset Purchases – QE1, QE2, QE3 – LSAP	2012 – Loan Support Programme
2015 – Expanded Asset Purchase Programme – APP – QE: 3/2015 to 3/2017: €60 bn per months = €1500 bn. ("QE" = PSPP)	2008/2011/2012/2013/2014 QE4 – "tapering" Forward guidance (qualitative and quantitative)	2013 – Quantitative and Qualitative Monetary Easing (70 trillion Yen a year) under "Abenomics" 2014 – Expansion of QE (80 trillion Yen a year)

ABCP= High-qualityAsset-BackedSecurities;ABS=Asset-BackedSecurities;ABSPP= Asset-Backed Securities Purchase Programme; AMLF= Asset-Backed Commercial Paper (CP)Money Market Mutual Fund Liquidity Facility; APP= Asset Purchase Programme; CBPP=Covered Bond Purchase Programme; CMBS= Commercial Mortgage-Backed Securities; JGB=Japanese Government Bonds; LSAP=Large-Scale Asset Purchases; MMIFF=Money Market Investor Funding Facility; PSPP= Public Sector Purchasing Programme; SMP= Securities Markets
Programme; TALF=Term Asset-Backed Securities Loan Facility.
(Breuss, 2016)

Figure 2: Central bank's balance sheets (total assets)



(Breuss, 2016)

Table2: Central banks balance sheets and the monetary base: ECB in comparison

	Dates	TotalAssets(% GDP)	MonetaryBase (% GDP)	OutrightPurchases(% GDP)	OutrightPurchases(% totalassets)
ECB (Eurosystem)	Latest	20.7	15.2	5.2	25.4
	Peak (June2012)	26.2	18.0		
FED	Latest	24.5	22.7	24.3	99.1
	2007	5.8	5.7		
Bank of Japan	Latest	70.1	66.0	53.5	90.6
	2007	16.3	17.1		
Bank of England	Latest	23.4	21.7	20.9	89.5
	2007	5.4	4.4		

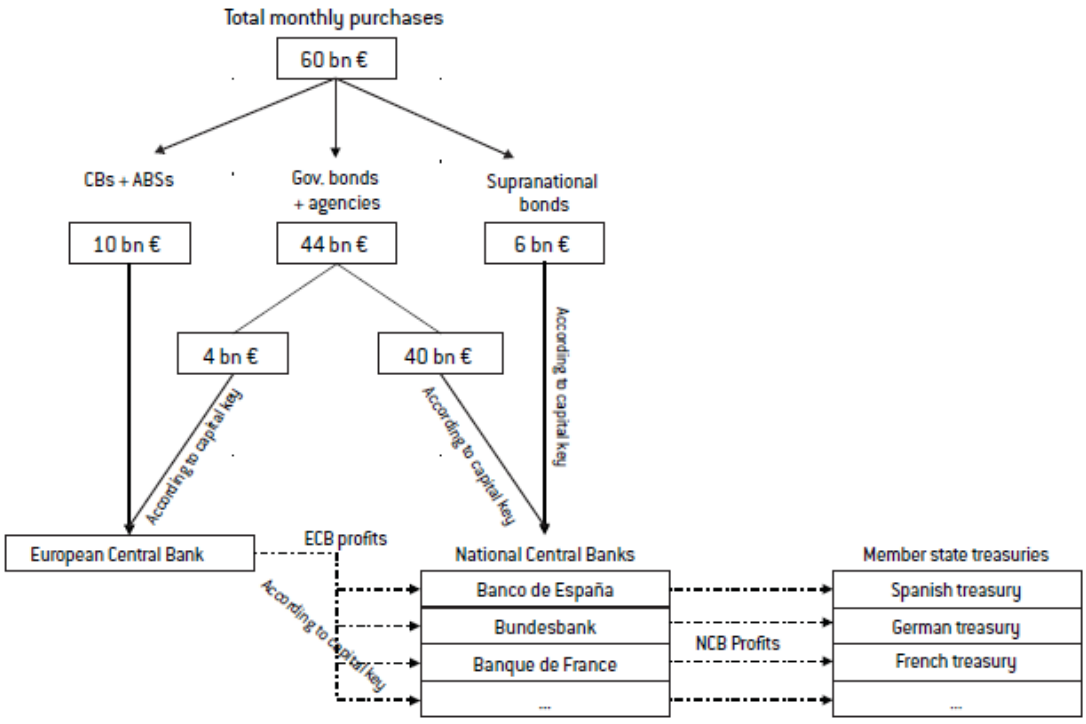
(Breuss, 2016)

7.1.3 ECB's Quantitative Easing

On January 2015, ECB announced a massive expansion of its asset purchase program. Under the new program, Public Sector Purchase Programme (PSPP), the Eurosystem would buy sovereign bonds from euro-area governments as well as securities from European institutions and national agencies. From its start the program had an open-ended horizon, meaning that would be extended if necessary.

ECB announced that the program will consist of monthly asset purchases of 60 billion Euros. 10 of these will be devoted to covered bonds and asset-backed securities. The remaining 50 billion will be directed to the PSPP. 6 billion per month , the 12% of the PSPP, will be used to purchase the debt of the supranational institutions located in the Euro area and denominated in euros. The additional 44 billion will be used to purchase sovereign debt securities, divided into 4 billion held by the ECB and 40 billion by the National Central Banks, and a part of these 44 will be used for bonds issued by national agencies. The outstanding amount of debt of the agencies is relatively small and they are located mainly in three countries, Germany, France and Spain. (Claeys et al., 2015)

Figure 3: Allocation of monthly asset purchases by the Eurosystem



(Claeys et al., 2015)

In order for a bond to be eligible for being bought in the secondary market, it must have a remaining maturity of 2 to 30 years, to be denominated in euros and eligible as collateral for ECB monetary policy operations. Finally, the Governing Council decided that bonds yielding less than the deposit rate, at that time -0.2 %, will be excluded from purchases. On top of these criteria, the Governing Council decided to set a 25% issue limit and a 33% issuer limit on Eurosystem holdings. The 25% is imposed to prevent ECB from having a blocking minority in a debt restructuring

involving collective action clauses. That simply means that ECB does not want to be in a position to block a potential vote on the restructuring ECB-held debt of a euro-area country. The 33% issuer holdings limit is set with aim of preserving market functioning and allowing the formation of a market price on a given security. Hence, one cannot hold more than 25% of the total eligible debt securities without breaching the issue limit, this means that ECB felt compelled to add this limit because the Eurosystem was already holding more than 25% of some bonds. A limit that primary concerned Greek bonds as was the only country that the Eurosystem was holding already more than 25% of the 2 to 30-years residual debt. (Claeys et al., 2015)

7.2 The Asian Crisis in 1997

Before the crisis, there was a great build-up of stocks of capital in the East and Southeast Asia. The starting point was the Plaza Accord in 1985 that led to a rise in the value of the yen against the US dollar. Japanese industries sought a new cheaper manufacturing base and the ground of Southeast Asia was an obvious choice as it was geographically close, the currency was pegged to the US dollar and had cheap, well-educated labor force. This led to an investment and exports boom in Southeast Asia. Increased exports allowed for more borrowing, more equity issues, and more direct investment. However, the burst of the bubble in Japan in 1990 left a legacy of bad debts in the banking system which besides all else, affected foreign direct investments in Asia. Moreover, an expansionary monetary policy that was conducted by the central bank of Japan resulted in an excess liquidity that spilled over into financial markets worldwide, increasing prices. With excess liquidity and extremely low inflation at home, lenders in the core countries were prepared to lend East and Southeast Asia at nominal rates even lower than the cost of domestic borrowing, and borrowers in this region were prepared to borrow abroad to take full advantage of the lower nominal rates. The foreign borrowing and lending was premised on the assumption that exchange rate will hold, because any change in the value of the domestic currency could erase any advantage. The Asian countries, except for Japan and Korea, operated in a fixed exchange rate regime, and their currencies were pegged to US dollar. That is the reason for making the assumption believable.

At the same time, these countries experienced a rather radical financial deregulation, like a near-removal of restrictions on the inflow and outflow of mobile capital, however, these deregulations occurred with little attention. An effect of this event was that inexperienced private domestic banks and firms were allowed to take out large dollar-denominated loans from foreign lenders with generous spreads. Thailand was the first victim of the crisis, fueled its fast-paced expansion with massive foreign borrowing, with Korea in the follow-up. On top of all these,

governments adopted the inflation targeting policy, making the exchange rates an anchor for the inflation control. This led to an extreme overvaluation of the currency, hurting exports. Meanwhile, before the crisis, East and Southeast Asia was the world's biggest pool of savings, where gross domestic savings were typically one-third of the GDP. This comes in contrast with the low income providing in the region. Most of the savers were households, and their risk preferences were not high, most of the savings were deposited in banks rather than invested in equities. On the other hand, firms were the system's borrowers and most of them had high debt-to-equity ratios, meaning they were more vulnerable to depreciation shocks.

To sum up, there were certain preconditions for the upcoming crisis. Firstly, there were very high rates of domestic savings, intermediated from households to firms through the banking system, thus creating a deep structure of domestic debt. Secondly, the fixed rates regimes created the perception of little risk in moving funds from one market to the other. Also, the liberalization of capital markets in the early 1990s and the deregulation of the domestic financial systems at about the same time, and without compensation of regulatory control. Lastly, the huge inflows of assets coming from Japan and Europe were being channeled through financial institutions scouring Asia for higher returns and lending at lower nominal rates than in domestic market, leading to a deep structure of foreign debt.

Inflationary pressures started the movement towards crisis. The inflow of capital in combination with the fixed exchange rate regime forced an increase in domestic money supply. In order to keep the exchange rate at its fixed level, the central bank has to buy foreign currency and issue domestic money in exchange. This led to an increase in inflation at around 6%. In turn, there were major shifts in exchange rates as US dollar appreciated against yen by 50% and then China devalued yuan by 35%. This turn of events put East and Southeast Asia in a really difficult position. These made the region to run big current account deficits of 4% up to 8% of the GDP, with Thailand having the biggest. In order to respond, investors turn to real estate.

As mentioned earlier, Thailand was the first one to be struck. The private sector-generated property bubble burst in 1995 and the stock market crashed in 1996. It ripped through the whole financial sector and onto the foreign exchange market as foreign investors saw that domestic borrowers were less able to meet the more expensive debt service changes on their short-term foreign loans. Economic growth and exports declined in a fast pace. With a prospect of baht devaluation that would break the peg, companies tried to sell their baht for dollars. Thai central bank tried to buy the baht to prevent the price from dropping but eventually gave up as reserves were extremely low. In 1997 Japan was threatening to raise interest rates in order to protect yen, these threats didn't come true but out of fear investors in Thailand sold their holdings in local currency and then the Thai baht floated and

sank. In August 1997 IMF provided a support package and conditionality measures that included the freezing of many finance companies. However, the freezing of these companies caused major panic to depositors. This troubled situation, passed to other countries as well as a form of contagion. And after investors' refocusing of risk, Malaysia followed Thailand's path and saw its currency float. One by one, the countries in the region were affected. Indonesia, suffered a milder crisis, following Taiwan, Hong Kong, and Korea.

A huge contractionary wave propagating itself through the region. International banks have cut credit lines to all borrowers, including the export-oriented companies that could have benefited from the currency devaluation. That is the biggest difference with the Latin American crisis of the 1980s. The resulting financial instability caused capital outflow, and many corporate sectors of the region are being sold to foreigners at really low prices or the recapitalized existing banks. This massive transfer to foreign ownership had affected the basic dynamic of the economy. (Wade, 1998)

Table 3 :Current account, NIA definition (% of GDP)

	1990	1991	1992	1993	1994	1995	1996	1997
Korea	-1.2	-3.2	-1.7	-0.2	-1.5	-1.9	-4.8	-1.9
Indonesia	-4.4	-4.4	-2.5	-0.8	-1.5	-4.3	-3.3	-3.6
Malaysia	-2.3	-14.0	-3.4	-10.1	-6.6	-8.9	-3.7	-3.5
Philippines	-6.3	-2.5	-3.2	-6.7	-3.7	-5.1	-4.7	-6.1
Singapore	9.5	12.4	12.4	8.5	18.1	18.0	16.3	13.9
Thailand	-8.7	-8.0	-6.2	-5.7	-6.4	-8.4	-8.5	-2.4
HongKong	8.4	6.6	5.3	8.1	2.0	-3.0	-2.4	-3.8
China	3.0	3.1	1.1	-2.2	1.2	0.0	0.5	3.6
Taiwan	7.4	6.9	4.0	3.5	3.1	3.1	4.7	3.2

(Corsetti et al., 1999)

7.2.1 Policy responses to the crisis

As mentioned, Thai baht was the first currency to be depreciated and then the contagion started, moving from country after country. The key to understand the steep devaluations of these currencies during the given period is the conduct of monetary policies before the crisis and after the first wave of depreciation. The first reaction taken by the monetary authorities against the speculative pressures in the foreign exchange market was to prevent a major monetary contraction and a rise in domestic interest rates. So, the first way to address the issue, Thailand and other countries at first the sterilized their interventions in the spot and the forward markets. When this approach turned out to be ineffective, they tried to discourage capital outflows with the introduction of limited capital controls targeting to

segment the onshore and offshore markets, while they left the domestic monetary stance untouched. However, under the current situation, capital controls could not help against speculative flows. Monetary policy in the region remained rather loose well into the crisis. Sharp devaluations continued to hit the currencies, and it was that moment that the monetary policy stance was changed. Central banks were held back by the concern that high-interest rates would only worsen the financial conditions of already indebted banks as well as other financial institutions. Such an increase would have slowed down the output growth. Taking into consideration the fragility of the banking system and the corporate sector, a monetary contraction would have led to a credit squeeze and this would have led to bankruptcies. A relatively loose monetary policy with the target to avoid further financial issues was extremely risky. As it eventually proved to be, it led a continuous spiral of currency devaluations that increased the real burden of the foreign currency liabilities. The depreciation set in danger the viability of the financial institutions and corporations, while the cost of bail-out was increased. After the further currencies depreciation and the increase in the real external liabilities, monetary authorities switched to a tighter monetary policy and credit conditions. However, the decision for acting like this was rather late and proved to have negative effects. It actually increased the amount of bad loans, created more financial problems for banks and firms and had a sharp deflationary effect on the level of real economic activity. (Corsetti et al., 1999)

7.3 The Japanese Asset Price Bubble

After the Second World War and until the early 1990s, Japan experienced a remarkable growth. By 1973, Japan's average annual growth rate was 7.4%. The following years, Japan experienced a decline in its growth rates, like many other countries at that time, with its level at 4% which still was rather higher than most of the other countries. As a result, the per capita output in Japan was extremely high. However, the rapid growth ended fast in the early 1990s. In 1992 and for the upcoming decade the annual growth rate was below 1%. This long period of slow growth is known as Japanese Recession. Many economists predicted the end of the crisis in 1996 and after that in 2000 but both of these predictions proved to be unmet. The unemployment rate underwent a minor increase, from 2.1% in 1990 to 5% in 2004. However, this could not be considered as evidence that Japan did well. Japanese companies offered insurance against unemployment for their employees. In other words, when the corporate sector suffered from a decline in its productivity, companies did not fire their employees. Additionally, the low growth rates and the high unemployment led to a steady fall of inflation. By 1995, Japan experiences negative inflation, deflation, which is a rather unique experience for a country.

In the 1980s, the Japanese Stock Exchange Market experienced a massive boom. The price of the Nikkei Index sharply increased, and inevitably started to rapidly fall in the following years. Such a sudden increase could be explained by two primary reasons. Firstly, with a change in a fundamental value of the stock price. For example, an increase in the current or the expected dividends. Investors will be willing to buy today at a higher price. This leads to an increase in the stock's price today. Another reason for such a case could be a speculative bubble. Investors will be willing to buy at a higher price today if they expect that the price will keep on rising in the future. Increase in the Nikkei Index developed in a financial bubble, the burst of it had a terrible impact on the Japanese economy, affecting the expenditures and the output. Investments, that thrived on in this bubble, suddenly collapsed. The fact that consumption had the lesser effect did not prevent the huge decline in the aggregate expenditure and in the GDP.

Monetary authorities tried to conduct monetary policy but acted too late. Monetary policy had to face the serious twin problems of liquidity trap and deflation. The nominal interest rate was high during 1990, near 8%. These rates can be explained due to the fact that Bank of Japan, out of fear for the increase of the Nikkei Index's price, tried to lower it by raising the nominal interest rates. Given a 2% inflation rate formulates a real interest rate near 6%. Because of the decline in the growth rate, Bank of Japan lowered the nominal interest rates, but it happened slowly and in 1996 nominal interest rates were lower than 1% affecting the inflation to drop below zero and actually be negative. As a result, the real interest rates were higher than the nominal interest rates and Japan fall into a liquidity trap. The short-term nominal interest rates were close to the zero bound. At the same time, unemployment was still high.

From 2003 an increase in the growth rates is observed, and the Japanese economy starts to recover. There are mainly three reasons aiding the recovery. Firstly, there is a change in the monetary policy. Under this condition in the Japanese economy and the liquidity trap, Bank of Japan was still in position to lower the interest rates by influencing inflation expectations. This, of course, was not easy to be achieved. Even if the central bank announces a target of inflation, people still have to believe the announcement otherwise would have no effect. In 2003 the President of Bank of Japan announced that the Bank of Japan will be committed to hold the nominal interest rates to zero until there is hard evidence of steady inflation. This announcement was considered believable and managed to shape people's expectations. Secondly, a reform of the banking system was needed. In 1990s banks in Japan were facing many bad loans. Many "bad" companies kept on being funded by banks when they should have closed. These loans made investments harder. Eventually, it got evident that a reform was needed both in the banking system and the corporate sector. This reform that started in 2002 would help the "good"

companies with higher productivity to raise output and also would aid investments to increase. Finally, a third reason for the recovery of Japan was the strong growth that the rest of Asia, mainly China, was experiencing. This growth led to a huge expansion of the Japan's exports. (Blanchard, 2012)

Japan in an attempt to cope with the crisis launched a quantitative easing policy (QEP) program. Bank of Japan provided excess reserves by using various tools for money operations, including an increase in the purchase of long-term government bonds. Bank of Japan adopted credit easing measures and unprecedented measures to secure the stability of the financial system. In theory, such an unconventional monetary policy could be implemented by the two elements of the central bank's balance sheet, its size, and its composition. The QEP consisted of three main pillars. The Bank of Japan altered its main operating target for money market operations from uncollateralized overnight call rate to the outstanding balance of the CABs held by financial institutions at the Bank of Japan. Secondly, The Bank of Japan committed itself to maintain the above procedure until the consumer price index inflation becomes positive, as mentioned earlier. Finally, the bank of Japan would increase the amount at the outright purchase of long-term Japanese government bonds up to a ceiling of the outstanding balance of banknotes issued, if it is necessary to secure a smooth provision of liquidity. (Shiratsuka, 2010)

8 Conclusion

As discussed in the present thesis, the Central Bank plays a major role in the proper functioning of the economy. Both in times of normality as well as in financial crises, the Central Bank is responsible to deliver the necessary policies in order to promote stability in the economic system and to resolve any financial disturbances that may appear.

Inflation targeting is in the center of attention for many of the Central Banks. Through it, the ultimate goal of price stability can be attained. Furthermore, a Central Bank should work on its communication channels, as it can prove useful to shape people's expectations. In that way conducting monetary policy becomes more efficient.

In addition, a Central Bank has many tools at its disposal that they can be distinguished between conventional and unconventional. Where the first are used most of the times, the latter are proven to be efficient in dealing with severe economic disruptions. A Central Bank may choose to make large-scale asset purchases when nominal interest rates have reached their lower bound and the economy is prone to fall into a liquidity trap.

Financial crises are a common phenomenon for a Central Bank to face. They are created, most of the times, by a bursting of a financial bubble. They require careful management as they can be extremely contagious to other countries. A Central Bank should be alerted in time and act accordingly. It needs to obtain flexible policies and work to pave the way for a successful intervention. The cases analyzed in the present thesis can confirm it.

In each of these cases, the burst of a financial bubble led to severe crises. It can be derived that even though Central Banks tried to contain the crises with conventional means, soon they realized that the use of unconventional measures needed to be taken. In addition, communication played an important role in coping with the given situation. Similarities in Central Banks' actions are easily acknowledged.

Along with this lesson, one should note the importance of Central Banks' cooperation and coordination in order to address a crisis, since it can easily be transmitted to other countries as well.

All in all, prices stability is vital for the smooth functioning of the economy, however, it is not suffice and a Central Bank needs to help every situation by preventing painful crises.

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