

The Euro: ‘As bad as gold’?

An examination into the Euro Crisis through the eyes of the
gold standard literature

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Abstract

This paper examines whether monetary autonomy can explain the divergence in macroeconomic performance between Euro and Non-Euro countries across the OECD since 2007. The paper also provides a short overview on the gold standard literature. Historical, empirical, and theoretical accounts of the Great Depression have mainly revealed that the economic downturn in the 1930s was largely of monetary nature. More specifically, monetary policy was constrained by the peg to gold. Countries off gold, however, were able to pursue expansionary policies and their economic performance during the 1930s was thus far superior. Euro countries face somewhat similar constraints when it comes to monetary policy. The current Euro Crisis has striking similarities to the Great Depression when it comes to both the buildup of the crisis as well as its progression. Using an estimation method from the gold standard literature, this paper finds that Euro countries (and Euro-pegs) have indeed performed significantly worse than Non-Euro countries. Furthermore, the better performance of the latter can largely be explained by their monetary autonomy.

Keywords:

Euro Crisis, Great Depression, monetary policy, exchange rate, macroeconomic performance

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1. Introduction:

1.1 Research question and basic findings:

The basic premise of this paper is that the Euro system resembles in many ways the interwar gold standard¹. Both monetary systems have led to policies of tight money in the respective member countries. The research question of this paper is to determine whether monetary autonomy is the factor that explains the divergence in macroeconomic performance across OECD countries since the outbreak of the crisis.

The findings of this paper indeed point out that monetary autonomy played a crucial role for economic performance after 2007. More specifically, members of the Eurozone as well as countries pegged to the Euro have performed significantly worse over the last couple of years than countries with their own currency. The inability to conduct monetary policy is a major constraint on an economy's capability to return to full resource utilization and full employment during an economic crisis. This ultimately implies that the Great Recession, similar to the Great Depression in the 1930s, is also a monetary phenomenon.

The repercussions for economic policy, and especially monetary policy, for the entire Eurozone are severe. The results suggest that countries suffered severely because they are part of the common currency area. The Eurozone as a whole would benefit from more expansionary monetary policy, and especially countries in Southern Europe where money seems to be very tight. Mass unemployment and stagnating levels of GDP for years to come imply that a country's cost-benefit analysis could soon tip towards a possible exit from the Eurozone in order to gain competitiveness through expansionary monetary policy and the associated currency depreciation.

1.2 General Background:

It is now common knowledge that the global financial crisis of 2007/2008 originated in the U.S. financial system as a result of the bursting of the housing bubble. The early 2000s were characterized by huge increases in the price of housing in the American housing market. More importantly, the rise in prices seemed to be far above any values that could have been reasonably justified by long-term fundamentals (Cassidy, 2009, pp.237-238). The housing bubble had to burst eventually and the associated drop in prices caused severe economic

¹ Eichengreen (2008, p.43) and others explain that historically there have been actually many different gold standards. This paper refers to the fragile gold standard that existed in the period between the two World Wars.

distress for many American and international financial institutions that relied on a variety of exotic financial products (such as CDOs, CDSs, etc.²) related to the housing market to make large profits. The huge decrease in housing prices in 2007 and an increasing number of defaults of homeowners on their mortgages meant that a large number of these financial products turned out to be toxic. Banks and other financial institutions therefore found themselves increasingly liquidity constrained.

It is in this environment that the bankruptcy of Lehman Brothers took place on September 15th 2008. This event marked the beginning of the most severe global economic downturn since the Great Depression in the 1930s. The decision to let one of the biggest American investment banks fail resulted in a financial panic as stock markets tumbled and credit markets froze (Paulson, 2010, pp.222-228)³. The financial crisis spread relatively quickly to the real economy and the associated huge drop in aggregate demand led to the severest recession the U.S. economy experienced since the Great Depression. Even though the crisis was of American origin, globalization ensured that the impact was felt relatively quickly throughout the world. The American financial crisis spread through international financial markets quickly to banks and other financial institutions around the globe (Paulson, 2010, p.322). The economic downturn in the U.S. with American GDP being just roughly below one fourth of the world's output had a huge effect on global economic activity. A large drop in international trade, falling consumer and business confidence coupled with troubled financial markets led to a huge drop in aggregate demand worldwide, with some countries much stronger affected than others. The international decrease in global economic activity in 2008/2009, now called the Great Recession⁴, was without precedent during the last 80 years. Indeed, the three decades before the outbreak of the crisis were characterized by very stable macroeconomic conditions (low volatility of both output and inflation), a period known as the Great Moderation (Bernanke, 2004).

The end of 2009 marked a new chapter in the Great Recession. Increasing levels of public debt as a result of the recession led to fears about government solvency in the Eurozone area. Huge increases in long-term interest rates of government bonds of the so-called 'PIIGS'

² CDOs are collateralized debt obligations and CDSs are credit default swaps. Both are relatively complicated financial products.

³ Actually, neither the FED nor the Treasury did have the legal authority to prevent a Lehman bankruptcy at that point in time (Paulson, 2010, p.208-209).

⁴ The name 'Great Recession' is obviously an allusion to the Great Depression of the 1930s, one of the greatest international economic downturns the world has ever experienced.

(Portugal, Ireland, Italy, Greece and Spain) indicated that financial markets became increasingly aware of the levels of government debt in the Eurozone periphery. The following years, characterized by fears of sovereign debt in the Eurozone, are now called the 'Eurozone Crisis'.

It is remarkable to what extent the recent international economic downturn resembles the Great Depression of the 1930s. Banking panics, mass unemployment and attempts of austerity to allegedly decrease the level of public debt describe the situation in the United States or Germany at that time as well as the situation nowadays in Southern Europe (Krugman, 2010).

Rogoff and Obstfeld (1996, pp.626-630) claim that the economics of the Great Depression are nowadays widely understood by macroeconomists. It is especially a bulk of empirical research in international macroeconomics done during the 1980s and 90s, such as Eichengreen and Sachs (1985), Bernanke (1995), and others⁵, which revealed the origin and the transmission mechanism of the global economic downturn of the 1930s.

It seems to be commonly understood now that the Great Depression was first and foremost a monetary phenomenon. The evidence points towards a global international monetary contraction that took place in the early 1930s, initiated by the Federal Reserve (FED) in the United States to pop a stock market bubble, which was transmitted via the gold standard to all other countries that were pegged to gold (Friedman and Schwartz, 1963). The gold standard, being a system of fixed exchange rates, prevented all member countries from reacting to the global monetary contraction using expansionary monetary policy to achieve full employment. Falling levels of output, deflation, banking crises, and mass unemployment in many countries were thus the result of tight money.

It is widely acknowledged that the Great Recession of the late 2000s in the Eurozone is largely the result of a huge fall in aggregate demand, coupled with banking crises and sovereign debt crises. The individual Euro members are, however, constrained by the actions of the European Central Bank (ECB) that determines the stance of monetary policy for the entire currency area. It seems to be mainly the inability for member countries to pursue their individual monetary policy that prevents them to return to a normal price level associated with full employment.

⁵ A more extensive summary of the research on the Great Depression can be found below.

1.3 Methodology and research limitations:

Using data from the IMF, the OECD database and several other sources for all high-income OECD countries⁶, this paper draws upon the methodology employed by Bernanke and James (1991), and Bernanke (1995). Both articles make use of panel data for various macroeconomic variables to compare the economic performance between countries on the gold standard and countries off the gold standard during the 1930s. Using a similar methodology, this paper evaluates whether Eurozone countries and Euro-pegs have fared significantly worse than OECD countries, which have their own currency. It is crucial to note that a comparison of Euro vs. Non-Euro countries must necessarily also include the years before the crisis in order to address the endogeneity issue, that is, the analysis must also determine whether any fundamental difference between the two types of countries already existed prior to the crisis.

One of the main limitations of this research paper is related to the fact that the Euro Crisis has not been resolved yet. Each additional year provides an abundance of new data that could be used to test the hypothesis of this paper. The most important drawback of the data analysis, however, rests upon the very bold assumption that Euro and Non-Euro countries were not fundamentally different before the outbreak of the crisis.

1.4 Outline:

The paper is structured as follows. Section 2 relates this paper to prior research that has been done mainly on the Great Depression but also on the Eurozone Crisis. That particular part of the paper also presents the theoretical framework on which the analysis is based. Section 3 reviews the functioning of the gold standard while section 4 briefly outlines the Euro system. The next part, section 5, illustrates the main differences and similarities between the interwar gold standard and the Eurozone. Section 6 is devoted to a theoretical model of aggregate demand-aggregate supply. This is followed by the empirical part of the paper, consisting of sections 7-9. The results of the data analysis and a discussion thereof are presented next in sections 10 and 11. Last but not least, the paper closes with a conclusion.

⁶ See Appendix 1 for the list of countries.

2. Previous research on the Great Depression:

2.1 Research based on the U.S. experience:

The Great Depression, being one of the largest economic downturns the world has ever experienced, has obviously resulted in a large body of academic research (see table 1 in the appendix). Most of the research before the 1980s focused on the U.S. experience during the Great Depression (Obstfeld and Rogoff, 1996, p.627). With only American data to work with, it is not surprising that economists came to different conclusions as to the origins and the transmission mechanisms of the economic crisis.

Friedman and Schwartz (1963) accused the Federal Reserve of being responsible for a large contraction in the money supply in 1928. According to this view, the economic downturn in the U.S. was a FED induced recession. The sharp drop in output was the consequence of a sharp drop in the money supply initially designed by the FED, but later on exacerbated by the banking crises of the early 1930s. Friedman and Schwartz (1963) were thus among the first economists to argue that Great Depression was first and foremost a monetary phenomenon⁷. They asserted that the economic downturn could have been mitigated or maybe even entirely prevented by using a more proactive and thoughtful approach to monetary policy (Friedman and Schwartz, 1963).

Temin (1976), however, held the view that the monetary contraction was nothing less than the passive response of the decline in output and not its cause. He suggested that the Great Depression was the result of a large autonomous decrease in consumption.

Obstfeld and Rogoff (1996, p.627), however, summarize that the new view on the Great Depression seems to support the monetarist view advocated by Friedman and Schwartz (1963). More recent empirical research from the 80s and 90s draws upon cross-sectional and panel data from the 1930s to determine the origins and causes of the Great Depression.

2.2 International data:

Choudhri and Kochin (1980) realized a clear difference in economic performance between countries that stubbornly adhered to the gold standard (Belgium, Italy, the Netherlands, and Poland) and countries that left the peg early (Denmark, Finland, and Norway), or even had a flexible exchange rate to begin with (Spain). Their study revealed that the countries that

⁷ Some economists such as Cassel, Hawtrey and Keynes already made similar assertions during the 1930s. See Irwin (2010).

remained on the gold standard suffered from significantly sharper declines in output and prices as well as employment. Choudhri and Kochin (1980) thus found out that the monetary regime, fixed vs. flexible exchange rate, played a crucial role in determining a country's economic performance during the Great Depression.

This result is backed up by the findings of Eichengreen and Sachs (1985). Using cross-sectional data for 10 different industrialized countries⁸, the authors find that countries that abandoned the gold standard earlier also experienced a much quicker recovery from the Great Depression than countries that remained on the peg. More specifically, Eichengreen and Sachs (1985) find amongst other things a significant negative relationship between the change in the exchange rate and the change in industrial production from 1929 to 1935⁹. Similarly, the authors also discover a significant negative relationship between the change in the exchange rate and the change in export volume over the same time period. These results are consistent with the fact that countries that left the gold standard earlier had a better economic performance. Leaving the peg to gold allowed these countries to pursue expansionary monetary policy to counter the recession. The associated depreciation of the exchange rate and the fall in real wages also implied that domestic goods became much cheaper for foreigners, thus explaining the surge in exports for the countries that left the gold standard (Eichengreen and Sachs, 1985).

One should realize that during the time of the Great Depression devaluations were commonly seen as 'beggar-thy-neighbor' policies. Even many economists shared this view. Nurkse (1944), for example, asserted that devaluation is an economic policy that raises a country's domestic income at the expense of its trading partners. Eichengreen and Sachs (1985) do indeed explain that the economic advantage of the devaluing countries came mainly at the expense of the countries that remained on gold. It is, however, important to notice that the macroeconomic view on this kind of devaluations has significantly changed over the last decades. They are not considered to be 'beggar-thy-neighbor' policies anymore.

That is, as Eichengreen and Sachs (1985) explain, because a coordinated reduction in interest rates across the globe (expansionary monetary policy) would have counteracted the monetary contraction that was transmitted via the gold standard. Such a policy would have raised world

⁸ These countries are Belgium, Denmark, Finland, France, Germany, Italy, the Netherlands, Norway, Sweden, and the United Kingdom.

⁹ A lower value for the exchange rate in this study implies a depreciation of the domestic currency vis-à-vis gold.

income and allowed countries to return to the equilibrium consistent with full employment. The modern view of expansionary monetary policy and the associated devaluations thus contradicts the old-fashioned notion that these policies are necessarily ‘beggar-thy-neighbor’. Svensson (2011) correctly states that all countries cannot depreciate against each other. Monetary policy is not a zero-sum game. It rather allows all countries to increase real activity in the event of a global economic downturn while leaving relative exchange rates unchanged¹⁰.

The cross-sectional data analysis by Choudhri and Kochin (1980), and the results by Eichengreen and Sachs (1985), represented a major contribution to the research on the Great Depression as most American economists focused entirely on U.S. data before. The 1990s brought along significant changes to the field as macroeconomists took advantage of vast amounts of panel data and more elaborate econometric techniques to study the global impact of the Great Depression.

In this spirit, Bernanke and James (1991) conduct an international study to evaluate the impact of deflation and financial crises on real output during the Great Depression. Their findings are consistent with Fisher’s theory of ‘debt deflation’ that advocates that deflation has significant effects on output even with perfectly flexible wages by increasing the real value of debt¹¹ (Fisher, 1933). Bernanke and James (1991) find out that deflation had a large impact on the financial sector by causing financial distress. The associated banking panics across the globe led in turn to a disruption of credit flows in the real economy and additional decreases in the money supply. The impact of deflation on the financial sector thus seems to be one of the sources of monetary non-neutrality. Bernanke and James (1991) argue that one of the reasons why the monetary contraction had large real effects on output stems from the failing of the financial sector as a result of falling prices. The associated disruption in credit markets, also called credit crunch, affects both businesses and consumers who rely on financial intermediaries. Financial crises during the Great Depression thus had a significant negative impact on real economic activity¹².

¹⁰ Svensson’s speech refers to the Great Recession. This particular argument about monetary policy, however, is obviously equally valid for the Great Depression of the 1930s.

¹¹ That is because debt is usually issued in nominal terms. Debt deflation would thus not be a problem if all debt contracts were inflation-indexed (issued in real terms).

¹² One can notice the similarities to the Great Recession and the Eurozone crisis where the troubles of the financial sector spilled over to the real economy.

Bernanke and Carey (1996) empirically determine that nominal wage stickiness was another main driver of the non-neutrality of money. The failure of nominal wages to adjust downwards was already emphasized by Keynes as one of the main forces driving the depression (Skidelsky, 2009, pp.93-95). The existence of nominal wage rigidities for a considerable amount of time prevents the labor market from clearing, thus leading to involuntary unemployment. Rogoff and Obstfeld (1996, p.630) explain that it is, however, not entirely clear how these wage rigidities can persist for very long periods. It would be reasonable to assume that workers who experienced long spells of involuntary unemployment would accept a lower nominal wage at some point in time instead of remaining unemployed. Businesses and firms also would benefit from hiring labor at a lower wage rate. It somehow seems as if there was a free lunch lying around but nobody bothered to pick it up, which should not happen according to conventional economic theory. It thus remains unexplained how such long spells of nominal wage stickiness can persist without that the relevant adjustment takes place to clear the labor market.

3. The functioning of the gold standard and the international transmission of the Great Depression:

The gold standard was suspended at the outbreak of World War I. After the end of the war, however, many countries desired to return to the gold standard, mostly at prewar parity. 28 countries were pegged to gold again by the end of 1925 (Bernanke and James, 1991). The perception that there was not enough gold available to satisfy world money demand led to the recommendation that some 'key currencies', mainly dollars and pounds, should be used besides gold by national Central Banks to back up domestic money supplies (Bernanke and James, 1991). The reason for doing so were concerns in the late 1920s that gold production, the supply side, could not keep up with an increasing demand for gold (Irwin, 2010). Such a shortage of gold would necessarily lead to falling international prices and thus cause a global depression.

Irwin (2010) summarizes the writings of some economists, such as Keynes and Cassel, who were well aware of that problem. Their warnings and possible remedies were largely ignored. It turns out, however, that it was not a shortage of supply that should become the Achilles' heel of the gold standard. Irwin (2010) reports that the production of monetary gold continued to expand through the early 1930s. It was ultimately the desire of some Central Banks, in particular the FED and the Bank of France, to hoard unreasonable amounts of the precious

metal that led to a reduction in gold holdings and thus in the money supply in most of the other gold bloc countries. It is this artificial shortage of gold created by the United States and France that imposed deflationary pressures on the rest of the world and ultimately caused the Great Depression (Irwin, 2010).

One of the main flaws of the interwar gold standard is thus related to the asymmetry between surplus and deficit countries. The need to defend the peg to gold and to avoid a complete loss of reserves forced deficit countries to reduce the domestic money supply and to deflate. Surplus countries, that is, countries that experienced gold inflows were supposed to increase their respective domestic money supplies and inflate. While deficit countries were forced to deflate in order to defend the fixed convertibility to gold, there was nothing that prevented the surplus countries from sterilizing the gold inflows and thus preventing a rise in the domestic price level (Bernanke and James, 1991).

This deflationary bias inherent in the gold standard was magnified by the fact that most countries in the gold bloc used a system of fractional reserves, that is, the domestic money supply was only fractionally backed up by gold. The FED's 40% reserve requirement, for example, meant that any gold outflow would reduce the domestic money supply by 2.5 times the loss of gold (Bernanke and James, 1991).

The conventional account of the Great Depression blames the monetary tightening in the United States in 1928 as the trigger of the global economic downturn¹³. The FED raised interest rates in 1928 in order to curb speculations in the stock market. The increase in interest rates attracted gold inflows from the rest of the world. These inflows, however, did not have any impact on the monetary base because of the FED's sterilization policy. The increased interest rates in the U.S. forced other gold bloc countries to raise their domestic interest rates as well to prevent further outflows of gold. The initial monetary tightening in the U.S. thus directly led to contractionary monetary policy in other gold bloc countries (Friedman and Schwartz, 1963). It is this global monetary contraction that led to deflation, followed by banking panics and the associated fall in real economic activity, thus causing the Great Depression.

Irwin (2010), however, comes to the conclusion that France is even more to blame for the Great Depression than the U.S. It is indisputable that France was among the countries that

¹³ See, for example, Friedman and Schwartz (1963, p.360), and Eichengreen (2008, p. 65-66).

experienced the most severe losses in terms of both human and physical capital during World War I. Consequently, the country experienced a postwar period that was somewhat erratic. France experienced a year of deflation in 1923, followed by an inflationary burst from 1924-1926. The so-called Poincaré stabilization¹⁴ succeeded in stabilizing prices and the exchange rate in 1926 (Irwin, 2010). The key policies were to stabilize the Franc at an undervalued rate. Furthermore, France decided to only hold gold as part of its Central Bank reserves and to sterilize any inflow of gold to prevent the domestic price level from rising (Irwin, 2010). The Monetary Law of June 1928 might just have been one of the most important turning points when it comes to the interwar gold standard. This particular policy restored a convertibility of Franc in terms of gold at an undervalued rate. It also prevented the Bank of France from accumulating foreign exchange reserves and required the Bank to maintain a reserve ratio equal to 35% of liabilities, which are notes in circulation and demand deposits (Irwin, 2010).

This set of policies initiated by the Poincaré stabilization turned out to have a significant impact on the rest of the world as France started to attract significant inflows of gold from 1926 onwards. The accumulation of gold by the Bank of France meant that France's share of world gold reserves increased from 7% in 1926 to roughly 27% in 1932 (Irwin, 2010). The sterilization policy by the Bank of France, however, implied that the gold inflows did not affect the monetary base and thus the domestic price level. The monetary tightening by the FED in 1928 implied that the U.S. started to accumulate gold reserves as well. Similarly, the FED ensured through sterilization that the inflows of gold would not lead to domestic inflation.

As a result of these policies, the U.S. and France held more than 60% of the world's monetary gold stock in 1932. These reserves did not correspond in any way to their combined share of world GDP. One should note that France held roughly the same amount of gold as the U.S. even though its output was only about 25% of the size of American output (Irwin, 2010).

Irwin (2010) summarizes that some contemporary economists, such as Keynes, Cassel, and Hawtrey, recognized at that time the FED's and especially the Bank of France's role in imposing deflation on the rest of the world by excessive accumulation of gold reserves, thus causing the Great Depression.

¹⁴ Named after Raymond Poincaré, French President and Minister of Finance at that time.

One can thus conclude that the inability to conduct autonomous monetary policy was the major constraint that prevented countries to reach full resource utilization and full employment. The absence of an adjustment mechanism between surplus and deficit countries aggravated the situation. Deficit countries had no choice as to raise interest rates to prevent further outflows of gold. The associated monetary tightening necessarily led to deflation and years of economic depression.

Many governments considered the downturn in the beginning as a necessary evil to remain in the gold bloc, which had allegedly so many benefits¹⁵. The ongoing depression and the associated economic costs, however, became increasingly large and governments soon started to reconsider their choice to remain within the monetary system. The Scandinavian countries, for example, left the gold standard relatively early, as mentioned above. The ability to conduct independent monetary policy and the associated depreciation of their respective currencies allowed them to recover much earlier than countries, such as France, who decided to stay on the gold peg until the interwar gold standard was finally resolved in 1936.

4. The Eurozone:

The idea of a single European currency is relatively old. The introduction thereof, however, had to wait until the end of the 20th century.

The first step towards a common currency was the implementation of a European system of fixed exchange rates (Gärtner, 2006, p.318). Its goal was to reduce exchange rate volatility and promote monetary stability within Europe. The system of pegged exchange rates was thus supposed to increase and facilitate intra-European trade, reduce transaction costs and promote economic integration.

The European Exchange Rate Mechanism (ERM) was introduced in 1979. The ERM was insofar not a system of “ideal fixed exchange rates” in two respects. First, official parities were allowed to fluctuate within a margin of 2.25% (temporarily this band was allowed to widen to $\pm 6\%$ for some currencies and during the European exchange rate crisis of 1993 all bands were widened to $\pm 15\%$ except for the Guilder/Deutsche Mark exchange rate). Second,

¹⁵U.S. president Herbert Hoover, for example, was advised by his treasury secretary, Andrew Mellon: “Liquidate labor, liquidate stocks, liquidate the farmers, liquidate real estate. It will purge the rottenness out of the system...” (Skidelsky, 2013).

even though exchange rates were considered fixed, realignments for some currencies were implemented on a frequent basis. The Italian lira, for example, was realigned 8 times in between 1979 and 1987 (Gärtner, 2006, p.318)¹⁶.

The ultimate goal of the ERM was obviously to implement in the long run a common currency for all member countries: the euro. On the 1st of January 1999 the Euro was introduced. The notes and coins for the old currencies, however, continued to be used as legal tender until the 1st of January 2002 when Euro coins and notes started to circulate. This meant that twelve countries¹⁷ gave up their monetary autonomy once and for all in order to share the same currency. The European Central Bank was thus in charge for monetary policy within the entire Eurozone (Gärtner, 2006, pp.318-319).

5. Differences and similarities between the Euro system and the gold standard:

5.1 Differences:

The main difference between the gold standard and the Euro area is that the former was a system of fixed exchange rates whereas the latter is a common currency area. Joining the Euro area requires an absolute commitment whereas being part of the gold standard does not. We have seen that countries could theoretically leave the gold standard anytime. During the 1930s it was more or less a political choice to remain pegged to gold (Bernanke, 1995).

The Maastricht Treaty that led to the creation of the Euro makes, however, no provision for a government that plans to quit the Eurozone (Eichengreen, 2008, p.223). A country that envisages abandoning the Euro would not only experience many procedural difficulties. It also would suffer from very high political and economic costs associated with exiting the common currency area.

Eichengreen (2008, p.223) explains that any country quitting the euro would suffer from political recrimination and might not be welcomed anymore at any European summits where

¹⁶The European exchange rate crisis is commonly known as the EMS crisis where EMS stands for European Monetary System. This currency crisis should have been a warning sign to policy makers who tried to implement a common European currency, but it was largely ignored. More on this particular crisis involving the European system of fixed exchange rates can be found, for example, in Gärtner (2006, pp.321-327).

¹⁷Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, and Spain.

EU policies are decided. The political costs associated with such an exit thus seem to be incredibly high.

In addition, one should realize that leaving the Eurozone is a democratic decision that would have to go through a variety of democratic procedures before being approved and properly implemented. Investors would thus have a considerable amount of time to prepare for the expected depreciation of the newly implemented currency¹⁸ (Eichengreen, 2008, p. 223). They would sell domestic assets and transfer considerable amounts of money abroad to avoid the losses associated with the depreciation of the new currency. Fire sales, bank runs, and capital flights would lead to the failure of the domestic banking system. Eichengreen (2008, p.223) illustrates that a possible exit from the Eurozone would thus precipitate the “mother of all financial crisis” in any country that considers doing so.

It thus seems that any attempt of quitting the common currency area would be associated with almost insurmountable political and economic costs. This, however, might change anytime soon. Mass unemployment in Southern Europe, falling output levels and deflation mean that for some countries the cost-benefit analysis could possibly soon tip in favor of a Eurozone exit.

Another main difference between the gold standard and the Euro is that the latter is what economists call ‘fiat money’, or unbacked paper money. This is in stark contrast to the gold standard where all money in circulation had to be backed up by gold reserves¹⁹. This implied that the amount of gold reserves held by the Central Banks were a binding constraint on monetary policy. As mentioned before, a global shortage of monetary gold would impose deflationary pressures on all countries adhering to the gold standard. Furthermore, countries could only issue money that was backed up by their domestic gold reserves.

The European Central Bank on the other hand is not restricted by such a constraint. The ECB can issue as much currency as long as its single primary objective of price stability within the Eurozone is fulfilled²⁰. The main advantage of the ECB is that it could theoretically have

¹⁸ Obviously, only a country lacking competitiveness because of high real wages and excessive unemployment would consider leaving the common currency area. Implementing a new currency could thus resolve the competitiveness problem via depreciation.

¹⁹ Note that, according to a country’s specific reserve requirements, only a certain fraction of the money is backed up by gold. As mentioned before, in the U.S. the FED’s reserve requirement was 40% (Bernanke and James, 1991).

²⁰ Price stability is defined as close to but below 2% average inflation over the medium-term.

prevented falling prices in Southern Europe by issuing more money as long as these actions are not inconsistent with its mandate of stable prices. The obvious conclusion is that the ECB could have done more during the Great Recession in order to achieve its inflation target of 2%. The ability of issuing ‘unlimited’ amounts of paper money could have been put to use to prevent deflation in parts of the Eurozone during the last couple of years. Fiat currency thus has an obvious advantage over any monetary system where the currency is backed up by a certain commodity²¹.

One standard account of a Central Bank’s incapability to raise the price level during a depression involves Keynes’ famous argument about the liquidity trap (Krugman, 1999). The liquidity trap is a situation where standard open market operations (OMT) by a Central Bank do not have any impact on the economy at the zero lower bound²² since the Central Bank is just swapping one zero yielding asset for another (bonds for cash). One should note, however, that Central Banks should always be able to raise prices, at least in the medium-term, with unconventional monetary policy. This is emphasized by Bernanke’s (2000) ‘reductio ad absurdum’ argument: The Central Bank can just buy other assets than government bonds. A continuous acquisition of assets in the real economy surely must have an impact on prices sooner or later because otherwise the Central Bank will end up owning the entire economy without affecting the price level. This is obviously not a feasible equilibrium, thus showing that in a system of fiat currency a Central Bank can always impact the rate of inflation, even in a so-called liquidity trap (Bernanke, 2000).

This is also demonstrated in Krugman’s (1999) modern version of the liquidity trap where the Central Bank can escape the trap by raising inflation expectations. Bernanke’s (2000) point of view thus demonstrates that a deflationary process in a fiat currency regime generally does not take place because of the Central Bank’s inability to raise the price level but it rather reflects the Central Bank’s unwillingness to do something against it. Figure 2 shows that the Eurozone recently experienced very low levels of inflation, inconsistent with the ECB’s objective of price stability. The ECB was thus unwilling to do whatever it takes to achieve its inflation target of 2%. Unlike the gold standard where the amount of gold reserves held at the

²¹ Note that the gold standard was not the only commodity-based monetary system that existed in the past. Some countries, for example, were on a silver standard or even copper standard. See Eichengreen (2008, pp.7-9).

²² A situation where the nominal interest rate set by the Central Bank cannot be lowered anymore since it already is at zero.

Central Bank signified a binding constraint on monetary expansion, the ECB's major issue seems to be overly conservative Central Bankers.

5.2 Similarities:

As mentioned beforehand, the main similarity between the gold standard and the Eurozone is the inability of their respective member countries to conduct independent monetary policy. The gold standard tied the hand of the Central Banks because the convertibility of the domestic currency into gold at a given rate had to be defended at all times. Uncoordinated monetary policy of an individual country in a system of fixed exchange rates was thus unfeasible.

Similarly, the Eurozone's monetary policy is conducted by the ECB in Frankfurt. The Eurozone countries thus have completely given up their autonomy on that matter as the ECB sets a common interest rate for the entire currency area.

Eichengreen (2008, p.222) emphasizes that the loss of monetary autonomy in the Eurozone countries should lead to the realization that fiscal policy remains the only tool to address country-specific shocks. This would require balanced government budgets in good times so that any economic downturn can be addressed by fiscal expansion. In early 2013, it now seems clear that Eichengreen's (2008, p.222) assessment of the situation in 2008 was overly optimistic. Not only did many national governments fail to keep government debt and fiscal deficits within the required targets of the Stability Pact²³, but they also failed to address the current economic downturn with expansionary fiscal policy.

A variety of economic indicators (low inflation and low nominal GDP growth, for example²⁴) and a bulk of research reveal that monetary policy within the Eurozone has been excessively tight since the outbreak of the Great Recession. Furthermore, some Eurozone countries have been affected by the current economic downturn much more than others. The result of having 17 very heterogeneous countries in one currency area is that the common monetary policy set by the ECB might be too tight for some countries and too easy for others (even though low inflation and low nominal growth rates suggest that monetary policy is relatively tight for the

²³ The fiscal criteria is a budget deficit of not more than 3% of GDP and a debt ceiling of 60% of GDP (Eichengreen, 2008, p.219-222).

²⁴ See figure 1 and figure 2 in the appendix.

entire Eurozone at the moment).²⁵ The ECB thus has to find some middle ground when setting a common interest rate for the entire Eurozone (Eichengreen, p.222).

Against this background, one would have expected that governments would use fiscal policy to fight the current recession and to offset the effects of tight monetary policy set by the ECB. This outcome envisaged by Eichengreen (2008, p.222), however, has not been realized. Instead of using proactive government policies to cushion the current recession, governments in the Eurozone have engaged in harsh austerity measures (a combination of spending cuts and tax increases) to allegedly fight public debt levels and restore confidence.²⁶

This pro-cyclical behavior by governments to tighten their belts in bad times has greatly amplified the Great Recession. The combination of tight monetary policy and austerity thus has led, not surprisingly, to the greatest economic contraction the Eurozone countries have experienced since the Great Depression in the 1930s.

Many economists have emphasized how remarkable it is that the policy mistakes of nowadays seem to be exactly the same as the ones that were made nearly 80 years ago (Krugman, 2010). Then as today it is the combination of tight monetary policy and austerity that has led to a downward spiral of falling output.

There is another main feature that is common to both the Eurozone and the gold standard. Rogoff and Obstfeld (p.629) state that this problem is inherent to any system of fixed exchange rates (or currency areas for that matter). It seems to be clear that the Eurozone experiences the same lack of adjustment mechanism between surplus and deficit countries, which was also one of the main features of the interwar gold standard.

The standard account of the origins of the Eurozone crisis refers to the creation of asset bubbles in Southern Europe. The creation of a common currency totally eliminated exchange rate risk. Furthermore, investors suddenly perceived that bonds of Southern European governments were suddenly as safe as, for example, German ‘Bunds’. This is illustrated by the convergence of government bond yields before the crisis. The creation of the Eurozone thus led to large capital flows within the common currency area. Countries at the European periphery experienced large capital inflows as investors were ‘searching for yield’. These inflows led to larger price and wage increases, which in turn made these countries highly

²⁵ See Nechio (2011).

²⁶ This is what Krugman called the “confidence fairy” (Skidelsky, 2013).

uncompetitive. Additionally, the capital inflows led to the creation of asset bubbles, specifically in the housing market, and huge amounts of government spending as the respective governments in Southern Europe suddenly profited from very low interest rates on their debt (Krugman 2012).

This process went on for several years during the early 2000s. Countries in Southern Europe accumulated large current account deficits (associated with the capital inflows) and fiscal deficits whereas Germany, for example, experienced large current account surpluses over these years.

These imbalances pose significant challenges for the Eurozone as a whole. Southern Europe seems to be living constantly beyond its means whereas countries in Northern Europe produce more than they consume. Such a process can obviously only be sustained for so long. The problem is that these imbalances do not seem to self-correct even after the outbreak of the crisis. Furthermore, the adjustment apparently falls entirely on the deficit countries.

Fubini (2013) remarks that the combined current account surplus of the Scandinavian countries, the Netherlands, Austria, Switzerland, and Germany is around 500\$ billion in 2012 whereas the Southern European countries experience continuous deficits.

Harsh austerity measures in Southern Europe are supposed to lead to smaller government deficits. The continuous fall in GDP leads to some kind of adjustment as imports plunge and current account deficits in Southern Europe increasingly go down. Furthermore, banking panics and sovereign debt crises in these countries have increasingly led to a reversal of capital flows towards the core of the Eurozone.

It seems, however, that the Northern European countries do not even attempt to help with the necessary adjustment mechanisms. Scandinavia, Germany, the Netherlands, and others could tackle their continuous surpluses by stimulating domestic demand. This would increase imports from Southern Europe, thus simultaneously addressing surpluses in the North as well as deficits in the South at the same time.

As mentioned above, the asymmetry of the burden of adjustment between surplus and deficit countries was also inherent to the interwar gold standard. In this respect, the similarities between the current crisis and the Great Depression are striking.

Eichengreen (1992, p.226) reports that capital imports on a large scale were also a common feature of the countries that first experienced the economic downturn in the 1930s, just as in Southern Europe before the Euro Crisis. As the FED choked off foreign lending with its policy of tight money in 1928, these countries found itself increasingly under distress due to rising debt burdens. As a consequence, these nations quickly had to shift their current accounts from deficits into surplus in order to service their debt. This was only possible by draconian spending cuts. Tight monetary and fiscal policies were implemented to limit domestic spending and strengthen the balance of payments, which inevitably led to a downward spiral of falling output (Eichengreen, 1992, p.226). It is now clear that this entire economic process, biased against the deficit countries in the gold standard, is very similar to what the Southern European countries in the Eurozone experience at the moment. The process started with rapid accumulation of foreign capital and ended dramatically with falling levels of output.

6. Theoretical model:

The last sections emphasized the main similarities and differences between the interwar gold standard and the European monetary union. They also illustrated why one would expect the Eurozone's macroeconomic performance to be worse since 2007 than the performance of the OECD countries having their own currency. This can also easily be shown using a rather simplistic macroeconomic model: the aggregate demand/aggregate supply framework (AS-AD). I will use a modified version employed by Cowen and Tabarrok (2010). This version seems to be more intuitive since it has the inflation rate π and the real growth rate g on the two axes instead of the price level P and potential output Y , which are normally used²⁷.

Figure 3.1 depicts the Solow growth curve. This curve represents an economy's potential growth rate and it is determined by the supply side of the economy. The curve is vertical because an economy's steady state growth rate is independent of the inflation rate. Productivity shocks (supply shocks) shift the Solow growth curve to the left or to the right depending on whether it is a positive or negative shock (Cowen and Tabarrok, 2010). The Solow growth curve is very much alike the normal long-run aggregate supply curve (also called potential output) in the usual AS-AD model. See Mishkin (2004, pp.590-591).

²⁷ See, for example, Mishkin (2004, pp.588-594).

Cowen and Tabarrok (2010) use the quantity equation to derive the aggregate demand curve (AD). Transforming $Mv = PY$ ²⁸ into growth rates, one can obtain the following equation:

$$\vec{M} + \vec{v} = \vec{P} + \vec{Y}$$

Or in words: The rate of spending growth (equal to money growth plus growth of money velocity) is equal to inflation plus real growth. The downward sloping AD curve in this framework thus represents a given level of nominal spending growth. It represents all possible combinations of inflation rate plus real growth that sum up to that particular level of nominal spending growth (Cowen & Tabarrok, 2010).

Finally, the Keynesian assumption of sticky wages leads to an upward sloping short-run aggregate supply curve (SRAS). The SRAS curve is different for every level of expected inflation because expected inflation is built into labor contracts (Cowen & Tabarok, 2010). The economy is thus in equilibrium at the intersection of the three curves: The Solow growth curve, the SRAS and the AD curve (see figure 3.2)²⁹.

Changes in aggregate demand can be broken up into changes in the money growth rate and changes in the growth of money velocity. The latter can be split up again into changes in consumption growth, investment growth, government expenditure growth and growth in net exports.

In this model, the Great Recession can be represented as a huge shock in aggregate demand. A large drop in consumption growth, investment growth, and growth of government expenditures as a result of austerity would lead to a huge leftward shift of the AD curve (see figure 3.3). Tight monetary policy such as experienced in the Eurozone would worsen the situation and depress aggregate demand even further, thus shifting the AD curve even more to the left.

The economy would thus end up temporarily in the equilibrium to the left of the Solow growth curve where the AD curve (representing a low level of spending growth) and the SRAS curve intersect. The economy is deeply depressed. Both real output growth and the inflation rate have dropped significantly in the short-run.

²⁸ M is money in circulation, v is money velocity, P is the price level, and Y is real output.

²⁹ See Cowen and Tabarrok (2010) for a more detailed explanation of the model and its underlying equations.

Expansionary monetary policy can prevent the big shock to aggregate demand by increasing the growth in money supply and by preventing the drop in the growth rate of money velocity through lower interest rates. Countries with their own currency should thus be able to prevent the drop in aggregate demand and shift the AD curve back to equilibrium (see figure 3.4).

This, however, is not true for the Eurozone countries. It is likely that the member countries of the common currency area face idiosyncratic shocks. The ECB, however, targets inflation for the entire Eurozone and has been unable to increase aggregate demand in some of its member countries. This is especially true for Southern Europe.

Furthermore, the huge drop in nominal spending in the Eurozone has increasingly caused distress in the financial markets. Banking crises and financial panics can add to the problem of aggregate demand by shifting the Solow growth curve to the left. A financial sector that is unwilling to lend to firms and consumers (this is the credit crunch hypothesis as mentioned above) can lead to a lower steady state growth rate. Looking at figure 3.3, it is easy to see that an economy can then permanently end up in a state of low real growth and low inflation if in addition to the AD shock the Solow growth curve shifts sufficiently to the left. This is most likely the equilibrium in which many Eurozone countries currently are.

This modified version of the AS-AD model thus shows why one would expect the Eurozone countries' economic performance since 2007 to be worse than the performance than the performance of the other OECD countries. The latter would be more able to increase aggregate demand (shift the AD curve to the right) as they do not face the constraint to monetary policy that is imposed by the common currency. The following section will empirically support this hypothesis.

7. Methodology:

As mentioned above, this paper draws upon the methodology employed by Bernanke and James (1991), and Bernanke (1995), to evaluate whether Eurozone countries have in generally performed significantly worse than OECD countries having their own currency and, more importantly, whether this difference can be attributed to monetary autonomy.

More specifically, Bernanke and James (1991) analyze the logarithmic differences (growth rates) of several macroeconomic variables, such as wholesale prices, money growth, and industrial production, for 24 countries from 1930 until 1936. Their findings reveal that there is

a significant divergence in performance between countries on the gold standard and non-gold countries. In particular, non-gold countries experienced higher growth rates for the wholesale price index, industrial production, and a number of monetary aggregates (Bernanke and James, 1991). Their results also show that banking panics amplified deflationary pressures. Financial panics thus had a significant effect on real output during the Great Depression through falling prices (Bernanke and James, 1991).

Bernanke (1995) extends this analysis by using panel data for up to 26 countries for roughly the same time period. Using a simple OLS regression, Bernanke (1995) runs a number of regressions on thirteen selected macroeconomic variables against annual gold standard dummies (ONGOLD) for the period of 1931 until 1936. Most of the dependent variables (except for nominal and real interest rates, which are measured in percentage points) are measured as log-changes and can thus be interpreted as growth rates. Each regression also contains a full set of annual time dummies (so-called time-period fixed effects), which controls for average global macroeconomic conditions. This makes it possible to interpret the ONGOLD dummy as reflecting purely cross-sectional differences between countries on and off the gold standard. The regression results indicate that the ONGOLD dummy is indeed statistically significant for most of the macroeconomic variables included in the analysis (Bernanke, 1995).

Using an analogous approach, this paper evaluates the difference in economic performance between Euro and Non-Euro countries after the financial crisis of 2007. More specifically, I perform various regressions where I run a number of macroeconomic variables (mostly growth rates) against an annual ECB dummy. Including a full set of annual time dummies, this regression thus reflects purely cross-sectional differences between countries whose monetary policy is determined by the ECB and the rest of the OECD countries in the sample. It is crucial to note that the ECB does not only determine the stance of monetary policy for the Eurozone countries but also for all countries that have their currency pegged to the Euro. The “Trilemma” states that countries cannot have a fixed exchange rate, capital mobility and independent monetary policy at the same time. A country can only chose two out of these three at any given point in time. As capital mobility is prevalent in Europe and across the sample of OECD countries, countries with Euro-pegs have thus given up monetary autonomy for the sake of having a fixed exchange rate. For this reason, the ECB dummy thus includes both sets of countries, Eurozone members as well as Euro-pegs.

There is of course a crucial difference between Eurozone countries and countries that merely have an exchange rate pegged to the Euro. As explained above, it is close to impossible for Eurozone countries to leave the common currency area as such an exit would be accompanied by an enormous financial crisis and macroeconomic instability. Countries having a fixed exchange rate to the Euro on the other hand can always decide to change the value of the peg (revaluation or devaluation) or to abandon it altogether and let their respective currency float. The reason for treating Euro-pegs the same as Eurozone countries is because most of them actually joined the Eurozone after being pegged to the common currency³⁰. The only exception is Denmark, which has a fixed exchange rate to the Euro since 1999. The very strong Danish commitment to the Euro-peg, however, makes any abandonment of the fixed exchange rate or even any change in valuation highly unlikely.

Finally, Bernanke (1995) extends his gold standard analysis by including a dummy variable for banking crises in order to evaluate to what extent financial distress has an impact on economic performance. Going back to Fisher's idea of debt deflation (1933), falling prices also have a significant impact on economic activity by putting financial institutes under enormous distress. As borrowers increasingly face bankruptcy in an economic downturn, banks' nominal claims are replaced by claims on real assets such as collateral from firms and consumers (Bernanke, 1995). Loan losses from debt deflation will thus squeeze the banking system and consequently increase the risk of bank runs. As a result, financial institutes will have to increase liquidity and thus will significantly reduce any lending activity (Bernanke, 1995). The hypothesis is that this so-called credit crunch, where the financial sector stops lending activities to the real economy, has significant macroeconomic effects.

Bernanke and James (1991) find economically large and statistically significant effects of banking panics on industrial production. As in Bernanke (1995), I will also include a banking crisis dummy to evaluate whether I can find similar results for the ongoing financial crisis.

8. The endogeneity problem:

8.1 In the gold standard literature:

The main problem with this specific methodology as well as with comparable approaches employed to analyze gold standard vs. non-gold standard countries is related to the

³⁰ This is true for Greece, Slovenia, the Slovak Republic, and Estonia. See table 2 in the appendix.

endogeneity issue. Bernanke (1995) states that there would be little doubt about the importance of nominal factors in determining real outcomes during the Great Depression if the choice of the exchange rate regime was random. One should assume, however, that the decision whether to leave the gold standard or not was probably not completely random but endogenous to some degree. This leaves some doubt about whether the results of some of the literature on the Great Depression, such as Eichengreen and Sachs (1985), are indeed reliable. That is because neglecting the possibility of endogeneity could lead to spurious regressions. More specifically, some underlying factor could account for both the choice of the exchange rate regime and the difference in economic performance during the crisis years. In this particular case, the observed regression results would imply causality where there is none. Bernanke (1995), however, states that the results of the gold standard literature are unlikely to be spurious for two reasons.

First, the decision to remain on gold was strongly influenced by economic and philosophical beliefs as well as internal and external political factors (Eichengreen, 1992). France's willingness to remain on the gold standard, for example, was related to its economic beliefs that sound money and fiscal austerity are the cures for the Great Depression. The desire to preserve the economic benefits of the Poincaré stabilization and a strong association of national pride with maintenance of the gold standard also played a significant role (Bernanke, 1995). Analyzing a set of macroeconomic variables, Bernanke and James (1991) show that the macroeconomic conditions were on average quite similar in the countries that were to leave the gold standard in 1931 and those that would not. This is clearly a strong argument against possible endogeneity. That is because the choice of leaving the gold standard does not seem to be reflected in cross-sectional differences in macroeconomic performance (Bernanke, 1995).

Second, Bernanke (1995) argues that any bias created by the problem of endogeneity should go the wrong way. It would make sense to assume that countries suffering the deepest economic downturn would be the first to devalue or abandon the gold standard completely. As discussed before, the gold standard literature points out that the countries that left the system recovered more rapidly than those who did not. Bernanke (1995) thus points out that any correction for endogeneity bias in the choice of the exchange rate regime should in this case rather strengthen the association of economic expansion and the abandonment of the gold standard rather than weaken it.

8.2 The endogeneity problem applied to the analysis of the Euro Crisis:

For the purpose of my analysis, one should notice that the endogeneity problem is more difficult to address when comparing Euro to Non-Euro countries within my sample. It is simply wrong to just assume that the choice of being part of the Eurozone is completely exogenous.

The hypothesis that Eurozone countries are fundamentally different than Non-Euro countries cannot be rejected without evidence to the contrary. It is clear that being part of the Eurozone is at least partially determined by cultural and geographical factors. This implies that spurious regressions are more likely to occur than in the gold standard literature. That is because there is definitely a possibility that some underlying cultural or geographical factors inherent to the Eurozone countries determine both the macroeconomic performance of these countries as well as the choice of the exchange rate regime. One can imagine that some country-specific cultural or geographical features common to the Eurozone countries either directly have an impact on macroeconomic performance, or indirectly influence a set of institutions that, in turn, determine the economic outcome of the Eurozone countries.

As in Bernanke and James (1991), however, it is possible to reduce the likelihood of spurious regressions by showing that the macroeconomic conditions were on average relatively similar across the entire sample of OECD countries. Cultural and geographical attributes specific to the Eurozone are in this case irrelevant to the analysis if these factors do not influence macroeconomic performance.

One should take into account that any empirical evidence in favor of the hypotheses that macroeconomic conditions were similar across OECD countries before the crisis is insufficient to solve the problem of endogeneity. That is because we know for sure that, when it comes to economic institutions, Eurozone countries are inherently different from Non-Euro countries, as the former are members of a currency union and thus have given up any autonomy on monetary policy once and for all. As noted before, the dependence on the ECB to determine the stance of monetary policy is the crucial difference that sets Eurozone countries and Euro-pegs apart from the other countries in the sample.

The currency union, however, already existed before the outbreak of the crisis. This seems to be a very challenging problem at first, given that we want to examine the impact of monetary autonomy on macroeconomic performance during the Great Recession. Even if we show that macroeconomic conditions were similar across both Eurozone and Non-Euro countries before

the crisis, we cannot rule out that some underlying factors influence both Eurozone membership and macroeconomic performance. Only because Euro and Non-Euro countries behave in a similar way does not necessarily imply that they are similar in every aspect. Comparing average macroeconomic performance across all OECD countries is, however, the best we can do for now to address the issue of endogeneity.

9. Macroeconomic conditions across the OECD countries before the crisis:

One first step in the right direction involves the issue whether monetary policy was already a factor holding back the Eurozone in terms of macroeconomic performance before the crisis. In order to address this particular question, I will evaluate the stance of monetary policy using the so-called Taylor rule³¹. It is far from clear that the Taylor rule is actually an optimal rule for monetary policy and many economists question the use of the Taylor rule for actual policy making³². Nonetheless, the Taylor rule can be used to evaluate the stance of monetary policy and large deviations from the rule would be an indication that monetary policy is either too tight or too easy. In this sense, it is more like a rule of thumb for policy making (Bernanke, 2010).

One version of the Taylor rule states that the interest rate set by the Central Bank should respond to deviations of inflation from its target and unemployment from its natural rate (Nechio, 2011). Nechio (2011) assesses monetary policy in the Eurozone between 2001 and 2011, using the following simple version of the Taylor rule:

$$\text{Target rate} = 1 + 1.5 \times \text{Inflation} - 1 \times \text{Unemployment gap}$$

Figure 4.1 compares the interest rate set by the ECB with the interest rate prescribed by the version of the Taylor rule given above. It seems as if monetary policy in the Eurozone was a little bit too easy during the period 2001-2005 as the interest rate set by the ECB was lower than the rate suggested by the Taylor rule (Nechio, 2011). In 2007 at the outbreak of the crisis and thereafter, however, monetary policy was too tight as interest rates should have been lower according to the rule.

Figure 4.2 divides the Eurozone into two parts, the so-called core countries and the Eurozone periphery. One can see that monetary policy set by the ECB follows almost perfectly the

³¹ One should note that different versions of the Taylor rule exist.

³² Inflation targeting, price level targeting, and nominal GDP targeting are other rules for monetary policy that are possibly superior to the Taylor rule.

interest rate that the Taylor rule suggests is appropriate for the core countries during the period 2001-2008. The periphery countries, however, should have had higher interest rate during the same time period, indicating that monetary policy was too loose for this set of countries (Nechio, 2011). After 2008, monetary policy became too tight for both the Eurozone core and even more so for periphery, thus further strengthening the case that monetary policy has been one of the major constraints to macroeconomic performance of the Eurozone since the beginning of the economic downturn.

In general, this assessment of monetary policy by means of the Taylor rule suggests that monetary policy was not a binding constraint in the Eurozone before 2008 in the sense of tight money being an impediment to economic growth. That is because the interest rate was in accordance to the Taylor rule for the core countries, suggesting an appropriate stance of monetary policy, and too low for the Eurozone periphery, thus indicating easy money.

Overall, the stance of monetary policy before the outbreak of the crisis was relatively accommodative for the Eurozone as a whole, where this is more correct for the periphery than for the core. However, this is in line with global macroeconomic conditions before the crisis. Bernanke (2010) points out that globally monetary policy was, according to the Taylor rule, relatively accommodative before 2007 for various OECD countries, including Non-Euro members.

This suggests that macroeconomic conditions across OECD countries during the years before the crisis, the last years of the so-called Great Moderation, were on average relatively similar across both Euro and Non-Euro members.

Table 4.1-4.10 underlines this point. One can see that ECB and Non-ECB countries in my sample behaved relatively similar in the period from 1999 to 2007. Average growth rates in industrial production, real GDP, and private consumption, for example, are very close to each other across the two groups of countries. The same can be said for average unemployment rates, real interest rates, and all the other macroeconomic variables displayed in the table.

A clear divergence in performance, however, between ECB and Non-ECB countries can be seen since the outbreak of the financial crisis in 2007 (numbers marked in red in the table). The difference between these two groups of countries is particularly striking for some variables such as industrial production growth, real GDP growth, and the unemployment rate.

The table shows that ECB countries had on average much lower growth rates in industrial production and real GDP as well as much higher levels of unemployment.

After 2008, the (ex-post) real interest rate also is on average much higher across the ECB countries. This also seems to suggest that monetary policy is especially tight in this group of countries and that the European Central Bank could accelerate the recovery by lowering the real interest rate. This can either be done by lowering nominal interest rates (this is obviously not an option when constrained by the zero-lower bound) or by increasing inflation/inflation expectations.

Table 4.2 shows that the difference in consumer prices for the two groups is actually not very high. This is a little bit surprising since one would have expected inflation to be much lower across the ECB countries due to the very bad growth performance as a result of the aggregate demand shock over the last couple of years.

10. Regression results:

Table I on the following page displays my regression results where the macroeconomic variables are the dependent variable and the only explanatory variable at the moment is the “ECB” dummy³³. One can see that the dummy variable is highly significant (at the 1% level) for most of the variables for the time period 2007-2012. For some other variables such as the consumer price growth rate and producer price growth rate, however, the ECB variable is insignificant. Table I shows that the difference in economic performance between ECB and Non-ECB countries since 2007 is significant both statistically as well as economically. Growth rates in industrial production, for example, were about 2.09% lower in ECB countries on a yearly basis over the relevant time period. Additionally, unemployment was about 2.67% higher, real GDP growth was 1.1% lower per year, and real interest rates were about 1.03% higher in ECB countries.

Surprisingly, consumer prices in ECB countries were only about 0.37% lower per year whereas producer prices were roughly 0.93% lower per year. The difference in the price level between the two groups of countries is not as clear-cut as the difference in other macroeconomic variables. All in all, the results in table I, however, clearly demonstrate that the divergence in economic performance after 2007 is statistically significant.

³³ See table 3 in the appendix for the list of selected macroeconomic variables examined.

Table I - Regression results for the first estimation with period fixed dummy effects:

The regression is a normal OLS estimation. The constant is not displayed because its value is not of particular interest. The bold value represents the coefficient estimate of the dummy variable. The first value in brackets is the absolute value of the t-score, the second value is the p-value.

Selected macroeconomic variable (dependent variable)	ECB Dummy	R²
Industrial production (annual % growth)	-2.09 (2.54 / 0.012)	0.54
Consumer prices (annual % growth)	-0.37 (1.40 / 0.16)	0.23
Unemployment (% of labor force)	2.67 (5.34 / 0.000)	0.24
Private final consumption expenditure (annual % growth)	-1.27 (3.16 / 0.002)	0.31
Real GDP (annual % growth)	-1.1 (3.10 / 0.002)	0.53
Real interest rate (in %)	1.03 (2.71 / 0.007)	0.12
Exports in goods (annual % growth)	-1.75 (1.36 / 0.176)	0.58
Imports in goods (annual % growth)	-1.84 (1.86 / 0.064)	0.74
Producer prices (annual % growth)	-0.93 (1.65 / 0.010)	0.52
Real share prices (annual % growth)	-4.33 (1.58 / 0.115)	0.55

Panel data: Countries listed in table 2 in the appendix, 2007-2012 is the relevant time period

Table II on the following page displays the result of the second regression where the banking crisis dummy is included. Dates for banking crisis for the relevant OECD countries are retrieved from Laeven and Valencia (2012) and are shown in table 5 in the appendix, followed by the definition of banking crisis according to these two authors (table 6). The data is only for the years from 2007 up to 2011 because the IMF database on banking crises by Laeven and Valencia (2012) unfortunately does not include data for 2012.

The results of the regression including the banking crisis dummy are mixed. On the one hand one can see that almost all of the R^2 in table I are marginally lower than the R^2 in table II even though the regressions in the first table include one more year and thus have more data points to work with. This suggests that including the banking crisis dummy slightly improves the fit of the regression.

Unfortunately, the results also show that that the banking crisis dummy is not always significant. The dummy is highly significant and of ‘correct sign’ for real GDP growth and growth in private consumption expenditure (with ‘correct sign’ I mean that the occurrence of a banking crisis leads to about -0.92% lower growth in real GDP and about -1.06% lower growth in private consumption expenditure). The variable is also significant at the 10% level for growth in imports of goods. For some of the other variables, such as industrial production and unemployment, the banking variable is highly insignificant, but it is of ‘correct sign’.

The regressions including both the ECB dummy as well as the “banking crisis” dummy show that in some of the regressions the former dummy is highly significant and that in other regressions the latter dummy is highly significant. There is, however, no regression where both dummies are highly significant at the same time. This erratic change in between the two variables suggests that there is a large degree of multicollinearity between the two independent variables. Indeed, a comparison of table 1 and table 5 shows that most countries defined as “ECB countries” also experienced banking crises during the relevant time period of 2007-2011. This is problematic as it could point towards the endogeneity problem mentioned beforehand.

In the case of a correct specification of the model, multicollinearity only poses a problem insofar as it leads to high standard errors for the OLS slope estimators, thus explaining why some of the t-values observed in the table are relatively small. Multicollinearity in a correctly specified model does not bias the OLS estimators (Wooldridge, 2009, p.96-98).

Table II - Regression results for the second estimation with period fixed dummy effects:

The regression is a normal OLS estimation. The constant is not displayed because its value is not of particular interest. The bold value represents the coefficient estimate of the dummy variable. The first value in brackets is the absolute value of the t-score, the second value is the p-value.

Selected macroeconomic variable (dependent variable)	ECB Dummy	Banking crisis dummy	R²
Industrial production (annual % growth)	-1.72 (1.72 / 0.087)	-1.01 (0.89 / 0.250)	0.55
Consumer prices (annual % growth)	-0.54 (1.73 / 0.086)	0.05 (0.14 / 0.885)	0.26
Unemployment (% of labor force)	2.28 (4.48 / 0.000)	0.12 (0.20 / 0.842)	0.25
Private final consumption expenditure (annual % growth)	-0.72 (1.57 / 0.118)	-1.06 (2.06 / 0.041)	0,34
Real GDP (annual % growth)	-0.75 (1.83 / 0.070)	-0.92 (1.98 / 0.050)	0.57
Real interest rate (in %)	0.91 (2.51 / 0.013)	-0.18 (0.43 / 0.667)	0.18
Exports in goods (annual % growth)	-2.15 (1.38 / 0.171)	-1.27 (0.72 / 0.474)	0.59
Imports in goods (annual % growth)	-1.38 (1.17 / 0.245)	-2.51 (1.89 / 0.062)	0.76
Producer prices (annual % growth)	-1.48 (2.20 / 0.030)	1.29 (1.62 / 0.108)	0.54
Real share prices (annual % growth)	-1.91 (0.58 / 0.56)	-6.00 (1.62 / 0.108)	0.57
Panel data: Countries listed in table 2 in the appendix, 2007-2011 is the relevant time period			

11. Discussion of the results:

Similar to Bernanke (1995), the results of my regressions using just the ECB dummy provide a clear indication that the exchange rate regime since the outbreak of the crisis has been a critical factor in explaining macroeconomic performance across the sample of OECD countries. The ECB dummy has across all regressions in table I the ‘correct sign’ and is highly significant for most of the regressions. Relatively high values of R^2 indicate that a lot of the variation in the dependent variable can be explained by the independent variable.

Just as the gold standard countries were unable to use expansionary monetary policies during the Great Depression, the ECB countries are similarly constrained during the current economic depression.

The second set of regressions displayed in table II is unfortunately less clear-cut. The coefficients of both dummy variables are mostly of the ‘correct sign’. However, some of the coefficients are also not significant. Nonetheless, adding the banking crisis dummy provides additional information. Even though the dummy is not significant for all examined macroeconomic variables, it is highly significant for some of them. This erratic change is most likely a result of multicollinearity, as mentioned above. Multicollinearity in itself, however, does not bias the coefficients if the model is correctly specified.

The regressions in table II thus clearly indicate that not only the exchange rate regime has an impact of macroeconomic performance. Distress in the financial sector in the form of banking crises seems to have significant real effects because of the so-called credit crunch (see above). These results are again in line with the findings of Bernanke (1995), which unambiguously show that the inclusion of a banking crisis dummy increases the performance of the regression. Economies, that experience large financial distress in the banking sector, perform significantly worse than those who do not. Again, this result shows that the current economic downturn is very similar to the experience of the Great Depression.

The most problematic aspect of the analysis performed above is related to the endogeneity issue. The Eurozone countries are by definition different than Non-Euro OECD countries. The attempt to control for average macroeconomic conditions before the crisis is maybe not enough to get rid of the endogeneity problem, which would lead to bias in the regressions. Furthermore, it is possible that the occurrence of banking crises is somehow linked to the exchange rate regime. This would imply that banking crises are also endogenous to some degree, thus amplifying the problem.

Nonetheless, the similarities between my results and those of Bernanke (1995) are encouraging. Not only does it support the fact that the current crisis is in many aspects very similar to the Great Depression, but it also validates to some extent the correctness of my results.

12. Conclusion:

This paper has briefly summarized some of the most famous research on the Great Depression. The experiences from the 1930s are very similar to the current economic crisis. The empirical findings presented later on support the main hypothesis of the paper that the exchange rate regime has been a critical factor in determining macroeconomic conditions since the beginning of the economic downturn. Just as the gold standard countries in the 1930s, ECB countries nowadays face a major constraint when it comes to monetary policy. The results of my analysis suggest that it is indeed this particular constraint that has been behind the divergence in economic performance across OECD countries.

The implications of this analysis are severe. The study provides further evidence that the creation of a common currency for so many member countries that are so different from each other might have been a severe mistake with huge consequences for economic welfare. The current state of affairs with no economic growth and mass unemployment cannot continue. Electorates in the respective Eurozone member countries will not support a political and economic system forever where mass unemployment and increasing poverty is imminent or already reality.

There are in my view only two feasible options: A breakup of the currency area where the “weakest” members such as the countries at the European periphery quit the monetary union. Alternatively, the Eurozone has to push forward economic integration at a rapid pace where some measures such as more integrated labor markets, a common banking union, and common fiscal policy are adopted as rapidly as possible.

The biggest methodological problem related to my study is the issue of endogeneity. As mentioned before, this problem is more severe than in the gold standard literature. The attempt to control for it by comparing macroeconomic conditions before the crisis is most likely insufficient. One possible shortcoming of my empirical analysis is related to the fact that I do not control for fiscal austerity in my regressions. This could be done relatively easily but it was beyond the scope of this study. Furthermore, the endogeneity problem could

possibly be addressed by using an instrumental variable (IV) approach. Using the IV method, one can theoretically get consistent estimators, provided that the instrument used is uncorrelated with the error term and correlated with the explanatory variable in question (Wooldridge, 2009, pp.507-509).

The problem with this approach is that it is relatively difficult to find a good instrument that is suited for my particular study. The instrument in question must have the property that it must be correlated with having the Euro as a currency, but at the same time it must be uncorrelated to all political, economic and cultural factors common to the Eurozone that come to mind that could lead to the endogeneity problem mentioned beforehand. Further research on the Eurozone crisis and the constraint on monetary policy imposed by the common currency is needed. For future studies, the distance between Frankfurt (where the ECB is located) and a country's capital comes to mind as a possible instrument that could address the issue of endogeneity.

Additionally, my paper primarily focuses on the fact that Eurozone were primarily constrained because of their inability to increase aggregated demand through expansionary monetary policy. Another critical issue that I neglect is the fact Eurozone countries de facto lack a lender of last resort because the ECB did not inherit this role from their respective Central Banks when the Euro replaced the former national currencies. The likelihood of bank runs as well as runs out of government bonds in an economy without lender of last resort should be much higher than in an economy where such an institution exists. This increased likelihood of self-fulfilling crises in Eurozone countries increases the problem of endogeneity mentioned beforehand. The possible existence of multiple equilibria for individual members of a common currency area should be the focus of future research.

All in all, despite some of the shortcomings just described above, this study provides empirical evidence that the current economic downturn in the Eurozone is indeed greatly the result of the member countries' inability to conduct monetary policy. This is a binding constraint similar to what the gold standard countries experienced during the Great Depression. Back then as well as today, the economic crisis seems to be primarily monetary in nature. Logic suggests that the Eurozone can only be successfully revitalized if the European political elite manages to overcome the institutional deficiencies that the common currency union faces at the moment.

13. List of references:

- Bernanke, B. (1995). The macroeconomics of the great depression: A comparative approach. *Journal of Money, Credit, and Banking*, 27(1), 1-28.
- Bernanke, B. (2000). Japanese monetary policy: A case of self-induced paralysis. In A. Posen & R. Mikitani (Eds.), *Japan's financial crisis and its parallels to U.S. experience* (pp.149-166). Washington: Institute for International Economics.
- Bernanke, B. (2004, February 20). *The great moderation*. Retrieved from <http://www.federalreserve.gov/BOARDDOCS/SPEECHES/2004/20040220/default.htm> on the 24th of June, 2013.
- Bernanke, B. (2010, January 3). *Monetary policy and the housing bubble*. Retrieved from <http://www.federalreserve.gov/newsevents/speech/bernanke20100103a.htm> on the 30th of May, 2013.
- Bernanke, B., & Carey, K. (1996). Nominal wage stickiness and aggregate supply in the great depression. *The quarterly journal of economics*, 111(3), 853-883.
- Bernanke, B., & James, H. (1991). The gold standard, deflation, and financial crisis in the great depression: An international comparison. In R. Hubbard (Ed.), *Financial markets and financial crises* (pp. 33-68). Chicago: University of Chicago Press.
- Cassidy, J. (2009). *How markets fail: The logic of economic calamities*. (pp.237-238). Penguin Books.
- Choudhri, E. U., & Kochin, L. A. (1980). The exchange rate regime and the international transmission of the business cycle disturbances. *Money, Credit, and Banking*, 12(4), 565-574.
- Cowen, T., & Tabarrok, A. (2010). *Modern principles: Macroeconomics*. (1 ed.). Worth Publishers.
- Eichengreen, B. (1992). *Golden fetters: The gold standard and the great depression, 1919-1939*. (p.226). New York: Oxford University Press.
- Eichengreen, B. (2008). *Globalizing capital: A history of the international monetary system*. (2 ed., pp.7-9, 43, 65-66, 219-223). Princeton: Princeton University Press.
- Eichengreen, B., & Sachs, J. (1985). Exchange rates and economic recovery in the 1930s. *The journal of economic history*, 45(4), 925-946.
- Fisher, I. (1933). The debt-deflation theory of the great depression. *Econometrica*, 1(4), 337-357.

- Friedman, M., & Schwartz, A.J. (1963). *A monetary history of the united states, 1867-1960*. Princeton: Princeton University Press.
- Fubini, F. (2013, April 22). *Europe in depression?*. Retrieved from <http://www.project-syndicate.org/commentary/restoring-growth-and-external-balances-in-the-eurozone-by-federico-fubini> on the 17th of May, 2013.
- Gärtner, M. (2006). *Macroeconomics*. (2 ed., pp.318-319, 321-327). Harlow, England: Pearson Education Limited.
- Irwin, D. A. (2010). Did France cause the Great Depression? *NBER Working Papers 16350, National Bureau of Economic Research, Inc.*
- Krugman, P. (1999). It's baaack: Japan's slump and the return of the liquidity trap. *Brookings Papers on Economic Activity*, 137-205.
- Krugman, P. (2010, June 17). *That '30s feeling*. Retrieved from <http://www.nytimes.com/2010/06/18/opinion/18krugman.html> on the 24th of June, 2013.
- Krugman, P. (2012, July 29). *Crash of the bumblebee*. Retrieved from <http://www.nytimes.com/2012/07/30/opinion/krugman-crash-of-the-bumblebee.html> on the 24th of June, 2013.
- Laeven, L., & Valencia, F. (2012, June 1). *Systemic banking crises database: An update*. Retrieved from <http://www.imf.org/external/pubs/ft/wp/2012/wp12163.pdf> on the 24th of June, 2013.
- Mishkin, F. S. (2004). *The economics of money, banking, and financial markets*. (7 ed., pp. 588-594). Addison Wesley.
- Nechio, F. (2011, June 13). *Monetary policy when one size does not fit all*. Retrieved from http://www.frbsf.org/publications/economics/letter/2011/el2011-18.html?utm_source=home on the 30th of May, 2013.
- Nurkse, R. (1944). *International currency experience: Lessons of the inter-war period*. Princeton: Princeton University Press for the League of Nations.
- Obstfeld, M., & Rogoff, K. (1996). *Foundations of international macroeconomics*. (p. 626-630). Cambridge, Massachusetts : The MIT Press.
- Paulson, H. M., Jr. (2010). *On the brink: Inside the race to stop the collapse of the global financial system*. (1 ed., pp.208-209, 222-228, 322). New York: Business Plus.
- Skidelsky, R. (2009). *The return of the master*. (pp.93-95). Penguin Books.
- Skidelsky, R. (2013, May 21). *Austere illsuions*. Retrieved from <http://www.project-syndicate.org/commentary/the-predictable-failure-of-fiscal-austerity-by-robert-skidelsky> on the 29th of May, 2013.

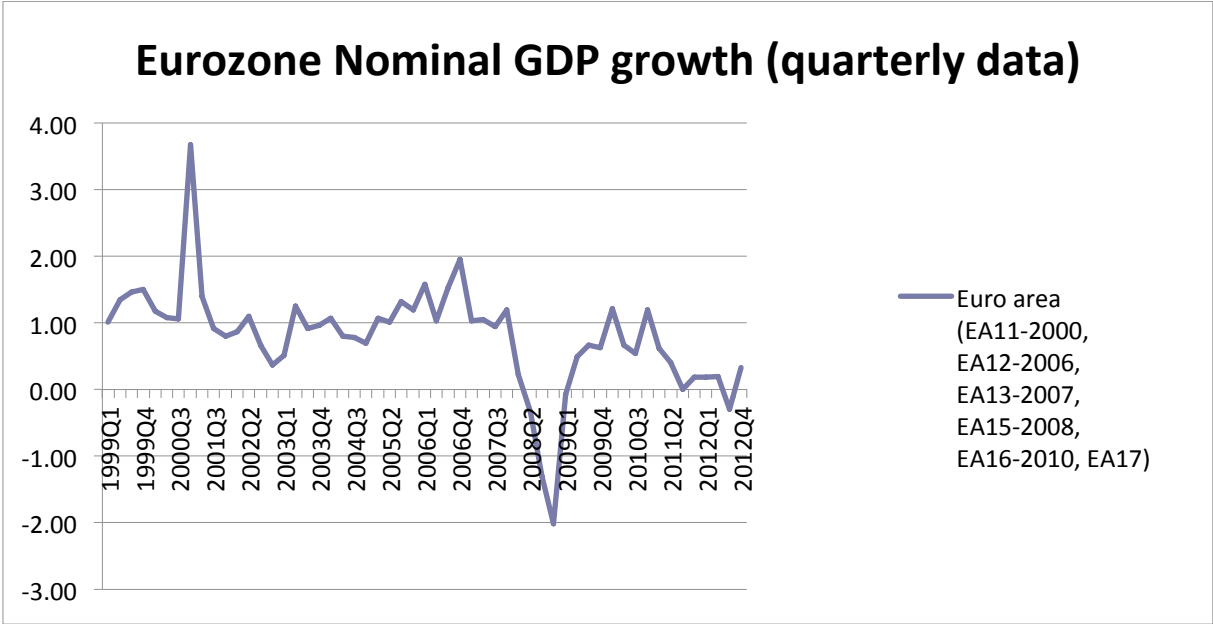
- Svensson, L. E. O. (2011, November). *Monetary policy after the crisis*. Federal Reserve Bank of San Francisco. Asia's role in the post-crisis global economy, San Francisco.
- Temin, P. (1976). *Did monetary forces cause the Great Depression?*. New York: W.W. Norton.
- Wooldridge, J. M. (2009). *Introductory econometrics: A modern approach*. (4 ed., pp. 96-98, 507-509). South-Western CENGAGE Learning.

14. Data sources:

- Eurostat: <http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home>
- OECD Database: <http://stats.oecd.org/>
- Reinhart & Rogoff: <http://www.reinhartandrogoff.com/data/>
- World Bank Database: <http://data.worldbank.org/>

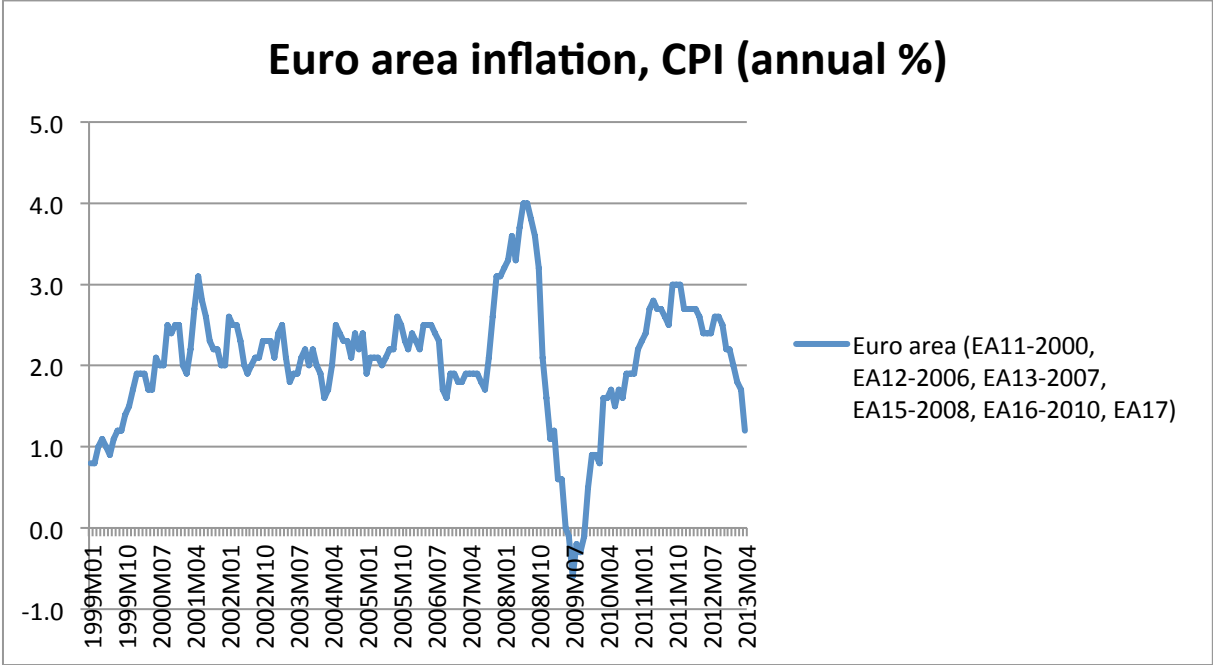
15. Appendix - Figures and tables:

Figure 1 - Eurozone nominal GDP growth:



Data from Eurostat

Figure 2 - Euro Area inflation:



Data from Eurostat

Figure 3.1 - The Solow growth curve:

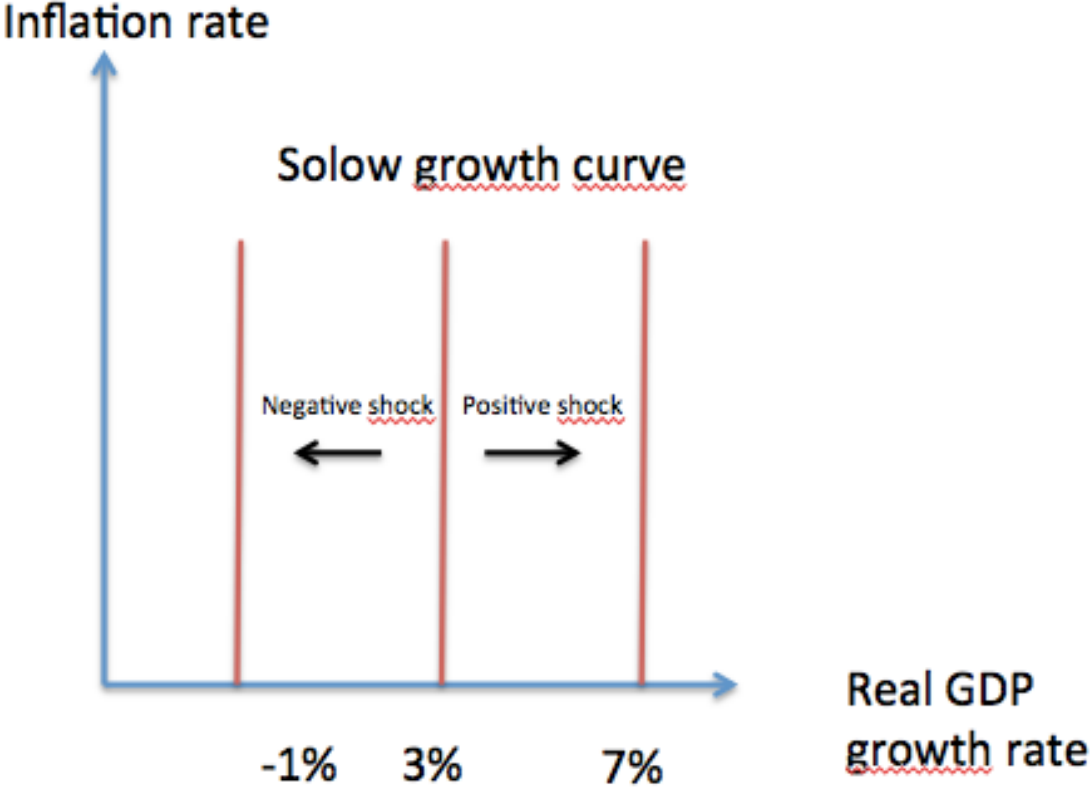


Figure 3.2 - The equilibrium in the model:

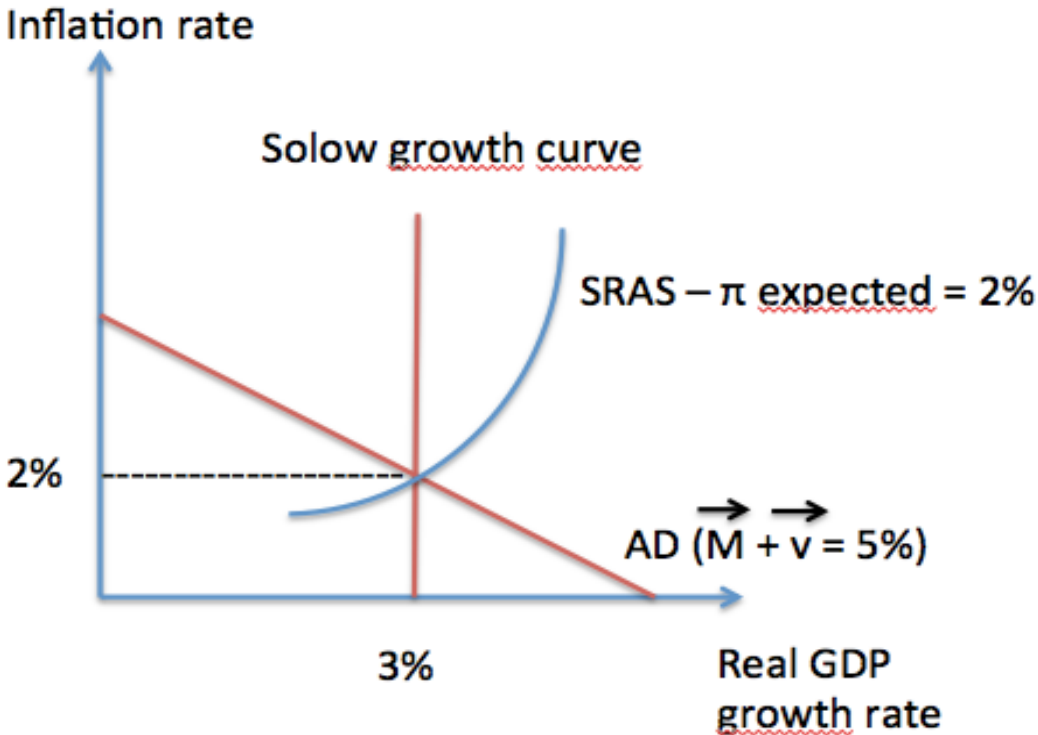


Figure 3.3 - The Great Recession and the big fall in AD:

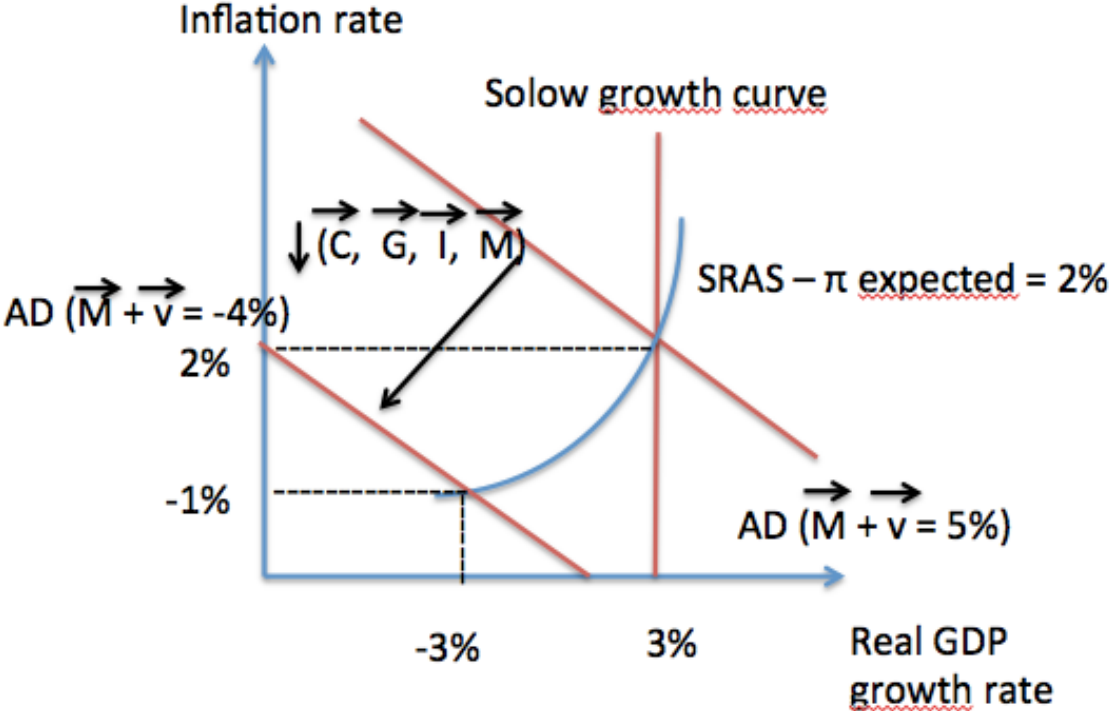


Figure 3.4 - Aggregate demand shock and return to long-run equilibrium:

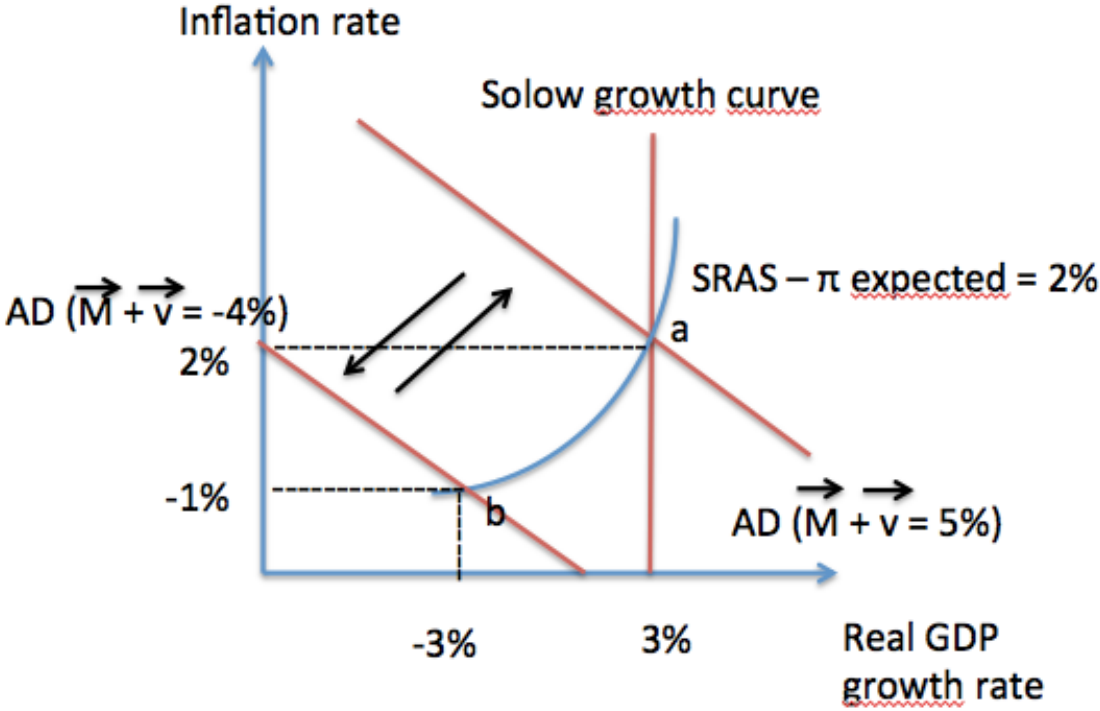
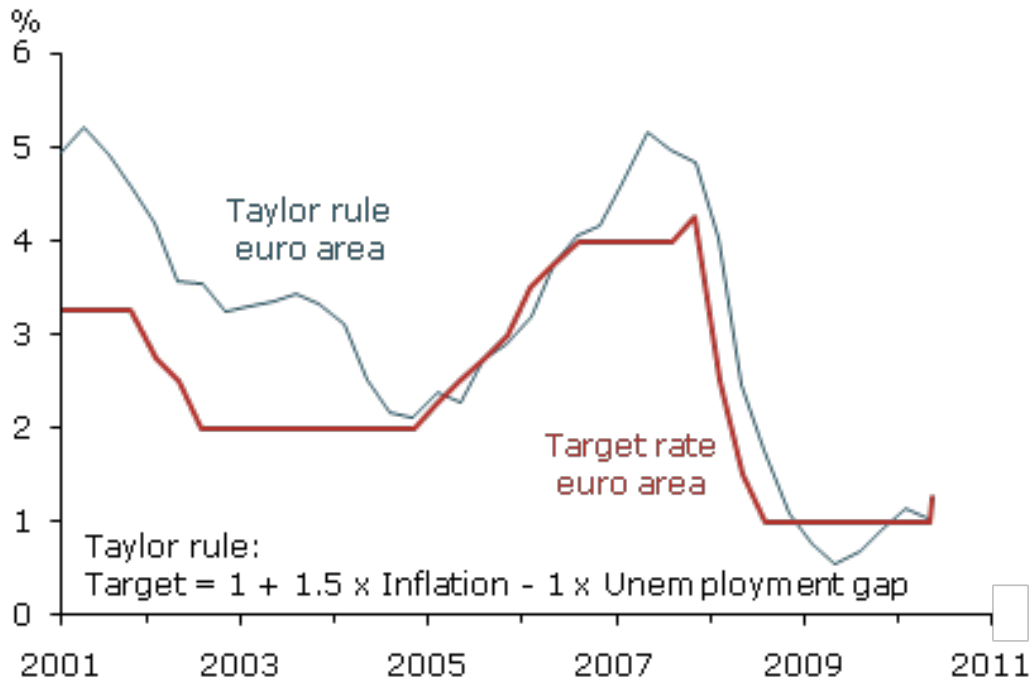
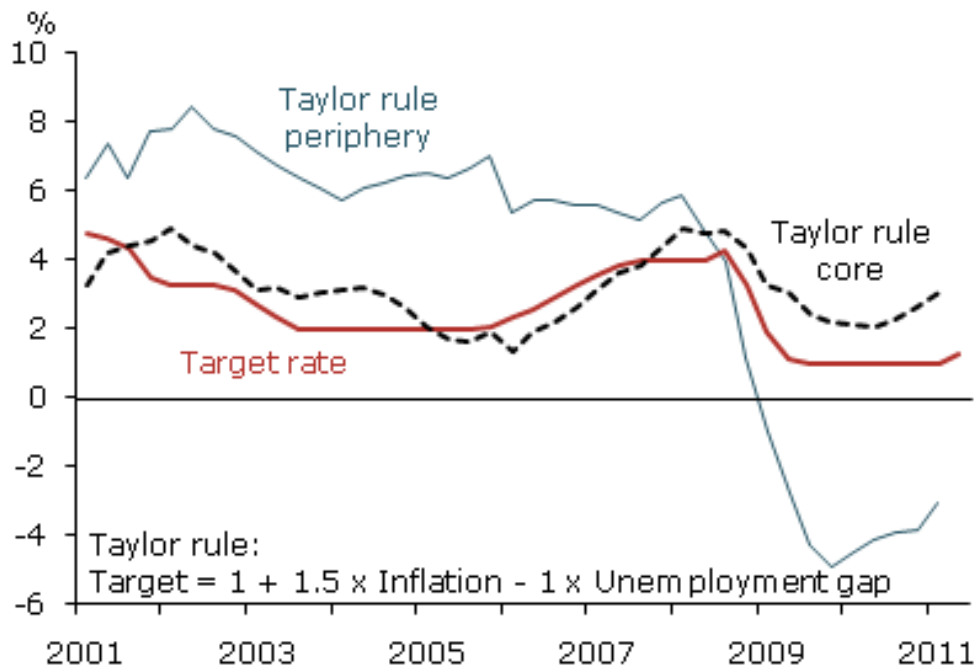


Figure 4.1 - Taylor rule for the Eurozone:



Retrieved from Nechio (2011).

Figure 4.2 - Taylor rule for the Core and the Periphery:



Retrieved from Nechio (2011).

Table 1: A selection of previous research on the Great Depression:

Author (year)	Article	Method	Number of countries
Choudhri and Kochin (1980)	<i>The exchange rate and the international transmission of the business cycle disturbances</i>	Cross-section	8
Eichengreen and Sachs (1985)	<i>Exchange rates and economic recovery in the 1930s</i>	Cross-section	10
Bernanke and James (1991)	<i>The gold standard, deflation, and financial crises in the Great Depression</i>	Panel data	24
Bernanke and Carey (1996)	<i>Nominal wage stickiness and aggregate supply in the Great Depression</i>	Panel data	22
Bernanke (1995)	<i>The macroeconomics of the Great Depression: A comparative approach</i>	Panel data	26

Table 2 - List of selected OECD countries and exchange rate classification:

High-income OECD countries³⁴	Euro countries (entry date)	Euro pegs (duration)	Readjustment of the peg
Australia	-	-	-
Austria	1999	-	-
Belgium	1999	-	-
Canada	-	-	-
Czech Republic	-	-	-
Denmark	-	1999-present	-
Estonia	2011	1999-2011	2004
Finland	1999	-	-
France	1999	-	-
Germany	1999	-	-
Greece	2001	1999-2001	2000
Hungary	-	-	-
Iceland	-	-	-
Ireland	1999	-	-
Israel	-	-	-
Italy	1999	-	-
Japan	-	-	-
Korea, Rep.	-	-	-
Luxembourg	1999	-	-
Netherlands	1999	-	-
New Zealand	-	-	-
Norway	-	-	-
Poland	-	-	-
Portugal	1999	-	-
Slovak Republic	2009	2005-2009	2007, 2008
Slovenia	2007	2004-2007	-
Spain	1999	-	-
Sweden	-	-	-
Switzerland	-	-	-
United Kingdom	-	-	-
United States	-	-	-

Exchange rate classification retrieved from Reinhart and Rogoff (2010).

³⁴ High-income is defined by the World Bank as \$12,476 or more. Mexico and Turkey are thus the only OECD countries that are excluded from the analysis.

http://data.worldbank.org/about/country-classifications/country-and-lending-groups#High_income

Table 3 - List of selected macroeconomic variables:

1. Industrial production, annual % growth
2. Consumer prices, annual % growth
3. Unemployment, % of labor force
4. Private final consumption expenditure in constant prices, annual % growth
5. Real GDP, annual % growth
6. Real interest rate, in %
7. Exports in goods, annual % growth
8. Imports in goods, annual % growth
9. Producer prices, annual % growth
10. Real share prices, annual % growth

Table 4 - Behavior of selected macroeconomic variables from 1999-2012:**4.1 Industrial production, average annual % growth:**

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Non-ECB	3.50	7.10	1.11	1.44	2.64	5.20	3.41	5.33	4.32	2.22	-8.37	7.43	2.87	1.06
ECB	3.41	6.47	2.23	1.41	1.86	2.99	1.65	4.88	4.11	-1.38	-13.86	7.39	2.37	-1.65
Difference	0.09	0.63	-1.12	0.02	0.78	2.21	1.76	0.45	0.21	3.60	5.49	0.03	0.50	2.71
OECD Average	3.46	6.82	1.62	1.43	2.28	4.13	2.50	5.10	4.21	0.36	-11.21	7.41	2.61	-0.38

1 value missing: Switzerland 2012

4.2 Consumer prices, average annual % growth:

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Non-ECB	3.25	4.23	3.86	2.79	2.46	2.44	2.14	2.55	2.48	4.51	2.20	2.37	2.91	2.13
ECB	1.68	2.92	3.24	2.65	2.17	2.14	2.36	2.57	2.74	4.09	0.16	1.75	3.08	2.58
Difference	1.57	1.31	0.62	0.14	0.29	0.30	-0.22	-0.02	-0.26	0.42	2.04	0.62	-0.17	-0.45
OECD Average	2.54	3.64	3.58	2.73	2.33	2.29	2.25	2.56	2.61	4.30	1.15	2.05	2.99	2.46

4.3 Unemployment average, % of labor force:

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Non-ECB	7.04	6.89	7.01	7.25	7.35	7.29	6.31	5.79	5.01	4.91	6.73	7.00	6.62	6.61
ECB	7.88	7.26	6.80	7.02	7.44	7.62	7.94	7.19	6.48	6.46	8.86	9.95	10.08	11.07
Difference	-0.84	-0.37	0.21	0.23	-0.10	-0.33	-1.63	-1.39	-1.47	-1.54	-2.13	-2.95	-3.46	-4.46
OECD Average	7.42	7.06	6.92	7.15	7.39	7.45	7.15	6.51	5.77	5.71	7.83	8.52	8.41	9.07

4.4 Private final consumption expenditure in constant prices, average annual % growth:

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Non-ECB	4.69	3.73	2.66	3.39	3.09	3.65	3.71	3.31	4.01	0.53	-1.47	2.33	1.87	1.55
ECB	3.34	3.71	2.66	2.57	1.69	2.91	3.30	3.68	3.45	0.80	-2.36	0.73	-0.28	-1.13
Difference	1.36	0.02	0.00	0.82	1.41	0.74	0.41	-0.36	0.56	-0.27	0.88	1.61	2.15	2.68
OECD Average	4.08	3.72	2.66	3.02	2.46	3.29	3.50	3.50	3.72	0.67	-1.93	1.50	0.76	0.09

4.5 Real GDP, average annual % growth:

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Non-ECB	3.72	4.21	2.37	2.55	2.78	4.16	3.69	3.90	3.78	1.10	-2.38	2.64	2.35	1.09
ECB	4.02	5.20	2.55	2.14	1.88	3.24	3.27	4.47	4.44	0.40	-5.27	1.65	1.36	-0.61
Difference	-0.30	-1.00	-0.18	0.41	0.90	0.91	0.42	-0.58	-0.66	0.70	2.89	0.99	0.98	1.69
OECD Average	3.86	4.66	2.45	2.37	2.37	3.71	3.47	4.19	4.12	0.74	-3.87	2.13	1.84	0.19

4.6 Average real interest rate, in %:

(calculated using the long-term nominal interest rate and the CPI)

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Non-ECB	2.88	2.39	2.20	2.95	2.50	2.54	2.19	2.04	2.33	0.23	2.20	1.64	0.85	0.78
ECB	2.80	2.23	1.44	1.94	1.64	1.67	0.81	1.04	1.31	-0.01	3.70	2.14	1.98	2.25
Difference	0.07	0.16	0.76	1.01	0.86	0.86	1.38	1.00	1.02	0.24	-1.50	-0.50	-1.14	-1.46
OECD Average	2.84	2.34	1.86	2.49	2.11	2.12	1.47	1.52	1.82	0.11	2.95	1.89	1.43	1.54

Values missing for the following countries because the long-term nominal interest rate is unavailable:
Czech Republic 1999, Korea 1999-2000, Luxembourg 2007-2010, Slovak Republic 1999-2000,
Slovenia 1999.

4.7 Growth in exports of goods, in %:

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Non-ECB	4.97	20.86	3.90	0.95	4.79	14.41	8.54	14.95	7.43	14.14	-12.61	15.00	10.71	1.05
ECB	3.73	22.66	5.24	0.14	1.31	8.08	10.15	13.36	7.36	3.55	-17.69	15.20	14.14	3.18
Difference	1.24	-1.80	-1.34	0.82	3.47	6.33	-1.61	1.58	0.07	10.59	5.08	-0.20	-3.43	-2.13
OECD Average	4.41	21.68	4.50	0.58	3.22	11.34	9.38	14.13	7.39	8.67	-15.23	15.10	12.03	1.93

Values missing: Greece 2012, Israel 2012, Slovenia 2011-2012

4.8 Growth in imports of goods, in %:

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Non-ECB	6.28	18.30	1.53	0.85	5.65	14.14	9.93	15.09	7.85	9.95	-16.43	14.05	11.44	2.23
ECB	4.78	23.76	2.58	-0.94	2.81	9.67	11.18	14.47	8.24	4.59	-21.61	14.44	11.25	1.26
Difference	1.50	-5.46	-1.05	1.79	2.84	4.46	-1.25	0.62	-0.39	5.36	5.18	-0.39	0.19	0.97
OECD Average	5.60	20.76	2.00	0.04	4.37	11.98	10.58	14.77	8.05	7.18	-19.10	14.25	10.98	1.58

Values missing: Greece 2012, Israel 2012, Slovenia 2011-2012

4.9 Producer prices, annual % growth:

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Non-ECB	1.87	5.68	2.32	0.56	1.19	4.18	3.13	4.19	2.94	8.86	-1.16	3.58	5.97	1.69
ECB	0.51	6.61	1.49	0.23	0.79	3.40	3.28	4.28	4.06	6.07	-5.79	3.91	5.80	2.26
Difference	1.36	-0.93	0.83	0.34	0.40	0.78	-0.15	-0.08	-1.13	2.79	4.63	-0.33	0.17	-0.57
OECD Average	1.13	6.18	1.87	0.38	0.97	3.73	3.22	4.24	3.60	7.21	-3.91	3.78	5.87	2.03

Values missing: Australia, Canada New Zealand and USA for all years, Austria 1999, Estonia 1999-2001, Iceland 199-2005, Poland 1999, Switzerland 1999-2003

4.10 Real share prices, annual % growth:

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Non-ECB	0.06	0.10	-0.19	-0.03	0.02	0.24	0.21	0.18	0.14	-0.31	-0.35	0.17	-0.02	-0.05
ECB	0.07	0.17	-0.24	-0.20	-0.10	0.20	0.22	0.17	0.18	-0.33	-0.38	0.09	-0.09	-0.14
Difference	-0.01	-0.07	0.05	0.17	0.12	0.04	-0.01	0.02	-0.03	0.02	0.03	0.08	0.07	0.09
OECD Average	0.07	0.13	-0.21	-0.11	-0.04	0.22	0.22	0.18	0.16	-0.32	-0.36	0.13	-0.05	-0.10

Real share prices obtained by deflating nominal prices with CPI. Values missing: Luxembourg 1999

Table 5 - Banking crises:

List of banking crises from 1999-2011 for my selected OECD countries. Data retrieved from Laeven and Valencia (2011).

High-income OECD countries	Banking crises
Australia	-
Austria	2008 - ...
Belgium	2008 - ...
Canada	-
Czech Republic	1996 - 2000
Denmark	2008 - ...
Estonia	-
Finland	-
France	2008 - ...
Germany	2008 - ...
Greece	2008 - ...
Hungary	2008 - ...
Iceland	2008 - ...
Ireland	2008 - ...
Israel	2008 - ...
Italy	2008 - ...
Japan	1997 - 2001
Korea, Rep.	-
Luxembourg	2008 - ...
Netherlands	2008 - ...
New Zealand	-
Norway	-
Poland	-
Portugal	2008 - ...
Slovak Republic	1998 - 2002
Slovenia	2008 - ...
Spain	2008 - ...
Sweden	2008 - ...
Switzerland	2008 - ...
United Kingdom	2007 - ...
United States	2007 - ...

Table 6 - Definiton of a banking crisis:

A banking crisis is defined by Laeven and Valencia (2012) as follows:

- 1) Significant signs of financial distress in the banking system (as indicated by significant bank runs, losses in the banking system, and/or bank liquidations).
- 2) Significant banking policy intervention measures in response to significant losses in the banking system.

The first year when both criteria are met is considered to be the year when the crisis became systemic. Policy interventions in the banking sector are significant if at least three out of the following six measures have been employed:

- 1) Extensive liquidity support (5 percent of deposits and liabilities to nonresidents).
- 2) Bank restructuring gross costs (at least 3 percent of GDP).
- 3) Significant bank nationalizations.
- 4) Significant guarantees put in place.
- 5) Significant asset purchases (at least 5 percent of GDP).
- 6) Deposit freezes and/or bank holidays.