

Evaluation of the European Central Bank's Reactions to the Recent Financial Crisis within the Two-Pillar Framework

Economics
Master's thesis
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2009

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EVALUATION OF THE EUROPEAN CENTRAL BANK'S REACTIONS TO THE RECENT FINANCIAL CRISIS WITHIN THE TWO-PILLAR FRAMEWORK

The main objective of this paper is to evaluate whether the European Central Bank has been consistent in its monetary policy approach during the recent extraordinary financial conditions. The evaluation is conducted within the ECB's two-pillar framework. Both the central banks' interest rate setting behaviour and their liquidity providing actions have been studied. The effectiveness of all these actions has been mostly left outside this paper's focus.

The European Central Bank's policy framework is based on the two-pillar framework, which includes very thorough monetary and economic analysis. Cross-checking the results from the analysis the ECB should maintain price stability in the euro area. This current study shows that the integration process still underway in the euro area limits the ECB's pro-activity regarding extraordinary situations, as seen during the recent financial crisis.

The criticism laid on the ECB's actions is found to be partly justified in a context of the interest rate setting, while the liquidity providing actions have closely followed those conducted by other major central banks. The interest rate level lowering has been relatively slow in the euro area, especially when compared to the US. This is found to result mostly from the consistency of the ECB's policy, as well as misperceptions and forecast errors toward the evolution of the recent turmoil.

Empirical tests, which are loosely based on an earlier study by Gerlach (2004), further provide support to the consistency in the ECB's actions. They also show that since the ECB has still reacted to changes in real economic variables, it is likely that since the recent changes have happened extraordinarily fast, the models used have not been able to efficiently predict the future outcomes.

Overall, the most significant limitations for the ECB's policy framework, as well as for its flexibility and pro-activity in exceptional situations come through the disintegrated euro area. This makes the ECB's responsibilities much less straight forward than those of a central bank acting within a single nation state.

Keywords: The European Central Bank (the ECB), economic analysis, monetary analysis, financial crisis, the refinancing interest rate.

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1. Introduction

1.1 Motivation

The global economy has been hit by its most severe financial turmoil, at least since the Great Depression in the 1930s. In the autumn of 2008 dramatic weakening of the global financial industry, topped by the collapse of Lehman Brothers, led to a sudden disappearance of liquidity in the markets. Investors were unable to evaluate the credit worthiness of their counterparties or the value of extremely complex financial instruments. The values of these instruments created in order to provide liquidity from sources outside normal deposit institutions backed by the central banks. The warnings over the high credit expansion seen in several years, especially in the US economy, had been left unnoticed, and furthermore, both the European Central Bank (the ECB) and the Federal Reserve (the Fed) had maintained a low level of interest rates, thus supporting economic growth. Suddenly, the bubble blew up and faith was again placed in the central banks to maintain liquidity in the market in order to save the collapsing global financial system.

The European Central Bank has received numerous critical comments and evaluations from politicians, market participants and academics over monetary policy choices in Europe. Without question some of this criticism comes from good and reasonable reasons. It is widely accepted that the ECB, as well as most other institutions, failed in evaluating and estimating the strength and suddenness of the global financial crisis, which began in 2007. The ECB has been accused of acting too slowly, and with not enough power, thus enabling the US born crisis to spread across Europe with a tremendous pace and resulted in remarkable consequences in the economy of the area. The ECB has not even decreased the level of its main refinancing interest rate to zero, as the Fed has. Furthermore the explanations for this view have been more or less convincing. In December 2008, the ECB executive board member Lorenzo Bini Smaghi stated that the situation in Europe was “very different” from the US. He continued by saying that even though the Fed has used all of its ammunitions regarding interest rate policy, the interest rates to households and companies in the US have remained as high as in Europe despite the ECB’s claimed lack of correct policy actions. Neither does Mr. Smaghi forget to mention how the global financial crisis came about largely because of keeping interest rates too low for too long. (Di Leo, 2008)

The motivation behind this study is to find out, if it is possible to evaluate the reasons, why the ECB has acted as seen since early 2007 by focusing on the framework, which the ECB's policy is built on. Whether the ECB has truly been so misguided by its predictions and evaluations regarding the recent economic developments, that no reasons to act any differently were seen? Or whether the ECB has been closer to correct evaluations, but only because of some limitations in its current policy framework, it has not been able to follow other central banks' examples fast enough of fighting against economic slowdown. This would then mean that the ECB should not have received such hard criticism over its actions, rather the criticism should be put on the whole European System of Central Banks (the ESCB), and the way monetary and fiscal policies are conducted in the euro area. It is very much possible that the European Central Bank has only followed the given approach and framework to its monetary policy choices, based on the best future estimates available.

1.2 Objective, Methodology and Limitations

The main objective of this paper is to evaluate whether the European Central Bank has been consistent in its monetary policy approach during the recent extraordinary financial conditions. Has the ECB been following its own chosen path for monetary policy, as given to it in the Treaty of the European Community (The Treaty) and further clarified by the ECB itself, or has the ECB's approach to the monetary policy changed because of the global economic distress? The ECB's monetary policy framework includes two separate aspects, namely economic and monetary analysis, and differs, at least explicitly, from the Federal Reserve's approach to monetary policy, its main goals and targets. This paper is searching for evidence whether the widely criticised actions of the ECB can result from the consistency of monetary policy actions and goals, rather than serious misperceptions over the economic conditions, as criticised by several authors and commentators.

The time-frame limitation for this paper is such that the evaluation will cover central banks' actions until early 2009. Any forecasting of future monetary policy decisions will be left outside the scope. Also, it will not be relevant to estimate the effectiveness of the most recent policy actions, since there exist lagging periods before the benefits of the actions are visible in the economy.

1.3 Structure of the Thesis

The main objective of this paper being to evaluate the consistency of the European Central Bank's monetary policy, it is first necessary to provide some background information of the common European system of central banking. This part, including a characterisation of the ECB's policy framework and some statistics illustrating it, is covered in chapter 2. Chapter 3 moves into more theoretical issues regarding the central banks' role during financial crises. The recent reactions by the central banks to the global financial turmoil are listed and discussed in chapter 4. Chapter 5 contains a short empirical testing about the consistency of the ECB's interest rate setting process related to changes in inflation expectations, money growth developments and future economic outlook. Chapter 6 then summarises the results and draws an overall picture of the ECB's role in recent times.

2. The European Central Bank, Mission and Strategy

This chapter covers the main characteristics behind the European Central Bank's decision making process and its pivotal focuses over economic progress in the euro area. By starting from the history and establishment of a common central bank in the euro area, we gain a deeper understanding of some of the geopolitical issues affecting today's monetary policy decisions. Furthermore, this section reflects the fact, that while the integration process in the European economy is yet undergoing, and certainly not finalized, it has already come a long way since World War II. We will further continue by explaining the mission and objectives of the ECB's monetary policy instruments available to implement the chosen policy, and some limitations, which the central bank is currently facing in the euro area. After this, we will take a closer look at the two-pillar approach of the ECB's policy framework. The focus will be on both theoretical and practical issues.

The rest of the chapter reviews the heavily stressed role of price stability behind the ECB's policy, and explains how the fiscal policy in the current European context is conducted. Regarding the role of price stability we are mostly interested in finding out how this role can have affected the recent, widely criticised, monetary policy decisions in the euro area. Regarding the fiscal policy, a short comparison between the US, Japan, and the euro area is necessary in order to understand differences in the fiscal policy stances among these regions. Finally, we bring the chapter together with some conclusions.

2.1 History

The European central bank has evolved over time, through various stages, treaties, and communities. One of the starting points could be the European Economic Community (EEC), which was established in 1958 by six Western European countries.¹ In 1962 the EEC made its first proposal for an economic and monetary union, and by 1979 the European Monetary System (EMS) was created (Scheller, 2006). Other major steps on the road to the European Monetary Union (EMU) and the common currency euro, were the European Council's agreement in June 1989 on the realisation of EMU, and the Treaty on European Union (the

¹ These six countries were Belgium, Germany, France, Italy, Luxembourg and the Netherlands. The same countries had already in 1952 established the European Coal and Steel Community (ECSC).

Maastricht Treaty) in February 1992, which eventually led to the establishment of the European Central Bank (ECB) and the European System of Central Banks (ESCB)²

The legal basis for the ECB alone distinguishes it from the US Federal Reserve System or the Bank of Japan for the simple reason that the present European Union is not a nation state. Also, it is noticeable that EU membership does not automatically guarantee that a country will become a member of the euro area. This lack of automatic implementation can either be a country-, or ECB-based decision. Thus, while the Federal Reserve, Bank of Japan (BoJ) and the Bank of England (BoE) are the monetary authorities of their respective national states, the ECB conducts monetary policy among an economic area consisting of widely autonomous states. The integration process in the euro area is still developing further, and this process certainly has an influence on the ECB's policy actions.

The lack of a common fiscal policy in the euro area is one limiting factor when the central bank tries to stimulate economic growth in the euro area. Whereas in the US, the central bank and the finance ministry have shared a common worry and been able to cooperate effectively against the recent turbulence in the economy, the same has not been the case in the euro area. The integration process for the common European financial system started from the monetary side, by the establishment of the European Central Bank, who is responsible for price stability through the monetary policy among all member states.

The other side of the coin, regarding the birth of a fully integrated financial union, is fiscal policy. Based on the modern ideas of Keynesian and New-Keynesian styles of economic approaches, fiscal policy is an important part of decreasing the effects of regular economic cycles. Furthermore, fiscal policy plays a central role in a crisis situation as seen in recent years. In the context of today's disintegrated euro area, fiscal policy is still maintained at national levels, thus providing each nation state in the euro area a possibility to better concentrate and influence their own local priorities. And even though some common fiscal targets among the nations have been declared, very few of these are yet legally binding. This is

² There is an excellent introduction to the road to the euro, and to the birth of the ESCB and the ECB in Hanspeter K. Scheller's book (2006): "The European Central Bank. The History, Role and Functions".

a characteristic of the euro area, which creates difficulties, also, for the ECB, when fighting against current financial turmoil.

There has been much discussion over the ECB's limited flexibility regarding quick changes in monetary policy. The limiting factor here again is the structure of the euro area, including numerous autonomous states, with numerous autonomous parliaments and governments, each having their own preferences regarding economic and monetary policies. The ECB is an independent institution, but has not yet been completely convincing as such. Worth noticing is also that the common central bank in Europe does not have a history of many decades. While the Federal Reserve has seen several difficult eras during the 20th century, thus gaining learning experiences, which have further supported development of more effective central banking, the ECB lacks this kind of experience. One could say that the real smart ones learn from other's mistakes. Unfortunately, the environment in which the ECB must conduct its policy is far from the Fed's situation, as the President of the ECB Jean-Claude Trichet (2004) has described it, "...the ECB, which has been put in charge of the monetary policy of a totally new economic entity." The complexity and disintegration of the euro area is an important aspect regarding the ECB's policy reactions in a crisis situation, as seen in 2007-2008.

2.2 Monetary Policy

The monetary policy of the ECB was initially set up in 1998, and during the first years it received wide academic criticism over being too difficult to evaluate, including not enough predictability, and being too vague (ECB, 2004). Mostly because of this criticism, the policy was further clarified in 2003.³ Clearly, after this clarification the ECB began establishing a stronger position, not only in the European economy, but also in a more global perspective. With a strong commitment to its main objectives, the ECB gained high levels of accountability, transparency, and effectiveness of communication - all of which are high priorities for a central bank to function effectively. This evolution was relatively fast, mainly because of effective policy actions by the ECB, but the process was also further supported by ongoing stable economic conditions in the euro area. On the other hand, maintaining price stability was not supported by a slow pace of structural reform in the euro area (Meltzer, 2008).

³ Press releases related to both 1998 and 2003 policy announcements are available at www.ecb.eu/pub

The first element of the ECB's monetary policy strategy is a quantitative definition of price stability. In addition, the strategy includes a framework, which ensures that monetary policy decisions are explained to the public in a clear and transparent manner. This open communication has been widely supported by academics (Rudebusch, 2008a). As stated above, strong commitment to the main objectives in addition to effective and reliable public communication has led the ECB to gain a strong position in the euro area.

2.2.1 Objectives

“The ESCB is entrusted with one overriding objective: to maintain price stability. This goal is its single most important objective, the reason for which the System is created, briefly: its raison d’etre.” (Smits, 1997).

First and foremost the European Central Bank acts to maintain price stability in the euro area.⁴ This stability has been further explained and clarified, as maintaining the HICP (Harmonized Index of Consumer Prices) level at below but close to 2.00% per annum.⁵ Thus, the ECB has a clear inflation target, which is the leading indicator for its monetary policy. When compared to the Fed, the mandate for the ECB focuses heavily on the issues around inflation and price stability, while the Fed is also explicitly responsible for following more strictly the growth rate, level of employment, and overall conditions in the US economy.⁶ Later, when talking about the two-pillars behind the ECB's policy decisions, it becomes obvious that similar economic indicators are not overlooked in the ECB's policy either, but they are used more as a 'cross-check' for the chosen policy actions. In the euro area the central bank is not, at least explicitly, mandated to maintain economic growth or a certain level of employment. Differences in the role of economic analysis could create a remarkable factor affecting the central bank policies, especially during times of financial turmoil. This issue will be looked at more carefully in section 2.3.

⁴ Article 105 of the treaty establishing the European Community begins: “The primary objective of the ESCB shall be to maintain price stability.”

⁵ This formalization was announced in 2003. Initially in 1998, the target was, “Price stability shall be defined as a year-on-year increase in Harmonized Index of Consumer Prices (HICP) for the euro area of below 2.00%. Price stability is to be maintained over the medium term.” (ECB, 2004).

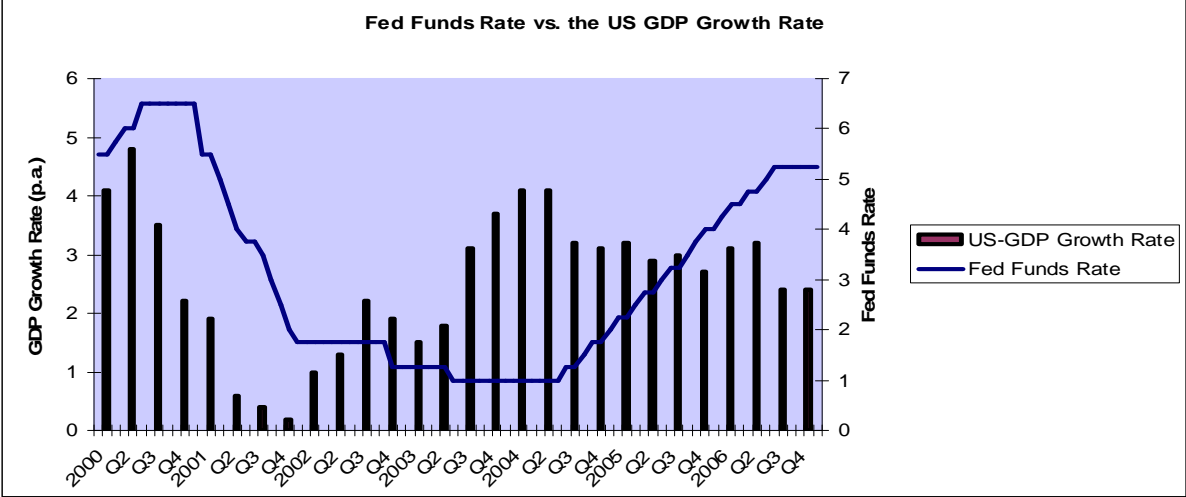
⁶ The Federal Reserve Act specifies that the Federal Reserve should, “promote effectively the goals of maximum employment, stable prices, and moderate long-term interest rates.” (Federal Reserve Act, section 2A).

It is yet way too simplified to state that the ECB exists only to maintain the price stability. The Treaty mentions, that “*without prejudice to the objective of price stability, the ESCB shall support the general economic policies in the Community with a view to contributing to the achievement of the objectives of the Community as laid down in Article 2*”.⁷ Article 2 mentions very similar objectives, as seen in the Federal Reserve Act, including: “a high level of employment, sustainable and non-inflationary growth, a high degree of competitiveness and convergence of economic performance”. During the discussions over the constitution of the European Union, some politicians have even proposed that supporting sustainable growth and high levels of employment should be raised to an equal footing as regards the primary objectives of the ECB (Lenihan, 2006). It is incorrect to claim that the ECB only focuses on the inflation level, but compared to the Federal Reserve, the leading indicator behind policy decisions is the outlook for the euro area’s price stability. This is a difference worth keeping in mind when evaluating the choices made by the ECB in the recent economic storm.

The role of the Federal Reserve as a responsible player regarding economic growth in the US is easily seen by looking at Figures 1a and 1b. These figures include the GDP growth rates and implemented interest rate levels in the US and in the euro area between 2001 and 2006. Both areas faced a slow pace of GDP growth in late 2001 and early 2002. The Fed, having a mandate including a responsibility for creating economic growth heavily decreased its fed funds rate from over 6.00% down to 1.75%, and kept decreasing the level in 2003 and 2004. The main purpose of gaining a stronger growth rate in the US GDP was attained. In this point of view, the results were good and clearly visible. The GDP growth rate having been almost 0 in the last quarter of 2001, it rose to over 3.00% p.a. by autumn 2003.

⁷ Lenihan (2006) further points out that the wording of the second part of the ESCB’s strategy is really, “...to support general economic policies (plural) in (rather than of) the Community.” This reflects the fact that the primary responsibility for economic policies is left to the member states rather than the community. The EU Growth and Stability Pact defines some of the main targets and guidelines for these policies.

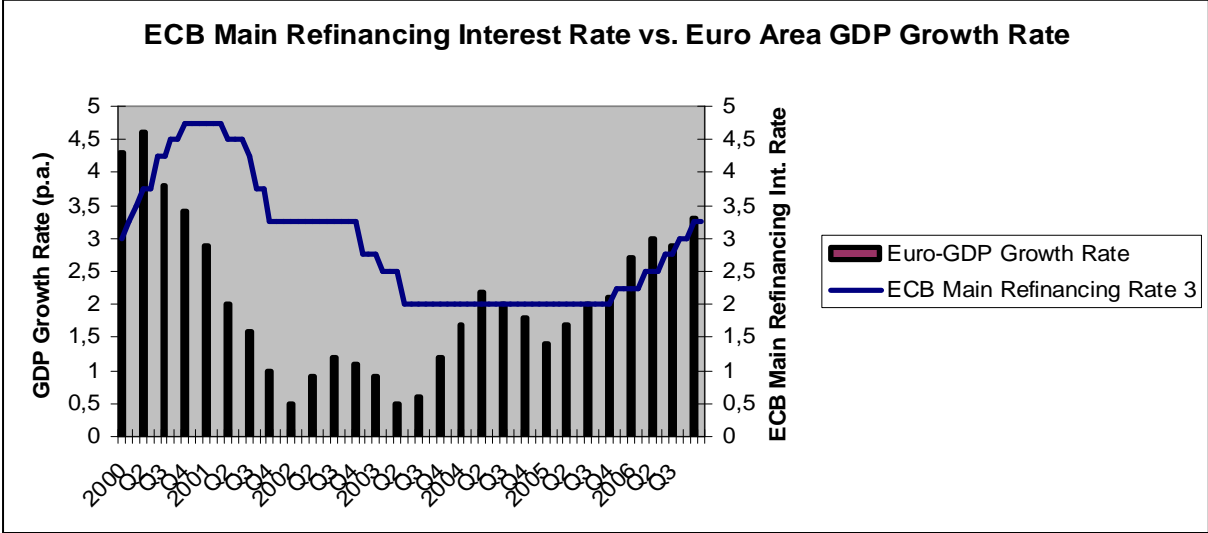
Figure 1a: Fed Funds Rate and the US GDP Growth Rate 2000 (Q1) – 2006 (Q4)



Source: Bureau of Economic Analysis and Federal Reserve (www.tradingeconomics.com)

The European Central Bank’s focus being on maintaining the target inflation level, it did not change interest rates as heavily as the Fed reacting to slow GDP growth rate faced in early 2002. The ECB’s main refinancing interest rate was maintained at 3.25% p.a. until December 2002, when it was decreased to 2.75% p.a. At this point, the fed funds rate was already at 1.25% p.a. The less remarkable decreases by the ECB may also have played a part in much less rapid increase in the growth rate of the GDP in the euro area, compared to the one seen in the US.

Figure 1b: ECB Main Refinancing Interest Rate and Euro Area GDP Growth Rate 2000 (Q1) – 2008 (Q4)



Source: European Commission and European Central Bank (www.tradingeconomics.com)

Regardless of the differences in interest rate levels between the euro area and the US in 2002-2006, as seen in Figures 1a and 1b, both central banks have been accused of maintaining too low an interest rate level for too long. This is seen as another leading reason behind the recent economic problems. As Buiter and Sibert (2007) state, *“The problems we are seeing today are the result of four to five years of (1) excessively low risk-free interest rates at all maturities in the US, Euroland and Japan, and (2) ludicrously low credit risk spreads across the board (not just in the subprime mortgage markets).”*

During the recent liquidity crisis, there has been wide discussion over the central bank’s role as a lender of last resort, and how effectively it could and should provide liquidity in the market. Central banks all over the world have been forced to create ways to support the economy, after the sudden shocks in the latter part of 2008 when liquidity in the market was totally lost, and banks, as well as other business entities were fast running out of cash and thus having serious difficulties to continue their operations. Suddenly, there was no-one, except governments and central banks, who were considered reliable counterparties for lending money.

More difficulties have arisen because of overly imaginative financial innovators who have created ever more complex new financing tools. Perhaps the most discussed innovation is the process where home mortgage loans were made available as investment opportunities through the process of securitisation. Especially in the US this field grew so fast that no credit rating agency, who were to evaluate and provide these new instruments with a certain risk categorisation, was able to keep up with the pace (Diamond & Rajan, 2009). Even though this development was more visible in the US than in the euro area, the global economic framework has spread the consequences of misinterpreted risks around the globe, as seen in fall 2008, when liquidity in the market suddenly disappeared.

Maintaining financial stability in today's highly integrated European banking system has been seen as a difficult task to solve.⁸ Under normal conditions the financial stability in the euro area is managed at the national level. In particular, fiscal competence to deal with the banking crisis is the responsibility of national governments (Goodhart & Schoenmaker, 2009). Now, under the global financial crisis there have existed some contradictory opinions over the role of the central bank in returning and maintaining financial stability. Certainly, there exist differences regarding this issue, depending on whether analyzing a single nation framework, such as the Fed in the United States, or a multinational monetary area, such as the ECB and the euro area.

Explicitly, neither the Federal Reserve Act nor the Treaty limits the central banks' possibilities to support economic growth in their corresponding areas. Yet, contradiction exists. When the Act states: "*the economy's long run potential to increase production, so as to promote effectively the goals of maximum employment, stable prices, and moderate long-term interest rates,*" the same in the Treaty is, "...to promote **throughout the Community a harmonious and balanced development of economic activities**⁹, sustainable and non-inflationary growth respecting the environment, a high degree of convergence of economic performance, a high level of employment and of social protection, the raising of the standard of living and quality of life, and economic and social cohesion and solidarity among Member States.". Hence, if an economy is hit by sudden turbulence, the ECB should first be certain that the downturn affects all numerous individual nation states in the common monetary policy union.

By looking at the mandates given to the ECB and the Fed, there are a few issues related to handling a financial crisis worth noticing. First of all, the ECB's main task being so strongly centered around price stability, this must limit its possibilities to react to temporary disturbances as flexibly as the Fed can. On the other hand, the whole working environment, in which the ECB must conduct its policy, is so complex compared to the United States that regardless of relevant similarities in the policy tools available, the lack of common fiscal policy alone has decreased the power of policy-lead stimulus packages in Europe. Next, the

⁸ Goodhart & Schoenmaker (2009) provide more theoretical modelling of fiscal burden sharing on possible recapitalization of failing cross-border banks in the euro area. They show that more localised (specific) burden sharing results in better cost-benefit value than more collective generic burden sharing.

⁹ Bolding added by the author.

main instruments for the European Central Bank to implement its policy decisions and to support and maintain any possibly liquidity needs are discussed.

2.2.2 Instruments

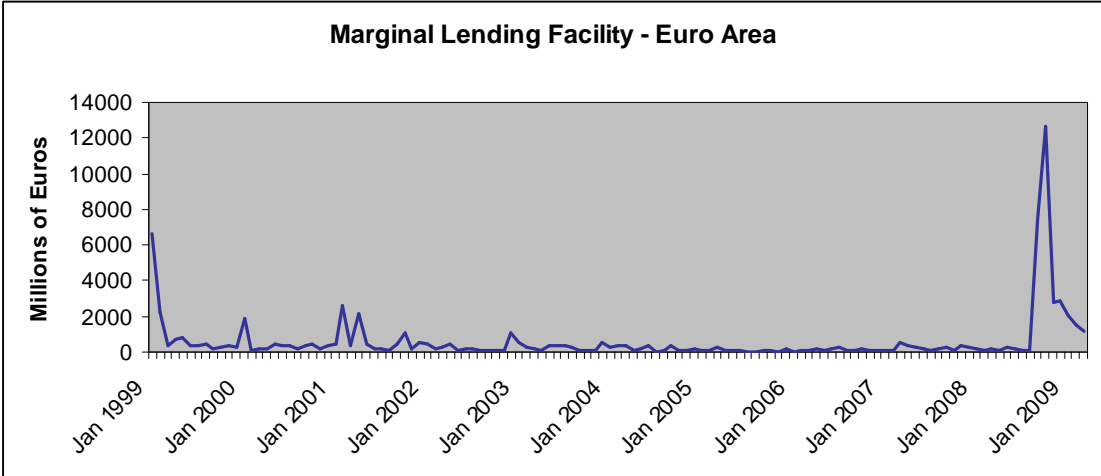
In this part, the main instruments which the European System of Central Banks (ESCB) uses in order to reach its objectives will be covered briefly. Introductions of the instruments will follow the order of the ECB's booklet "The implementation of monetary policy in the euro area, November 2008." Some relevant comparisons with other central banks, especially with the Fed, will also be made. For the purpose of this paper, it will be interesting and important to gain an understanding of how differences in available instruments may have led to different policy decisions during the recent financial turmoil. Hence, it may be that part of the criticism directed at the ECB is only based on the fact that in the euro area there are limited instruments available to conduct monetary policy, compared to those available in the US. These possible legal or statutory differences create an important issue for us to examine.

First of all, the most common monetary policy instrument for a central bank is to conduct different open market operations. With the ECB this includes five types of instruments: 1) reverse transactions, 2) outright transactions, 3) issuance of debt certificates, 4) foreign exchange swaps, and 5) collection of fixed-term deposits (ECB, 2008). These operations can also be classified according to their aims and regularities. This classification then includes all of the following: main refinancing operations, the longer-term refinancing operations, fine-tuning operations, and structural operations. While the main refinancing operations are the most pivotal in pursuing the objectives of the ECB under normal circumstances, it has been the fine-tuning operations, which have played the biggest and most noticeable role during the current turmoil. The fine-tuning operations are used to manage shorter term liquidity situations, which have been especially critical during the last year. These are the central bank's main tools for unexpected sudden changes in liquidity situations. In chapter 4, we will take a more careful look at how these tools have been used lately, and why some academics have written so negatively and pessimistically on these actions.

Another important set of instruments has recently been standing facilities. These are aimed to provide or absorb overnight liquidity, hence signalling the stance of monetary policy and

affecting the overnight market interest rates. Generally, there are two separate facilities available, the marginal lending facility and the deposit facility (ECB, 2008). The former basically sets a ceiling for the overnight market interest rate, while the latter sets the floor level. Normally, these rates are not tempting for banks, since market rates are better for them. This is to say that these instruments serve only to provide and absorb liquidity in exceptional circumstances. This becomes clear when looking at Figure 2, which illustrates the levels of marginal lending facilities used in the euro area since 1999. Times of financial or economic turmoil draw peaks onto the graph.

Figure 2: Marginal Lending Facility in the Euro Area since 1999



Data: European Central Bank, Statistical Warehouse. <http://sdw.ecb.europa.eu/home.do>.

The third main instrument used by the ECB is the holding of minimum reserve requirements to credit institutions in the euro area (ECB, 2008), thus again influencing the liquidity in the market, and also stabilising money market interest rates. The latter is performed mainly by so called averaging provision.¹⁰ The reserve requirement system is more essential in the ECB’s system, than for the Fed or the Bank of Japan. The latter central banks’ levels for reserve requirements are relatively much lower than the ones held in the Eurosystem. The most extreme case is the Bank of England, which does not impose any reserve requirements subject to averaging. Hence, while the ECB here has another tool for liquidity management, the other main central banks have to be more focused on daily developments and hence to operate on

¹⁰ For the ECB, averaging provision means, ”A provision allowing counterparties to fulfil their reserve requirements on the basis of their average reserve holdings over the maintenance period. The averaging provision contributes to the stabilisation of money market interest rates by giving institutions an incentive to smooth the effects of temporary liquidity fluctuations.”

the basis of daily, or more than daily, open market operations. This difference provides another support for the ECB's more stable policy framework, also regarding the implementation phase.

2.2.3. Limitations

Some of the limiting factors regarding policy decisions and implementations have already been touched on including the heterogeneity of the euro area. Conducting monetary policy that would benefit all member states in the area is not only a politically fragile issue, but also includes some more legal or statutory problems. These have become a part of politicians' and academics' discussions, while central banks have been forced to modify their policy instruments.

A decentralised Eurosystem with regional central banks having a strong voice in the decision making process, provides us with another explanation for the ECB's lack of proactive policy moves. In terms of voting power, the position of the Executive Board within the Eurosystem is relatively weak (de Haan, et.al., 2005). This is not the only noticeable limitation for the Executive Board. The Board has the responsibility to set up meetings of the ECB Governing Council, but it does not have an exclusive power of initiative. Also, the Executive Board has no budgetary autonomy, since the Governing Council has to approve the budget. Perhaps most remarkably, considering the recent times, is that the ECB has no control over the many activities performed by national central banks. They are free to perform certain functions. The ECB is able to restrict some of these functions with a two-thirds majority decision, if these are seen to interfere with the objectives and tasks of the Eurosystem (de Haan, et.al., 2005).

Overall, the limitations for the ECB come mainly through the decentralised working environment, in which it conducts policy decisions. Although, under more stable economic conditions most of national central banks are usually in line with the ECB regarding common objectives and targets, this may have changed under the recent financial turmoil. These objectives are led by the price stability goal, which has been under severe pressure in several national central banks' decisions, since they have been more or less forced to support their suffering local economies, thus giving up some of the main guiding principles regarding price stability. The less effective the ECB is, the more incentives there are for national central banks

to deviate from common monetary policy guidelines. The ECB should consider this in its decision making process. Furthermore, the increasing centralisation in the euro area will make common monetary policy ever more effective in the future.

2.3 Two-Pillar Approach

“No central bank has so far made a commitment to a simple instrument rule like the Taylor rule or variants thereof” (Svensson, 2003).

The European Central Bank has assigned a special role to money in its decision making process, and also received a lot of criticism over this. Most inflation-targeting central banks do not focus heavily on monetary aggregates (Beck & Wieland, 2007). The ECB's two-pillar strategy, on the other hand, includes both economic and monetary analysis. There has never been a formal mathematical exposition of the strategy published, but throughout its history the ECB has clearly stated that it distinguishes between these two types of analyses, and the decisions over the monetary policy in the euro area are based on both these analyses (Beck & Wieland, 2007).

As the ECB's policy cannot be said to be an inflation-targeting strategy, Rudebusch and Svensson (2002) name it *“a combination of a weak type of monetary targeting and an implicit form of inflation targeting.”* The reason is that the ECB does not follow a simple formulation in which money growth is an intermediate target variable, such that it is always brought in line with reference value. While the first pillar focuses on this monetary issue, the second contains more widely evaluated topics and variables related to inflation forecasts. Yet, there exists no direct and public comparison of an inflation forecast to an announced target. According to Rudebusch and Svensson (2004) this is an important element of an explicit inflation targeting strategy. Hence, the ECB's policy does not fit fully into any traditional theoretical central bank policy model.

Note here that even though no central bank, at least explicitly, follows a simple instrument rule, the Fed does include the Taylor rule in the context of its booklet about the role and monetary policy tools and framework in the US. This is another demonstration, that the Fed's role is much more economic output oriented than the ECB's. Yet, it needs to be stressed that

the Fed does not at any point claim that its monetary policy decisions would be based on the Taylor rule, or any of its variants.

The two-pillar approach to monetary policy is how the ECB characterises its regular analyses and justifications behind policy implementations. There are two clearly distinctive parts of macroeconomics evaluated, namely economic and monetary issues. These provide the basis for the ECB's monetary policy decisions, regarding the level of interest rates and other liquidity providing or absorbing actions. Next, these two pillars will be studied more closely.

2.3.1 Economic Analysis

This economic analysis assesses the short- to medium-term determinants of price developments. This part of the strategy focuses on real activity and financial conditions in the economy (ECB, 2004). Obviously, during the last several years, this analysis has played an increasingly important role in the decision making process of the ECB. In an environment with relatively stable short- and medium-term expectations for economic conditions, it has not been a difficult task for the ECB to maintain targeted price stability. Difficulties, however, may arise when the economy is hit by some sudden shocks affecting the short- and medium term conditions. A central bank willing to maintain a certain level of inflation in the medium term will have to decide how serious these shocks are, how the longer term conditions will be affected, and if these effects will have any specific impact on future inflation, hence on price stability. Depending then on the mandate given to the central bank, it may either focus more on short-term growth expectations for the economy, or maintain its longer term perspective toward price stability, even though it may further strengthen some short term negative changes in economic conditions.

The ECB's economic analysis tries to take into account all factors which are helpful in assessing the dynamics of real activity and likely developments in prices. The ECB's governing council's target is to have a comprehensive understanding of the prevailing economic situation, focusing especially on awareness of the specific nature and magnitude of any disturbances. Regularly reviewed variables are those relating to developments in overall output, demand and labour market conditions, a broad range of price and cost indicators, fiscal policy, and the balance of payments for the euro area (ECB, 2004). In addition, developments

in financial market indicators, asset prices and developments in the exchange rate are also closely monitored. Many of the economic variables listed above are often discussed in the ECB's monthly bulletins. This illustrates the comprehensiveness of the decision making process, and stresses the weight given to any threats regarding price stability.

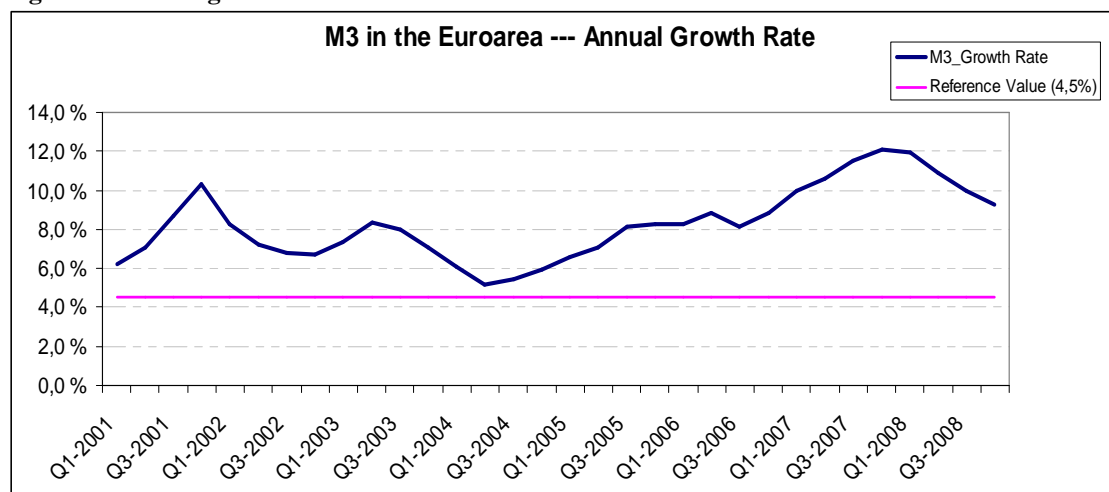
2.3.2 Monetary Analysis

A number of academic studies (Assenmacher-Wesche & Gerlach, 2007, Svensson, 2003, etc.) on monetary growth and inflation have shown that a close relationship exists between these two when focusing on medium to long run perspectives. In a short-run this relationship does not seem to be particularly strong (Assenmacher-Wesche & Gerlach, 2007). Since the ECB's main objective is to maintain price stability in the medium-term horizon, these findings have given a justification to use monetary aggregates as reliable and firm measurements of future expected inflation development. Hence, monetary analysis plays an important role in the decision making process of the ECB. The importance of this role has been further emphasised by setting a certain reference value for monetary growth,¹¹ as regards to the main objective of having a target value for the inflation level.

Looking at Figure 3, it is noticeable that since 2001 the actual M3 growth rate in the euro area seems to have been clearly higher than the initially set reference value of 4.5% p.a. This then, at least partly, indicates that just as the ECB stated, monetary policy cannot react mechanically to deviations of the M3 growth from the reference value, since these deviations can also occur because of several factors caused by institutional changes (ECB, 2004). For example, during 2007-2008 there has been a strong movement in money holdings, mainly relating to flat yield curve, thus making shorter term investment options more attractive relative to less liquid components (Trichet & Papademos, 2008). This movement will lead to an overestimation of the growth rate of M3 in a short-run. The ECB's monetary analysis will, at least theoretically, attack this problem effectively by extending its analysis far beyond the assessment of just M3 growth rate relative to its reference value.

¹¹ The ESCB will monitor monetary developments against the reference value (4.5% p.a.) of three-month moving averages of the monthly twelve months growth rates of broad monetary aggregate M3. For more information, see the ECB's press release on December 1, 1998. Available at http://www.ecb.int/press/pr/date/1998/html/pr981201_3.en.html

Figure 3: Annual growth rate of M3 in the Euro area 1/2000 – 2/2008



Data: www.OECD.org

The previously stated reference value is not a strict monetary target but a benchmark for analysing the relevant information. As Rudebusch and Svensson (2002) put it, *“This strategy appears to be a combination of a weak type of monetary targeting and an implicit form of inflation targeting.”* They continue, *“Nevertheless, the Eurosystem has made it clear that deviations of money growth from the reference value will be treated as a major factor in its policy decisions.”* Figure 3 supports the slightly less important role played by the variations from the M3 growth rate reference value. On the other hand, this is evidence that the ECB’s monetary policy is not based only on monetary analysis, rather the two-pillars provide a wide base for each implemented decision.

The context of monetary analysis is not limited to the assessment of the M3 growth. Several other monetary variables are monitored on a regular basis as well. One often mentioned in the editorials of the ECB’s monthly bulletins is the development in the components of M3. This factor is one of the explanations for the long lasting variation from the reference value. For example, in May 2007, a couple of months before the ECB’s controversial decision to increase its main refinancing interest rate, the annual growth rate of M3 was 10.9%, clearly above the reference value. The interest rate decision was still pushed forward since the editorials stated that

“Short-term monetary and credit developments can be affected, inter alia, by the shape of the yield curve and external factors, and be subject to some degree of volatility. Looking through such transitory aspects, there are, however, several indications that higher short-term interest rates are influencing monetary dynamics, although they have not, as yet, significantly dampened the overall strength of these dynamics. For example, increases in short-term rates have served to moderate the expansion of the narrow aggregate M1, in recent quarters, but its annual growth is still robust.”
(ECB’s Monthly Bulletins, May 2007)

Another important factor is changes in credit extended to the private sector. Note here, that this is probably one of the factors receiving increasing attention in the future, since this relates to an important issue behind the recent financial turmoil, namely a credit-bubble.

2.3.3 Cross-Checking

The cross-checking procedure in the ECB’s policy operations only means that the economic and monetary analyses are both taken into account in the decision making process. This is to limit the possibility of clear errors that could result from blindly following the growth rate of money in the economy. This could cause the central bank to conduct too strict a monetary policy, which eventually leads to slowdown in economic activity, and then possibly unnecessary actions by the central banks and governments to further boost the depressing economy. Unnecessary, as these actions could have been avoided by a correct analysis about the true reasons behind temporary acceleration in the growth rate of M3. The correct analysis, in the ECB’s framework, should be received through the cross-checking procedure. A more theoretical examination of the purpose of the ECB’s cross-checking method is provided by Beck and Wieland (2007).

The ECB’s monetary policy strategy has not proved to be easily digestible to academics, even less so to politicians and the public. The ECB’s two-pillar strategy can be seen as a good example of a modern, very procedural notion of a monetary policy framework. Ben Bernanke (2004) writes that the ECB’s policy is hard to fit into any category in the spectrum of different interest rate setting rules. Although the policy framework itself seems to be quite widely accepted, and the comprehensiveness of different aspects analysed highly valued, there are clear limitations and complications regarding communication compared to a simpler representation of inflation targeting. *“At the same time it arguably provides a more explicit*

and stable framework than an eclectic multi-indicator approach of ‘looking at everything’” (Stark, 2007).

2.4 The Role of Price Stability and Consequences in Policy Implementations

To explain the importance of price stability the European Central Bank lists the benefits of maintaining it as follows:

Table 1: The Benefits of Price Stability

<p>The benefits of price stability</p> <ul style="list-style-type: none">1) Improves the transparency of relative prices2) Reduces inflation risk premia in interest rates3) Avoids unnecessary hedging activity4) Reduces distortions of tax and social security systems5) Increases the benefits of holding cash6) Prevents the arbitrary redistribution of wealth and income <p>Source: “The Monetary Policy of the ECB 2004” (ECB, 2004)</p>
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Improving the transparency of relative prices should lead to better investment and consumption decisions by firms and consumers. This makes resource allocation in the market more efficient. Reducing inflation risk premia in interest rates reduces the demand compensation for holding longer term assets. A central bank’s credibility is a key characteristic in achieving this goal. The third benefit listed, namely to avoid unnecessary hedging activity, is also related to the central bank’s credibility. The more reliable and trustworthy a central bank is in maintaining price stability, the less incentive for different hedging strategies against inflation exists (Rudebusch, 2008a).

Benefits four through six in Table 1 are all related to equality among firms and consumers. For the ECB these goals are even more important to reach than for a central bank, whose working environment is a single nation state. In the twentieth century, there are several

examples of high inflation eras leading to social and political instability.¹² In the euro area, where economic conditions are still uneven to start with, losing price stability could soon lead to local, and even European wide, discontent with the ECB and the European Union. Furthermore, if price stability started to look less permanent, this could give nation states incentives to support their local economies with fiscal policy tools, thus decreasing fiscal integration in the euro area, and creating protectionism within the euro area borders. The consequences of both scenarios will be covered later in this paper.

The ECB's policy stance of maintaining the euro area's price stability in medium- to longer-term perspectives is, therefore, to support broader economic goals. These goals are comparable to those explicitly given to the Federal Reserve. Whether price stability truly leads to a substantial contribution of achieving higher standards of living, high levels of economic activity and better employment perspectives, as listed by the ECB (ECB, 2004), continues to be a controversial topic. Otmar Issing (2005) states that: "*We must be aware that price stability is not a sufficient condition for financial stability*", and continues, "*Interestingly it has recently even been suggested that the conventional wisdom that price stability is good for financial stability has to be reversed*".

Without a deeper analysis the effectiveness of price stability to overall economic conditions, it can be concluded that specific institutional features of central bank independence vary across different constitutional traditions and governmental provisions. The independence of the ECB is very much related to improving price stability in the euro area. This independence needs to be created with enough consensus on the common goals among the member states. This is the only way to attain sufficient commitment to these targets in order for the ECB to act effectively. The next section explains some fiscal policy tools, which play a crucial role in the overall validity of the ECB's actions.

¹² The most significant certainly is the hyperinflation in Germany in the 1920s, but there are also more recent examples like Yugoslavia between 1993 and 1994, and Latin American countries led by Argentina and Bolivia in the 1970s and 1980s. (Salemi, 2009)

2.5 Fiscal Policy in the Euro Area

A common currency requires common monetary and exchange rate policies, which in the euro area are set up under the ECB and the ESCB.¹³ Unlike these centralised policies, economic and fiscal policy decisions are largely left as national states' responsibilities. There are some principal guidelines directing each member state's conduct of economic policy, regarding issues like public finance, taxation, labour market regulation, etc. These guidelines are, however, more recommendations, and are not legally binding. This creates various sharp differences in policies among member states, thus affecting the well-being of the overall euro area.

Yet, the importance of fiscal sustainability is stressed by the ECB in an article in its monthly bulletin in February 2007, "Fiscal sustainability is prerequisite for stability, growth and cohesion in the monetary union". In the editorials of the ECB's monthly bulletins the member countries have continuously been urged to meet the levels set in the Stability and Growth Pact¹⁴ as soon as possible and by 2010 at the latest. The recent financial crisis has needed such exceptional treatment that by the end of 2009, the ECB ceased from explicitly stating these targets, since it became clear that every member states cannot be forced to meet these fiscal obligations because of the global economic downturn. Yet, a clear disadvantage in the euro area is that today there exist requirements that limit substantially the use of expansive fiscal policies at a domestic level. In a situation where the whole euro area is hit by an economic crisis, seen recently, decreases to these limitations are soon negotiated, and expansive policies approved. Unfortunately for the countries facing a local crisis, this kind of negotiation may never take place.

¹³ The exchange rate policy in the euro area is actually conducted jointly by the ECB and the ECOFIN council, with the council having the final say (Scheller, 2007).

¹⁴ The Stability and Growth Pact (SGP) is an agreement by European Union member states related to their conduct of fiscal policy, to facilitate and maintain Economic and Monetary Union of the European Union.

On the other hand, Article 104 of the EC Treaty provides a procedure for fiscal policies in the euro area, which is legally binding and enforceable. During the recent financial turmoil, a question raised is whether the level of autonomy in economic and fiscal policies in the euro area has deleveraged the ECB's possibilities to react to and ease the current crisis with enough flexibility? As Scheller (2007) writes: "...the rules and procedures of the economic policy framework ensure macroeconomic stability, provided that the policy-makers respect them". In chapter 4 we will take a closer look at this issue, and evaluate whether the policy-makers in the member states have respected the rules under the tremendous pressure to support their local economies.

2.6 Conclusions

Overall, it is clear that even though the central banks always have quite similar objectives and relatively common tools to conduct their policies, some remarkable differences exist among the European Central Bank and the Federal Reserve. The differences, including how the central banks explicitly approach the interest rate setting process and its targets, have previously affected interest rate levels in the euro area compared to the level seen in the US. The Federal Reserve, being more focused on maintaining economic growth, hence having a less direct emphasis on inflation levels and growth of monetary and credit aggregates, has more flexibility in its monetary policy framework regarding situations where proactive policy actions are required.

On the other hand, the ECB's two-pillar framework does provide what looks like a target to a more stable economic and monetary environment, which several studies see as a precondition for maintaining sustainable economic growth. Furthermore, this approach should better prevent a future birth of economic and financial bubbles. The downside is that in a situation where a bubble has already been created, the ECB's monetary policy approach does not necessarily provide enough support to first-aid actions, which would stimulate economic growth, thus decreasing the negative impact from strengthening downward development.

Another important aspect covered in this chapter was the less than complete integration process in the euro area. The whole working environment for the ECB is quite different from those of the Fed, the Bank of England, and the Bank of Japan. The ECB environment includes

numerous autonomous nation states, each responsible for their own fiscal policies, and each with their own characteristics and own special interests. All this limits the ECB's choice of actions especially when there is as serious a turmoil in the market as recently seen.

Next attention will be directed toward the central banks' role in the financial crises. Keeping in mind what has been covered here, it should be noticeable that the differences in objectives, monetary policy approaches, and tools available, do influence central banks' actions and possibilities during times of turmoil.

3. Central Banks' Role in Financial Crises

Under stable economic conditions and in an ordered market, central banks should manage their objectives relatively easily, at least theoretically (Buiter & Sibert, 2007). Conducting monetary policy is quite straightforward as long as all underlying economic and monetary variables are known for certain. Problems arise when a financial crisis strikes, and unfortunately, throughout financial history times of turmoil have kept following each other. Finding a recipe, which could prevent these crises, would be certain to lead to receiving the Noble prize for economics, but since this recipe is yet unknown, central banks are forced to prepare themselves for also dealing with financial crises, liquidity squeezes, and credit crunches.

This chapter will take us through some of the main issues regarding the role of the central banks during financial unrest. First, we will review some of the criticism laid against the central banks' actions during the recent downturn. Then we will move on by looking at some more theoretical aspects of the role of money in interest rate rules, and how monetary stability is seen with respect to financial stability. These are issues often covered in academic literature, while studying optimal interest rate settings (Evans & Honkapohja, 2003; Svensson, 2003, etc.). Continuing on the theoretical side, we will also consider some of the issues regarding the central banks' functions and problems within a liquidity crisis situation. Finally, we will conclude the chapter, and move on to evaluate more closely the recent actions of the ECB and the Fed, using this chapter's theoretical basis as our framework.

3.1 Recent Criticism

Following are two different examples of criticism laid on the central banks, especially on the European Central Bank regarding its actions, or lack of actions since the beginning of the ongoing crisis. The criticism has been wide, and has come from different sources, like academics shown here, but also from politicians, for example French president Nicolas Sarkozy has been keen on criticizing the ECB's reactions. This paper will mainly only include the criticism from academics, thus leaving out a deeper evaluation of any national level or more politically motivated comments from Sarkozy, and so on. This is not to say that their comments would be any less valuable or less trustworthy.

“The announcement today of coordinated liquidity injections by FED, ECB, BoE, BoC, SNB is however too little too late and it will fail to resolve the liquidity and credit crunch for the same reasons why hundreds of billions of dollars of liquidity injections by these central banks – and some easing of policy rates by Fed, BoC and BoE – has totally and miserably failed to resolve this crunch in the last five months.”
(Roubini, 2008).

Notice here, that Roubini still stresses the fact that the ECB has eased its monetary policy far less and clearly more slowly than its counter parties. Liquidity injections, which will be covered later in this paper, do not convince Roubini as being effective reactions toward the recent crisis. He continues by explaining that most of the crunch is due to serious credit and solvency problems, not just to illiquidity. Thus, monetary policy tools are not suited to solving these problems.

He also points out that a large contributing factor behind the crisis is a recent change in the financial system’s structure. This will become more clear later in this paper, but briefly it means that while depository institutions (commercial banks) have traditionally been financing sources in the market, and hence central banks have mainly merely acted as the lender of last resort for these institutions, the market today is not quite as straightforward. So called, non-depository institutions have taken a larger role in fulfilling the financial needs of companies. New financial innovations have been created, and the central banks’ original tools, created as back-up for depository institutions, are not capable of solving all existing problems in the financial markets. The change has been more dramatic in the US, but it has also affected the ECB’s working environment (Roubini, 2008).

“We are already, however, well into the realm of what I call depression economics. By that I mean a state of affairs like that of the 1930s in which the usual tools of monetary policy – above all the Federal Reserve’s ability to pump up the economy by cutting interest rates – have lost all traction.”
(Krugman, 2008).

This critique by Nobel laureate Paul Krugman illustrates how at the end of the year 2008, the question among several authors in public and in academic papers was not so much whether the ECB should also decrease its main refinancing interest rate to zero, rather what other options and tools after this move should be used in the euro area, as well as in the US. In this issue, the pivotal question has been whether central banks should create more liquidity by

repurchasing government bonds. For the Fed this has been a natural next step after interest rates were lowered to practically zero. As previously discussed in chapter 2, for the ECB this whole procedure would turn out to be a much more difficult task including questions such as, which countries' bonds should be bought, how these bonds should be priced between the countries, and so on. Krugman's main point, that all central banks are forced to create extraordinary actions and tools, remains.

3.2 The Role of Money in Interest Rate Rules

The role of money growth aggregates, while deciding on monetary policy has been an argued topic among academics and policy makers (Rudebusch & Svensson 2002; Bernanke 2004, etc.). The European Central Bank does provide a much more significant role for monetary aggregates in its two-pillar framework than do most other inflation targeting central banks, especially the Federal Reserve. The way the ECB implements this role under its monetary policy framework is explained in the previous chapter. The amount of emphasis put on monetary aggregates in recent exceptional financial conditions is still difficult to evaluate, but from the Monthly Bulletins of the ECB it becomes obvious that the contradiction between the short-term fluctuations, which should not affect the main policy decisions, and the medium- to long-term changes has been difficult to establish. Furthermore, since the economic slowdown has put more emphasis on economic analysis, it initially appears as if the monetary policy's role has recently diminished. In chapters 4 and 5, we will also evaluate this change based on some empirical data.

It needs to be stressed, that the ECB does not consider monetary analysis as a prior guiding principal of its policy decisions, rather it serves mainly as a cross-check from a medium- to long-term perspective (Beck & Wieland, 2007). A 'new Keynesian' model of inflation determination allocates no role for the quantity of money in future inflation estimation (Woodford, 2007). Stefan Gerlach (2003, 2004) has presented some evidence for the long-run relationship between money growth and inflation. This low-frequency relationship thus supports the ECB's idea of using monetary aggregates in its policy making process. During times of financial turmoil, as seen since early 2007, it may have been that this cross-checking process has made the ECB more cautious in lowering its interest rates than the central banks,

giving less emphasis on monetary aggregates. For a more theoretical background we will follow the structure of Beck and Wieland's (2007) paper.

The article by Guenter Beck and Volker Wieland (2007) characterises ECB-style cross-checking and policy design. They formulate a proposed interest-rate rule as having two components:

$$i_t^{CC} = i_t^{EA} + i_t^{MA}, \quad (1)$$

where i_t^{CC} refers to cross-checking, and i_t^{EA} and i_t^{MA} to previously introduced economic and monetary analysis, respectively. From here, the next step is to set the first component equal to the optimal interest-rate rule responding to the lagged inflation and output gaps, but not to money growth development¹⁵, hence,

$$i_t^{EA} = i_t^{opt}. \quad (2)$$

This interest-rate setting controls inflationary risks, and ensures that inflation fluctuates around the targeted mean π^* . Unfortunately, for policy makers, the components behind this are unobservable such as the equilibrium real interest rate r^* and potential output y^* . The latter especially, has received a great deal of academic interest because of its role behind the monetary policy rules in which interest rate is the chosen policy instrument (Evans and Honkapohja 2003, Svensson, 2003, etc.).

Note here, that as Gerlach (2008) explains, survey measures such as the Purchasing Managers Index constructed by Markit (www.markit.com) and the Economic Sentiment Index published by Eurostat have some clear advantages over the output gap measure. The sentiment index will also be used later in the empirical analysis. These advantages include

¹⁵ Beck and Wieland (2007) defines the i_t^{opt} in the equation (2) as $i_t^{opt} = r_t^* + \pi_{t-1} + \frac{1}{\alpha_y \beta_r} (\pi_{t-1} - \pi^*) +$

$\frac{1}{\beta_r (y_{t-1} - y_{t-1}^*)}$

- monthly availability versus quarterly for real GDP data
- much faster availability compared to the GDP data
- advance movement related to the output gap

All these aspects are important when trying to analyse the ECB's policy decisions. If decisions were based more heavily on the survey measures, which on the other hand would effectively predict the output gap development, the policy would fairly quickly respond to changes in the real economic outlook. This would then naturally change in a situation where the survey indicators would no longer reliably forecast the actual changes in the real GDP development. This is another important factor, which should be considered when criticising the ECB's recent reactions.

Beck and Wieland continue by examining how the second component of the ECB's cross-checking framework, namely i_t^{MA} is intended to offset persistent policy bias due to imperfect information especially regarding the output gap. They begin with the assumption that the central bank regularly tests whether filtered and adjusted money growth still averages around the inflation target. Here the main focus is on the policy-relevant medium- to longer-term development, as often stated in the editorials of the monthly bulletins.

In Beck's and Wieland's formalised model, the central bank computes the normally distributed test statistic, including the filtered and adjusted money growth μ^f , target inflation π^* , and the standard deviation σ_μ^f . The computed test statistic then is,

$$\kappa = \frac{\mu_{t-1}^f - \pi^*}{\sigma_\mu^f}. \quad (3)$$

Now, as long as $i_t^{EA} = i_t^{opt}$ is implemented with full knowledge of potential output y^* and the real economic rate of return r^* , cross-checking, using κ , will rarely lead to an adjustment in interest rates. With imperfect knowledge, however, cross-checking may occasionally have very important effects on policy. This is, yet, another explanation of the ECB's commitment to stable longer-term price stability, with less emphasis placed on shorter-term, temporary fluctuations in economic conditions.

3.3 Monetary Stability versus Financial Stability

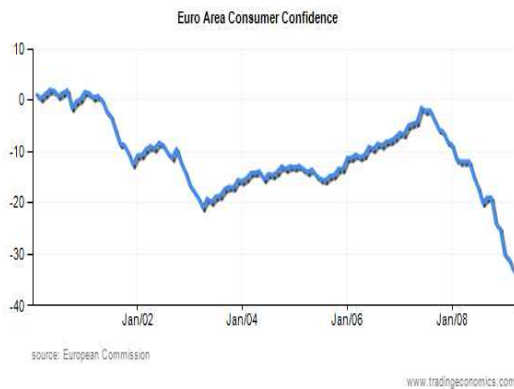
An important aspect, which central banks need to bear in mind during an era of financial distress, and especially when the economy is heading into such an era, is consumer psychology. *“If everyone expects a crisis and acts as if one is about to occur, then the crisis becomes a self-fulfilling prophecy. Conversely, if no one expects a crisis, this expectation is also self-fulfilling and no crisis occurs”* (Allen & Gale, 2007). This further illustrates the importance of proactive actions in both financial and monetary policies in preventing economic recessions.

Comparing the mandates given to the ECB and to the Federal Reserve, it initially seems that the Federal Reserve System is more suitable for keeping the economy away from recessions, since it may promote consumer confidence by lowering its interest rates without paying as much attention to price stability as does the ECB. In the short-run, this may give the Fed more room to act, which in this current situation may partly have led to recent interest rate lowerings being faster in the US than in the euro area. Unfortunately for the Fed, it is arguably devastating for the economy in the longer run, if the central bank too strongly emphasises stimulating short-run growth, thus increasing the possibility of future inflation level expansion. The ECB’s mandate, on the other hand, first and foremost, maintains focus on medium- to longer-term stability and the well-being of the economy.

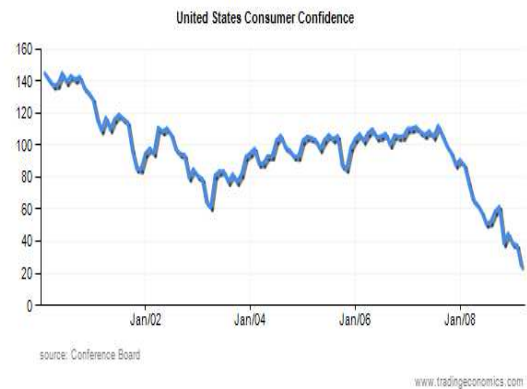
Figures 4a and 4b illustrate consumer confidence in the euro area and in the US, respectively. Between 2002-2004 both areas experienced a strong decline in consumer confidence, which was noticed by the central banks by lowered interest rate levels. At this point, the ECB did not see any significant medium- to longer-term pressures on the inflation level, and hence was able to conduct a decrease in the main refinancing rate from 3.25% in November 2002 down to 2.00% in June 2003¹⁶. A similar reduction by the Fed led the fed funds rate to decrease from 1.75% in October 2002 to 1.00% in June 2003.

¹⁶ Editorials in the monthly bulletins by the ECB in 2002 and 2003 do in several cases illustrate this low upside pressure on price stability when looking at the policy-relevant horizon.

**Figure 4a: Euro Area Consumer Confidence
1/2000 – 2/2008**



**Figure 4b: United States Consumer Confidence
1/2000 – 2/2008**



One reason for the Federal Reserve not being able to proactively sustain consumer confidence and decrease the strength of the recent downturn in the economy is a certain lack of effective communication by the Federal Reserve over its economic forecasts (Rudebusch, 2008a). As stated previously, the ECB has gained public and academic credit for developing transparency, thus making it easier to forecast and predict the future road of its monetary policy. This is important for consumer confidence, since less predictability leads to more uncertainty, which, as seen in 2008, further lowers confidence.

Another aspect of the possible low quality of communication by a central bank is that, if financial market participants understand the policy makers' expectations, then long-term interest rates and other asset prices may respond more appropriately to incoming data (Rudebusch, 2008a). Naturally, this would make the central bank's policy actions more effective and probably decrease the lag between actions and their results to the real economy. This lag being another important aspect of the recent financial crisis, since the downturn in the world economy was so sudden, and especially the financial sector needed an immediate cure and rescue.

3.4 Liquidity Crises and Credit Crunches

Dealing with liquidity squeezes in the market has become a seriously more difficult task for central banks than previously. This is because of an increased role of other sources of funding in place of traditional commercial banks. Market liquidity suffers when it is difficult to raise money by selling assets at reasonable prices (Brunnermaier 2009, et.al.). This reflects the situation seen in September 2008, when suddenly faith in the financial markets was lost, and

pricing of assets used in raising money was put under severe doubt. Under stable economic conditions, running monetary policy effectively should not be too difficult, but overcoming or even preventing a financial crisis is, from a historical perspective a hard task. Even harder, for central bankers, is to somehow move away from liquidity problems in the market without creating a fertile platform for a new credit and liquidity boom (Buiter & Sibert, 2007).

In the context of disintegrated euro area it is noticeable that several plans for dealing with financial crises have been agreed among the member states. This should be kept in mind when evaluating the ECBs working environment and tools for financial crisis situation management. The overarching tool is the EU-wide Memorandum of Understanding (MoU), which was adopted in March 2003 in order to contribute to effective crisis management by ensuring a smooth interaction between the authorities concerned (ECB Monthly Bulletin, 2/2007). At the next level are regional and national memoranda of understanding, which include some different authorities, and are mostly concentrated on more local issues than the EU-wide participants. These regional committees are set up, for example, in the Nordic region and between Dutch and Belgium authorities.

Table 2: Overview of the EU Framework for Financial Crisis Management

	Authorities responsible for financial stability		
	Central banks	Banking supervisors	Finance ministries
Regulatory arrangements	Capital Requirements Directive (CRD)		
	Financial Conglomerates Directive (FCD) ¹		
Voluntary cooperation arrangements	2005 MoU on crisis management		
	2003 MoU on crisis management ²		
	2001 MoU on payment systems ²		
	Regional MoUs		
	National MoUs		
Central banking arrangements	Eurosystem		
EU committees	BSC and CEBS ³		FSC ³
	EFC ³		EFC ³
Tools for practical implementation	Financial crisis simulation exercises		
	Development of practices by EU committees		

¹The exchange of information between supervisory authorities and finance ministries regarding the regulated entities of financial conglomerate is subject to the sectoral rules in EU legislation for credit institutions, insurance companies and securities firms.

²Regional and national memoranda of understanding (MoUs) may involve different sets of authorities including either the central banks or banking supervisors or both. Some Member States' finance ministries are also party to MoUs.

³ BSC = Banking Supervisors Committee, CEBS = the Committee of European Banking Supervisors, FSC = the Financial Services Committee, EFC = the European Financial Services Committee. (This supranote was added by the author). source: "The EU arrangements for financial crisis management." ECB Monthly Bulletin, February 2007.

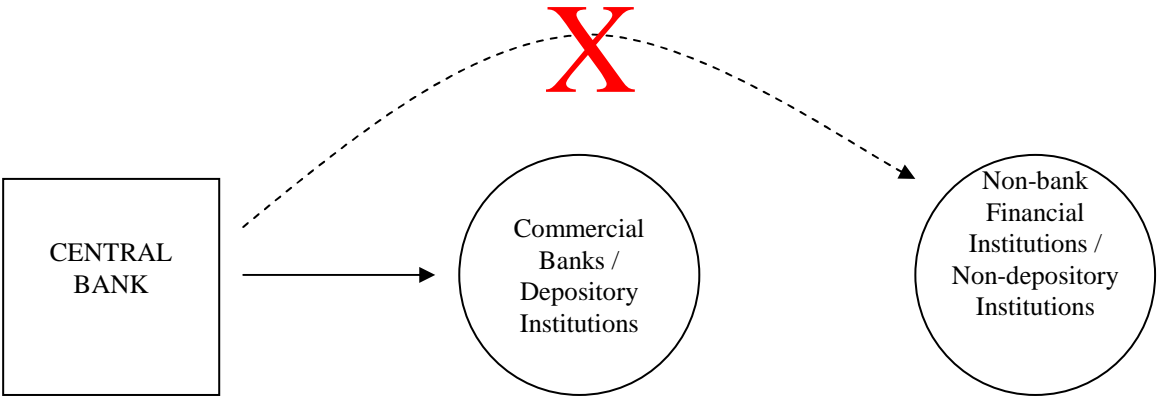
The MoUs together form a broad framework for voluntary cooperation among the authorities responsible for financial stability. These are not legally binding, hence creating another disadvantage with respect to the disintegrated euro area. In a situation, as seen in the autumn of 2008, when financial instability hit the euro area as a whole cooperation among the authorities was supported by common goals to stabilize the situation. On the other hand, in a situation where problems arise only locally, either nationally or regionally, the authorities involved may not get the required support from their counterparts not having similar financial conditions. The further strengthening of financial regulation among the member states in the euro area thus plays an extremely important role in preventing serious local or regional financial disruptions. Solving these instabilities without the support of the common central bank may be an overwhelmingly difficult task, especially for smaller euro area nations.

Table 2 illustrates the multi-layer system of the EU-wide financial crisis management plan. While local and regional authorities have important roles in crisis management, it is the cooperation between central banks that is the most viable aspect of preventing and solving a financial crisis situation, as seen in 2007-2008. There is one specific tool available for the euro area central banks in a crisis situation, namely the provision of emergency liquidity assistance (ELA) (ECB, Monthly Bulletin 2/2007). Generally, this tool enables the central banks to provide liquidity, under exceptional circumstances, to temporarily illiquid credit institutions, which cannot obtain liquidity through either the market or participation in monetary policy operations. The idea of this tool is quite directly comparable to the Federal Reserve Act's permission to the Federal Reserve to extend credit to entities that are not depository institutions in "unusual and exigent circumstances" (FED, 2005).

In the past, the central banks were clearly the lender of last resort for commercial banks, whose regular business led to, on average, having relatively illiquid assets on their balance sheets. In cases of lost confidence by consumers toward the commercial banks, bank runs were born, which led to liquidity problems, if the banks were not able to borrow. The central banks' function under these credit crunches was to be available as a lender of last resort (Buiter & Sibert, 2007).

Today’s situation is quite different. Blame can be put on global integration, which has resulted in external finance to non-financial and financial institutions be increasingly provided through other alternatives than banks (Buitter & Sibert, 2007). The issuance of tradable financial instruments, which in many occasions have been created through securitisation and similar techniques, has functioned well in ‘normal times’. When the financial markets for these instruments unfortunately collapsed, the central banks had to play their original role in liquidity crises, that is, to become the lender of last resort.

Figure 5: Central Banks as the Lender of Last Resort



Drawn by the author

Figure 5 above illustrates the current problem faced by central banks regarding market liquidity problems. When banks were the main providers of credit, the central banks were able to act as the lender of last resort, if necessary. Basically, all they had to do during a crisis was to lend money to commercial banks against some collateral, which was impaired during bad times, but good and valid in ‘normal’ times. In a simplified version, as in Figure 5, this arrow is always an available tool against a credit crunch. But now, since the banks are not the only main provider of external finance anymore, the central banks, during a liquidity crisis, should be able to inject additional liquidity directly to the financial markets, full of assets which no-one trusts, is able to price, or is willing to either buy or sell. The liquidity crisis, as seen today, is based on a complete loss of faith in securitised instruments, by the parties in the markets, and in counterparties behind those instruments. The central banks should find a way to return market participants’ trust in each other, and hence rebalance the modern way of external financing.

Theoretical evaluation of the mechanics behind the lender of last resort function will be left outside this paper's focus. Rather, in chapter 4, we will evaluate some of the actions taken by the ECB in order to defend against the credit crunch seen in recent times. In addition to comparing the instruments used by the ECB to those used by the Fed, we will especially focus on two ways of dealing with liquidity crisis, listed by Buiter and Sibert (2007). These are outright purchases and sales of private sector securities and acceptance of those securities as collateral in repurchasing operations.

3.5 Conclusions

The central banks' role during financial turbulences is somewhere in between being a back-up for the whole financial system and being a main catalyst for recreating new economic growth. These functions do not always go well hand in hand. Temporary short term changes in the economy may sometimes need a central bank reaction, but quite as often, if the central bank wants to maintain any longer-term stability and its own credibility and trustworthiness, some temporary shocks must be left unattended.

Theoretically the ECB's two-pillar framework, including the cross-checking method, does provide the bank with what seems like an effective way of maintaining price stability. The disadvantage, however, is that clearly the ECB seems to be slower in reacting to changes in the economic environment if the leading indicators, such as survey measures used, cannot anticipate sudden changes. On the other hand, the similar problem with any sudden changes also prompts the central banks to use a more 'traditional' way of concentrating on output gap and inflation measures. Hence, this does not fully explain why the ECB has delayed its interest rate level decreases.

The central banks' role in liquidity provision has turned out to be quite a difficult task during the recent crisis. From the ECB's point of view, there are two basic reasons behind the difficulties. First, the disintegrated euro area with numerous nation states, each having their own distinctive problems and own fiscal policies. This limits the ECB's possibilities to provide liquidity into the euro area, since several national characteristics must be analysed in order to maintain the necessary equality among the nation states, as stated when the common

monetary area was established. Similar problems do not occur if a central bank only functions in a single nation state.

The second issue then is more global, and mainly US based, that is, the changes in financial system. Traditionally, depository institutions have been the main financing source for companies, but today their role has decreased. New financial innovations, topped by “the US mortgage packages”, have moved a large portion of financing responsibility to non-depository institutions. In the US, these non-bank institutions even overtook depository institutions as financing parties for US companies in 2007 (Roubini, 2008). This has then created a problem for the central banks, since their monetary policy tools were created in order to act as a lender of last resort for the depository institutions. Now, the central banks have been forced to re-evaluate their stances on which financial instruments they should receive as collaterals against central bank financing. Even though this has been a larger issue for the Fed, it clearly has also affected the ECB’s approach.

Now, the latest global financial distress has included some new characteristics, against which the central banks have not been prepared. Criticism has been voiced over the slow reactions by central banks, led by the ECB. As seen in the theoretical illustration of the ECB’s two-pillar policy by Beck and Wieland (2006), it seems that theory partly explains why the ECB may have delayed its supportive and stimulating actions. Yet, it does not fully explain the difference to, for example, the Fed’s reactions. This, on the other hand, may be more supported by looking at the characteristics of the euro area, where some additional tools may be more difficult and slower to implement, hence giving the ECB an incentive to maintain some power within its interest rate setting.

The next chapter will cover some of the main actions taken by the ECB and other main central banks since early 2007. Both interest rate setting and liquidity decisions will be included and possible differences analysed based on the framework seen in chapters 2 and 3.

4. Central Banks' Reactions during the Financial Crisis in 2007-2008

In the previous chapters some background information, necessary to better evaluate and study the central banks' reactions to the latest financial crisis, were given. These reactions have received enormous amounts of criticism from different authorities and academics. This criticism also stems from several different sources. Part of this criticism may be placed under normal political environment, in which it is almost impossible to act 'correctly'. There always exists people from other parties, who cannot accept the choices made by those in power. Yet, under the recent financial distress, criticism has clearly been more than only politically driven.

This chapter will take a closer look at the reactions taken by the ECB. How they have acted regarding their interest rate setting process, their ways of supporting suddenly vanished liquidity, and their stimulus packages for the euro area economy. The focus here is on the consistency of the monetary policy, holding the two-pillar framework as a reference. Then we will move on to compare the main ideas and chosen actions to those from other central banks, mainly the Federal Reserve. Here we will evaluate whether the criticism laid down against the ECB that it has acted too slowly and ineffectively, is supported by our evidence.

The latter part of the chapter takes a little sidestep into an interesting and important issue of the possible rebirth of protectionism in the global economy. There have recently been several warnings from academics and politicians (Brown, 2009; Earthtimes.org, 2009, et. al.), that central banks and governments are further pushing their own areas and countries to create new atmosphere of patriotism. The ECB has, during the recent past, already held growing protectionism as one of the most serious threats to price stability and sustainable economic growth. The threat of growing protectionism has also been stated in almost every editorial of the monthly bulletins since early 2007. This is another topic, which we will take a deeper look into.

At the end, we will bring together the results, findings, and conclude how these may either further support the mistakes made by the ECB, or give positive evidence that the ECB has just acted based on its own plans as stated in the EC Treaty, and according to their own policy framework.

4.1 The European Central Bank

4.1.1 Interest Rate Setting

First, it is relatively straightforward to evaluate how central banks have modified their respective key interest rates since the beginning of 2007. For the ECB this time period has included five decreases and three increases in the main refinancing rates. An interesting issue is that each lowering has been either 50 basis points, or once even 75 basis points. Table 3 lists the changes in the key rates in the euro area, in the US, and in Great Britain since January 2007. As the table shows, the ECB and the Bank of England have both started to decrease their key interest rates remarkably later than the Federal Reserve. This could result from too optimistic views in the euro area's economic outlook, without fully understanding the spreading influence that the US-based financial crisis was going to have also in Europe. It is also possible and supported by findings on the history of interest rate change frequencies in the euro area and in the US shown later in this chapter, that the ECB has traditionally been less keen to quickly modify its main refinancing interest rate with respect to changes in economic outlook.

Its main priority being in maintaining price stability, the upward pressure on future inflation in the euro area, seen until autumn 2008¹⁷, has clearly made the ECB less willing to relax its monetary policy. The slow reaction concerning lowering the main refinancing interest rate, one criticism levelled at the ECB, should thus be seen as a consistent policy choice, based on the economic outlook and price stability development estimates the ECB had at the time decisions were made.

¹⁷ The editorial of the ECB's monthly bulletin in September 2008 states that, "At the policy-relevant medium-term horizon, taking into account the weakening in demand, upside risks to price stability have diminished somewhat, but they have not disappeared."

Table 3: Developments in Key Interest Rates by the ECB, the Fed and the BoE since 2007

Date of transaction	ECB	Main Refinanc. Int.Rate	DoT	Fed	Fed Funds Rate	DoT	Bank of England	Official Bank Rate
1.1.07		3.50	1.1.07		5.25	1.1.07		5.00
14.3.07	I-0.25	3.75	18.9.07	D-0.50	4.75	11.1.07	I-0.25	5.25
13.6.07	I-0.25	4.00	31.10.07	D-0.25	4.50	10.5.07	I-0.25	5.50
		4.00	11.12.07	D-0.25	4.25	5.7.07	I-0.25	5.75
		4.00			4.25	6.12.07	D-0.25	5.50
		4.00	22.1.08	D-0.75	3.50			5.50
		4.00	30.1.08	D-0.50	3.00	7.2.08	D-0.25	5.25
		4.00	18.3.08	D-0.75	2.25			5.25
		4.00	30.4.08	D-0.25	2.00	10.4.08	D-0.25	5.00
		4.00			2.00			5.00
8.7.08	I-0.25	4.25			2.00			5.00
8.10.08	D-0.50	3.75	8.10.08	D-0.50	1.50	8.10.08	D-0.50	4.50
11.11.08	D-0.50	3.25	29.10.08	D-0.50	1.00	6.11.08	D-1.50	3.00
9.12.08	D-0.75	2.50	16.12.08	D-0.75	0.25	4.12.08	D-1.00	2.00
10.1.09	D-0.50	2.00			0.25	8.1.09	D-0.50	1.50
		2.00			0.25	5.2.09	D-0.50	1.00
10.3.09	D-0.50	1.50			0.25	5.3.09	D-0.50	0.50

Data: Websites of the ECB, the Federal Reserve and the Bank of England

As can be seen, in the latter part of 2007 the ECB held its main refinancing interest rate at a constant 4.00%. By the end of 2008, the rate was decreased by 2.00 percentage points, reaching the level of 2.00%. During the same time period, the Federal Reserve's main refinancing interest rate, fed funds rate, was lowered from 5.25% in August 2007 to 0.25% in December 2008, a decrease of a total of 5.00 percentage points.

By looking Figures 6a and 6b it is clearly visible that during the last decade, although the main interest rates on both sides of the Atlantic have moved in quite a synchronised pattern, the European Central Bank's policy has been a bit less volatile than the Fed's. Statistically speaking, between January 2000 and December 2008 the ECB changed its main refinancing interest rate 25 times, while the fed funds rate was modified up to 40 times. So, the Fed's more urgent need to adjust its key interest rate seems to be a longer-term trend. Furthermore, there have been 5 times during this period when the ECB has changed its interest rates in two consecutive months, while the Fed has implemented similar consecutive changes 19 times.

The question now arises whether the economic conditions in the US have been this much more volatile, and hence needed more regular actions by the central bank, or whether the ECB has been effective enough in creating stable economic conditions in the euro area, which then

have led the central bank to not needing to change its monetary policy too often? On the other hand, the central banks' mandates could also provide a reason for this difference. Since the Fed is explicitly more responsible for economic growth conditions in the US, it may be forced to react to changes in economic conditions with less delay, and less comprehensive analysis. This then leads to reactions made against temporary changes, which the ECB has been able to avoid, resulting in fewer interest rate adjustments in the euro area compared to the US. Note here, that this does not mean that the Fed's policy has been objectively better or worse than the ECB's, rather the central banks' policy framework may have created the difference.

Following the main focus of the ECB's mandate, namely the inflation rate, we should look at Figures 7a and 7b. These figures clearly illustrate that throughout this century the inflation rate in the euro area has been relatively more stable than the inflation rate in the US. In the euro area, the inflation rate fluctuated, on average, slightly above the ECB's target level from early 2000 until late 2007. This is a clear indication, that over this time period the ECB should receive a relatively high grade from its actions regarding interest rate policy. This goes hand in hand with the earlier statement that the ECB has been able to gain high levels of accountability, transparency, and effectiveness of communication (Meltzer, 2008). Unfortunately, the latest global financial turmoil has affected the euro area with such a strength and suddenness that no sign of an ongoing stable inflation era is currently to be seen.

Figure 6a: The ECBs Main Refinancing Interest Rate 1/2000 – 2/2008

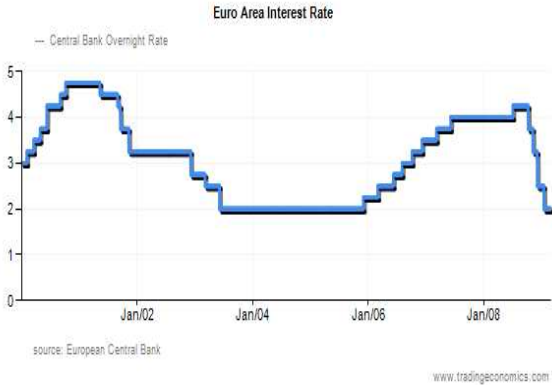


Figure 6b: The Fed Funds Rate 1/2000 – 2/2008

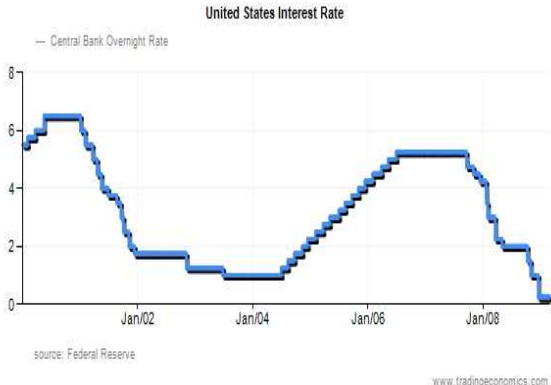


Figure 7a: Euro Area Inflation Rate 1/2000 – 2/2008

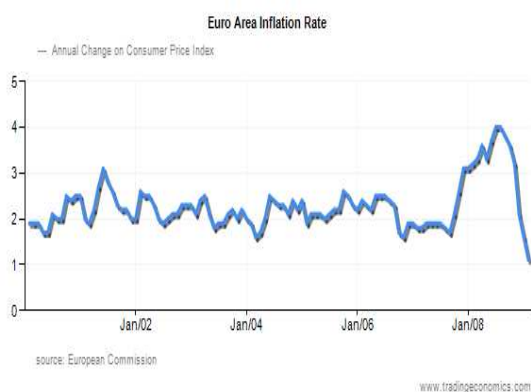
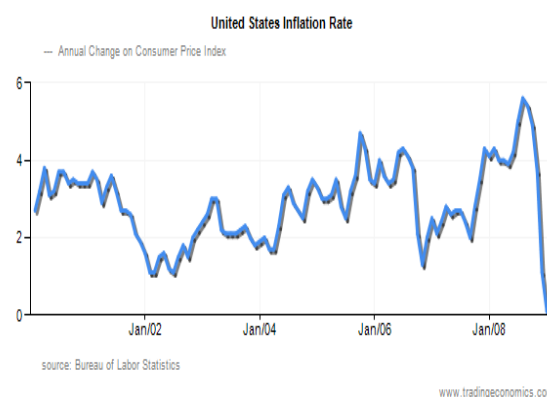


Figure 7b: The US Inflation Rate 1/2000 – 2/2008



4.1.2 Communication over Decisions

The content of the editorials of the Monthly Bulletins of the European Central Bank support the importance of future inflation expectations behind policy decisions. For example, in June 2007, when the ECB decided to increase its main refinancing interest rate by 25 basis points the statement in the editorials was, *“Taking into account both short-term factors and the underlying trend of the continued vigorous expansion of money and credit, there are clear indications of upside risks to price stability at medium to longer-term horizons.”*

Also, in January 2008, when the fed funds rate was dramatically lowered, there was pressure on the ECB to follow with similar actions. At this point, the communication in the editorials regarding the decisions made, provide us with a good explanation for the chosen interest rate path. By looking at the statements in the editorial of January’s monthly bulletin regarding inflation expectations, one leading reason behind the decision not to decrease interest rates in the euro area is available. According to the ECB it is clear that, *“Risks to this medium-term outlook for price developments are fully confirmed to lie on the upside,”* and *“...the period of temporarily high rates of inflation would be somewhat more protracted in than previously expected.”* But, on the other hand the decision to cut any interest rates was delayed, since, *“...assumes some reversal of the recent rises in commodity prices – in line with what is currently captured by futures prices – and, more fundamentally, that recent oil and food price dynamics and their impact on HICP inflation do not have broadly-based second-round effects on wage and price-setting behaviour.”* These examples illustrate how strong a position

inflation expectations play in the ECB's decision making process. This follows from the central bank's mandate given in the EC Treaty.

While both central banks have cut their respective key interest rates several times, and clearly below the levels seen in recent history, there are important differences in how the future changes have been communicated. These differences are, once again, due to the ECB's primary focus on price stability versus the Fed's more wide economic targets. The purpose of the interest rate cuts have mainly been in fighting a sudden drop in economic activity. The problem being that, just as this crisis is partly because of an era of too low interest rate levels leading to economic expansion and credit boom, the levels seen today could create another expansion period and a certain market bubble if they were maintained for too long.

Since the European Central Bank is heavily responsible for maintaining price stability in a medium- to longer-term horizon, it has kept pointing out that it will be *"flexible in the opposite direction by raising interest rates quickly if there is a rapid recovery in financial markets or if there is an upward shift in projections for future inflation"* (Mishkin, 2009). The Fed has not used a similar mode of communication, rather it has almost purely focused on shorter term outlooks of economic and financial recoveries, without concentrating as heavily, at least explicitly, on longer-term inflation developments. The ECB has used this future threat of higher inflation as one explanation for its sticky lowering of the main refinancing interest rate, compared to the fed funds rate.

4.1.3 Maintaining Liquidity in the Market

Table 4 illustrates developments in the main accounts of the ECB's balance sheet regarding liquidity management. The time period covered is from the early part of 2007 until February 2009, and the frequency is changed to shorter periods while moving closer to the present. The accounts included from the assets side are the main refinancing operations (MRO), longer-term refinancing operations (LTRO), and marginal lending facility (ML). Regarding liabilities, current accounts (CA), deposit facility (DF), and banknotes in circulation are available here. All the original data is from the ECB's own website (www.ecb.int/press/pr/wfs).

Table 4: Main Assets and Liabilities on The European Central Bank's Balance Sheet

	ASSETS in millions of Euros			LIABILITIES in millions of Euros		
	Main Refinancing Operations (MRO)	Longer-term Refinancing Operations(LTRO)	Marginal Lending (ML)	Current Accounts (CA)	Deposit Facility (DF)	Bank-notes
13.2.09	198,383	482,335	562	247,514	75,938	740,745
16.1.09	204,501	610,188	7,107	169,237	281,393	743,269
12.12.08	218,560	616,131	2,669	298,543	159,161	743,506
7.11.08	312,790	402,168	8,441	152,351	225,500	729,294
17.10.08	311,986	447,182	14,003	230,516	239,575	721,833
3.10.08	189,999	420,519	24,592	153,367	38,854*	693,205
12.9.08	176,501	299,998	0	229,709	55	682,677
8.8.08	160,000	300,021	0	211,037	88	690,348
11.7.08	175,001	299,997	157	236,075	62	685,613
9.5.08	150,002	295,024	14	194,841	478	673,524
7.3.08	178,496	268,479	1	195,830	230	657,316
11.1.08	151,500	268,487	184	180,614	665	659,395
9.11.07	160,003	265,005	1	190,806	270	642,123
7.9.07	256,001	190,001	279	181,548	1,029	639,169
13.7.07	292,000	150,002	0	193,037	78	638,835
11.5.07	276,001	149,999	145	185,937	148	623,066
16.3.07	271,501	140,000	1	181,869	33	609,192

* Note: Fixed-term deposits in the ECB's balance sheet were 193,844 on 3 October 2008. Compared to 0 on 12 September and 0 on 17 October.

In normal times both the deposit facility, in which commercial banks can park excess liquidity, and the marginal lending facility, where banks can draw on central bank liquidity at a fixed-rate against sound collateral, have not played a major role. When heading towards autumn 2008, things here changed. Participants in the market lost their faith in the financial system, since they felt they could not see which banks would possibly go into bankruptcy. The central bank then became the only reliable source of short-term funding.

The ECB answered by not only offering larger amounts through its operations, but also by narrowing the corridor between the marginal lending facility rate and the deposit facility rate. Normally, the spread here has been 200 basis points, but on October 9, 2008 the ECB halved this. The target here was to lower interbank money market rates, that is the rates at which the commercial banks lend money to each other. The central bank wants to decrease direct deposits and loans through its own channels, and only act as a lender of last resort. This should then restore enough faith for the market participants to result in the financial sector functioning again.

One important tool used here was the ECB's decision to loan unlimited amounts at the fixed rate to its accepted counter parties against sound collateral. Hence, the actual limiting factor

for the banks to borrow was the amount of accepted collateral they had. Here another change was made since the ECB widened the group of assets it accepts as collaterals. A similar decision was also made by the Fed.

On 15 October 2008, the ECB also expanded the collateral framework, thus enhancing the provision of liquidity. The most significant instruments added into the list of eligible collaterals were,

- 1) Marketable debt instruments denominated in the US dollar, the British pound and the Japanese yen
- 2) Subordinated debt instruments when they are protected by an acceptable guarantee
- 3) Debt instruments issued by credit institutions, which are traded on the accepted non-regulated markets.¹⁸

The last addition implies especially that certificates of deposits (CDs) will also be eligible when traded on one of these accepted non-regulated markets. (ECB press release October 15, 2008).

All this shows that not only has the ECB used original policy tools, such as marginal lending and the deposit facility, but modifications to these procedures have also been made. The ECB, just as other central banks, has been forced to take severe and quick actions in order to support the vanished liquidity in the financial markets. Without contradicting the mandate given or the main objectives, the ECB has shown that even though the euro area is still quite disintegrated, the central bank itself is well organised and able to handle situations with less normal and predictable characteristics.

¹⁸ The assessment of non-regulated markets is based on three principles: safety, transparency and accessibility. Full list available at: <http://www.ecb.int/paym/coll/standars/marketable/html/index.en.html#acceptable>

4.1.4 Supporting and Stimulating the Economy

Central banks, national governments, the International Monetary Fund (IMF), the Bank for International Settlements (BIS), and many other global coordinated organisations have conducted numerous different common operations in order to maintain stability in the financial systems, as well as promote economic activities. The financial crisis in 2007 and 2008 began from the financial system's failures, changing relatively quickly to become a more or less global economic crisis. Central banks, especially the Federal Reserve and the European Central Bank began their cooperative liquidity providing actions as early as in December 2007, the main focus at the time being to guarantee availability of US dollars in the banking system. These operations have continued throughout the crisis, as was seen regarding the euro area in Table 4. The central banks' role in supporting and stimulating the economy should thus be seen through their liquidity injections into market liquidity and the low level of set interest rates. The latter is, as discussed before, a controversial issue when evaluating the ECB's policy actions, while liquidity provisions are quite widely accepted policy choices of all central banks.

Another important venue for the economic stimulus packages has been local governments, through their fiscal policy decisions. Here also, common global actions have been partially reached in different settings like the G7-countries, Financial Stability Forum, and several more unofficial meetings between finance ministries from the most powerful economic countries. As is the case with interest rate setting decisions, actions taken to support economic activity do not have an immediate affect, thus it is not relevant to fully evaluate the effectiveness of these operations quite yet. Furthermore, the evaluation of stimulus actions by local governments and global organizations is beyond the scope of this paper. Yet, it is important to notice that none of the central banks' monetary policy decisions can be made without also evaluating the prevailing stimulating and supporting actions.

4.2 The Federal Reserve

In late 2008, the Chairman of the Federal Reserve, Ben Bernanke described the US central bank's strategy against the ongoing financial turmoil as consisting of three components, 1) aggressive easing of monetary policy, 2) supporting credit markets and providing liquidity to the private sector, and 3) using all available tools in promoting financial stability and healthy

economic growth (Bernanke, 2008). Components 1 and 3 are answers to the mandate given in the Federal Reserve Act. The component regarding liquidity provision is far more time-related, since under stable financial conditions it is private counterparties in the market, who maintain the required level of credit and liquidity. During times of financial distress, central banks should, and they clearly have recently, take their roles as lender of last resort, thus preventing the collapse of the financial system.

The Federal Reserve has implemented large liquidity injections into credit markets, while trying to encourage them lending again. In particular, it has lowered the discount rate to just 25 basis points above the federal funds rate, the normal difference being 100 basis points. In addition, the provision of liquidity has been widened well outside the Fed's traditional trading partners, namely depository institutions. This can be seen as a way to serve as a lender of last resort in today's new environment, where a large part of market liquidity stems from these non-traditional units. But just as is the case with the ECB, the Fed's actions have not been explicitly in line with its written mandate. Paul Volcker, a former chairman of the Federal Reserve has said that the Fed's recent actions have gone to the "*very edge of its lawful and implied powers* (Mishkin, 2009)."

Of course, compared to the ECB, the Federal Reserve has been more effective, or at least faster, in its cooperation with the national government and Ministry of Finance. How deep the cooperation has gone is not directly noticeable, but it seems probable that large fiscal stimulus packages and monetary policy easing are conducted in common well-approved understanding. Whether the same has happened in the euro area is much more unclear. At least, at the beginning of the crisis, the ECB seems to have made its decisions without too much attention paid to any national level fiscal policy actions. When the crisis deepened, similar common fiscal actions to support and maintain economic and financial markets were necessary to conduct.

An example is autumn 2008, when local governments and national central banks started increasing their guarantees over the deposits in bank accounts, hence creating a threat that the whole banking field in Europe will become an uneven playground. At this point, the ECB together with the fiscal ministries intervened by setting a common guarantee level across the euro area.

4.4 Rebirth of Protectionism

“The ESCB shall act in accordance with the principle of open market economy with free competition, ensuring an efficient allocation of resources, and in compliance with principles set out in article 3a”(Article 105(1) of the Treaty). In the latter part of 2008, public and academic discussion on the rebirth of protectionism raised its head. This included topics such as French car manufacturers receiving national financial support, unevenness between national and regional stimulus packages to financial sectors, and wider global issues like China’s and Russia’s protective attitudes toward their national companies. All of these are potential threats to efficiency in more and more globalized markets. When viewed from the perspective of the European Central Bank, these issues become even more serious. This is again related to the euro area’s characteristic of consisting of numerous autonomous national states. While the ECB is trying to support the euro area economy and maintain financial stability, some local decisions may have a negative impact on these common goals.

4.4 Results

The focus of this thesis being on the consistency of the European Central Bank’s policy actions during the recent financial turmoil, a deeper analysis of the effectiveness of chosen actions is beyond its scope. Yet, this perspective will provide researchers with a variety of fruitful targets to explore. It would be interesting to investigate if central banks have been able to support the lacked confidence in the world economy through their policy actions, or whether they have just been focused on pragmatic solutions to save the financial system by liquidity injections? Also, the true consequences for, for example, the cost of capital in the future, can only be effectively studied after some time has passed. Overall, the results of the reactions seen from the central banks are beyond the scope of this paper, and in any case too early to examine.

4.5 Conclusions

The financial turbulence, which was born in 2007, has been said to be the first truly global crisis. This has forced the biggest central banks to be more cooperative in their efforts to fight the downturn. Common decisions, as seen on 8 October 2008, have shown that regardless of any possible differences in their mandates or main goals, all main central banks have shown the necessary flexibility to take part in these operations. From the European Central Bank’s

point of view this has not resulted in any clear significant changes in its policy framework. Some new or rarely used policy tools have been introduced, but the main focus on the longer-term inflation management has remained unchanged.

The slow reaction that to lowering the main refinancing interest rate, for which the ECB has been blamed, should thus be seen as a consistent policy choice, based on the economic outlook and price stability development estimates the ECB had at the time decisions were made. Furthermore, findings show that the Bank of England also started decreasing the interest rate level remarkably later than the Fed. This implies that the US born crisis did not arrive into Europe at the same time as the problems in the US occurred, hence the central banks in Europe did not have enough reason to react at that time. One could argue that this is only because of bad predictions regarding the severity of the crisis, and that the ECB should have reacted earlier. Time to evaluate this more properly comes after some years, here the current study only shows that the ECB has followed its main objective, namely medium- to longer-term price stability, as its leading indicator when making monetary policy decisions.

Regarding liquidity provision issues, all central banks have been relatively quick to find and create effective ways to retain the market's normal conditions. Here the ECB has also, regardless of the disintegrated working environment, reacted to its changed role. Moving from traditional lender of last resort for depository institutions, central banks have widened their counter parties as well as the range of acceptable collateral assets in order to support the economy, which today is heavily based on non-traditional modes of financing coming through non-depository institutions. Even though this is a larger problem in the US than in the euro area, the ECB has shown flexibility in providing liquidity into suddenly dried up financial markets.

One widely discussed question is whether the ECB could, or should, follow the Fed and the Bank of England in repurchasing government bonds in order to further lower interest rates and push up supply of money. The ECB's policy tools do not include such an operation, although it has been seen that under severe conditions the ECB has also been creative and more flexible than perhaps expected. It thus sounds that there could be ways in which the government bond purchases by the central bank in the euro area can be conducted. This should probably be done via the local central banks, since the problems regarding this operation are related to questions

such as which countries' bonds should be bought, and how the pricing of these bonds would affect the economy of the whole area? Nonetheless, the ECB's slow lowering of the interest rate level could also be because of a willingness to avoid the need to organise government bond purchases. Whether the ECB will end up creating this kind of policy tool is yet to be seen, but already findings here show that the ECB, even though limited by lack of common fiscal policy, seems to be sufficiently flexible even in highly difficult and exceptional financial conditions.

The analysis in this chapter showed that the ECB's policy decisions have followed the two-pillar framework of the bank quite well. Even though financial conditions have suddenly being so heavily disrupted, the ECB has maintained its focus on medium- to longer-term price stability, without reacting to what have seemed to be more temporary changes in the economic environment. Certainly, in this kind of policy it is crucial to have enough predictability power to correctly evaluate how shorter-term changes will affect the longer-term conditions. The Fed having a mandate with more emphasis on economic growth conditions has been faster in reacting to the economic slowdown, and it may be that future investigations will prove the ECB's to be as ineffective and slow compared to the Fed's, but at this point, and within the scope of this paper, the conclusion remains that the ECB has acted close to its mandate and targeted its main goals.

The next chapter will provide a short empirical testing of the consistency of the European Central Bank's interest rate setting policy during the recent financial turmoil. This should further provide us with evidence on whether the ECB's policy approach has truly followed the constructed framework, and targeted the given objectives.

5. Empirical Section

5.1 General

This chapter provides empirical tests to further evaluate the consistency of the ECB's policy. The empirical part is loosely based on a paper by Gerlach (2004). The idea is to estimate empirical reaction functions for the ECB with the ordered-probit technique. Variables such that relate to the ECB Monthly Bulletins are chosen. In addition to regular quantitative variables such as the expected and underlying inflation rates or the growth of money aggregates other indicator variables have also been constructed. This follows Gerlach's idea (2004). These variables are explained further below. Results are analysed by concentrating on possible differences between the periods from 2000 until June 2006, and since June 2006.

Besides testing the empirical reaction functions, this part also takes into account the wording in the editorials of the ECB Monthly Bulletins. Following Gerlach's idea, this evaluates how temporary or permanent the ECB has seen changes in economic variables, and how these assessments may have affected interest rate setting. These assessments will be studied by constructing quantitative indicators based on the wording in the ECB Monthly Bulletins. The indicators will include opinions over inflation, output and money growth developments. Correlations will be studied to see how well these indicators and related macroeconomic variables, which were used in the reaction functions, follow each other. By comparing the correlations from years 2000-2006, to those seen since mid-2006, we can evaluate whether the ECB has seriously misjudged developments in monetary aggregates and inflation as well as in economic growth. This again will identify any inconsistencies in the ECB's policy framework, or will indicate whether the actions are more based on a lack of correct estimations.

5.2 Data

All the following analysis is based on the data from the ECB's web site, unless otherwise stated. Also, the data is chosen such that it would be similar to the one used in the paper by Gerlach (2004).

5.2.1 Inflation

The main focus of the central banks in the euro area, led by the ECB, should be in maintaining price stability. For the reaction functions three different inflation-related variables are chosen. One is for the expected future inflation, while the remaining two focus on available core and headline inflation data. Even though core inflation is never mentioned in the editorials of the ECB Monthly Bulletins, there are frequent references to a measure of inflation that excludes fresh-food and energy prices. Hence both headline and core inflation measures can justifiably be taken into account here. Following again Gerlach's (2004) idea, headline inflation and expected inflation will be used with a one-month lag, while core inflation, which is a more revised indicator, will be used with a two-month lag.

The expected inflation variable is conducted from *the Economist's* future inflation expectation surveys. Gerlach (2004) is followed in this current study by computing the variable as a weighted average of the forecasts for two consecutive years. *The Economist* publishes forecast surveys made by a number of financial institutions over the inflation and real output growth for this and the next year. They are published on a monthly basis. The weighted average for the variable used here is calculated with the weights depending on the month in which the forecasts are made. For example, the expected rate of inflation in May is computed as 7/12 of the expected rate of inflation for this year and 5/12 of the expected rate of inflation for next year.

5.2.2 State of the Economy

Data for the state of the economy chosen differs somewhat from that used by Gerlach (2004). The editorials never refer to output gap, furthermore Gerlach did not find this variable significant in any reaction function tested. In addition, output gap is only measured with a relatively long time lag, and its calculation is often a highly argued process. With all these arguments, output gap has been left out of this paper's analysis.

Two variables chosen for the state of the economy are the ones often covered in the editorials of the Monthly Bulletins, namely the sentiment for the economic outlook, and a measure of expected real GDP growth rate. The latter is calculated based on the same approach and average weighting as discussed with the measure of expected inflation, using the same survey

data from *the Economist*. The sentiment indicator is developed by the European Commission as a subjective indicator of real economic activity.¹⁹

For the purpose of the ECB it would make good sense to follow these two subjective indicators if they are found to correlate with real output growth in a relatively constant time gap. For the purpose of monetary policy decisions, these indicators would then provide good approximates for future real economic activity. This would enable the central bank to react in a more timely manner to upcoming changes in economic activity, thus it would further strengthen a proactive monetary policy approach. Since these indicators are relatively quickly available to decision makers, a one-month lag will be used with them.

By testing the correlations between the subjective economic growth indicators and the real GDP growth it becomes clear that the expected economic growth variable provides a good approximation for the future outlook. The GDP data in the euro area is mostly in quarterly form, thus for the correlation the first month's figure in every month is used for the expected growth variable. With a one-quarter lag, the correlation between these two is 0.861. This, in addition to all the existing problems, provides further support for excluding the output gap from the analysis.

5.2.3 M3 Growth

The essential role of monetary aggregates given by the European Central Bank in its policy framework, strengthens the importance of the M3 growth variable. The ECB's preferred measure of money growth is a three-month centered moving average, and as it is available with a two-month lag, a similar lag will be used for the reaction functions.

5.2.4 Exchange Rate

The exchange rate change variable used is the percentage change over twelve months in the nominal effective rate of the euro against a basket of 12 main trading partners' currencies.²⁰ A one-month lagging period will be used for this variable. Although the exchange rates are

¹⁹ The economic sentiment index is based on a large survey of firms and consumers in the euro area. For more information, see http://ec.europa.eu/economy_finance/indicators/business_consumer_surveys/userguide_en.pdf.

²⁰ Namely these currencies are Australian, Canadian, Singapore, the US and Hong Kong dollars, Danish, Swedish and Norwegian kroner, Swiss franc, Japanese yen, Pound sterling, and South Korean won.

available timely, it is more appropriate to use a short lag with the reaction functions, since many other related factors studied by monetary policy makers, for example foreign imports and exports, are not available with similar frequencies. This is also in line with Gerlach (2004).

5.3 Model and Results

There are numerous authors who have studied the interest-rate-setting behaviour of the European Central Bank by estimating empirical reaction functions.²¹ The aim here, based on Gerlach (2004), is to include some variables, which bring some insight into how the ECB interprets incoming macroeconomic data. This is to provide a more accurate picture behind the recent interest rate setting choices, which have been accused of being too mild and slow. As Gerlach (2004) puts it: *“Estimates of reaction functions in which policy-controlled interest rates are regressed on macroeconomic variables disregard the fact that policymakers’ assessment of these variables may vary over time.”*

These different assessments will be looked at in the next section. First, the change in the ECB’s main refinancing interest rate is estimated by using the ordered-probit technique. Again in line with Gerlach (2004), an ordered-response model that shows the significance of different variables in the ECB’s policy reactions will be constituted. These models are constructed with different sets of variables, and similar tests are conducted in three different time periods, namely since January 2000²², between January 2000 and July 2006, and lastly since June 2006 until February 2009. The last period illustrates the period of recent financial turmoil.

Tables 5 and 6 below show the results from conducting ordered-probit estimates from six reaction functions, including different sets of explanatory variables, all explaining whether there has been a change in the main refinancing interest rate, or not. Rather than commenting on, or interpreting the regressions individually, the focus will be on a more widespread analysis. This is to say that we are interested in identifying any significant differences between the periods. It is also useful to use Gerlach’s (2004) results as another source of comparison.

²¹ Some examples of recent literature estimating reaction functions are Berger, de Haan and Sturm (2006) and Carstensen (2006).

²² Results of this period are found in appendix 2.

His results were based on data from February 1999 to June 2006. These showed that the ECB's policy reacts to the state of the real economy, M3 growth, and exchange rate changes, but not to inflation. Based on this paper's earlier sections, it would seem reasonable to expect that the recent policy may still have reacted to the same variables, hence being relatively consistent, and the reasons for the criticism seen is more based on the ability of these variables to keep up with sudden changes in overall economic conditions.

Table 5: Ordered-Probit Estimates of Reaction Function: June 2006- February 2009

Model	1	2	3	4	5	6
Sentiment	0.4141*** (2.59)	0.4069*** (2.64)	0.473*** (2.82)			
Expected Growth				7.447* (1.83)	4.724** (2.25)	5.560** (2.04)
Headline Inflation	-1.995 (-0.29)			-4.094 (-1.44)		
Core Inflation		-2.156 (-0.89)			-0.727 (-0.21)	
Expected Inflation			1.761 (0.89)			2.841 (0.90)
M3 Growth	-0.920 (-1.57)	-0.7037 (-1.19)	-0.4066 (-0.53)	-2.296 (-1.35)	0.023 (0.04)	0.790 (0.76)
Exchange Rate	30.629 (1.61)	22.820 (1.53)	18.57 (1.12)	205.15* (1.73)	81.69** (2.17)	85.52** (1.97)
Lagged Change in Repo Rate	-0.649 (-0.98)	-0.7218 (-1.08)	-0.645 (-0.96)	-4.726 (-1.60)	-2.320** (-1.86)	-3.04* (-1.73)
Lagged Level of Repo Rate	-3.682*** (-2.59)	-3.359** (-2.45)	-4.914*** (-2.77)	-5.098 (-1.45)	-5.809* (-2.16)	-8.883* (-1.82)
Pseudo-R ²	0.4454	0.4585	0.4588	0.714	0.5998	0.6150
Note: Absolute value of t-statistics in parantheses. *, **, and *** denote significance at the 90 percent, 95 percent, and 99 percent level, respectively.						

During the recent financial crisis, it seems that the ECB's policy has clearly reacted to the state of the real economy, as seen through the sentiment survey index and expected growth estimates. Similar results were found by Gerlach (2004). Expected growth was an even more significant variable in his study, but this could also be explained by relatively short time period used here.

Inflation, even though being the main responsibility of the ECB, does not appear to have any significance on policy reactions. This is in line with the findings by Gerlach (2004). Lagged level of the main refinancing interest rate being a significant variable also supports the earlier results. Lagged change in the policy rate can be left outside a deeper analysis because of the short estimation period used. Similar limitation relates to the exchange rate change variable.

The monetary growth variable, namely the M3 growth rate does not seem to be significant in our reaction function. Yet it was highly significant in all reaction functions tested by Gerlach. The short time period may also affect this variable, but it also seems reasonable to claim that it supports the earlier findings that during the recent crisis, the ECB has not been quite as worried about monetary growth as previously. Thus, it appears as if the ECB's policy has not reacted to this variable. Furthermore, it looks like the variable used here may not accurately reflect the ECB's stance of how it analyses future money growth as a guideline to future price stability. This is the first indication that the ECB's monetary policy may have not been fully consistent over recent times.

Table 6: Ordered-Probit Estimates of Reaction Function: January 2000- June 2006

Model	1	2	3	4	5	6
Sentiment	0.209** (2.04)	0.1847* (1.83)	0.2738** (2.33)			
Expected Growth				3.02*** (2.63)	3.583*** (2.88)	4.383** (2.52)
Headline Inflation	-2.195** (-2.26)			-0.983 (-0.98)		
Core Inflation		-0.433 (-0.45)			-0.552 (-0.49)	
Expected Inflation			-6.164*** (-2.60)			-4.506* (-1.91)
M3 Growth	0.0756 (0.20)	0.0654 (0.19)	-0.580 (1.09)	0.195 (0.54)	0.190 (0.50)	-0.322 (0.86)
Exchange Rate	-50.099*** (-3.37)	-37.78*** (-3.69)	-57.35*** (-3.10)	-46.02*** (-3.06)	-43.94*** (-3.03)	-56.64*** (-2.67)
Lagged Change in Repo Rate	-1.951** (-2.55)	-1.180** (-2.02)	-2.697** (-2.55)	-2.057** (-2.37)	-1.782** (-2.32)	-3.275** (-2.18)
Lagged Level of Repo Rate	-1.815* (-1.88)	-1.359* (-1.86)	-1.042 (-1.04)	-3.921** (-2.43)	-3.981** (-2.46)	-4.551** (-2.19)
Pseudo-R ²	0.6152	0.5541	0.6609	0.6596	0.6520	0.7052
Note: Absolute value of t-statistics in parantheses. *, **, and *** denote significance at the 90 percent, 95 percent, and 99 percent level, respectively.						

Table 6 shows the results from the empirical reaction functions as seen in Table 5, but now the time period is January 2000-June 2006. Since the focus here is on the consistency of the ECB's policy it is interesting to compare the significant variables in Tables 5 and 6. As stated before and reflected in the paper by Gerlach (2004), monetary growth has become a less significant factor, while the remaining results support the consistency of the ECB's policy.

By looking at Table 6 it is interesting to notice that in a few models inflation measures become slightly significant variables. This further supports the idea that the recent policy actions have been less related to inflation levels, hence evidencing that the ECB was already in 2007 able to correctly predict that the relatively high inflation level at the time, was mostly due of short-term fluctuations. Temporary changes were then seen as not needing any remarkable interest rate increases.

The question whether the last interpretation over policy rate and inflation variables shows that the ECB's interest rate setting policy has changed during the recent times can be evaluated from two different points of views. First, one could argue that yes, the ECB is today much less concerned about future inflation, while heavily focusing on economic growth. On the other hand, one could evaluate the situation being such that the ECB, since it focuses on the medium- to longer-term perspective, estimates today that inflation indicators are currently so heavily affected by the temporary effects, and that over the policy-related medium term, they do not show any significant sign of inflation pressure, which should be fought against with interest rate settings. This is to say that the has remained unchanged, but the current situation has changed the context of the variables used in our models in such a way that they do not estimate future longer-term inflation as effectively as they have previously.

Overall, the results here illustrate the difficulties of trying to evaluate the European Central Bank's interest rate setting process. Clear indications that the interest rate setting policy has changed dramatically during the recent crisis are not available. Yet, it becomes an interesting question whether the ECB has been forced to change, or to add new economic and monetary variables in its research methods, because of sudden changes in economic and financial conditions. These changes have certainly had some effect on interrelatedness between the variables, thus influencing the overall process of interest rate setting. Theoretically it is

perhaps easy to claim that first the central bank must find correct variables and indicators, and then it must be able to evaluate existing changes, thus creating correct divisions between shorter-term and more policy-related medium- to longer-term influences. Certainly the ECB's analyses behind its policy framework are deep and thorough, as seen earlier. Yet, it initially seems that in a situation as seen during 2007, when economic conditions change dramatically and very suddenly, it is quite natural that any central bank focused heavily on maintaining certain financial and economic stability can be rather slow to react to such changes.

5.4 Indicators and Economic Conditions

In order to further study the connection between how the ECB has seen the economic developments since mid-2006 and how well its estimates have been able to predict historically sudden changes, information from the editorials of the ECB Monthly Bulletins is used. In line with Gerlach's (2004) paper, three indicator variables have been constructed for the ECB's interpretation of future outlook. These variables include future inflation pressure, developments in real economic activity, and M3 growth. The construction follows the similar coding and idea as in the paper by Gerlach (2004), but yet, because of subjective interpretation of the wording in the editorials, cautious needs to be exercised when drawing conclusions from the results.²³ Anyhow, if the ECB's interest rate setting policy is to be relatively consistent, as our previous studies have shown, the results found here should be relatively close to those found by Gerlach (2004).

This part has been restricted to include only a simple study of correlations between the constructed indicator variables and real variables related to them. These real variables follow the ones used in the earlier ordered-probit tests. Even with this, we should be able to evaluate whether economic conditions have recently changed so that the ECB's future forecast, as stated in the monthly bulletins, have become seriously misguided. Note, that for the purpose of this paper a problem arises from having a relatively short time period under examination, hence the reliability of correlations becomes lower. Yet, by understanding this limitation some conclusions can still be drawn and further support, or counter facts, to the paper's earlier sections found.

²³ Appendix 1 illustrates part of the texts from which the indicator variables are constructed. It should be noticed that these are only short quotes and that the coding of the indicator variables has been made on the basis of the full editorials.

5.4.1 Inflation Indicator

The European Central Bank's main responsibility being price stability in the euro area, it becomes obvious that the wording in the ECB Monthly Bulletins regarding the future inflation outlook needs to be carefully studied. Table 8 shows the correlations between the indicator and the HICP. With the HICP a two-month lag is used, since this lag provides the best correlation between these two variables when testing with all available data²⁴. No clear correlation was found with core inflation, perhaps illustrating that even though core inflation seems important regarding price stability, it remains in the background in the ECB's economic analysis, since the explicit target is defined in terms of HICP.

The results indicate that, at least regarding inflation, the ECB has shown relatively efficient forecasting power. Yet, with such a dramatic change as seen here, it could be that even the two-month lag has been too long for effective reactions, resulting in the criticism received. Note also that since indicator values are based partly on Gerlach's (2004) paper and partly constructed by the author the comparisons between different time periods must be looked at with exceptional carefulness. Still, it would seem that between 2000 and 2006, when the HICP level actually stayed more stable than during the recent two years, the indicator variables do not provide an accurate picture of inflation development. This results mainly from the indicator values' discrete and quite rough characteristics.

Table 7: Inflation Indicator and Harmonized Index of Consumer Prices

	Inflation Indicator	Inflation Indicator
	January 2000-June 2006	June 2006-February 2009
HICP	-0.0612	0.6826

5.4.2 Output Indicator

The economic analysis part of the two-pillar framework provides the ECB with plentiful material in order to evaluate future economic outlook. The economic outlook indicator constructed here describes how these future estimations are stated in the editorials of the Monthly Bulletins. To compare this indicator to real GDP growth, correlation between the indicator values and the real GDP growth in the euro area is calculated. Since GDP growth

²⁴ Using a two-month lag with the inflation indicator variable gives a correlation 0.3241 with the HICP. This is the highest correlation within any reasonable lags.

values are most often published quarterly, similar data is used here. The indicator values are then used by always taking the first month of every quarter.

Calculating the correlation with a one-quarter lag gives a value of 0.795 between the output indicator and GDP growth since the first quarter of 2000. This high correlation reveals that at least over the recent decade the ECB seems to have predicted development in the euro area's economic growth relatively accurately. For maintaining price stability, as the ECB is mandated, proper estimates for future economic conditions are necessary. High correlation supports the earlier parts of this paper regarding the ECB's careful and widespread analyses inside its two-pillar framework.

The same correlation is 0.797 when restricting the time period to the era of this recent crisis — namely, since the second quarter of 2006. This shows that based on these calculations there has not been a serious decrease in efficiency regarding the ECB's economic outlook predictions. Yet, it should be noted that since almost all economic variables have seen dramatic and extremely sudden changes, the central bank's ability to predict future development in a quarterly-manner has not been adequate enough. Regarding the recent criticism, the central bank should somehow have improved its estimations, even though times of turmoil are naturally the most difficult periods for any estimators, since, after all, estimations are only one form of probability calculations.²⁵

5.4.3 Money-Growth Indicator

The editorials of the ECB Monthly Bulletins always include a careful and thorough analysis of monetary growth. Future expectations, current numbers and possible changes in different monetary components are all discussed. With this analysis being so thorough, it seems reasonable to say that even though the simple statistical test does not provide too high a correlation between the money-growth indicator and real M3 growth, this component plays, and has played, an important role in the ECB's monetary policy decisions.

²⁵ The sentence is the author's version of Pasi Sorjonen's, ETLA's head of forecasting, statement on the Finnish National Television news during the financial crisis.

Table 8: Money-Growth Indicator and M3 Growth Measure

	Money-Growth Indicator	Money-Growth Indicator
	January 2000-June 2006	June 2006-February 2009
M3 Growth	-0.2619	0.3931

5.5 Conclusions

Empirical testing of the central banks' interest rate setting reaction functions is a widely studied topic regarding central bank policies. In line with the scope of this paper in studying the consistency of the European Central Bank's policy within its two-pillar framework, the empirical support for the earlier findings were looked at via some ordered-probit testing. In addition, a quick look at the wording of the ECB's economic and monetary outlook in its Monthly Bulletins was also included in the analysis. Gerlach's (2004) paper on similar issues was held as a reference study. However, this paper's analysis was limited so that it does not fully follow Gerlach's paper.

The findings from testing several models of the reaction function, by studying which variables seem to be significant factors in the ECB's interest rate setting behaviour provided quite similar results as found by Gerlach (2004) from time the period 2000-2006. Interestingly, even though the ECB is close to being an inflation targeting central bank, with its HICP target level, inflation measures do not show up as significant factors in any model. This implies that it is not inflation itself, rather the reasons behind it, that the ECB is trying to affect.

The monetary growth variable also remains insignificant, or at least its role is relatively unclear. This, on the other hand, further strengthens our earlier findings that during the recent turmoil, it has not been so much the actual growth in the M3 aggregate, but more what has been happening inside monetary aggregates that have been impacting factors. Changes in monetary and credit variables have been closely followed and mentioned in the ECB's explanations over the decided policy actions. Yet, the role of the M3 growth level cannot easily be left outside the analysis, since the ECB still has a reference value regarding this variable.

One clear factor influencing future inflation level is economic growth. The real measures of economic activity are often received with too long a lag in order for them to be relevant in

policy decisions. Hence, it is really positive, from the ECB's point of view, to notice that some survey measures, which are available even a few months earlier than the actual data, give good estimates of future economic growth. Economic outlook variables are found to be significant, many times even highly significant, in the reaction functions.

The focus on economic outlook in policy decisions supports the idea that the ECB tries to be proactive regarding its price stability mandate. When testing the wording in the editorials of the ECB Monthly Bulletins, it also becomes clear that during the recent financial crisis the ECB has been able to predict future changes relatively accurately. Certainly, the magnitude of the changes has surprised even the ECB, which has then probably deciding on too moderate policy actions. Also, the pace of the crisis has been so extraordinary, that part of the problem possibly comes through the analysis tools, which just have not been able to keep up. This would then lead a central bank to act based on its own targets and framework, but unfortunately, because of inadequate information received, too little and too late. This provides us with some explanation of why some of the criticism shown may have been well justified.

6. Conclusions

This paper's goal was to study the European Central Bank's role in the recent global financial crisis in the context of the two-pillar framework. The ECB's policy is built on this framework. The main objective was to evaluate the consistency of the ECB's monetary policy during this exceptional time period. This consistency was reflected in the ECB's mandate, legal responsibilities and, most of all, its two-pillar framework. The paper does not consider whether the ECB, or any other central bank, has reacted effectively, correctly or clearly better than another. The time for this type of study is later, when all consequences, costs and benefits from this global economic downturn have been seen.

The European Central Bank's history is relatively short, and its responsibilities regarding a financial distress situation, as recently seen, are still relatively unclear. Furthermore, the ECB's biggest limiting factor is its own working environment, meaning that being a common central bank in an area including very diversified nation states is not a simple task. The ECB is responsible for maintaining price stability and related stable economic conditions in the whole euro area. By focusing too heavily on only the largest countries in the area, the majority of nations could actually see their situation deteriorating further. Yet, focusing too much on a general level, may easily lead to mediocre actions, and in some cases, even prevent overall well being to grow at its optimal level. This limitation has affected the ECB's actions throughout its history.

In maintaining price stability in the euro area, the ECB gained a high and appreciated reputation during the past 10 years. The ECB's two-pillar framework does lead to a stable economic and monetary environment, which has been studied as a precondition for sustainable economic growth. The downside for the policy framework has seemed to be that the ECB's monetary policy cannot provide enough financial first-aid support if a global crisis occurs. The Federal Reserve, who is more focused on maintaining economic growth, has more flexibility regarding situations where proactive policy actions are required. During the recent financial chaos, both leading central banks have shown greater flexibility and innovativeness regarding supportive policy actions. In this, no significance differences between the central banks are noticeable.

The theoretical model developed by Beck and Wieland (2007) further supports the findings, which showed that the ECB's policy framework may not provide enough room for proactive policy implementation during a sudden economic crisis. The model explains some of the reasons why the ECB has been able to create relatively stable monetary conditions in the euro area. Yet, even the theoretical model does not say that all the criticism against the ECB's slow reactions can be attributed to the two-pillar framework. Rather, the disintegrated euro area again seems to cause numerous problems.

The ECB has received a lot of criticism over interest rate setting policy. The refinancing interest rate in the euro area has been claimed to be too high for too long, thus increasing the influence of the global crisis. This study supports the idea that the ECB, by following its own framework has lowered the interest level slower than it actually might have done without threatening price stability. On the other hand, the consistency of the ECB's policy has stayed. Unfortunately, when the economic and monetary analysis behind the policy framework has not been able to correctly estimate the great pace by which the global economy and financial markets have changed since the mid-2007, the consistency of the policy has led the ECB's actions to be, at least partly, too late.

Besides lowering interest rate levels, central banks worldwide have been forced to fight against the suddenly lost liquidity in the markets. In these liquidity injections, the ECB has not been remarkably different than any other major central bank. The current problems regarding this task are mainly created by changes in financial markets. Previously, depository institutions have been the main financing institutions for companies, and central banks the lender of last resort for depository institutions. To act as a lender of last resort has been a relatively straightforward task for all central banks.

New financial innovations have resulted in companies' external financing coming from sources other than traditional depository institutions. Central banks have faced a question of how to support liquidity through different non-depository institutions, which are not regular counter parties in central bank actions. There have been changes in collateral accepted when borrowing money from the central bank. Also, the range of accepted counter parties has been increased. With this the central banks have been forced to stretch their normal procedures, thus employing tools, which are not normally allowed to them. The latest financial crisis being

so critical and severe, there does not seem to be too many critical opinions over these extreme actions. Since financing through non-depository institutions has become more common in the US than in the euro area, the Fed has been much more urgent in using all extreme tools than has the ECB.

The short empirical section in this paper, loosely following the idea of Gerlach (2004), further supported the earlier findings regarding interest rate setting decisions by the ECB. This is to say, that the consistency with respect to the two-pillar framework is clearly visible. The ECB has reacted to changes in the real economic conditions as it has throughout the last decade. Yet, this also points out that the biggest reasons for all the criticism laid against the ECB's actions may be because of the characteristics of the recent crisis.

The global financial turmoil has been characterised by extremely sudden changes in most of the important economic indicators. Since the two-pillar framework is based on a deep and thorough economic and monetary analysis, these are needed to be accurate in order for the central bank to react correctly. Now, the ECB following its own strategy has not been able to react fast enough to all these changes, because everything has happened faster than prediction models have been able to forecast. The way the ECB reacts to different indicators has not significantly changed, hence it is valid to claim that the policy has remained relatively consistent.

Overall, the ECB has not provided the markets with any significantly different solution to the recent crisis, than has any other major central bank. Yet, the ECB has maintained a clear connection to its mandate and its created policy framework. The disintegrated euro area still limits the ECB's actions in a way that could make them appear rather slow and inefficient compared to the Fed. The responsibility over each nation state's monetary policy, together with local fiscal policy actions has decreased the ECB's possibilities to conduct truly proactive decisions. Also, the recent crisis has been characterised by such sudden changes that it seems quite natural that neither of the major central banks has managed without being heavily criticised.

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Appendices

Appendix 1

Summary of the Editorials in the ECB's Monthly Bulletin, January 2007-February 2009

Monthly Bulletin, Dates of Meetings, and Interest Rate Decisions	Outlook for Prices	Outlook for Real Activity	Outlook for Monetary Development
<p>January 2007 - 11.1.2007 - no change (the minimum bid rate of the main refinancing operations = 3.5%)</p> <p>(1,1,1. Values given to outlook for prices, real activity, and monetary development, respectively)</p>	<p>“In the Governing Council’s view, the outlook for price developments remains subject to upside risks”</p>	<p>“Drawing on the latest information, the evidence from various confidence surveys and indicator-based estimates supports the assessment that robust economic growth has continued and that the situation in labour markets has improved further”.</p>	<p>“...annual M3 growth rose to 9.3% in November. This represents its highest annual rate of growth since the introduction of the euro” “All in all, the rate of monetary and expansion remains rapid”.</p>
<p>February 2007 - 8.2.2007 - no change</p> <p>(1,1,1)</p>	<p>“The medium to longer-term outlook for price stability remains subject to upside risks”. “More fundamentally, stronger than currently expected wage developments pose substantial upward risks to price stability”</p>	<p>“Conditions remain in place for the euro area economy to continue to expand at rates around potential”.</p>	<p>“However, continued strong money and credit growth confirm the view that the underlying rate of broad money expansion in the euro area remains vigorous”.</p>
<p>March 2007 - 8.3.2007 - raise by 25 basis points to 3.75%</p> <p>(1,1,1)</p>	<p>“At the policy-relevant medium-term horizon, the outlook for price developments remains, in the Governing Council’s view, subject to upside risk”</p>	<p>“The strength of real GDP growth in the fourth quarter is thus indicative of ongoing robust growth in the euro area”. “...various confidence surveys and indicator-based estimates supports the assessment that robust economic growth has continued into 2007”</p>	<p>“Taking the appropriate medium to longer-term perspective... ..,the latest developments confirm the continuation of a persistent upward trend in the underlying rate of monetary expansion.”</p>
<p>April 2007 - 12.4.2007 - no change</p> <p>(1,0,1)</p>	<p>“Over the policy-relevant medium-term horizon, the outlook for price developments remains subject to upside risks.”</p>	<p>“Looking further ahead, the conditions are in place for the euro area economy to grow solidly.” “The risks surrounding this favourable outlook for economic growth are broadly balanced over the shorter term. At longer horizons, downside risks remain.”</p>	<p>“The continued robust expansion of money and credit...” “In this environment of ample liquidity, the continued vigorous expansion of money and credit...”</p>

<p>May 2007 - 10.5.2007 - no change</p> <p>(1,1,1)</p>	<p>“Over the policy-relevant medium-term horizon, the outlook for price developments remains subject to upside risks.” “...stronger than currently expected wage developments could pose significant upward risks to price .”</p>	<p>“The medium-term outlook for economic growth in the euro area continues to be favourable.” “At longer horizons, the balance of risks remains on the downside,...”</p>	<p>“The underlying rate of monetary expansion remains strong, in a context of already ample liquidity.” “...in the increasingly rapid growth of M3...”</p>
<p>June 2007 - 6.6.2007 - raise by 25 basis points to 4.00%</p> <p>(1,1,1)</p>	<p>“At the policy-relevant medium-term horizon, risks to outlook for price stability remain on the upside...” “...there is a risk that wage developments will be stronger than expected, which would pose significant upward risks to price stability.”</p>	<p>“..., incoming information clearly confirms that the euro area economy continues to expand at a pace which is significantly stronger than generally expected a year ago.” “Looking ahead, the medium-term outlook for economic activity remains favourable.”</p>	<p>“The underlying rate of monetary expansion remains strong, in a context of already ample liquidity.” “The strong rate of monetary and credit expansion reflects...”</p>
<p>July 2007 - 5.7.2007 - no change</p> <p>(1,0,1)</p>	<p>“At the policy-relevant medium-term horizon risks to the outlook for price stability remain on the upside.” “In addition, upside risks to price stability arise from increases in administered prices and indirect taxes beyond those anticipated thus far,...”</p>	<p>“The medium-term outlook for economic activity remains favourable.” “At medium to longer horizons, the balance of risks remains on the downside.”</p>	<p>“The underlying rate of monetary expansion remains strong in a context of already ample liquidity.”</p>
<p>August 2007 - 2.8.2007 - no change</p> <p>(1,0,1)</p>	<p>“At the policy-relevant medium-term horizons, risks to the outlook for price stability remain on the upside.” “Given the continued vigour of money and credit expansion, there are clear indications of upside risks to price stability at medium to longer-term.”</p>	<p>“the medium-term outlook for economic growth remains favourable, conditions are in place for economic activity in the euro area to continue expand at a sustained rate.” “At medium to longer horizons, the balance of risks remains on the downside, owing mainly to external factors.”</p>	<p>“The ongoing strength of monetary expansion is reflected in the in the continued robust growth in M3, which increased at an annual rate of 10.9% in June 2007.”</p>
<p>September 2007 - 6.9.2007 - no change</p> <p>(1,0,1)</p>	<p>“The Governing Council is of the view that risks to this outlook for price developments lie on the upside.”</p>	<p>“the data available suggest that economic activity in the euro area is continuing to expand at sustained rate.” “Data on activity.....remain favourable overall and support the assessment that real GDP is growing at sustained rate.”</p>	<p>“the underlying rate of monetary and credit expansion remains strong.”</p>

<p>October 2007 - 4.10.2007 - no change</p> <p>(1,0,1)</p>	<p>“Risks to the outlook for price developments remain on the upside.”</p>	<p>“... , it appears that the sustained economic growth experienced in the euro area in the first half of 2007 has continued through the summer.”</p>	<p>“A broad assessment of monetary data supports the view that the underlying rate of money and credit growth remains strong.”</p>
<p>November 2007 - 8.11.2007 - no change</p> <p>(2,1,1)</p>	<p>“Risks to the medium-term outlook for price developments are fully confirmed to lie on the upside.”</p>	<p>“... , it appears that the sustained economic growth experienced in the euro area in the first half of 2007 has continued through the third quarter, ...” “... , these indicators generally remain above their historical averages and continue to point to ongoing sustained growth.”</p>	<p>“... , even taking into account these special factors, the underlying rate of money and credit expansion remains strong.”</p>
<p>December 2007 - 6.12.2007 - no change</p> <p>(2,0,1)</p>	<p>“... , risks to this medium-term outlook for price developments are fully confirmed to lie on the upside.”</p>	<p>“The latest information on economic activity from various confidence surveys and indicator-based estimates supports the assessment that economic growth has continued into the fourth quarter of this year, ...” “... , the risks surrounding this outlook for economic growth lie on the downside.”</p>	<p>“Money and credit have both continued to grow vigorously in recent months.” “... , even taking these special factors into account, the underlying rate of monetary expansion remains strong.”</p>
<p>January 2008 - 10.1.2008 - no change</p> <p>(2,0,1)</p>	<p>“Risks to this medium-term outlook for price developments are fully confirmed to lie on the upside.”</p>	<p>“This assessment is in line with indicators for business and consumer confidence which, while declining over the past few months, generally remain at levels that continue to point to ongoing growth.” “That said, uncertainty about the prospects for economic growth remains high and risks surrounding the outlook for economic activity lie on the downside.”</p>	<p>“Money and credit have both continued to grow vigorously in recent months.” “Nonetheless, even taking these special factors into account, the underlying rate of monetary expansion remains strong.”</p>

<p>February 2008 - 7.2.2008 - no change</p> <p>(2,0,1)</p>	<p>“Risks to this medium-term outlook for price developments are fully confirmed to lie on the upside.”</p>	<p>“This assessment is in line with indicators for business and consumer confidence which, while having declined over the past few months, overall remain consistent with ongoing growth.” “That said, uncertainty about the prospects for economic growth is unusually high and the risks...have been confirmed to lie on the downside.”</p>	<p>“Annual M3 growth, ..., remained very vigorous at 11.5%...” “..., broad-based assessment of the latest data confirms that the underlying rate of monetary expansion remains strong.”</p>
<p>March 2008 - 6.3.2008 - no change</p> <p>(1,0,1)</p>	<p>“..., the risks to the outlook for inflation over the medium term are on the upside.”</p>	<p>“..., the latest information on economic activity confirms the picture of moderating growth around the turn of the year.” “Surveys of business and consumer confidence, which have followed a downward trend since the summer of 2007, overall remain consistent with ongoing growth.”</p>	<p>“Annual M3 growth remained very vigorous at 11.5% in January, ...” “..., a broad-based assessment of the latest data confirms that the underlying rate of money and credit growth remains strong.”</p>
<p>April 2008 - 10.4.2008 - no change</p> <p>(1,0,1)</p>	<p>“The risks to the outlook for inflation over the medium term remain clearly on the upside.”</p>	<p>“Looking ahead, both domestic and foreign demand are expected to support ongoing real GDP growth in the euro area in 2008.” “The uncertainty surrounding this outlook for economic growth remains high, and downside risk prevails.”</p>	<p>“..., even after taking such effects, a broad-based assessment of the latest data confirms that the underlying rate of money and credit growth remains strong.”</p>
<p>May 2008 - 8.5.2008 - no change</p> <p>(1,0,1)</p>	<p>“The risks to the outlook for inflation over the medium term remain clearly on the upside.”</p>	<p>“..., the latest data and survey information on economic activity confirms previous expectations of moderate but ongoing growth...” “The uncertainty surrounding this outlook for economic growth remains high, and downside risk prevails.”</p>	<p>“Annual M3 growth remained very vigorous at 10.3% in March, ...” “..., even after taking such effects into account, a broad-based assessment of the latest data confirms that the underlying rate of money and credit growth remains strong.”</p>

<p>June 2008 - 5.6.2008 - no change</p> <p>(2,0,1)</p>	<p>“... , at the policy-relevant medium-term horizon risks to outlook for prices remain clearly on the upside and have increased further.”</p>	<p>“In line with available forecasts, both domestic and foreign demand are expected to support ongoing real GDP growth in the euro area in 2008.” “... , the uncertainty surrounding this outlook for economic growth remains high, and downside risks prevail.”</p>	<p>“The monetary analysis confirms the prevailing upside risks to price stability at medium to longer-term horizons.” “... , even after taking such effects into account, a broad-based assessment of the latest data confirms that the underlying rate of money and credit growth remains strong.”</p>
<p>July 2008 - 3.7.2008 - raise by 25 basis points to 4.25%</p> <p>(2,0,1)</p>	<p>“Risks to price stability at the policy-relevant medium-term horizon remain clearly on the upside and have increased further over the past few months.”</p>	<p>“Interpreted on this basis, the information available remains broadly in line with the Governing Council’s expectation of moderate ongoing growth.” “... , the uncertainty...remains high, ... , and downside risks prevail.”</p>	<p>“... , annual M3 growth has remained very vigorous in recent months...” “... ,even after taking such effects into account, a broad-based assessment of the latest data confirms that the underlying rate of money and credit growth remains strong.”</p>
<p>August 2008 - 7.8.2008 - no change</p> <p>(2,0,1)</p>	<p>“Risks to price stability at the policy-relevant medium-term horizon remain clearly on the upside and have increased over the past few months.”</p>	<p>“... , it also partly reflects a weakening in GDP growth due to factors such as slower expansion at the global level...” “... , the uncertainty...remains high, owing to, ... , the very high and volatile levels of commodity prices and the ongoing tension in financial markets. Overall, downside risks prevail.”</p>	<p>“While the growth of broad money and credit aggregates is now showing some signs of moderation...” “Overall, a broad-based analysis of the data, taking the appropriate medium-term perspective, confirms the underlying strength of money growth.”</p>
<p>September 2008 - 4.9.2008 - no change</p> <p>(1,-1,0)</p>	<p>“... , at the policy-relevant medium-term horizon, there are upside risks to the outlook for price developments.” “There is particularly a very strong concern that the emergence of broad-based second-round effects in price and wage-setting behaviour could add significantly to inflationary pressures.”</p>	<p>“Taking into account all available information, the euro area is currently experiencing an episode of weak activity...” “... , the uncertainty surrounding this outlook for economic activity is particularly high at the current juncture and, generally, downside risks prevail.”</p>	<p>“While the growth of broad money and credit aggregates is now showing some signs of moderation, ... , the strong underlying pace of monetary expansion points to continued upside risks to price stability over the medium-term.”</p>

<p>October 2008 - 8.10.2009 - reduce by 50 basis points to 3.75%</p> <p>(0,-1,0)</p> <p>Note: The issue of the Monthly Bulletin was finalised before the decision to cut the rates.</p>	<p>“At the policy-relevant medium-term horizon, taking into account the weakening demand, upside risks to price stability have diminished somewhat, but they have not disappeared.”</p>	<p>“When analysing current developments current developments n economic activity, it needs to be stressed that the current situation brings with it an extraordinarily high degree of uncertainty.” “..., the economic outlook is subject to increased downside risks.”</p>	<p>“While the still strong underlying pace of monetary expansion points to upside risks to price stability over the medium term, the growth of broad money and credit aggregates is showing some further signs of moderation.”</p>
<p>November 2008 - 6.11.2008 - reduce by 50 basis points to 3.25%</p> <p>(0,-2,0)</p>	<p>“... current analysis indicate a further alleviation of upside risks to price stability at the policy-relevant medium-term horizon, even though they have not disappeared completely.”</p>	<p>“..., the latest survey data confirm that momentum in economic activity has weakened significantly,..., looking forward, it will remain crucial to lay sound foundations for a recovery.” “..., a number of the downside risks to economic activity ... have materialised.”</p>	<p>“..., the annual growth rates of broad money and credit aggregates, while still remaining strong, continued to decline in September. Taking the appropriate medium-term perspective, monetary data up to September confirm that upside risks...diminishing but...not disappeared completely.”</p>
<p>December 2008 - 4.12.2008 - reduce by 75 basis points to 2.50%</p> <p>(0,-2,0)</p>	<p>“..., risks to price stability at the policy-relevant horizon are more balanced than in the past.”</p>	<p>“...an intensified and broadening of the financial market turmoil.” “...a number of downside risks to economic activity...have materialised,...” “...the significant slowdown in economic activity...”</p>	<p>“While the underlying pace of monetary expansion has remained strong, it has continued to decelerate further.”</p>
<p>January 2009 - 15.1.2009 - reduce by 50 basis points to 2.00%</p> <p>(0,-2,-0)</p>	<p>““Risks to price stability over the medium term are broadly balanced. Unexpected further declines in commodity prices of a stronger than expected slowdown in the economy could put downward pressure...while upside risks ... could materialise.”</p>	<p>“...economic activity throughout the world , including in the euro area, has weakened further.” “..., this outlook for the economy remains surrounded by an exceptionally high degree of uncertainty.” “Overall, risks to economic growth remain clearly on the downside.”</p>	<p>“Turning to the monetary analysis, the latest evidence confirms a moderating rate of monetary expansion in the euro area. Monetary trends therefore support the view that inflationary pressures and risks are diminishing.”</p>

<p>February 2009 - 5.2.2009 - no change (0,-2,0)</p>	<p>“Looking over the policy-relevant medium-term horizon, annual HICP inflation is expected to be in line with price stability.”</p>	<p>“...the outlook for the economy remains surrounded by an exceptionally high degree of uncertainty. Overall, risks to economic growth remain clearly on the downside.”</p>	<p>“...the latest evidence confirms a continued deceleration in the underlying pace of monetary expansion in the euro area, supporting the view that inflationary pressures are diminishing.”</p>
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Appendix 2

Ordered-Probit Estimates of Reaction Function: January 2000 -February 2009

Model	1	2	3	4	5	6
Sentiment	0.0845*** (3.24)	0.0597** (2.15)	0.0918*** (3.30)			
Expected Growth				1.854*** (4.83)	1.629*** (4.71)	2.008*** (4.97)
Headline Inflation	-0.5537 (-1.96)**			0.281 (0.90)		
Core Inflation		-0.6230 (-1.26)			-0.817 (-1.55)	
Expected Inflation			-0.870 (-1.43)			1.209* (1.86)
M3 Growth	-0.102 (-0.82)	-0.0236 (-0.17)	-0.117 (-0.95)	0.442*** (4.15)	0.456*** (4.05)	0.419*** (3.82)
Exchange Rate	-7.619*** (-2.60)	-6.777** (-2.24)	-7.119** (-2.40)	-10.293*** (3.20)	-8.367** (-2.49)	-10.669*** (-3.26)
Lagged Change in Repo Rate	-0.036 (-0.12)	-0.083 (0.28)	-0.036 (-0.12)	-0.469 (-1.36)	-0.521 (-1.49)	-0.558 (-1.57)
Lagged Level of Repo Rate	-0.278* (-1.65)	-0.329** (-2.01)	-0.249 (-1.38)	-0.867*** (-3.80)	-0.732 (-3.57)	-1.063*** (-3.98)
Pseudo-R ²	0.2299	0.2150	0.2178	0.3447	0.3557	0.3630
Note: Absolute value of t-statistics in parantheses. *, **, and *** denote significance at the 90 percent, 95 percent, and 99 percent level, respectively.						