ISCTE Business School
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EFFICIENCY OF CENTRAL BANKS DURING FINANCIAL CRISIS: QUANTITATIVE EASING'S ECONOMIC IMPACT ANALYSIS ON THE EUROPEAN UNION

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DIVANACH ANAIS MARIE

Abstract

In 2015, the European Central Bank, decides to involve in unconventional monetary policies in order to reinforce economic and monetary European situation after the 2008's global crisis. This dissertation aims to show the positive as well as the negative impacts that the policy of quantitative easing has had on the European economy and finance.

Since these policies have only recently been introduced in the European Union, the method chosen to measure their impacts is to use historical facts such as the use of these policies in Japan, to use the various academic theories and finally to use ECB financial and economic data.

Additionally , the thesis shows what other tools could have been used or could be used in the context of non-conventional policies, but also what are the possible outcomes of these policies and how this could affect the independence of the European Central Bank.

Keywords : European Central Bank, Quantitative Easing, Monetary policies, European Union

Sumário

Em 2015, o Banco Central Europeu, decide envolver políticas monetárias não convencionais para reforçar a situação económica e monetária europeia após a crise global de 2008. Esta dissertação visa mostrar os impactos, positivos e negativos, que a política de flexibilização quantitativa teve na economia e nas finanças europeias.

Uma vez que estas políticas foram recentemente introduzidas na União Europeia, o método escolhido é o uso de fatos históricos, como o uso destas políticas no Japão, explicitando as várias teorias académicas e, posteriormente, utilizando dados económicos, em particular do Banco Central Europeu, para medir esses impactos.

Finalmente, a tese mostra que outras ferramentas poderiam ter sido usadas ou que podem ser usadas no contexto de políticas não convencionais, mas também quais são os possíveis resultados dessas políticas e como isso poderia afetar a independência do Banco Central Europeu.

Palavras-chave: Banco Central Europeu, Equilíbrio Quantitativo, Políticas Monetárias, União Europeia

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1. Introduction

The objective of this thesis is to assess the direct and indirect implications of central banks unstandardized monetary policies, following the 2008 financial crisis.

Banking and financial turmoil arising from the financial crisis that emerged worldwide in 2007, required a "thorough" intervention by the central banks of advanced countries, thereby forcing them to review their monetary policy strategies.

Indeed, the interbank crisis of confidence, the lack of liquidity on the market and the risk of insolvency made the action of central banks, extremely difficult. This difficulty is due partly to uncertainty about the unfolding situation and also the impact decisions made by central banks can have on the functioning of the financial system. The ECB decides, thus, in 2015 to implement an unstandardized monetary policy, already used by United Kingdom and USA bank central in order to avoid recession and to reverse the economic and financial damage that the crisis had on the euro zone.

In order to understand in which way, the central bank have an influence on economic and financial aggregates, the thesis will summarize first the diverse economic theories assessing the effects of an independent monetary institution on the different level of an economy. Thus, transmission channels, Keynesian and Monetarists theories as well as Mundell-Fleming model and liquidity trap will be considered in order to understand how an instrument can influence economic data.

The thesis is based firstly upon theory findings linking different monetary policies and unconventional mechanisms approach. This instrument, QE and its mechanisms of action on economic and financial aggregates, couldn't been analyze in the past as this is the first time that the euro zone will instigate it. Moreover, UK and USA have been applied it only since few years.

The main sources of theories regarding this instrument concerns the involvement of the QE in 2001 by Japan. Indeed, Japan, following a monetary crisis, decided to implement this monetary policy in order to fight domestic deflation and thus, artificially create inflation. The mechanism has been stop four years later because of a rapid excess of inflation on their economy.

Secondly, it will use secondary sources, meaning earlier international research articles and reviews. No econometrical and statistical analysis will be used, but some macro-economic statistics from official UE statistics, principally from ECB source. Using different statistics from UE official sources, the method aims to shows the consequences of Central Bank decision on inflation, interest rates, government bond yields and exchange rate. By analyzing the empirical findings and cross it with theoretical findings link to the literature review, the thesis will assess the successfulness of ECB decisions in UE.

As this thesis aim is to show the different mechanisms that QE might have on different economic data for the Euro zone, the period chosen for analysis will focus on 2014 to 2017.

Country wise, the thesis will analyses based on data for all Euro zone, but as well, it will focus for some data on five different countries: France, Portugal, Germany, Spain and Italy. Those countries were chosen as the 2008 crisis had different impact on them. The thesis will then aim to analyses if the effect were homogenate upon those countries or, on the contrary different considering other mechanisms than QE politics.

The limits of quantitative easing will be analyzed and described as well.

Finally, the study will develop alternatives theories that might have been used instead of quantitative easing during the 2008's crisis. Indeed, other mechanism have been analyzed to avoid deflation in an economic zone such as negative policy rate and helicopter money. Then, it will asset the different limitation the prior analysis might have and how this could have been improved.

Finally, the dissertation will assess the different challenges that central banks, in particular ECB, might have to face during the next years. The main next question would have to be the exit of unstandardized monetary policies over the euro zone but as well the meaning of the independence of the central banks, whose unstandardized mechanism might impact on.

2. Background

In order to understand why the ECB had to use unconventional policies, this chapter will review the financial crisis in 2008 and its consequences. Moreover, it will detail the ECB different solutions facing this crisis and thus make a summary of the different monetary policies and their mechanisms.

1. 2008's financial crisis

Following the subprime crisis in 2007, many countries faced a liquidity crisis. A liquidity crisis is characterized when a state does not have sufficient liquidity to meet its financial commitments. A set of systemic risks, that is, all risks affecting an entire economy and not just a company, has not been contained and all banking markets are bankrupt in several countries, US, Europe but also in Asia. In Europe, several institutions are rescued by governments and the Central Bank. We can thus find the example of the insurer International Nederlanden Groep (ING) recapitalized to the tune of 10 billion euros by the Dutch government in 2008. The action of the company had lost nearly 68% of its value.[1]

The culmination of the collapse of interbank trust is related to the bankruptcy of the international investment bank Lehman Brothers in September 2008. The liquidity crisis then affects the banking environment disturbing mutual loans between different banks due to the loss of confidence because of bad debts. A massive rescue of the interbank environment is then the only solution from the national and international institutions. Central banks are at the forefront of this unprecedented crisis and are therefore forced to review their monetary policy strategy in order to manage both the crisis of interbank confidence, the lack of liquidity but also the risks of insolvency due to many assets in the market (linked to the subprime crisis and credit default swaps).

2. ECB's solutions

The danger of bankruptcy of the banking system, which finances the economy, has pushed the central banks of the different countries to intervene. Before analyzing the various actions of

[1] Following its partial nationalization, ING sold a large number of its (most risky) subsidiaries in Canada, UK and Asia at the request of the European Commission. In 2016, ING announces 7000 layoffs to come, of which almost half in Belgium

the latter, it seems important to review the main tasks of the European Central Bank and its modes of operation.

Established in 1998, the ECB is based on a federal model, such as the Bundesbank, the German bank. After the Industrial revolution from the 19th century, one can see changes in the monetary creation system. The money is now created for loans and not only as an exchange for gold stocks for example. However, by generating too much money, agreeing too many loans, they might engender inflation in the economy.

ECB is accountable for issuing the Euro as the common and single currency of the Economic and Monetary Union, and defining the core monetary policy guidelines for the Euro area and taking the decisions necessary for its implementation, meaning, to preserve the purchasing power of the Euro and therefore the stability of prices in the Euro area. This zone currently includes the 19 countries of the European Union which have introduced the euro since 1999. (ECB, 2017)

1. Conventional policies

The primary measures of the ECB are designed to support the banking system and credit activity, but above all to restore the functioning of transmission (Blot, et al., 2015). These measures are part of the conventional monetary policy group.

Price stability is also at the heart of central bank policies since the emergence of the doctrine of Greenspan. Alan Greenspan, one of the main founders of the Fed's leadership, is suggesting that the Fed's policy should focus on targeting inflation through its key interest rate setting (Aglietta, 2008). Central banks have since followed the Taylor rule, which objective which is to obtain a target inflation rate in line with the level of potential activity.

$$(i)\ i_t = \pi_t + r*_t + \alpha_\pi(\pi_t - \pi*_{t)} + \alpha_y(y_t - \bar{y}_t)$$

With: r* the assumed equilibrium real interest rate, π* the desired inflation rate, π inflation observed and $(y_t - \bar{y}_t)$ the output gap meaning the logarithm of real GDP minus the potential output.

When targeted inflation equals the observed inflation and when observed growth is at its potential, the CB key rate should be equal to the real neutral rate.

For its monetary policy, the ECB uses three different key interest rates (from the lowest rate to the highest rate):

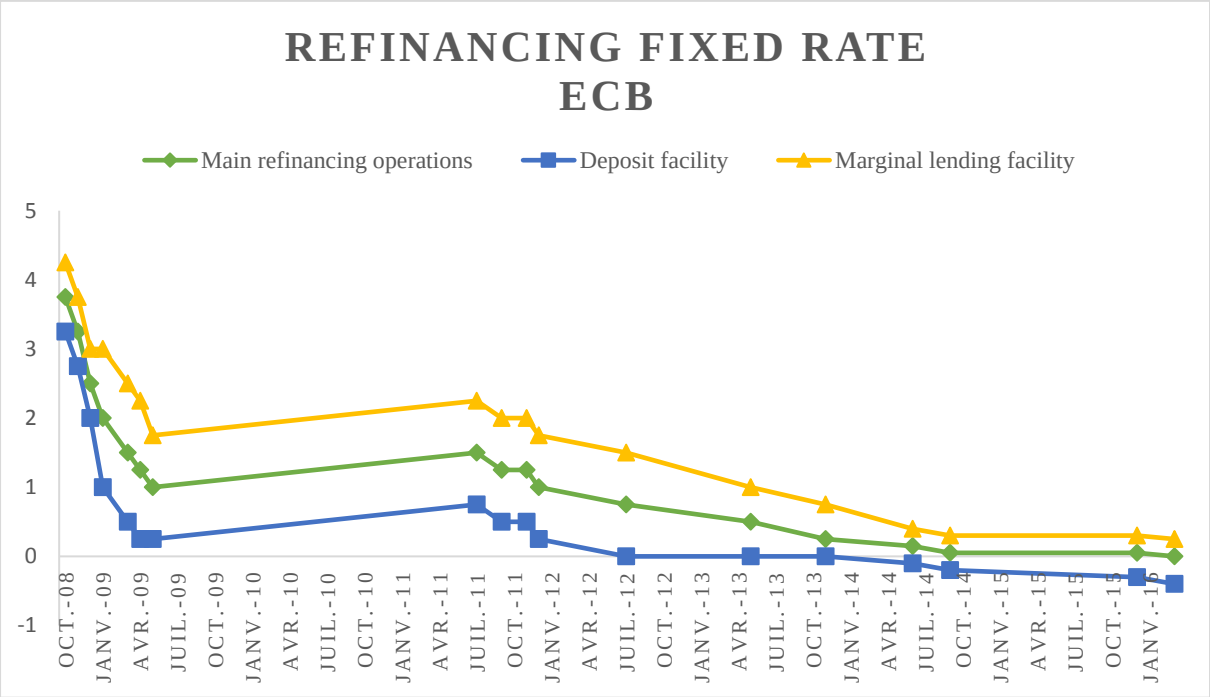
- the rate of remuneration of deposits; is the overnight interest rate agreed by the central bank, to which is paid the excess liquidity of banks and financial institutions retained with the central bank;
- The refinancing rate, the most important, is the rate to which these economic agents can borrow from the central bank;
- The marginal lending rate.

In order to accomplish its main objective of maintaining price stability, the Euro System has a series of monetary policy instruments : (i) Open-market operations used to pilot interest rates, manage the liquidity situation in the money market and signaling the stance of monetary policy; (ii) permanent facilities used to provide and withdraw overnight liquidity and to determine an upper and lower limit for the overnight market interest rate; and (iii) mandatory reserves, which objective is to stabilize interest rates on the money market and to create (or accentuate) a structural liquidity requirement. (ECB, 2017).

The first measure used to respond to the crisis was, in the first months, to increase the monetary base by Open-market operations intended at saturating the demand for liquidity, allowing institutions to refinance their activity and avoid triggering a systemic crisis. The first intervention took place on 9 August 2007, when the ECB injected 94.8 billion euros into the European financial system to increase the liquidity that was lacking in the market. This is the largest single-day provision of funds by the ECB, exceeding the € 69.3 billion loan made after the September 11, 2001 attacks. On the same day, the Fed is injecting 24 Billion US dollars in the financial system of his country.

Moreover, all central banks used the same rationality in order to resolve the crisis. Thus, they all decreased their key rates (Taylor rule). If the ECB decides to lesser its rates, it can nevertheless be noted that its rate is always higher than other central banks' in order to avoid risks of liquidity traps and hyperinflation (Bentoglio, 2009). On 8 October 2008 the ECB pronounced that, starting from the operation to be settled on 15 October, the weekly main refinancing operations would be carried out through a fixed-rate tender procedure with full allotment at the interest rate on the main refinancing operations. (ECB). ECB reduces its key rate to 3.75% from October. In May 2009, 10 years after the beginning of the Euro currency, Euro area is affected by a historic decline in the ECB's key rate to 1%. On 2009 September 23rd , European Union set up a new Board, the European Systemic Risk Board (ESRB) to

detect risks on financial system and to issue warnings so that measures can be taken quickly if necessary.



Graph 1: Historic Refinancing Fixed Rate – ECB

Source: ECB

In times of depression and risk of deflation, Taylor's rule becomes ineffective. Indeed, if the output gap becomes negative and the observed inflation is below its target level, the central bank central rate is under the constraint of a nominal interest rate which "cannot" be negative. Thus, the main objective of non-conventional policies used recently is to restore the "normal" state of the economy or certain markets.

2. NON-CONVENTIONAL POLICIES

Restricted by conventional solutions, the ECB will use other levers to fulfill its role. After having decided to increase to the largest maturity of its loans (initially 3 months) to one-year 2009 with long-term refinancing operations (LTRO becoming VLTRO in 2012 by increasing the maturity to 3 years) in June, September and December, the ECB also created securities purchasing programs. The different Covered Bond purchase programs (CBPP) aim of freeing these debts from the balance sheets of commercial banks and thus encouraging them to lend to enterprises, in particular SMEs.

One must then put the European situation in context. In May 2010, the price of the stock market declined under pressure from a rumor about the loan request from Spain. In Portugal, Italy, Greece and Spain, stock prices lost 11%, 13%, 13% and 14% respectively during the week. In the event of default by these countries, European banks would be in a dramatic situation. The monetary crisis then becomes a stock market crisis.

In May 2010, ECB starts to rebuy debt via the "Securities Market Program (SMP). Jean Claude Trichet, President of the European Central Bank, stressed that the SMP should not be confused with a policy of QE; the big difference being that the SMP would have no impact on the size of the ECB's balance sheet. This program involved limited amounts of purchases of government debt securities in secondary markets, which are assumed to be sterilized by the ECB; The SMP was thought to be a response to tensions in the sovereign debt markets, which questioned the smooth transmission of monetary policy in the euro area.

The Outright Monetary Transactions (OMT), a new sovereign bond purchasing program, in September 2012, aims to limit excessive risk premia on certain sovereign bonds.

On 4 September 2014, the ECB decided to set up a new program for the purchase of European corporate debt securities and the Asset Backed Securities Purchase Program (ABSPP).

On January 22, 2015, considering that there are threats of deflation in the euro zone, the ECB decides to pursue a policy of quantitative easing. To do this, 60 billion assets (40 billion public debt and 20 billion private debt) must be bought back every month until September 2016 at least. Of these sixty billion, only 20% are bought by the ECB. The other 80% is bought out by the national central banks in proportion to the share of each State in the capital of the ECB. The ECB cannot buy badly rated government debt unless they benefit from an IMF assistance program and therefore engage in a reform program. Moreover, the ECB cannot hold more than one third of the public debt of a State. In the case of Greece this threshold has already been reached. Finally, the risk of default of a security will be borne by 20% by the ECB and 80% by the national central banks. In case of default, the ECB will be on an equal footing with private creditors. (Couet, 2015)

On December 8, 2016, Mario Draghi, Director of the European Central Bank (ECB) announced an extension of its QE policy for 6 months, a policy of injecting billions of euros into the monetary circuit by buying debt States or private enterprises. It also announces its decision to keep rates at 0%.

DATES	**PROGRAM NAME**	**BUDGET**
June, Sept and Dec 2009	**LTRO** (Long-term refinancing operations)	1000 billion euros (with VLTRO)
June 2009	**CBPP** I (Covered-Bond Purchase Program)	50 billion euros (with CBPP II)
May 2010	**SMP** (Securities Markets Program)	160 billion euros
Nov 2011	**CBPP** II	50 billion euros (with CBPP I)
Feb 2012	**VLTRO** (Very Long-term refinancing operations)	1000 billion euros (with LTRO)
Sept 2012	**OMT** (Outright Monetary Transactions)	Unlimited but unused
Sept 2014	**ABSPP**	Unspecified
Sept 2014	**CBPP** III	Unspecified
January 2015	**QE** (Quantitative Easing)	1100 billion euros

Table 1 : Summary of ECB's programs

Source : (ECB, 2017)

3. LITERATURE REVIEW

The literature review of this dissertation will firstly review the theoretical aspects of monetary policies. Secondly, it will assess all the theory foundations of the notion of quantitative easing. Finally, as the Japan economy has experienced this unconventional policy before the crisis, from 1990, the chapter will review the monetary crisis in Japan and the consequences of QE in this country.

1. MONETARY POLICIES

This chapter will assess the different transmission channels that the monetary policies can use to be successful. The differences between Keynesian and monetarists theories will then be assess as well as some major theoretical foundations such as Mundell-Fleming model and the liquidity trap theory.

1. DEFINITION

Monetary policy is the action lead by monetary authority, usually Central Banks, which act over money supply in order to fill its triple-stability objective:

- Interest rate stability
- Exchange rate stability
- Price stability

Indirectly, those policies can have influence on other aims such as Domestic Growth, full-employment and balance trade equilibrium. Monetary policies cannot directly target these goals because central banks have only a very indirect control over these economic variables, which react with long and variable lags to the impulses of monetary policy, and are seen only with a significant delay and a frequent periodicity. Since its origin, the currency is the high point of economic theory. Passive or active, it raises a real theoretical debate about the effectiveness of monetary policy.

Monetary policy differs from fiscal policy. These two policies interact and together form the policy mix. According to modern economic theory, the aim of the central bank is to maximize the economic well-being of households. Thus, two main objectives are generally attributed to monetary policy: the stabilization of prices and the stimulation of economic activity. These two aims are closely linked, and not incompatible, as might be expected, since price stability is a precondition for sustained economic activity. However, if one accepts that there is no long-

term trade-off between price stability and economic activity because the currency is neutral in the long run (the long-term "Phillips curve" is vertical), the only long-term objective of the central bank should be the maintenance of price stability. In this hypothesis, the level of potential growth depends on multiple factors, including productivity, capital stock, etc., on which monetary policy has no impact.

To understand the influence of change in the supply of money, one must study the demand for money on the money market. The quantity of goods and services of price stand for the notion of real cash balances. The demand for real cash increases with nominal income and the amount of transactions. Keynes (1936) explains the fact that money is expected to be another store of value. He speaks about "liquidity preference".

During a given period, all monetary units can be exchanged during several transactions. The rate of circulation of the currency (V) is thus calculated in the form of:

[3] $V = \frac{P*Y}{M}$

- P: price level
- Y: real income, quantities traded
- M: the money supply.

This velocity of circulation of money is not the same according to the aggregate chosen to measure the money supply or according to the interval of time retained.
A known formula represents the quantitative theory of money such that:

[4] $M * V = P * Y$

In case the money circulation velocity is constant, each variation in the money supply affects GDP (nominal income) P * Y. Adjustment of price-quantity to achieve equality between quantities offered and demanded depends on the commodity exchanged and according to the market (raw materials, labor, and services). The Keynesian case reflects an absence of price adjustment, i.e. the short-term case. So, a change in the amount of money in circulation affects income, but not prices. However, in the case of the long-term case, there is a price adjustment

(classic case), where the change in the money supply will affect prices rather than income. We talk about monetary neutrality.

The demand for real cash is also influenced by the level of the nominal interest rate. Indeed, this interest rate is the opportunity cost of holding the currency. Two theories then engage: the classical theory defended by Friedman (1968) proves that the interest rate determines the division of income between consumption (present) and savings (future). The Keynesian theory indicates that the interest rate determines the sharing of saving between liquid savings and non-liquid saving, thus remunerated.
According to Baumol and Tobin (1989), when income flows do not occur at the same time as expenditure flows, agents must choose how to hold currency and when to turn their assets into currency.

The confrontation of money supply and demand determines both the quantity of money in circulation and the rate of interest which plays the role of price (opportunity cost). At a given income, only the interest rate ensures equality between supply and demand for real cash. An increase in the monetary base increases the reserves of commercial banks, above their desired level. These additional reserves allow them to give more credit. The fall in interest rates then encourages the holding of money, as opposed to non-monetary paid assets.

The central bank can control interest rates by different means. Refinancing is used when a bank's reserves become inadequate, then it must borrow from other second-tier banks via the interbank rate (EONIA or LIBOR) or directly from the Central Bank (key rate). The key rates determine the terms of the Central Bank's borrowing and influence the interbank market. When the central bank chooses the interest rate instrument, it must provide all the liquidity required to ensure at all times the equilibrium of the currency market. In most cases, the best indicator of monetary policy is the interest rate on refinancing operations (the other rates are adjusted accordingly by arbitration). Under certain circumstances, central bankers play on other rates. (The liquidity crisis of the summer of 2007: On August 17, the Federal Reserve reduced the marginal lending rate from 6.25 to 5.75% (primary credit discount rate), leaving its main rate unchanged at 5.25 %.).

2. TRANSMISSION CHANNELS

The transmission channels of monetary policy are an important step in the understanding of the realization of the monetary system. However, this process of transmission is complex and there is no single conception of this transmission of monetary policy. These channels are characterized by the impulses of monetary policy on economic activity, including the price level. This chapter will therefore attempt to summarize the different channels and their implication, within a theoretical framework, on the activity of an economy.

- Interest rate channel: Interest rate changes can affect different items of aggregate demand such as investment, consumption, but also the balance of the trade balance. An increase in the interest rate increases the cost of capital and reduces investment. In addition, **Tobin's q** (Tobin, 1969) describes the relationship between the market capitalization of a listed company and the cost of location of its assets. When q is less than 1 (low), investment yields less than it costs. The interest rate can then influence this ratio through its impact on the stock market value.

  The interest rate can also influence consumption because at the individual level it influences the allocation of consumption. Thus, an increase in the rate makes saving more remunerative and therefore the consumption presents more expensive.

- Exchange rate channel: in the short term, a change in the nominal exchange rate affects the competitiveness of domestic goods and services vis-à-vis those from abroad, and hence the volume of exports and imports. A monetary policy that reduces the nominal interest rate makes investment in the domestic financial market less profitable, which translates into the sale of domestic currency and the purchase of foreign currency to invest in foreign currency. Domestic currency is less demanded and its relative price falls, creating a depreciation of the currency. Among other factors, the volume of foreign trade depends on the real exchange rate, i.e. relative prices of domestic B. & S. vis-à-vis those produced abroad. At fixed domestic and foreign prices, a depreciation of the national currency makes local products cheaper, thus increasing the volume of exports and reducing the volume of imports.

- The credit channel: the interest rate has a greater influence on the supply of credit than on the demand of it. The creation of a monetary base stimulates reserves and makes the

granting of additional loans possible. A fall in interest rates increases the valuation of companies and reduces the risks.

3. KEYNESIAN AND MONETARISTS THEORIES

For Keynes, an easy money policy leads to an increase in the money supply, which forces the interest rate (or cost of borrowing) to decrease. A lower interest rate makes possible more investment. The increase in investment contributes to an increase in overall expenditure, which has a multiplier effect. The rare money policy works in the opposite direction. The traditional Keynesian IS-LM conception of the mechanism of transmission of monetary policy can be summarized in the following diagram, which illustrates the effects of a monetary expansion:

M⇧	**Ir ⇩**	**I ⇧**	**Y ⇧**
Expansionist Monetary policy	Decrease of Real Interest rates	Lower Capital cost then more Investment expenses	Increase of general demand → Increase of the production

Table 2 : The effect of a monetary expansion

But the easy money policy is likely to be ineffective because the excess reserves are not ready by some banks that fear bankruptcy of borrowers during periods of recession. That is why, in the event of a recession, Keynes recommends not using monetary policy but rather fiscal policy.

In addition, a government pursuing a policy of monetary expansion will reduce interest rates in order to stimulate private investment. However, Keynes points out that this policy also has its limitations. Starting with interest rates around 2%, this rate is so low that it can hardly be reduced. With interest rates of this magnitude, banks prefer to keep their savings because they give up only a low interest. Is it possible to reduce the yield of currency holding below 0% to remove this floor value? This is the question raised by Silvio Gesell (1958) who proposes then the use of a coin-stamp, whose detention is taxed but not use.

In addition, banks reserve the right to redeem securities in the future when rates have risen: an operation requiring savings in order to have the required liquidity. Therefore, from a low threshold, regardless of the volume of money injected into the economy, the interest rate does not fall.

According to the monetarists such as Milton Friedman (1968) , an easy money policy increases the liquid balances of individuals, encouraging them to spend more. Indeed, individuals maintain a stable relationship between the expenses they consider desirable and their liquid balances. A rare money policy reduces cash balances and truncates spending directly. In the vision of the monetarists, going through the investment is useless.

Friedman rely on the empirical verification of the equation of the quantity of money (equation [4]). Velocity is regarded as stable by monetarists because it reflects the desire for security of our society which results in maintaining a constant proportion between our liquid balances and our expenses. The monetarists criticize the recommendations of Keynes's policy, indicating that such a monetary policy is misguided because it aims to keep interest rates low (to facilitate the borrowing of the government) which is destabilizing and inflationary.

Keynesian economists reply to the monetarists that velocity is unstable. This calls into question the validity of using a stable rate of money supply growth for economic stability. Controversy is accentuated when a narrow definition of money mass is used as M1. Moreover, Keynesians point out that the equation of the quantity of money is a tautology which certainly cannot confirm the meaning of a mechanism of cause and effect.

Later, the new classics (Robert Lucas) will radicalize the monetarists' theses, assuming that economic agents determine their behavior on the basis of "rational expectations". Hence, monetary policy is not only ineffective in the long term, but also in the short term.

4. MUNDELL-FLEMING MODEL

The first contribution to Mundell's international economy (Mundell, 1962) is to have extended the IS / LM model (John Hicks' interpretation of Keynesian theory, which forms the basis of most applied macroeconomic models) to the case of an open economy, Adding the balance of payments (the model becomes IS-LM-BP or Mundell-Fleming model). The Mundell-Fleming model was developed independently by Robert Mundell in an article in 1963 (Mundell, 1963) and Marcus Fleming (1962). The objective of this model, compared to that of John Hicks, was to be able to understand the impacts of economic policies in a context of an economy open to financial exchanges with foreign countries.

In the context of an open-economy, the model shows that the effectiveness of monetary policy and, more generally, the optimal policy mix depend on the exchange rate regime and the

freedom of capital movements. Schematically, under a fixed exchange rate regime, fiscal policy can lead to an increase in interest rates, hence an inflow of capital, which drives the appreciation of the currency. The government is then obliged to intervene to keep the exchange rate fixed and the central bank can, for this purpose, issue notes and redeem currencies. This is a business-friendly policy. On the other hand, policies of monetary expansion would be totally ineffective since they would cause a fall in interest rates, a flight of capital and an intervention *a contrario* of the central bank. In the case of a flexible exchange rate, fiscal policy is inefficient and the monetary instrument must be used. For this time, the change in the exchange rate plays on the competitiveness of the country.

The famous Mundell triangle states, in particular, that it is impossible to have at the same time a perfect mobility of capital, an autonomy of the monetary policy, and a fixity of exchange rates.

5. LIQUIDITY TRAP

The liquidity trap is a phenomenon proposed in Keynesian analysis (reference), the purpose of which is to explain the characteristics observed when the central bank becomes incapable of stimulating the economy by the monetary way. It was taken over by Hicks (Hicks, 1937) under the IS / LM model, where the interest rate has a minimum rate below which it can no longer go down because speculators prefer to hold all their currency holdings.

In a context of recession, one of the methods of stimulus is the increase of the money supply in order to reduce the interest rate. However, agents react to their prediction of the interest rate in relation to a rate considered "normal". Thus, the demand for money for speculation is all the more important as the interest rate is low. For Keynes, agents arbitrate in the allocation of their portfolio between the holding of bonds - a risky asset whose price varies inversely with the interest rate - and the holding of money - a non-risky asset. When the interest rate is low, the agents anticipate (speculating) that they will necessarily increase and therefore want to hold money, as the price of bonds is reduced. There is then a critical rate, for which the demand for money is perfectly (infinitely) elastic: agents then all think that the rate will increase, and their preference for liquidity is then absolute. A monetary policy of depreciating the interest rate is then totally ineffective in the context of a revival.

Its existence is not accepted by all economists. For some neo-Keynesian economists, including Krugman, the "Lost Decade" in Japan in the 1990s, is a concrete example of a liquidity trap (Krugman, 1998).

2. QUANTITATIVE EASING

This chapter will assess the definition given to QE by different economists. Then, it will describe the different economic mechanisms that pushes Central Bank to use this unconventional policy. Finally, it will put in parallel the debates over QE and the controversies about its use.

1. DEFINITIONS OVERVIEW

Quantitative easing refers to a type of "unconventional" monetary policy for a central bank to massively repurchase debt securities from financial players, including treasury bills or corporate bonds, and in certain circumstances back-to-back securities to assets such as mortgage securities.

The first written mention of the concept of QE and the term "Quantitative Easing" is attributed to the German economist Richard Werner (Werner, 1995) (Werner, 2 September 1995). Working in Tokyo in 1994, he coined the phrase in presentations to Japanese investors.

According to the author, he used this expression in order to propose a new form of monetary policy: a policy of stimulation by the central bank which is not based on rate reductions nor on conventional monetarist policies such as the expansion of the money supply (for example, by "printing money"), the increase in bank reserves or the stimulation of M2-M3 aggregates. (Table 3)

M0	Monetary base (Central Bank)
M1	Cash (notes, coins and demand deposits)
M2	M1 + term deposits less than or equal to two years and deposits with a notice of repayment of less than or equal to three months
M3	M2 + money market instruments issued by monetary financial institutions (for example, certificates of deposit and receivables less than or equal to two years)

M4	M3 + Treasury bills, commercial papers and medium term notes issued by non-financial corporations.

Table 3 : Money supply

Source : (European Central Bank)

Instead, Werner argued that in order to bring about an economic recovery it was necessary and sufficient to stimulate "credit creation", through a number of measures such as the purchase of treasury bills and direct loans to companies and government by the central bank. He also suggested direct purchase by the central bank of non-performing assets from commercial banks and direct loans to enterprises and government. Even though, QE's name has been created by Werner, (Prins, 2014) argued that QE has been used in the past for different reasons.

The European Central Bank announced on 22 January 2015 the introduction of a QE which will begin in March 2015. This announced plan is of 1080 billion euros and will entail a modification both in the size and composition of the balance sheet of The ECB. The ECB thus plans to purchase securities for € 60 billion a month (Claeys, 2015).

It is possible to refer to the definition of Bernanke (2009) (Bernanke, 2009) to distinguish credit easing and QE. Indeed, according to Bernanke, a credit easing policy changes the composition and size of a central bank's balance sheet in order to support specific markets and improve credit conditions. The advantages of credit easing are that the Central Bank can directly control monetary injections in key sectors helping to recover the economy and thus limit speculative bubbles. However, the Central Bank is in the position of manager of economy financing. Moreover, such policies are difficult to implement and are more risky (holding more risky securities).

In contrast, a policy of QE refers to the increase in the size of the balance sheet of a central bank, which will result in an increase in reserves held by banks with central banks. As part of this policy, the composition of the balance sheet remains unchanged. According to Bernanke (2009), QE is "a strategy that consists, in its pure form, of increasing the level of reserves of commercial banks and the level of bank liquidity".

According to (Drumetz, et al., 2010) these instruments can only be defined in a negative way in the sense that they are measures which are not part of the usual conduct of monetary policy.

Therefore,(?) these policies can only be applied in the case of inefficiency of traditional channels.

Krugman (2000), states that the quantitative easing strategy can only have an effect if it is accompanied by a credible commitment, by asserting to public agents that the liquidity stimulus will be sustained as long as the conditions are not fulfilled.

2. ECONOMICAL MECANISMS

The mechanism of this measure is to increase the liabilities of the balance sheet of the central bank, via bank reserves to fuel the economy in cash. The central bank then modifies its balance sheet in return.

The inefficiency of the interest rate channel and the key rate dynamics have led the different central banks to adopt new instruments. Despite the fact that they all adopted a QE strategy, two schools of economists share different conceptions. If they agree on the main objectives, the different channels of transmission are discussed by the monetarist school and the Neo-Wickselian school. While monetarists consider that the rise in the monetary base will defy deflation by the increase in aggregate demand, Neo-Wickselians place the notion of the expectations of economic agents at the heart of the rate reduction policy.

Joyce et al. (2011) And Krishnamurthy et al. (2014) summarize potential channels through which unconventional measures, including QE, affect the banking and financial system, and ultimately economic activity:

The primary channels are:

- Signal effect: the announcement of large-scale asset purchases transmits the signal that monetary policy will be more accommodating, and so the rate of Central Bank will remain low for a long period. Considering that long-term interest rates reflect expectations of future interest rates, this announcement of purchases is expected to trigger a decline in long-term interest rates. (Loisel, 2006) This makes reference to the channel of expectations, theory approved by the Neo-Wickselian school. The study by (Fratzscher, et al., 2015) shows that the impact of non-conventional measures is mostly demonstrated when monetary policies are implemented. Thus, this nuances the theory of NW; the signal channel is important but the implementation is essential to trigger the signal of the rebalancing of the portfolios.

- Portfolio rebalancing: When the Central Bank buys a security from a seller, then his portfolio has more liquidity: the abundance of liquidity makes it possible to diversify its portfolio of assets, which sees their price rise, which creates a wealth effect. The explanation given by the monetarists in general and by the study by (Bowdler, et al., 2012) considers that if the economic agents wish to buy the same assets with different maturities then the Central Bank can restrict the quantity and price of these assets will increase. Moreover, if the Central Bank buys long-term assets, the amount of cash premiums will fall to match the Central Bank's offer, thus causing a reduction in long-term rates. However, according to the Neo-Wickselian school, the reallocation channel is totally ineffective when short-term rates are close to zero. The agents would be indifferent to the holding of money or securities (no credit risk on holding money). Monetary expansion will have no impact on demand and there is a risk of the concept of a liquidity trap (Woodford, 2012). It has to be noted that monetarists eradicate the concept of liquidity trap.

- Wealth effect: Metzler as monetarist asserts that an increase in liquidity generates a wealth effect because private agents will increase their aggregate demand. (Metzler, 1995)

- Liquidity effect: by creating money in order to buy assets, the central banks can inject liquidity into financial system which will push private agents to decrease the liquidity premium level of non-liquid assets and thus decrease their earnings. (Goodfriend, 2000)

The channels that flow from these primary channels and cited by (Joyce, M.; Tong, M.; Woods, R., 2011) and (Krishnamurthy, A.; Nagel, S.; Orlov, D., 2014) are:

- Confidence channel: This channel is the logical continuation of signal effect. If economic agents think that QE policy is efficient, the message should encourage confidence of consumers and companies. This anticipation leads them to increase their spending. A confidence effect can also lead to higher asset prices and lower risk premia. These confidence-building effects also translate into higher expected inflation, which decreases the real interest rate. (Eggertsson, et al., 2003).
- Bank credit channel: this channel is similar to the channel of choice of portfolio, with the difference that the sellers (here a bank) substitute for the transferred asset a bank credit. The increase in liquidity generated by the QE makes it possible to revitalize the

channel of bank credit, via the increase of reserves held by the banks with the central bank. Moreover, if the assets of non-financial corporations become more liquid, this could encourage banks to grant new loans, which they would not have done in the absence of QE.

- Default channel: in principle, QE reduces public rates, which reduces the burden of interest to be repaid for the states and allows them to have more fiscal resources. The fact that the central bank is a lender of last resort brings more serenity to the debt market and avoids situations of runaway prejudice.
- The exchange rate: depreciation of the currency due to monetary expansion but also to increased purchases of foreign assets, which facilitates exports. According to Neely study (2015), QE announcements in the United States in 2008 and 2009 weakened the US dollar, which is consistent with the theories already cited. In addition, Fratzcher (2015) demonstrated that US unconventional policies have triggered capital inflows into emerging economies and other industrialized countries.

These transmission channels are not necessarily different from those of conventional monetary policy measures. The signal or confidence effects are based on the role of expectations and therefore on the fact that the agents integrate the positive effects of the measures taken. Similarly, as we have pointed out, the exchange rate effect or the credit channel results from a reallocation of the portfolios of credit institutions or investors.

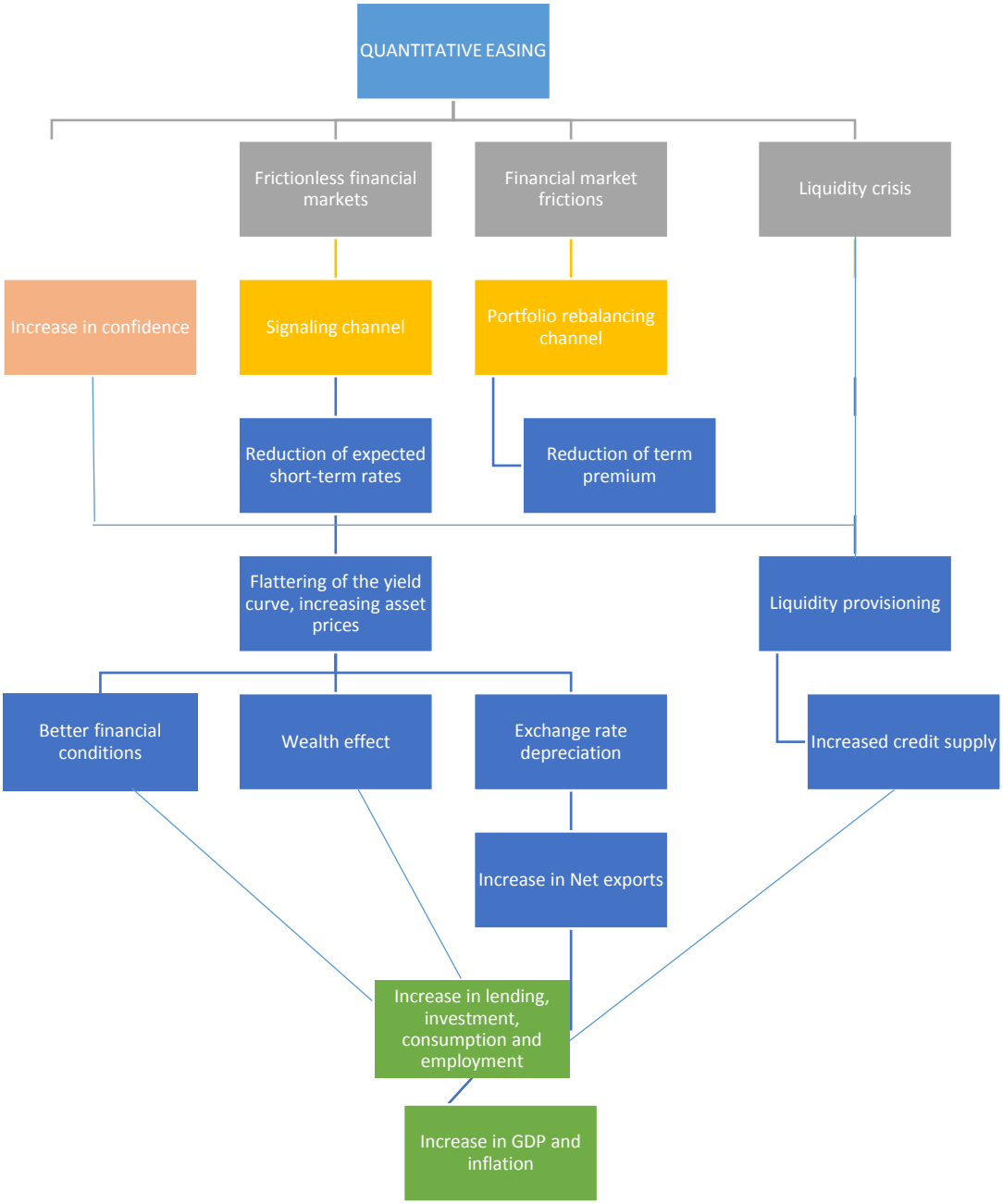


Figure 1 - QE and its transmission channels

Source: (Gern, 2015)

3. RECENT LESSONS FROM QE IN EMPIRICAL ANALYSIS

The study by Baumeister (2010) estimates that the various non-conventional measures in the US and UK have reduced the risk of deflation and accelerated the exit from the crisis. Moreover in a study Kapetanios (2012) highlights the positive impact that QE has had on GDP and inflation in the UK.

Gagnon & al (2011) shows that the Fed's policy between 2008 and 2010 resulted in lower interest rates on Treasury bonds and non-financial company bonds. The study by Altavilla, Giannone and Lenza (2014) confirmed that these programs have been able to reduce interest rates in the medium and long term, although Hamilton and Wu (2012) qualify this assertion by showing a very limited impact of the QE.

4. CONTROVERSIES

A study by Daniel Thornton (2012), the Vice President and economic Adviser of Federal Bank of Saint-Louis analyses several potential downsides of QE use for Central banks. The first danger that could cause QE is an increase above the expected of 2% of inflation. The second one is the fact that economists and policymakers cannot explain by one universal theory how monetary growth causes inflation. Finally, but not the least danger, Thornton analyzed that employment growth is particularly slow during the economic recovery and during QE policy.

The QE mechanism is only effective if the relationship between the monetary base and the money supply is confirmed. Indeed, if the demand for credit in an economy is non-existent, the effects of a supplementary credit policy will be unnecessary (Choukairy, et al., 2013).

Eggertsson and Woodford (2003) argue that the only mean to get out from liquidity trap is to control private agent anticipations and completely exclude increase of monetary supply, especially in case of interest rates close to zero.

3. BEFORE 2008: JAPAN AND QE

One way of understanding the potential effects of the ECB's QE is to look at the effects of non-conventional policies that have been already used in the past. The current financial crisis, due to its similarity to the Japan's in the 1990s, pushed the monetary authorities of the biggest central banks to adopt QE.

1. FINANCIAL CRISIS IN JAPAN

Only Japan, having experienced recent QE, but for enough years to be studied, can provide elements of result to this crisis. The unconventional measures adopted by the Bank of Japan between 2001 and 2006 following the "Lost Decade" of the 1990s is the first example of a large-scale QE policy.

From 1997, Japan experienced a monetary situation marked by a long deflationary period. The Bank of Japan decided in early 1999 to reduce its interest rate to zero and then decided to adopt a QE policy in March 2001 in an attempt to increase liquidity in order to escape deflation. On March 9, 2006, the Bank of Japan formally renounced the principle of QE, as prices rose for three consecutive months (Ito, 2006).

Several elements have been highlighted to explain the reasons for this crisis in Japan:

- A fall in asset prices due to the price bubble in the 1980s, at the most at the end of 1989;
- The numbers of loans to insolvent companies, particularly in the field of real estate, implying a fall in property prices and thus an economic deflation;
- Banks by lending to insolvent companies have a lack of liquidity reserves due to bad debts;
- The insolvency climate of the banks push the Japanese to invest in safe currencies like gold or treasury bonds rather than spare.

The Quantitative Easing Policy (QEP) from the Bank of Japan (BoJ) consisted in three pillars:

- "To change the main operating target for money market operations from the uncollateralized overnight call rate to the outstanding current account balances (CABs) held by financial institutions at the BOJ, and provide ample liquidity to realize a CAB target substantially in excess of the required reserves;
- to make the commitment that the above ample liquidity provision would continue to stay in place until the consumer price index (excluding perishables, hereafter "core CPI") registers stably at zero percent or an increase year on year;
- To increase the amount of outright purchases of long-term Japanese government bonds (JGBs), up to a ceiling of the outstanding balance of banknotes issued, should the BOJ consider such an increase to be necessary for providing liquidity smoothly." (Bank of Japan, 2006)

From 2001 to March 2006, the BOJ increased its monetary base by 76.5 percent. By extending its range of purchased assets and by directly granting loans to small and medium-sized enterprises, the BoJ expects stabilization of its financial markets and economic recovery.

2. CONSEQUENCES OF QE IN JAPAN

The work of Oda (2005) makes possible to transpose the different effects of this easing policy. This study shows that the impact of QE on deflation is not significant. However, they conclude that the effects of this policy on long rates have been favorable, due to the expectations of economic agents. Indeed, the study highlights the importance of management of expectations as a succeed factor for monetary policy.

The policy has enabled the BoJ to provide an abundant and cheap refinancing of banks. By allowing them to refinance at very low rates, Japanese policy has facilitated banks in difficulty, especially the weaker ones. Indeed, the QE in Japan has limited the effects of systemic risks. Thus, in 2003, following the weakening of the financial system, the capital ratio of Resona Bank, the fifth-largest banking group in Japan, reached 2%. Immediately, the Bank of Japan reacted by consolidating loans to the bank and raised the range of Resona's outstanding loans, to 27-30 billion yen. (Brooke, 2003)

This policy was also aimed at limiting the appreciation of the yen: this objective was achieved since the yen depreciated, in particular with the introduction of carry trade operations encouraged by the low level of interest rates in Japan. Indeed, foreign investors, especially Americans, benefited from a change in the exchange rate in their favor. Indeed, the money obtained in Japan and placed in the US, is appreciated with the dollar allowing to obtain more yen thereafter. This made it possible to repay the entire loan and make an extra profit with the remaining yen. This is called an exchange rate gain.

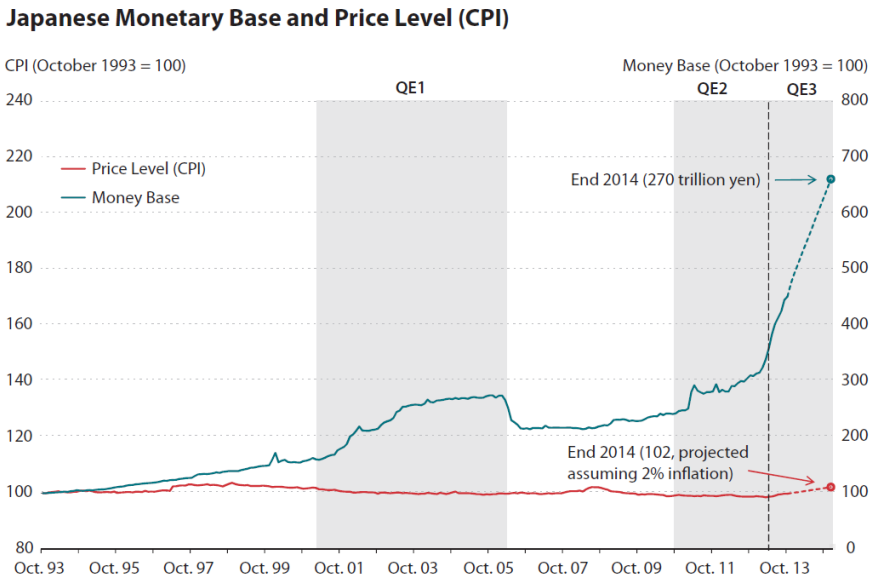


Figure 2- Japanese Monetary Base and Price Level (CPI)

Source: Bank of Japan, (2017)

As we can see on the graph, QE1 in Japan during 2001-2006 period didn't had a large impact on inflation as CPI didn't increase as expected (on the long-term, as QE1 stopped because of three consecutive month of price increase in 2006). Yet, inflation stabilized negatively from 2003 and became positive form 2006, justifying the end of QE. However, (Andolfatto, 2014) explained that this stable CPI can be explained by the fact that the Bo's first objective wasn't to increase inflation but to stabilize it. The aim of creating inflation expectations which would lower real rates has probably not been achieved, the mechanisms by which an increase in the monetary base leads to a rise in prices being probably less effective when the banking sector is in crisis. (Krugman, 1998).

Finally, to the extent that banks have significant reserves with the central bank, banks can use them to provide more credit to the economy at lower rates. The BoJ's policy would not have had a major effect on the business, at best a slight decline in long rates linked to purchases of shares by the BoJ.

A majority of economic analysts will say that the effects of Japan's non-conventional policy between 2001 and 2006 have been very limited, in particular (Bernanke, 2004) study. The effects of QE might be limited by the effect of portfolio re-balancing. Indeed, the fear of the bankruptcy of the financial system prompts the agents to prefer the liquidity rather than to use the deposits.

4. EMPIRCAL FINDINGS AND HYPOTHESIS

The aim of this chapter is to link the whole theory of monetary policy with recent and official data from the European Union. Thus, using data from the European Central Bank, the chapter will draw the parallel between the objectives of the European institution and the real involvement of the use of quantitative policy.

1. INFLATION AND QE BEFORE 2015

Beginning in 2014, inflation in the euro area is negative and deflationary risk remains high in the zone. Deflation amplified by the fall in the price of oil, is added then the factor of high unemployment that weighs on household incomes. The uncertainty of the various economic studies remains on the level of the output gap but the certainty is that it is also negative.

This non-inflation then becomes very dangerous for the euro area. Indeed, deflation can result in non-growth and thus little chance for the labor market to eliminate an unemployment rate that is too high.

In January 2015, Mario Drahi announced a QE plan designed to unconventionally solve this impasse of inflation for the euro area.

2. IMPACTS OF QE

Given that quantitative monetary policy has only been effective from 2015 in the European Union, data analysis in order to measure its impact can only be done on short-term data. Moreover, the notion of transmission delays in the macroeconomic framework must be taken into account. Indeed, according to Peersman (2011), the response time to the interest rate shock activity is estimated at 12 months, while the response to an unconventional monetary policy would be 18 months. The study by Laeven (2008) agreed with this theory and complements that the ad effects are generally positive.[2]

This study will provide insight of the different impacts of this monetary policy in the euro area, notably on economic main objectives such as interest rates, inflation, government bonds and the exchange rate. Moreover, other indicators will also be compared with QE, such as the unemployment rate but also consumer loans. These latter indicators thus make it possible to

[2] Study on the ECB's securities purchasing program

give some perspective on the influence of monetary policy on indicators affecting directly the European population.

1. GOVERNEMENT BONDS

As explained in the theoretical part of this study, the various mechanisms of QE should allow the long-term interest rates, determined by government bonds over 10-years maturity, to decrease to the maximum outstandingly through the signal effect but also by the decrease of its key rate. By buying government bonds in quantity, the ECB is willing to see its yield decrease and thus, be less interesting for banks to invest in it. Thus, banks would be more willing to invest in riskier assets, particularly in corporate or households loans. A low long term interest rate is really significant for a slow economy. Indeed, a low interest rate will allow more investment to develop the economy and thus, a decline in the recession.

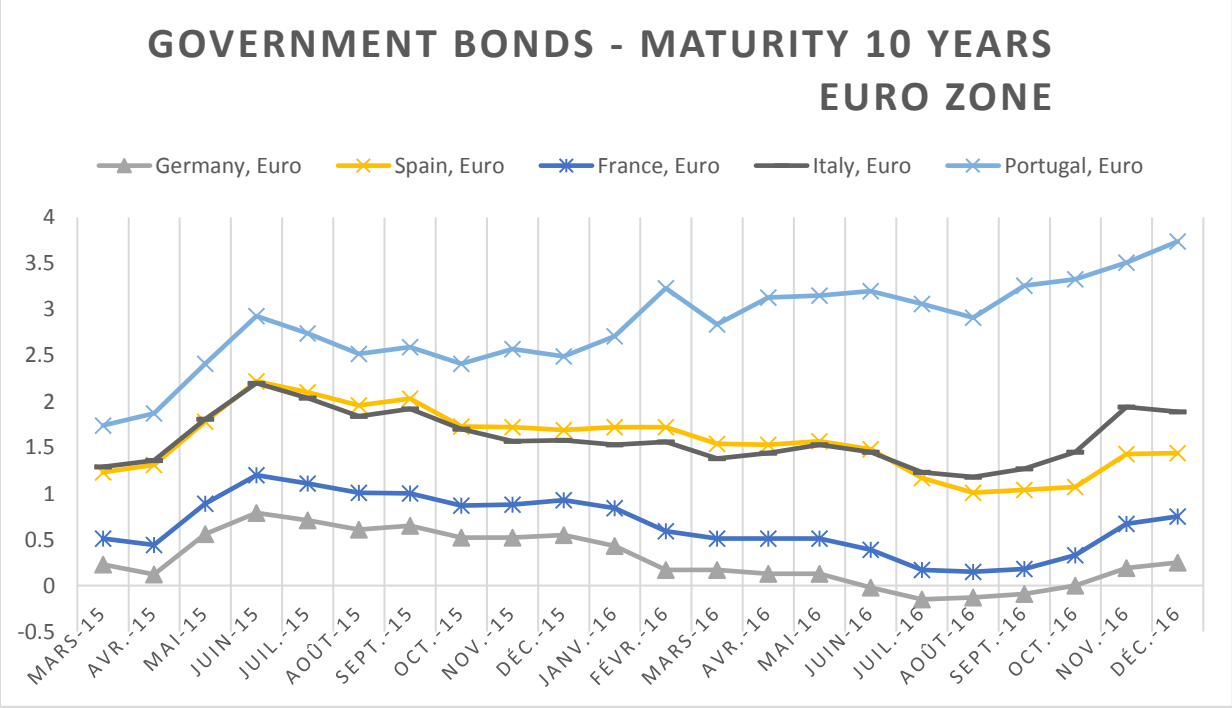


Figure 2 : Government bonds – Maturity 10 years in Euro zone

Source: European Central Bank (2017)

As quantitative easing has been only effective from March 2015, the Figure 2 above will analyze the impact of this policy on the government bonds in 5 countries of the Euro zone from March 2015 to December 2016. In order to get narrowed picture of the effect of government

bonds, this thesis will only use the 10 years maturity government bonds above only 5 countries of the Euro zone.

Thus, as one can see on figure 2 above, some countries are following the same trend regarding long-term interest rates from March 2015 to December 2016. Spain, France, Germany and Italy have the same long-term interest rate response pattern over this period. Portugal, on the other hand, shows an independence from its government bond yield and shows an increase in the latter. This shows that the reactions under the monetary policy of the European Central Bank are not harmonized in the euro area, thus highlighting disparities in the distribution of wealth.

Greece's exception in the monetary landscape of the euro area can also be highlighted. This country is suffering from the debt crisis showed by an exceptional rate of 7% for its long-term interest rate. This rate was about 12% in April 2015 which shows a potential decrease in the latter but an extremely difficult situation. (see Appendix 3)

Figure 3 below shows the average of the government bond yields across all countries of the euro zone. From the presented graph it can be seen that, since the launch of the QE policy in 2015 by the ECB, these rates have decreased. Using a trend line on the rate over 10 years maturity and calculating its equation, one might see that its coefficient is negative and thus what ECB was expecting from the non-conventional policy. However, this coefficient (=-0.0011) is certainly weak compared with ECB expectations. This analysis then concludes that, as the coefficient is not significant, there is probably no existence of influence of the introduction of QE politic with the rate government bond yields.

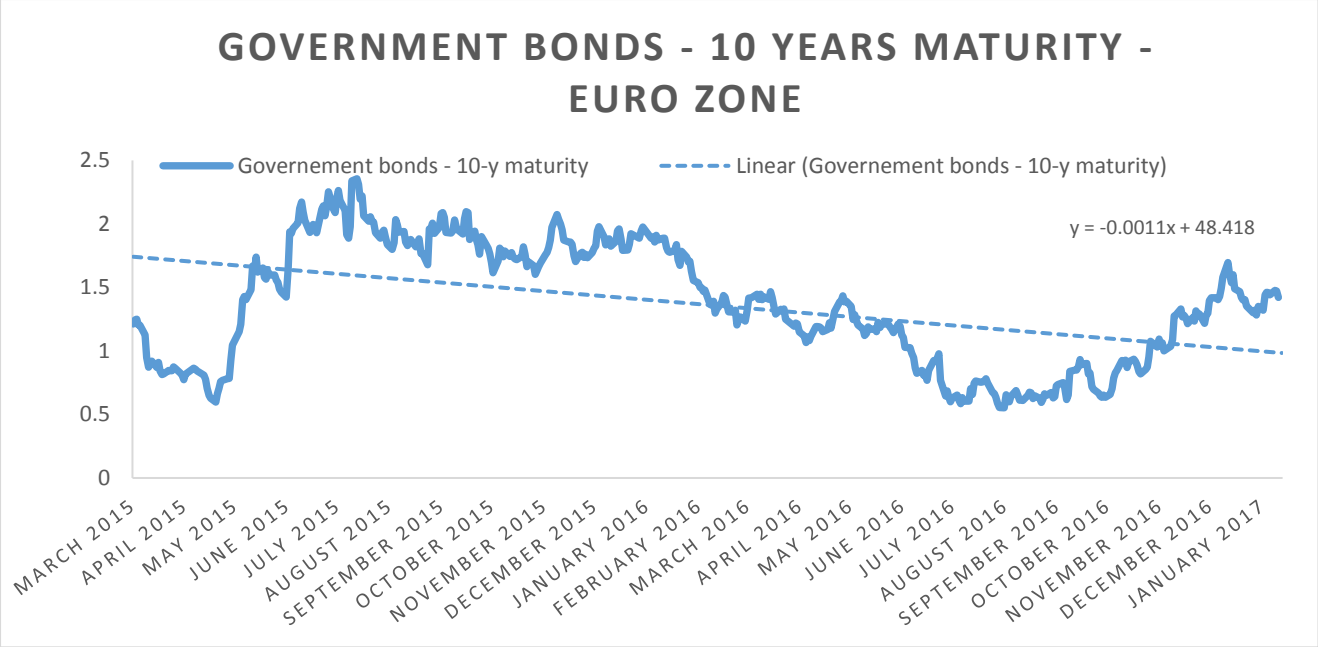


Figure 3 : Government bonds yield in Euro zone

Source: European Central Bank (ECB, 2017)

2. INFLATION

The main objective of the ECB in launching unconventional monetary policies was to recover inflation at a desired rate of around 2% as the definition of price stability as state by the ECB. (ECB, 2017)

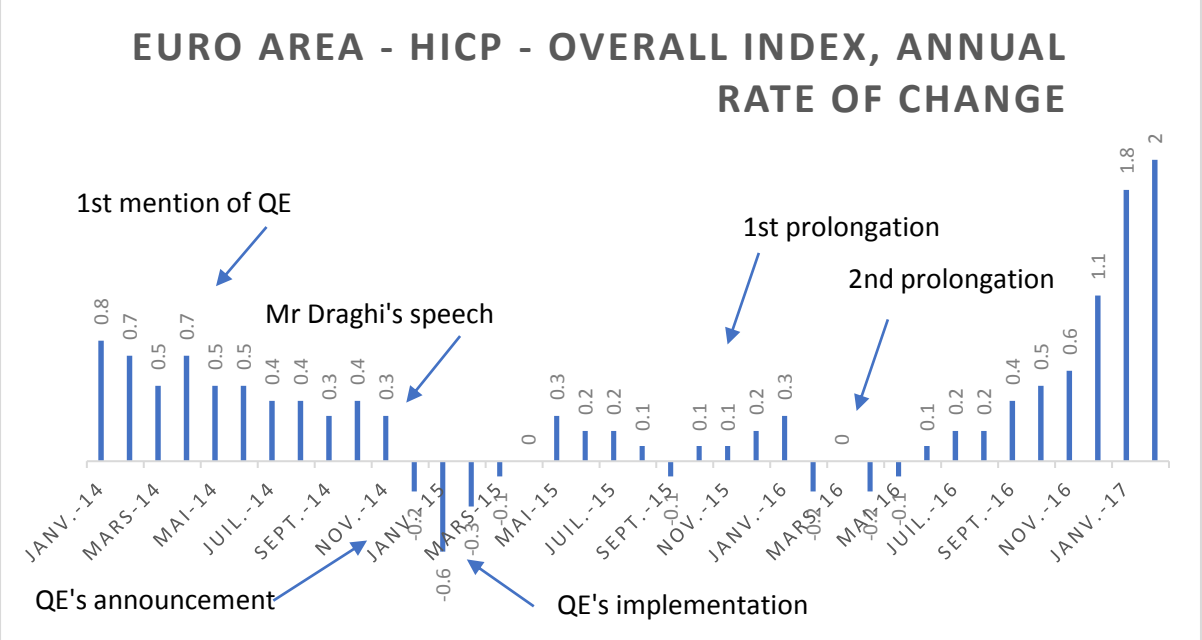


Figure 4 : HICP over Euro zone – Overall index, Annual rate of change

Source: European Central Bank (ECB, 2017)

As can be seen from the graph above, euro area inflation (here calculated by the Harmonized Index of Consumer Prices) decreased from 0.8% to -0.6% between January 2014 and January 2015; so to speak -1 percentage point in one year.

Following the announcement of the introduction of QE by Mario Drahi in January 2015, the inflation curve rises in positive but faces a + 0.2% resistance until September 2016, when it succeeded in exceeding this threshold.

If we compare the theory explained above with the financial reality in the euro area, it is possible to reach several conclusions: the effect signal anticipated by the monetary aggregates did not push the recovery of consumption, following the speech of Mario Drahi in September 2014. On the contrary, inflation has suffered a fall into the negative until the official announcement of the use of QE in January 2015. However, after this formalization, there is a resumption of consumption rather fast but really ineffective.

Indeed, as stated above, the objective of the ECB was to obtain in a less than two years a stable inflation rate close to 2%. However, the price index is difficult to stabilize at first. Secondly, it does not exceed 1% until November 2016, which can be described as very low compared to the expectations of the Central Bank.

Finally, the table below shows the Central Bank's expectations since 2012. QE in the euro area was launched at the beginning of Q2 of 2015. According to the graph below, the ECB expected then an inflation of about 1.1% for the following year therefore March 2016 (red marker). The chart above tells us that inflation was actually 0% in March 2016. It also expected inflation of more than 1.5% by March 2017. Due to the lack of data for March 2017, it is noteworthy that in February, inflation was 2%, i.e. very close to the expectations of the ECB, but also more positive. The second extension of the easing appears to have had a significant effect on price movements in the euro area (+2 percentage points between March 2016 and February 2017).

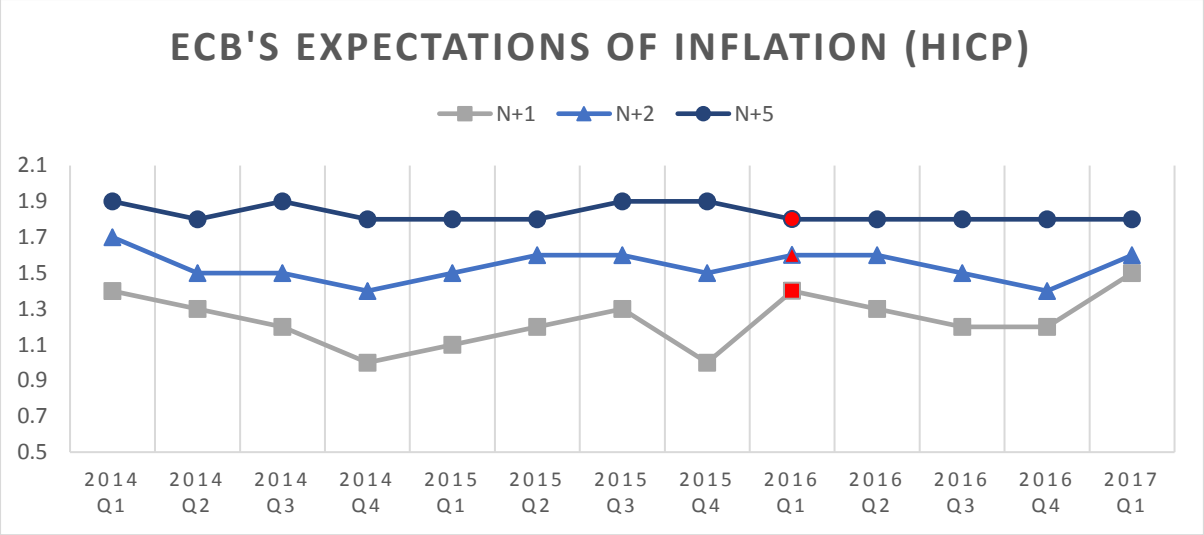


Figure 5 – ECB's expectations of inflation - HICP

Source: European Central Bank (ECB, 2017)

3. EXCHANGE RATES

Although the main objective of the ECB's mandate is not to influence euro area exchange rates, it has a very strong influence on changes in the euro area. Indeed, a weak euro has a lot of advantage for the euro area. A depreciation of the euro price would allow a better competitiveness on the prices of exports outside the euro zone (55% of France's exports for example), would increase the price of imports and then push for an increase in inflation.

As explained earlier in this study, QE is strongly influenced by the exchange rate channel. Indeed, an expansionary monetary policy increases the amount of liquidity in the European economy and thus pushes the value of money down.

The Figure 6 below shows the exchange rate between Euro and Dollar between January 2014 and February 2017.

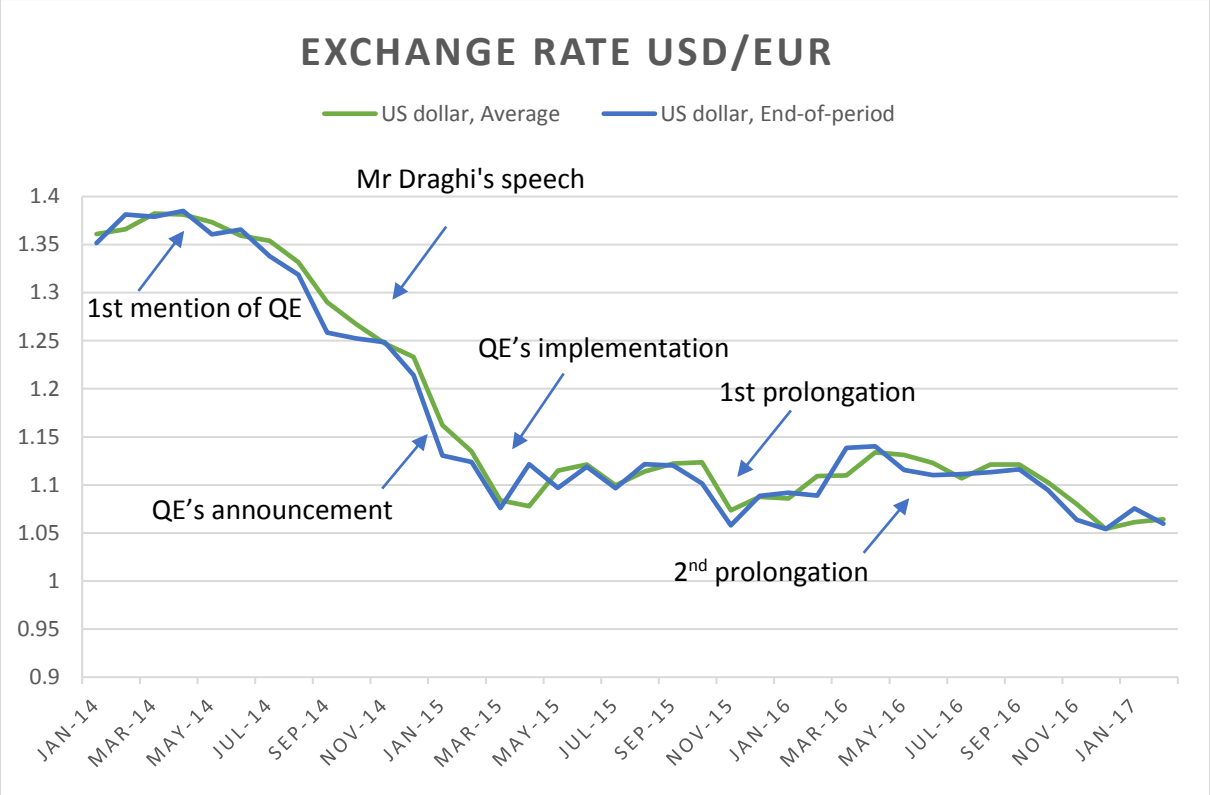


Figure 6 – Exchange rate USD/EUR

Source: European Central Bank (ECB, 2017)

It is interesting to use this exchange rate because first, the dollar is a currency often used as a reference. Secondly, the United States, and more specifically the Federal Reserve, also pursued an expansionary monetary policy over this period.

As could be predicted, the ECB's communicative nature on the exchange rate from early 2014 causes the euro to depreciate. Thus the exchange rate rises from 1,385 in April 2014 to 1, 0759 in March 2015 (-0.3 point in less than a year). The EUR / USD exchange rate had not been as low since January 2003, which shows a historical depreciation of the euro since the crisis of 2008. From the launch of the ECB expansionary monetary policy in March 2015, Euro seems to be stabilizing and to face resistance of 1.05EUR / USD.

The implementation of QE and the two extensions in 2016 do not seem to have had any conclusive effect on this continued depreciation. It can therefore be concluded that the ECB's forward guidance strategy has been more influential in the foreign exchange market than the real implications of monetary policy in the euro area.

The main objective of the ECB's decision to board on an expansionary monetary policy was to boost growth in the euro area. After analyzing its impacts on macroeconomic indicators such as interest rates, inflation and the exchange rate, it is essential to analyze the indicators influenced by its rates.

4. GDP GROWTH

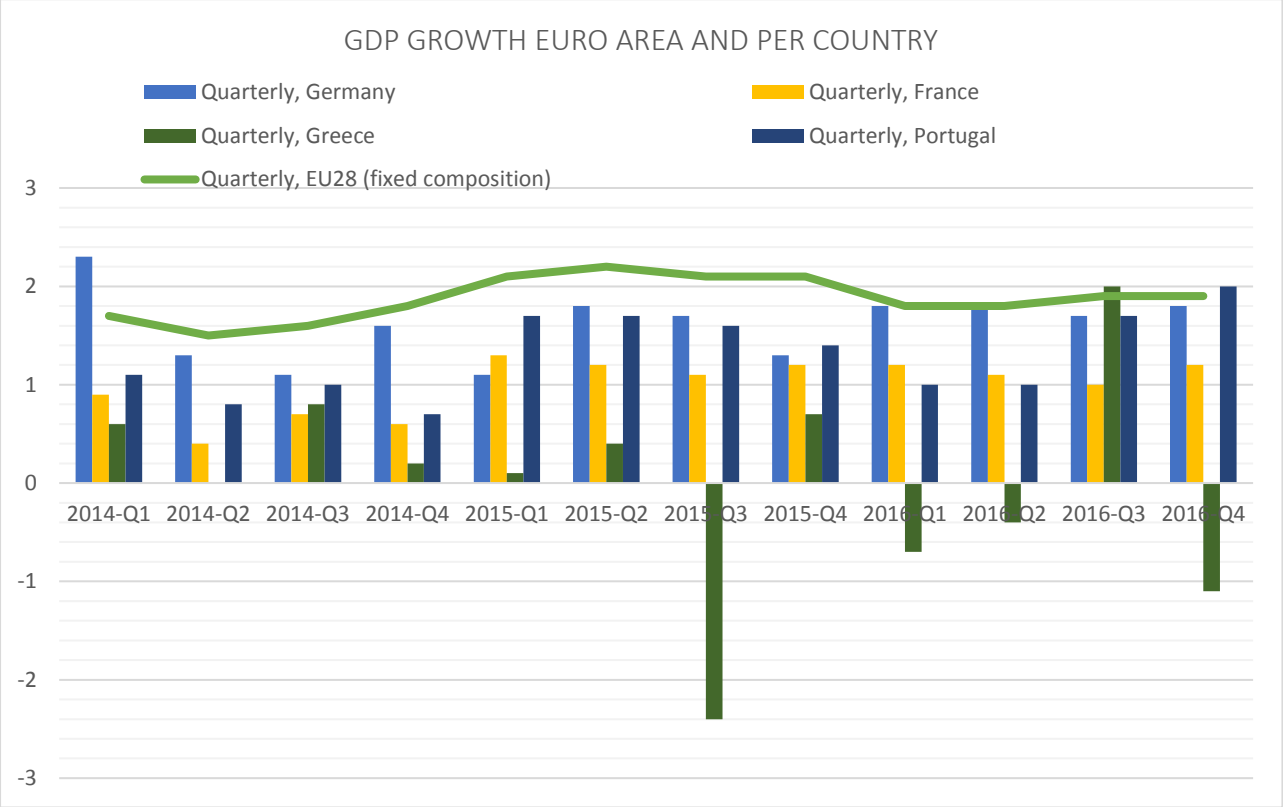


Figure 7 – GDP Growth Euro Area and per Country

Source: European Central Bank (ECB, 2017)

To measure the impact that QE has had on the growth of the euro area, one should look at the growth by country and general. Thus, the graph above shows the growth rates of four countries: Germany, France, Greece and Portugal.

The blue line also shows the evolution of growth across all 28 countries of the euro area.

Growth in the euro area remains very close to 2% over the whole period. On the other hand, from the beginning of 2016, it fell below the 2% threshold and stabilized between 1.8% and 1.9%.

While France's growth remains at a stable rate between 1% and 1.3%, the three other countries show more marked variations. Thus, Germany will rise from 1.1% to 1.8% over the period, Greece from 0.1% to -1.1% and Portugal from 1.7% to 2%.There does not seem to be any relationship between the different variations in different countries.

5. BANKING LOANS

In order to recuperate the economy and investment, interest rates had to be lowered and inflation increased. The table below shows the details of bank interest rates for business and households in the euro area. These rates are determined by the central bank's key rate mechanisms. We also saw earlier that the deposit rate had fallen below the zero threshold, hence negative, in order to encourage banks to issue more loans to businesses and individuals.

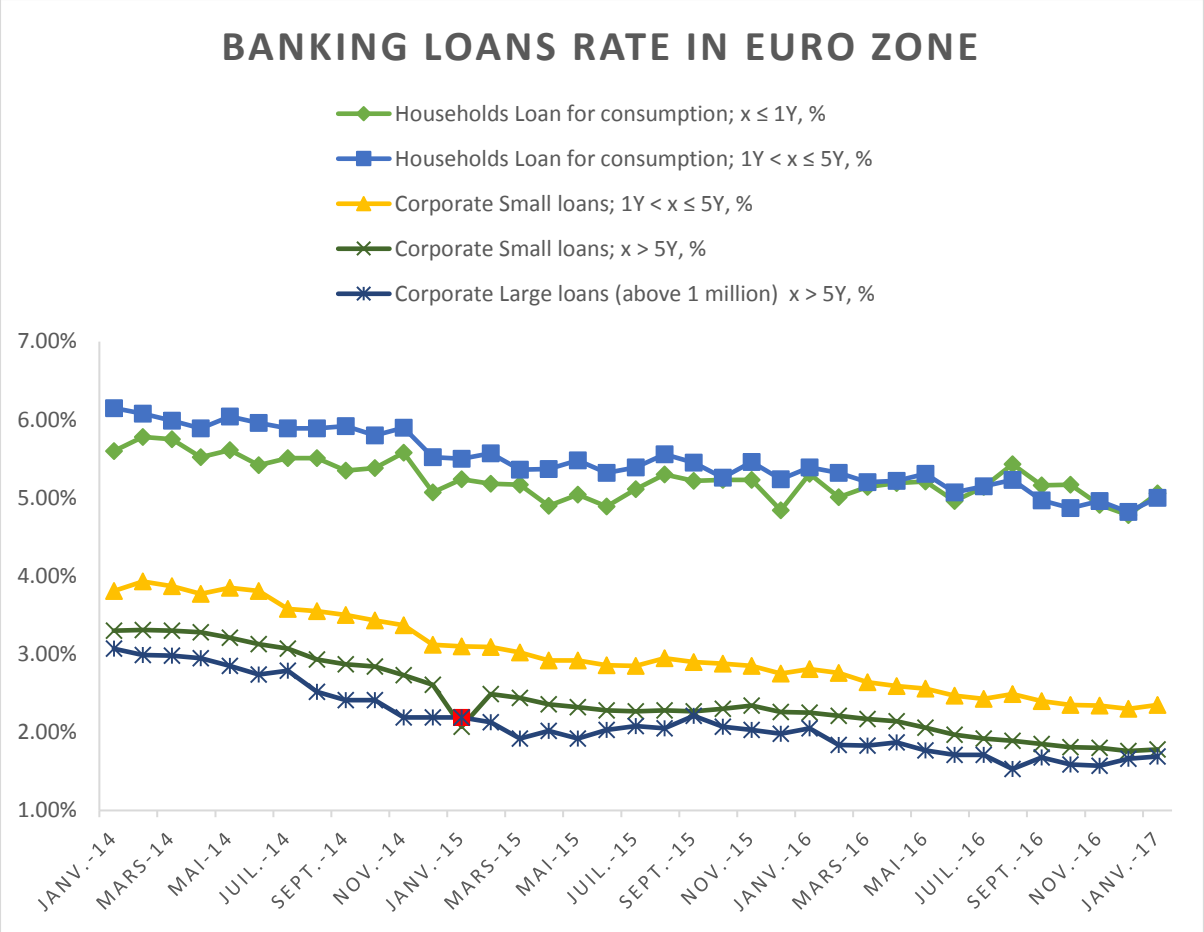


Figure 8 – Banking loans rate in Euro Zone

Source: European Central Bank (ECB, 2017)

In general, the different curves of bank interest rates have "relatively" decreased between January 2015 and January 2017.

Households' loans for consumptions decreased from an average rate of 5.24% in January 2015 to 5.06% in January 2017. This decline in rates remains very measured and low, especially compared at the refinancing rate decided by the ECB. The latter declined from 0.05% to 0% in March 2016.

As far as companies are concerned, the graph shows a more efficient and rapid rate lessening. Indeed, the lending rate of companies (loans between 1 to 5 years, less than one million euros, and yellow line) was close to 3% in January 2015 and to 2.35% in January 2017, i.e. about -0.6 point of percentage less. It should also be added that these rates are historically low. It is difficult to see a correlation between the different decisions of the ECB as for the previous

graphs with changes in bank interest rates. Indeed, even if one can appreciate a general decrease of these rates, one does not distinguish of a fall of the rate but rather a decreasing slow and controlled. Yet, on a very short term, one can see that on January 2015, there was a high decrease of the corporate small loans rate. Yet, this decrease had been compensated immediately and one can see that in March 2015, the rate came back at its original level. This short term deviation might linked to Mario's Draghi speech and QE implementation.

As will be presented later in the study, the trigger for new investment sources expected by the Central Bank is the reallocation of liquidity from commercial banks in loans to households and businesses. During the crisis of 2008, banks became both supercilious among themselves (loss of interbank trust) but also cautious in accepting loans to consumers. This reaction has thus frozen new investment and later the economy in general. The following graph provides an overview of the value of loans granted by commercial banks since the new monetary policy in the euro area.

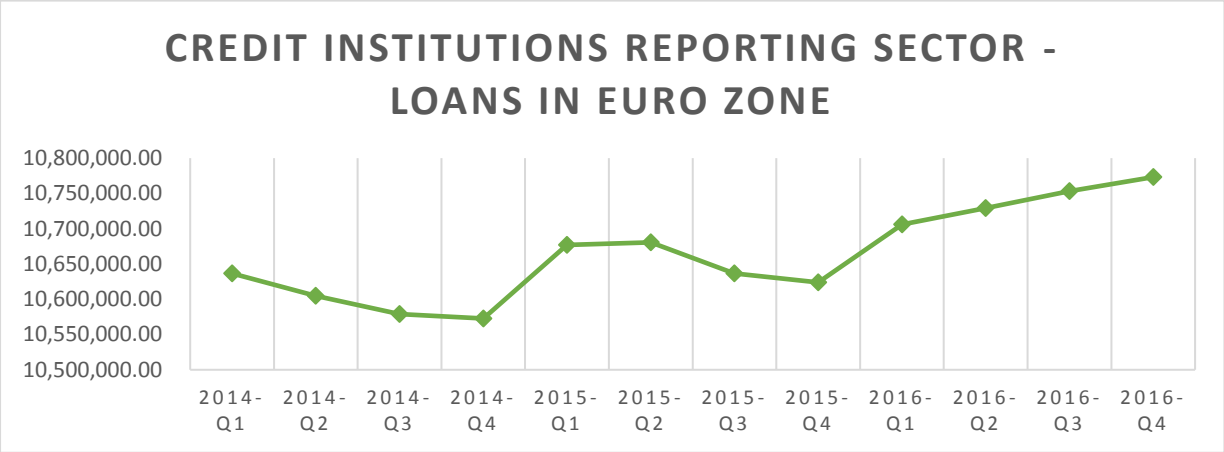


Figure 9 – Credit institutions reporting sector – Loans in Euro Zone

Source: European Central Bank (ECB, 2017)

For the whole of 2014, we can see a gradual decline in loans granted to all consumers (households and businesses). On the other hand, from Q4 this year, we are seeing an increase in the value of its loans. This growth remains volatile but sustained particularly during the year 2016.

Moreover, the desire of companies and consumers to invest (and thus saving less) and also essential for the stimulation of the economy as the theory foresees. Thus, the table below shows the ratio between savings (deposit) and investment (loans) reported by financial institutions.

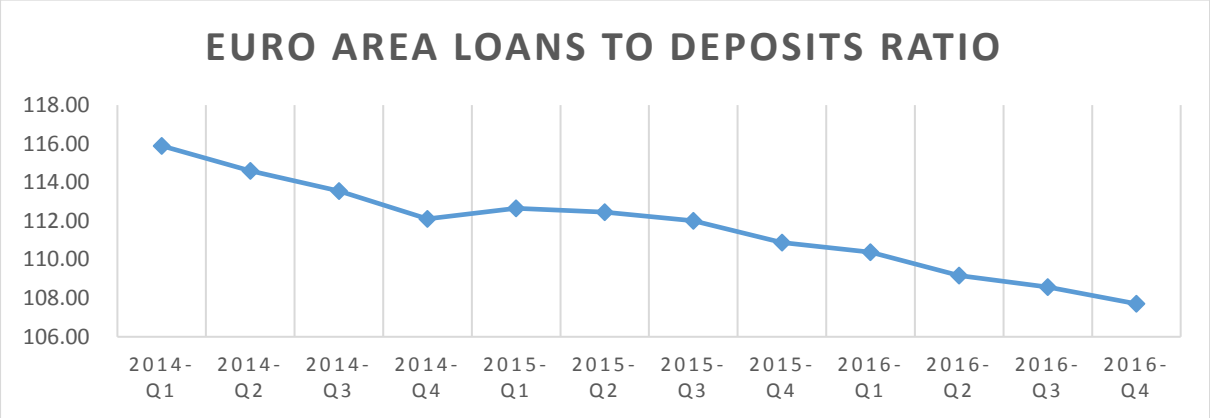


Figure 10 – Euro Area loans to deposit ratio

Source: European Central Bank (ECB, 2017)

According to the graph showing this ratio (loans over deposit), we can see that the proportion of consumers and businesses allocated to investment has been declining since 2014. Consumers consider investment to be less attractive than saving.

To make the connection between the two graphics, the conclusion would be that even if banks are willing to lend more since 2014, consumers themselves do not believe that investing is interesting, or at least not through financial institutions.

6. FINANCIAL MARKETS

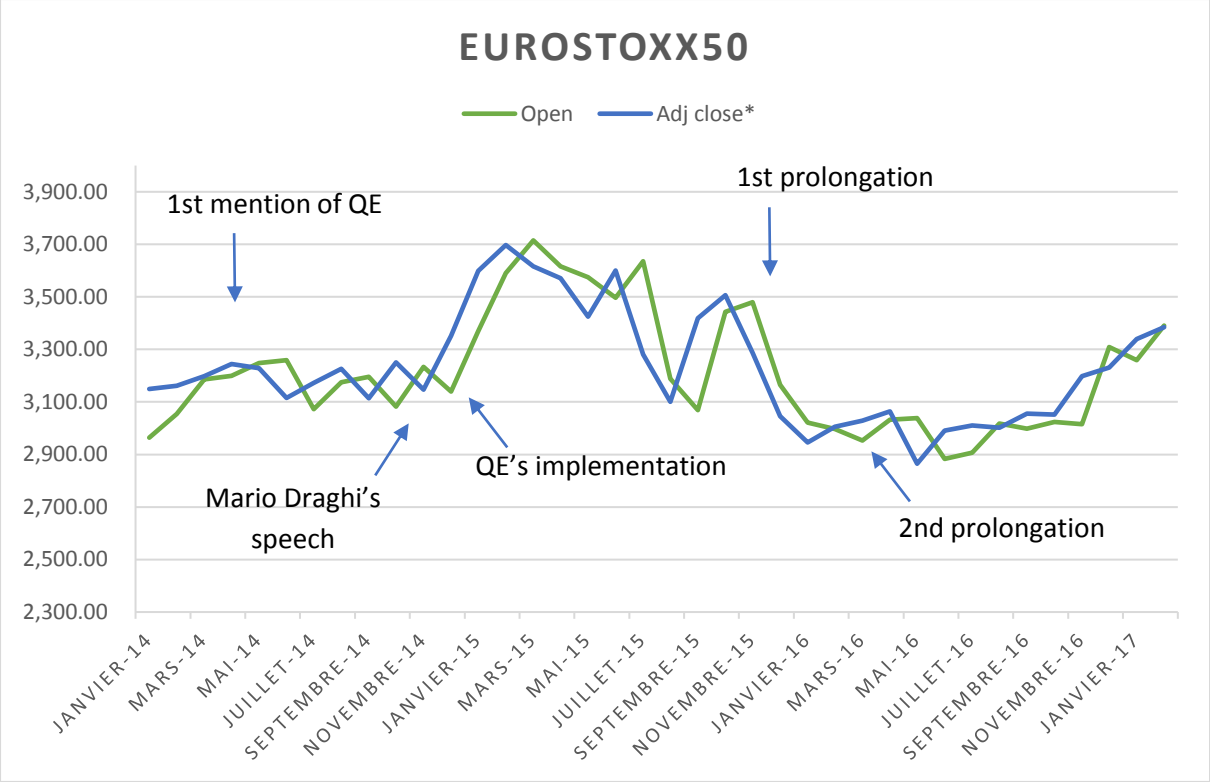


Figure 11 – Market data – Eurostoxx50

Source: European Central Bank (ECB, 2017)

The purpose of this chart is to analyze the response of the market in the euro area to the various actions of the ECB since 2014. The Euro Stix 50 presented here is the index of the 50 largest stock market capitalization of the euro area (and not Europe or the European Union). France and Germany are the countries most represented in this index with 19 French and 14 German companies.

When the ECB begins to communicate about a possible expansionary monetary policy in 2014, the chart shows that financial markets in the euro area are becoming volatile and not very stable; certainly because of the uncertainty in the markets. However, from the official introduction of QE, the price of the index increases to reach 3700 points (historical price since it had not been obtained since the fall of the price in May 2008, see Graph above).

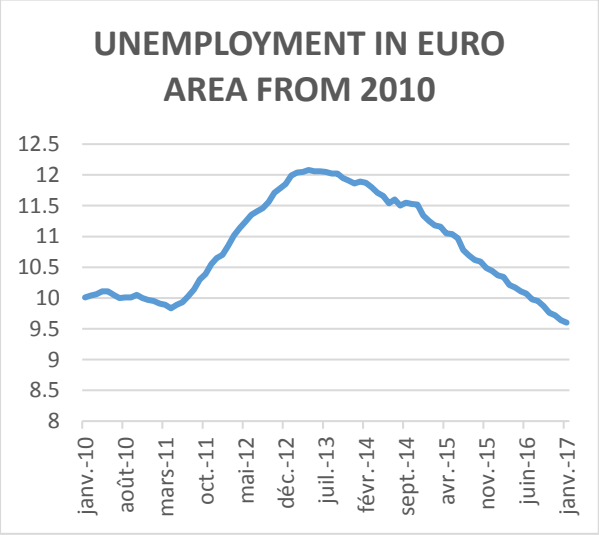
Unfortunately, market optimism will not last very long: in March 2015 the price falls again to reach its initial threshold of around 3000 points in August 2015.

7. EMPLOYEMENT

Even if the monetary policy of the euro area does not interfere with the employment policies of each country, it may have an influence on the labor market. A healthy economy is represented by low unemployment.

Unlike the FED in the United States, the European Central Bank does not have a full-employment objective in its directive. The structure of the euro area leaves sovereignty to the member countries to decide their own economic policies and hence of employment. The 2008 crisis had a huge impact on employment in the euro area. Some countries have been much more affected than others, notably Greece, Spain and Ireland. (See Appendix 2).

If we stick to the QE theory, the objective is to restart growth. Thus, we can expect a decline in the unemployment curve over the whole zone because the economy will be more stimulated.



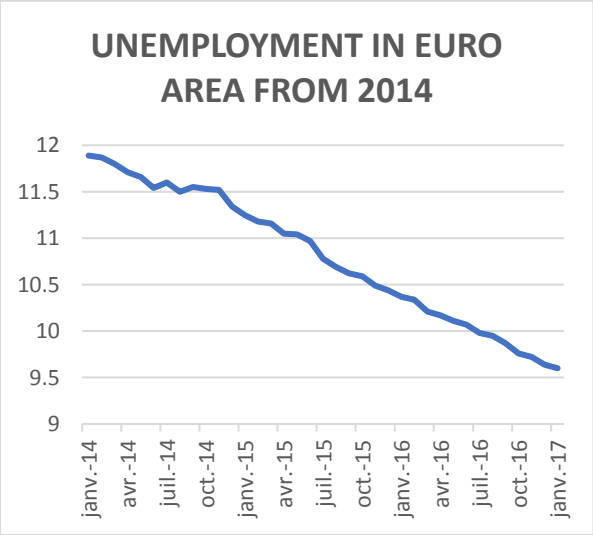


Figure 12 – Unemployment – Euro Area from 2010

Figure 13 – Unemployment – Euro Area from 2014

Source: European Central Bank (ECB, 2017)

The two graphs above give us an idea of the trend of unemployment both since 2010 and since 2014. From the first graph, it can be seen that the peak of unemployment set at around 12% was in May 2013. The Unemployment then starts to decline from mid-2013 on a steady and

regular basis. From January 2014 to January 2017, unemployment went from around 12% to 9.6% in January 2017, i.e. -2.4 percentage points.

The graph on the right shows a steadily decreasing curve and does not seem to be marked by particular events, as one might have thought.

As mentioned earlier, employment policy is not homogeneous across the euro area. It would then be necessary to look at the effects of QE by country in the zone.

Figure 14 – Unemployment – Portugal from 2014

Figure 15 – Unemployment – France from 2014

Source: European Central Bank (ECB, 2017)

As can be seen from the graphs above, the unemployment curves of France and Portugal are very different. The two countries share a relative decline in their unemployment over the period January 2015 to January 2017. When Portugal loses about 3.5 percentage point over the period (from 13.75% to 10.25%), France only loses 0.34 percentage point 10.34% to 10%). The two countries in January 2017 have about the same rate of unemployment whereas the one of Portugal was much higher two years ago. The unemployment curve in Portugal is fairly constant and rapid. That of France is much more volatile and inconstant with three decreasing peaks of unemployment in July 2015, January 2016 and September 2016.

The different labor policies of the two countries are undoubtedly the most obvious answer concerning its disparities. However, unemployment is generally falling in all the countries of the zone, but this rate remains high when compared with the figures before the crisis of 2008.

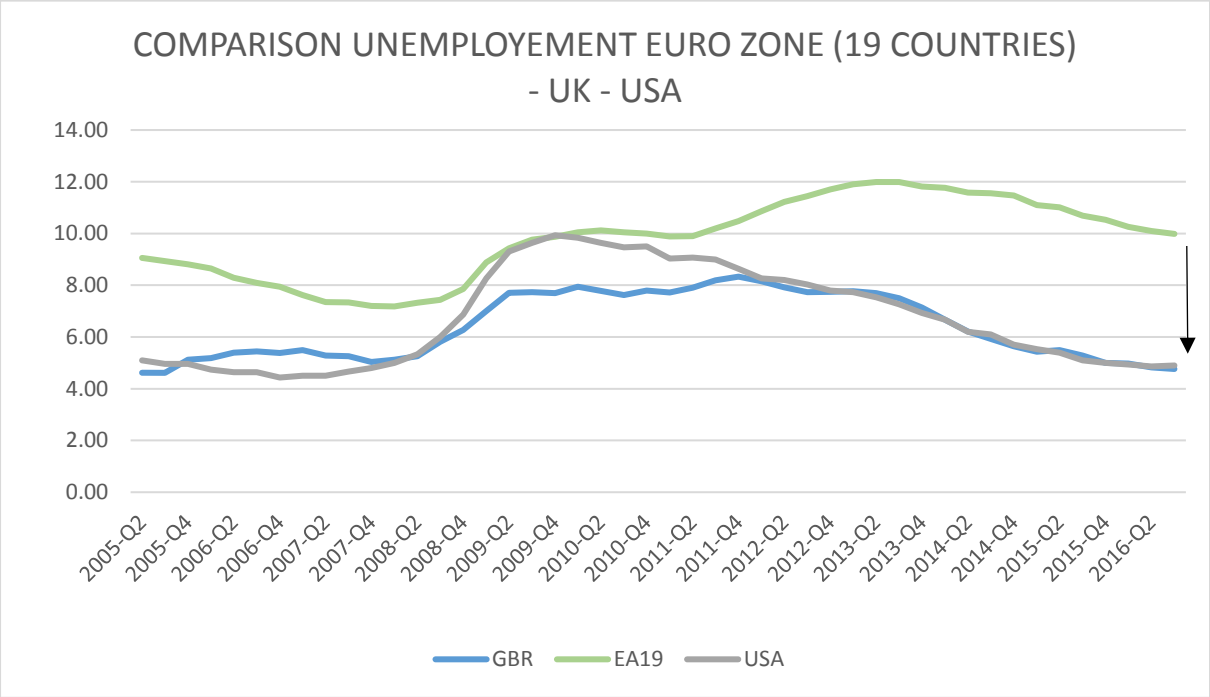


Figure 16 – Unemployment – Euro Area from 2005 compared to United Kingdom and USA

Source: European Central Bank (ECB, 2017)

As of Q2 2008, unemployment rates in Great Britain and the United States increase in the same way as in the euro area (a more relative increase for Great Britain). The QE programs of these two countries began much earlier for them.

Great Britain started this program in March 2009 and is still relevant today. Unemployment in Great Britain peaked at the end of 2011 with a value of 8.64%. It then decreased to reach 4.77% mid 2016 (-3.87 percentage points in more than four years).

On the US side, their QE program began in November 2010 and was renewed twice and ended at the end of 2016. Unemployment at the peak in Q4 2009 (close to 10%) is beginning to fall from 2010 to reach the end of 2016 at around 5%.

The different monetary policy programs have certainly had different impacts on these countries. As said earlier, the FED's goal (among others) is to make full-employment in the United States. We can therefore conclude that the Fed has managed this objective and fairly

quickly. On the other hand, the effects of the monetary policies of Great Britain are more varied. They were slower to react but also more relative.

However, when comparing the unemployment curves of the United States and Great Britain with those of the euro area, there is a very large gap in the evolution of employment. The euro area in 2016 has an unemployment rate well above that of other countries and the decline in unemployment previously commented seems much less, almost unchanged.

5. ANALYSIS

1. SUCESSFULNESS OF QE POLITICS

Many studies have researched on how a QE could be beneficial for countries such as United States and UK. However, the literature is still poor regarding the input and output of this policies in European Union. This might be explained by the fact that the ECB decided later than USA and UK use this unconventional method, and thus, it might be difficult to see long-term or even medium-term results.

Yet, what needs to be highlighted is that the ECB had the capacity to innovate and respond facing the changing economic and financial environment from 2014. As the main objective of this institution is to keep financial stability, one could say that it allowed to avoid a bigger structural crisis within the EU.

As the empirical analysis shows there was benefits from this monetary policy.

Firstly, the impact on exchange rate has been very positive for EU countries. Indeed, the weak euro relaunched exportations within the Union and would have help in importing inflation due to the increase of raw material prices. However, has the energy prices decreased more than the EUR/USD value, the effect has been less important.

Secondly, the government bond yield have also decrease during the QE cycle done by the ECB, As shown within the precedent part, the yield had decreased, even though the step down was very relative. We then could see that the QE politic had a positive impact on certain economies such as France, Germany and Italy. Yet, this impact could be completely different in other countries such as Portugal.

However, in 2015 Pelin Berkmen and Andreas Jobst (Berkmen, et al., 2015) offered a preliminary analysis of the impact of the future ECB policy on the European economy. In addition Tomasz Wieladek and Antonio Garcia Pascual (Wieladek, et al., 2016) have also sought to determine the positive and negative impacts that the ECB's easing has had on real GDP and the euro area consumer price index. Their main conclusion is that in the absence of the first QE program, real GDP and the underlying consumer price index would have been lower by 1.3% and 0.9%, respectively, In relation to the levels they have actually achieved.

The analysis suggests that the policy is transmitted through the channels of portfolio rebalancing, reporting, credit easing and the exchange rate. On the other hand, unlike the United States and the United Kingdom, QE does not appear to have stimulated euro area activity by reducing uncertainty. As regards the effects of the QE of the ECB on the GDP of each member country, the analysis shows that they were the largest in the case of Spain and the most limited in the case of Italy.

In this case, Spanish GDP increases four times more than Italian GDP in the face of QE. According to Wieladek and Garcia Pascual, this finding could be explained by the greater difficulties encountered by Italian banks compared to the Spanish one. Regarding the effects of QE on inflation in each member state, the analysis suggests that they were the largest in Germany and the most limited in Spain. This result is consistent with the idea that QE should have a stronger impact on prices in countries where capacity is used at its maximum rather than in countries where production capacities remain unused.

In conclusion, QE politic might have had very good impact on the EU economy, global wisely. Indeed, the GDP Growth has increased over the last month and the inflation rate increased and stabilise between 1.8 and 2% since April 2017. One need to highlight that this inflation rate is the primary objective of ECB. Thus, objectively talking, the ECB has fulfilled its role.

In June will take place the ECB Council? Some speculators already forecast an exit of the QE strategy. Their main argument is the better economic and financial conditions of the Euro zone.

2. LIMITS OF QE

The empirical study shows that even though the inflation rate and the GDP growth rate were getting out from a recession situation for global Europe, the differences within countries in Europe are still strong. Indeed, if one considers the variation of GDP growth per country from 2015 to 2017, the relation between countries economy and QE global politics is hardly highlighted.

Moreover, despite historically low interest rates, the level of demand stays low and saving rates haven't necessary decreased, in spite of the consumption rate theory. As the graphic below shows, the only relevant decrease of household saving rate is in Portugal.

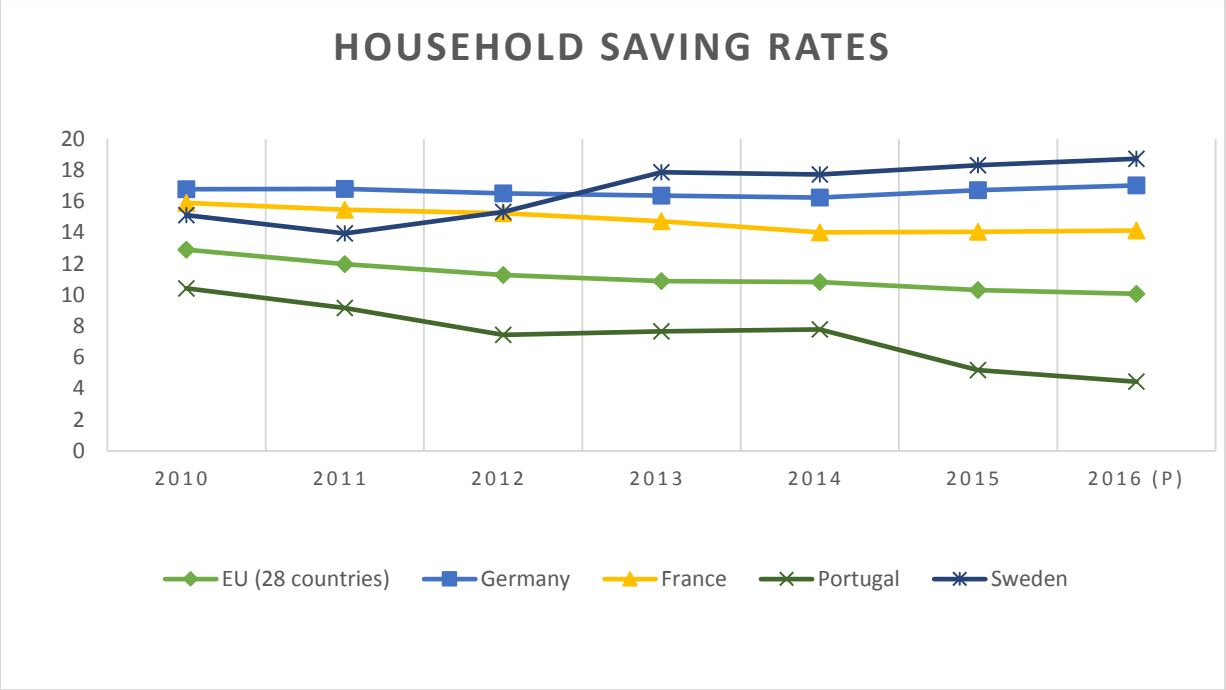


Figure 17 – Household saving rates from 2010

Source: European Central Bank (ECB, 2017)

This study also shows that the massive creation of central bank money does not increase the money supply in circulation, as only commercial banks create money. This "central bank" money serves to reassure banks, but fails to revive economic growth or inflation.

QE politics is not without danger. Indeed, from its "unconventional" side, QE could be very risky in terms of financial and political instability. Some economists agreed that QE could origin financial bubbles. QE policy mixed with forward guidance reinforce the auto referential side of financial system. The example of the situation in 2003 could explain how dealing with unconventional policies might create disturbance within a country or even at a global level. In 2003, Fed president used forward guidance and engage himself and the institution to keep low key rates for a considerable period of time. This policy contributed to real estate bubble and market were influenced to borrow in short-term asset in order to invest on longer term assets (shares and bonds). The bubble grown as the portfolio equilibrium had degraded since the central bank gives its implicit guaranty. Indeed, considering negative rates on bank surpluses, commercial banks might use this reserves to speculate on financial markets and thus, would create speculative bubble.

These stabilisation solutions might also weaken the monetary policies. Banks have obtained extreme large amounts of central bank money, making them insensitive to variation of future interest rates. Moreover, the system and especially countries get used to historic low rate, which will see the cost of their debt rise sharply when they exit these unconventional policies.

The QE policy lead by the Central Bank of the biggest economic actors favours financial condition in emerging countries, creating an investment boom, often finance by debt. During a public conference at London School of Economics, Raghruam Rajan, Indian Central Bank governor suggested that the monetary creation policy lost its utility. Indeed, QE favours capital expansion in emerging countries because the benefits are higher. Exchange rate policy were not efficient because, then, the emerging countries companies invest with debt, mainly in dollar. Emerging countries then might be not resistant to financial chocks as they have a high level of debt, they can be highly affected by changes in raw material prices and by the quick depreciation of their local currency.

In conclusion, although these monetary policies have succeeded in stabilizing the monetary and financial system in the European Union, it is optimistic to say that these policies have succeeded in boosting the growth and economy of the system. It appears that the positive impact of QE was mainly due to the depreciation of the Euro and the rise in raw material prices. However, coordinating this monetary policy with a budgetary policy within the Union could allow the Central Bank to revive the economy. Indeed, the problem of European solidarity as we saw it during the debt crisis in Greece could be the driving force behind the failure of a European project.

6. DISCUSSION, OPENING AND LIMITATIONS

1. COMPARISON WITH OTHERS INSTRUMENTS

1. NEGATIVE POLICY RATES

No one thought rates could actually go below zero. This scenario, however, has produced a unique concept in the world of investment and the economy.

In June 2014, the ECB reached a historic milestone, moving down one of its key interest rates, the rate of remuneration of deposits below 0. Come to support unconventional monetary policies, this instrument used by the ECB, follows the example of countries such as Japan, Denmark, Switzerland and Sweden. Therefore, between July 2009 and September 2010, the Riskbank (Central Bank of Sweden) move down its facility deposit rate at -0.25% and further this monetary policies until a rate of -1.25% since July 2016 (the lowest deposit rate known in monetary policy). Similarly, in 2014, the Swiss National Bank decides to set its rate at a negative level followed in 2015 by the Bank of Norway and the Bank of Japan in 2015.

The first experience of this kind of policy is in 1979, in Switzerland. The overnight rate which was already close from zero became negative and the mechanism have had an influence on the deposits of individuals, often foreigners, but also on the money market.

The existence of a negative rate for deposits implies that the applicant bears a cost. This instrument, theoretically, should push the banks that deposited funds to the central bank to lend them to private actors. Thus the main monetary policy channel for this measure concerns the incentive for commercial banks holding reserves remunerated at a negative rate to mitigate the burden resulting from these negative rates. To this end, banks can try to reduce excess reserves through balance sheet adjustments (through the granting of credits or purchases of securities to non-financial agents, increasing their deposits and thus reserve requirements).
In an open economy, the second channel of negative interest rates is the exchange rate channel. Lower interest rates make the currency less attractive as an investment currency. This declines, leading to a fall in the prices of domestic goods abroad and an increase in net exports. This in turn leads to an increase in gross domestic product and an increase in inflation.

In the euro area, banks are required to have an account with the ECB and deposit a reserve requirement in proportion to the deposits they receive from their customers. However, the negative rate does not apply to these reserves but to the deposit facilities as well as to the average reserve assets exceeding the reserve requirements and other deposits with the Euro system. However, the effectiveness of this channel depends on the ability of banks to increase their credit supply. With rates on negative deposits, each bank with excess liquidity on its account at the central bank must pay an amount of that excess cash. Banks will pay interest on their deposits at the central bank, which in turn will reduce their margin on their daily operations. Credit to individual companies, such as EMS, will thus be less profitable for commercial banks. They may then choose to recover their original margin by increasing the rates offered to these SMEs. Various studies by Credit Agricole and BNP Paribas show that a negative rate of return may induce banks to overburden private borrowers.

Moreover, with each new loan accepted by a bank, its level of bank deposit increases and thus causes an increase in its compulsory reserves and thus to reduce the share of their total reserves that exceeds the required reserves "taxed" at the negative rate. However, the bank must also find consumers. Indeed, the overall demand for loans does not increase in proportion to the supply of loans.

The objective of the low interest rate policy can then be reflected in the decline in interest rates on the money market. Indeed, this policy linked to a policy of forward guidance in which the central bank indicates a fall of these rates to a negative level and for a long duration can allow a reduction of the rates like Eonia and Euribor, that is to say the rates on the interbank market. Banks will prefer to lend to each other more than to the Euro system. Moreover, by lowering these rates on the interbank market, rates for households and businesses are also likely to decline, including variable rate loans.

2. HELICOPTER MONEY

Facing the limitations of the monetary policies currently used by the ECB and other central banks, especially on the level of inflation, some economic research has focused on the concept of "helicopter money" (also named QE for the People, QEP), which could be a solution to stimulate price-level progress.

At a press conference in March 2016, Mario Draghi expressed interest in this concept, but it had not yet been studied by the European Central Bank.

In his book "The Optimum Quantity of Money" (1969), Milton Friedman defined the concept of helicopter money for the first time:

> *"Let us suppose now that one day a helicopter flies over this community and drops an additional $1,000 in bills from the sky, which is, of course, hastily collected by members of the community. Let us suppose further that everyone is convinced that this is a unique event which will never be repeated."*

The mechanism of helicopter money is described with similar characteristics of the universal basic income, proposal also evaluated by some countries currently. Economic agents would thus collect newly created money without another variable changing. The concept implies that the Central Bank distributes money directly to households and businesses, without any compensation from the latter. Nowadays, the system of "money-printing" (vulgarly) finances the public deficit, but always with a counterpart such as the recognition of a debt or the purchase of bonds that the Treasury has issued, place in the balance of the BC.

Within QEP system, economic agents do not have an account with the central bank and would not issue any counterpart in exchange for this money. (Artus, et al., 2012). We speak therefore of "distribution" of money and no longer "injection" as for QE. (Waldman, 2013). The money supply thus increases without compensation and thus theoretically could cause a virtuous revival of prices and consumption. Citizens who receive these "citizen dividends" (Koenig, 2013) may consider increasing their consumption without the need to reduce their expenses later for the reimbursement of the initial sum.

The non-existence of a counterpart is criticized by Greenwill in 2013 because it maintains that a central bank does not have its role in creating currency and distributing it "freely". The Artus study contradicts this argument, arguing that "the theoretical reasons why banks create money only against asset purchases are unclear." Other studies also raise the question of the ease of transferring this money to households but also how to translate this operation into its balance sheet, something that is not yet existing. Steeve Waldman then proposes an adaptation of the accounting system of central banks by creating a «goodwill» asset which will enable the latter to have a fictional counterpart in the balance sheet. (Thoenig, et al., 2007)

The basic principle of helicopter money is to give money directly to European citizens so that the recovery of the economy is stimulated by consumption. This mechanism can be developed in two ways.

First, it can be done through public spending or tax cuts. However, this mechanism is currently not allowed by European treaties. Indeed, the article 123 of the EU Functioning Treaty, forbid monetary financing of public spending. This ban may be justified by the issue of the independence of central banks, which will be discussed later. Indeed, there is a fear of the subjectivity of the national governments to decide the appropriate moments before carrying out large-scale public expenditure (pre-election for example).

The second option available to the Central Bank is to pay this money directly into the European citizens' bank account. Several studies have been carried out in order to know the amount paid to each citizen. The study by J. Muelbauer indicates that for an effective QEP, this dividend-citizen should be 500 euros per year per citizen. According to the think tank "Positive Money" it should be 175 euros per month per citizen. We note therefore that these two amounts are very different and that the decision of the amount granted should take into account justified criteria.

Cutting taxes or distributing money directly to citizens was also analyzed by Buiter in 2003.

> *"The simplest example is a temporary tax cut or increased transfer payment by the government to the household sector, financed through a one-off, permanent expansion of the monetary base. (...) The treasury will implement a tax cut or increase in transfer payments and will finance this by selling debt to the Central Bank. The acquisition of Treasury debt by the central bank is financed through the issuance of base money" (Buiter, 2003)*

The concept then approximates an "Overt Monetary Financing» concept and then raises the debate of independence of the central banks. Buiter also adds that it is not induced in the mission of a central bank to act as fiscal agent for the State.

The logic of the helicopter money is that of monetarism. Indeed, the theory makes the assumption that acting on the money supply will have an impact on prices.

The main advantage of this type of instrument is the circumvention of the banking system. Indeed, the most offensive criticism on QE is the fact that the channels of transmission are mainly reflected in the channels of the banking system and not in the real economy. Here the concept of helicopter money makes it possible to distribute the money directly to the consumers

and thus allow this instrument to have an impact on household consumption. The first obstacle to this theory lies in the willingness of households to consume this money "free". Indeed, according to their own expectations of the economy, they could decide to save it. The effect of this policy would be void because it would be a leak in the consumer circuit. Koening then suggests various solutions (Koenig, 2013)in order to counter its obstacles:

- A limitation of QEP to employees, pensioners and households with the lowest incomes; a larger sum will therefore be allocated to Greek citizens compared to German citizens.
- Breakdown of liquidity calculated on the basis of the propensity to consume
- Money could also be distributed in the form of voucher with a limited validity.

Moreover, Koening emphasizes in his study that 15% to 20% of developed countries households don't have wealth enough to save money.

Other opponents of this policy put forward the argument of "labor value". Indeed, according to them, giving money without counterpart to citizens could eventually reduce the willingness of citizens to work. However, the amounts previously seen, in particular the one from Positive Money (175 euros per month) remain low amounts and this policy would have only a temporary focus.

On July 17, 2016, a group of 18 left-wing MEPs and environmentalists signed an open letter to the ECB inviting the ECB to "analyze the potential effects of this mechanism and clarify under which conditions the implementation of these proposals would be legal."

2. FUTURE CHALLENGES OF CENTRAL BANKS

1. HOW TO GET OUT OF QE?

> *"Communicating about when and how we are going to exit our asset buy-back program is difficult, we know that at some point we will have to get out of it, we know that keeping interest rates low for too long has undesirable consequences. At present, we are dependent on indicators ".*
>
> *Governor of the Bank of Italy at a forum at Columbia University.*

The long-term effects of a policy of QE demonstrated in different studies are not essentially positive. In this perspective, the different central banks must take into account the different outcomes of this policy, as these, unconventional, can only be temporary. A monetary policy "too long" in the Eurozone could indeed push States not to reduce their public debt, because of low interest rates and lead to an irreversible policy.

In December 2016, the Fed announced a gradual normalization of these monetary policies, in particular by raising one of its key rates ("tapering"). On December 14, the Fed, led by Mrs. Yellen, increases its key rates by 0.25 basis point to 0.75%. At the same time, the ECB and Riskbank announced an extension of their non-conventional policy and in particular their policy at zero rate.

However, this first "small" measure of the FED has had immediate consequences in the United States but also in the rest of the world. Thus, the economists were able to observe a rise in the dollar price of nearly 7%, which then brings this currency closer to parity with the Euro.

A normalization of monetary policy then raises a question about macroeconomic as well as social consequences. The role of central banks is widening, they must take measures of normalization, of "monetary destruction" without affecting employment and growth. Investor anticipation is the main obstacle to the exit of unconventional policies. Indeed, the rise in interest rates will be limited by several things. A risk of deflation, the reverse effect of monetary easing policies, especially on debt.

The two challenges for Central Banks regarding a "quantitative tightening" are: firstly, raising the interest rates and secondly narrowing Central Banks balance sheet.

According to (Gruson, 2010), "exit strategy has short-term deflationary potential and long-term inflationary potential. " Moreover, in his study, he compared the impact of exit from monetary policy with the stability of the financial system as well as the attitude of the Member States of the Central Banks.

While the QE policy maintains inflation expectations by increasing liquidity and asset price support, the exit effect of this policy is not guaranteed to have no impact on governments and for the assets of the Central Banks.

Central banks control overnight rates but they are not the only authority that can act on long rates. Measures to manage public debts by the Treasury are also an actor in the normalization of monetary policies.

As we saw earlier, some analysts believed that BCE would decide to exit this strategy in June 2017. The opposite decision was proved. Indeed, while the ECB's reduction in the allocation of securities from 80 billion to 60 billion in December 2016 suggested a normalization of the monetary policy of the ECB, the context seems to disfavour this hypothesis.

According to Patrick Arthus of Natixis, "the ECB, wanting to avoid a debt crisis, is forced to continue the QE to reduce long-term interest rates as long as investors fear the explosion of the Eurozone. (2017)

Thus, in the event of a likely exit from these monetary policies, all current flows of sovereign securities at negative rates that form a large bond stock will lose their full value as interest rates rise, which may create a bond crisis. The longevity of these policies makes it difficult to reconcile interest rates without creating financial instability.

2. HOW DO THEY KEEP INDEPENDENT?

> *"a central bank with a high degree of discretion in conducting monetary policy would find itself under constant political pressure to boost the economy and reduce unemployment, but since the economy cannot exceed its potential GDP or its natural rate of unemployment over time, this policy would instead only lead to higher inflation in the long run".* (Crowe, et al., 2007)

The subject of central bank independence has been studied in many analyses in the past. First, it is necessary to take stock of the necessity for an economy to separate the policy of the State from the policy of the Central Banks. This is called the time-inconsistency problem (Paul Klein). This notion refers to decisions taken for example by a government with influence on the monetary policies of the Central Bank. The government can then choose to announce a certain decision to be elected (or re-elected), and then once the election is over, change policy. This is what we call the inconsistent action. Within the framework of monetary policies, decisions are often based on the inflation rate and forecasts. The government can then promise the voters a drop-in inflation and then when the consequences of falling inflation begin to be felt, they can decide to change policy.

A real independence of the central banks would then be likely to limit inflation. (Alesina, et al., 1993). Several indexes have been developed by different economists to differentiate between legal independence and the real independence of central banks.

Two main indicators are used: the GMT index of Vittorio Grilli, Donato Masciandaro, and Guido Tabellini (1993) and (Cukierman, et al., 1992)

The GMT index includes two sub-indexes: The first is political independence, highlighting the appointment characteristics of the bank's executives, relations between the government and the board of directors of the central bank, and finally the responsibilities assigned to the bank. The central bank by the government. The second sub index is linked to the bank's economic independence, including the institution's funding and budgeting issues.

The 1992 Cukierman index alone makes up 16 sub-indices linked to four main variables: executive director status, policy formulation, central bank aims, and borrowing limitations.

These two indices, although effective, nevertheless tend not to be up to date and only reflect indices based on quantitative variables. They are not then very representative of the real independence of the central banks. In 2010, Alpanda and Honig (2010) tested the independence of central banks by examining to what extent the policy of central banks could be manipulated for political reasons on a sample between 1972 and 2001. Their results show a lower independence of central banks developing countries.

Alpanda and Honig, on the other hand, examine the extent to which monetary policy is manipulated for political reasons by testing the possibility of political monetary cycles between 1972 and 2001 in multiple countries. They see the evolution of monetary aggregates during political campaigns. Depending on their outcome, these cycles are in developing countries, which means lower actual independence in these countries.

According to the new classical economy, the benefits of an expansionary monetary policy are only temporary, while the inflationary consequences are lasting. Therefore, it is proper to conduct non-inflationary monetary policies. To the extent that a government commitment in this direction is not credible (since it is not irreversible), it is necessary that the central bank be independent to counter inflationary expectations.

3. LIMITATIONS OF THE STUDY

The analysis of the effects of the ECB's monetary policy on the economies of the euro area countries can be done in diverse ways. This study is based entirely on economic and financial data from the ECB and covers all countries in the area in an inclusive manner. Of course, this study gives different results depending on the country. A further study on the different effects that the policy of the European Central Bank may have on, for example, the countries of Eastern Europe and the countries of the West might have been interesting. Indeed today we can see very different social reactions to the broad policy of the European Union according to national policies.

Thus, one can take the example of the presidential elections in France in 2017. From the first four candidates, two candidates were representing an anti-European program. Thus, the parallel between national social policies and those of the European Union in a globalized way could give results very different from those demonstrated in this analysis. Other studies on the effects of ECB policy are also needed: effects on urbanized regions / rural regions, founder countries of the EU / new EU countries, on different economic sectors, etc.

Moreover, in general, the financial and economic indicators used in this thesis are very general indicators. In addition, used at a global level without taking into account the specificities of each euro area country, these indicators certainly highlight the results at the global level but with the disadvantage of shredding more significant results at the local level.

The analysis could have also used other indicators such as social indicators to show different steps of effects of the ECB politics.

Finally, the monetary policies of other countries were also mentioned. Thus the policy of the FED (Federal Reserve) in the United States and that of the BoE (Bank of England) shows results very different from those of the ECB. An analysis of the economic and financial data of these two countries in parallel with those of the European Union could then highlight the effectiveness of the ECB to fulfil its objective as an international institution.

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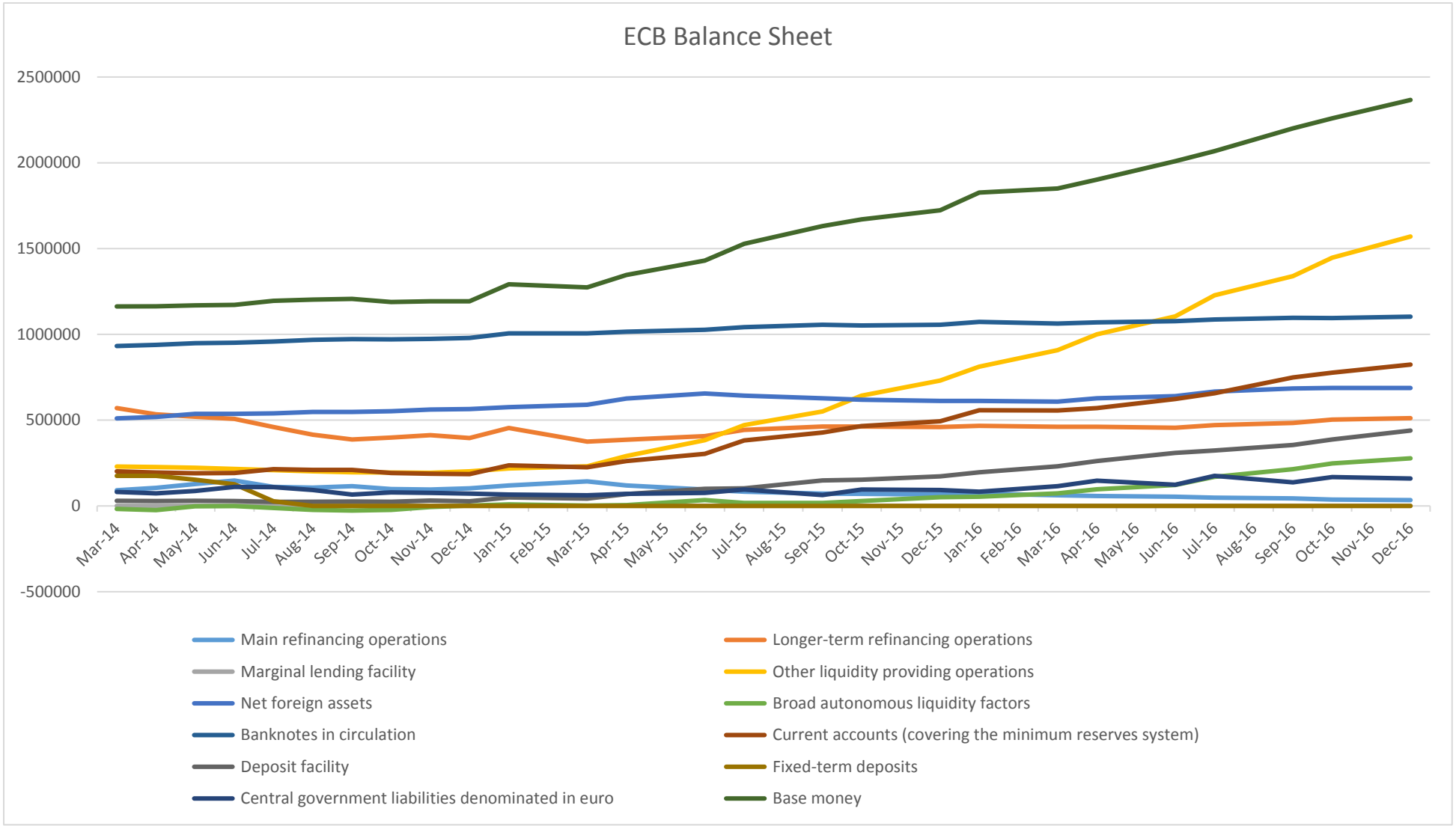
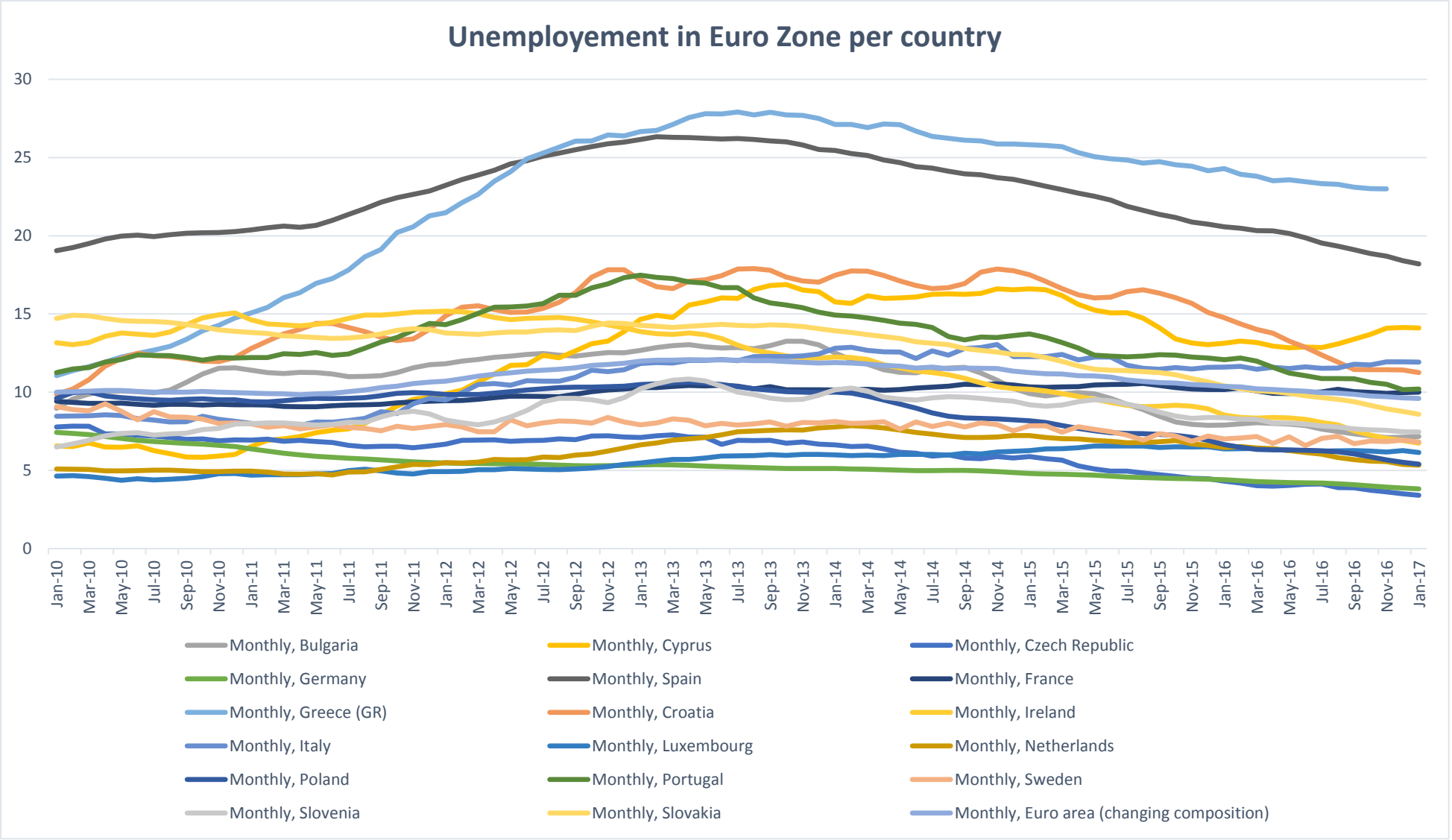
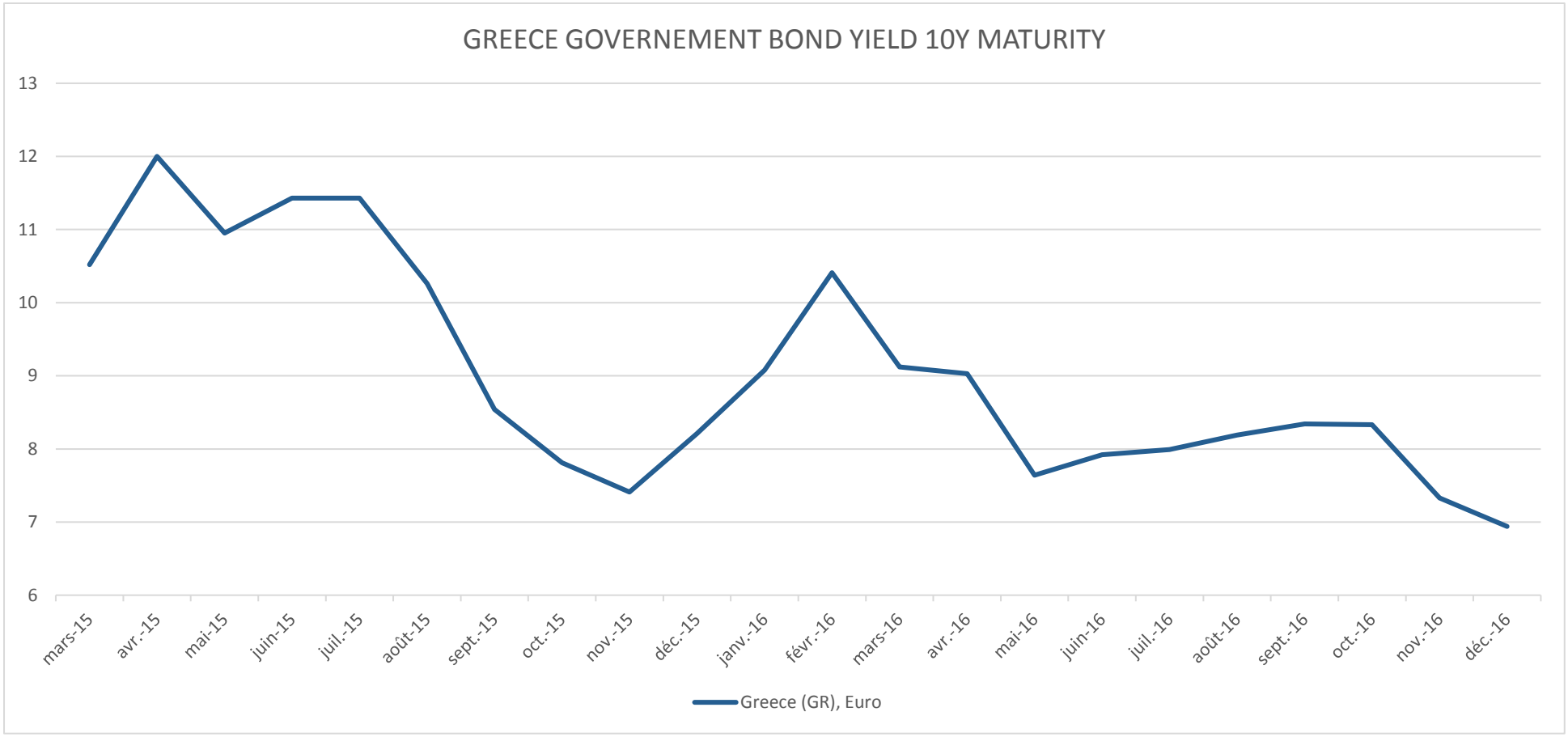
8. APPENDIX



Appendix 1 – ECB BALANCE SHEET Source : (ECB, 2017)



Appendix 2– UNEMPLOYMENT IN EURO ZONE Source : (ECB, 2017)



Appendix 3 – GREECE GOVERNMENT BOND YIELD Source : (ECB, 2017)