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Zaključna naloga
(Final project paper)

Ocenevanje pravil denarne politike v izbranih članicah EMU

(Assessing monetary policy rules in selected EMU members)

Ime in priimek: Tena Manc
Študijski program: Matematika v ekonomiji in financah
Mentor: doc. dr. Ana Grdović Gnip

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Izvleček:
Monetarna politika in kratkoročne obrestne mere omogočajo makroekonomsko stabilnost in dolgoročno ciljanje inflacijske tarče. Države članice EMU, ki imajo skupno valuto Evro, imajo tudi enako kratkoročno obrestno stopnjo, kljubtemu pa njihova gospodarstva niso navzoča enakemu gospodarskemu stanju, zato so obrestne mere, ki jih predpiše ECB lahko suboptimalne. Cilj te naloge je primerjati obrestne mere desetih članic EMU z tistimi, ki jih poda ECB in poiskati optimalno obrestno mero. Obrestno mero ECB primejamo z Genaraliziranim Taylorjevim pravilom (GTP) in Orphanides Wieland pravilom (OWP). Taylorjevo pravilo se v praksi uporablja kot cenilec kratkoročnih obrestnih mer, ki v obzir jemlje tudi makroekonomsko situacijo med drugim inflacijo in proizvodno vrzel. Preostali pravili sta adaptaciji Taylorjevega pravila kjer je ECB dodala brezposelnostno vrzel. OWP se po drugi strani posveča nivoju preteklih obrestnih mer. Analiza je pokazala da so obrestne mere ECB suboptimalne in so najboljši približek nemškemu gospodarstvu. Največja odstopanja so bila opažena v državah kot so Grčija, Španija in Portugalska kjer bi lastna monetarna politika bila boljša za njihovo gospodarstvo.

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Abstract: Monetary policy rules are used to assess the short-term interest rates which allow macroeconomic stabilization and long run inflation targeting. In the EMU set up, a same monetary policy short term interest rate apples for all countries that adopted euro as their currency. However, all these countries do not exhibit same macroeconomic conditions at the same time, meaning that monetary policy rates applied by the ECB can be different from their optimal levels. The primary objective of this final thesis is to assess the optimal interest rates given by different monetary policy rules and compare it to the ECB policy rate on a set of ten selected EMU members. The ECB policy rate is compared to the general Taylor rule, an adapted ECB version of the Taylor rule and to the Orphanides Wieland rule. The Taylor rule is the first monetary policy rule designed to assess short-term interest rates accommodated for macroeconomic conditions, and in particular for inflation and output gaps. The remaining two are just an adaptation of the Taylor rule, where the ECB form of the rule includes unemployment gap, while the Orphanides Wieland rule looks at previous interest rate levels. The analysis shows that the ECB policy rate is not optimal for all countries and it is the closest to macroeconomic conditions of Germany. Largest discrepancies are exhibited in case of peripheral countries, such as Greece, Italy, Spain and Portugal, where in some cases the contrasting policy would suit better, i.e. expansionary against the applied restrictive monetary policy and viceversa.

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List of Abbreviations

ECB.	European Central Bank
NCB.	National Central Banks
ESCB.	European System of Central Banks
EMU.	Economic and Monetary Union
FED.	The Federal Reserve System

1 Introduction

In December 1991 the European Council reached the agreement on a draft treaty (The Maastricht treaty) and the European Union (EU) called for the introduction of a single European currency by 1999. Therefore, on January 1st 1999 the Economic and Monetary Union (EMU), as an integration of eleven EU member states that share the same currency, was established. These countries were: Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal, and Spain (Majcen and Trunk, 2015).

On January 1st 1999 euro was firstly introduced as an accounting currency making it an *invisible currency*, that was only used for accounting purposes, e.g. in electronic payments. Euro as physical currency was introduced on January 1st 2002, when it replaced, at fixed conversion rates, the banknotes and coins of the national currencies of the eleven EMU members.

Nevertheless, the introduction of the common currency implied the introduction of the common monetary policy and supranational monetary authority and sovereignty. Thus, the European Central Bank (ECB), as a governing monetary authority became in charge of monetary policy which along with the national central banks of the EMU members formed the so called European System of Central Banks (ESCB). A common monetary policy that implies the application of a common monetary policy rule may not suit all member countries in the same manner at the same time, especially if there is a lack of business cycle synchronisation. Moreover, although fiscal policies are decentralized, if they are not closely and strictly coordinated monetary policy can result ineffective.

The aim of this thesis is to investigate how well the European Central Bank's interest rate matches the monetary policy needs of ten selected Euro area countries. To do so, this thesis compares the ECB policy rate with the interest rate resulting from other country-specific monetary policy rules, such as the Taylor rule OW rules.

This thesis is structured as follows: Chapter 2 explains the basic theoretical background for monetary policy analysis, main goals, and it's rules. Chapter 3 details on the data and methodology used to perform the analysis. Chapter 4 discusses and compares the results of different monetary policy rules per each country, while Chapter 5 is left for concluding remarks.

2 Theoretical background and literature review

2.1 Monetary policy

The purpose of monetary policy is to set the economy on a long-term, permanent path towards price stability and, creating conditions necessary for economic growth (ECB, 2011). According to (Cecchetti and Schoenholtz, 2015, p. 485) there are four conventional monetary policy tools[1], also known as monetary policy instruments:

1. the overnight rate
2. the discount rate
3. the deposit rate
4. the reserve requirement

The overnight rate, is interest rate on overnight loans of reserves from one bank to another as the primary instrument of monetary policy (Cecchetti and Schoenholtz, 2015). This rate is the shortest term rate available and forms the base of any term structure of interest rates relation (Mishkin, 2011). On any given day, banks target the level of reserves they would like to hold at the close of business. But as the day goes by, the normal flow of business may leave them with more or less reserves than they want to hold. This discrepancy between actual and desired reserves gives rise to a market for reserves, with some banks lending out their excess and others borrowing to cover a shortfall (Cecchetti and Schoenholtz, 2015). Central bank signals its monetary policy stance by announcing a target for the overnight interest rate(also known as reference rate). The target for the overnight rate, known as the policy rate is the main tool the Bank uses to conduct monetary policy. This rate refers to collateralized market based overnight transactions. The implementation of the stance of monetary policy is more successful when the reference rate is closer to the policy rate (Mishkin, 2011).

[1]Beside, conventional monetary policy tools, a central bank can also adopt the so-called nonconventional tools, such as quantitative easing, negative interest rates on deposits or forward guidance (Mishkin, 2013)

The discount rate, is the interest rate a central bank charges on the loans it makes to banks and it forms an ceiling rate. In case of the US, its central bank, i.e. the Fed, charges a discount rate called the federal funds rate (Cecchetti and Schoenholtz, 2015). In case of Europe and the ECB, the main interest rate is the interest rate on the main refinancing operations (MRO). Operationally, the discount rate is set at a spread above the targeted interest rate, and the deposit rate is set at a spread below the targeted interest rate. When the market federal funds rate or MRO climbs to the discount rate, banks may borrow from the central bank at the discount rate. When the market federal funds rate or MRO falls to the deposit rate, banks can deposit their excess reserves at the the central bank at the deposit rate. Thus, the deposit rate, is the interest rate that the central bank pays on reserves that banks hold on their accounts at the central bank and that puts a floor for the interest rate market (Cecchetti and Schoenholtz, 2015). Using open market operations, the central bank can adjusts the supply of reserves, with the goal of keeping the market interest rate (federal funds rate or MRO) close to the target rate.

Open market operations are an important monetary policy tool for many central banks, because they are primary determinants of changes in interest rates and monetary base, thereby lowering short-term interest rates and raising the monetary supply. Open market sales shrink bank reserves and the monetary base raising short-term interest rates and lowering the money supply. Vice-versa, open market purchases increase the monetary base and decrease short-term interest rates (Mishkin, 2011). Lending by central banks to commercial banks, called discount lending, is usually small aside from crisis periods, when it is used as primary tool for ensuring short-term financial stability, eliminating bank panics, and preventing the sudden collapse of institutions that are experiencing financial difficulties (Cecchetti and Schoenholtz, 2015).

The reserve requirement is the level of balances a bank is required to hold either as vault cash or as deposit on the account of a central bank. The reserve requirement is defined as a share of deposits the bank has collected from its customers. Changes in the reserve requirement affect the quantity of money and credit circulating in the economy, so, by adjusting the reserve requirement, the central bank can influence economic activity.

The usage of any monetary policy instruments can be performed to affect economic activity such that it can stimulate it or discourage it. In this sense it is possible to say that monetary policy (or the monetary policy stance) can be expansionary or restrictive. Expansionary monetary policy is used when economic growth has unexpectedly slowed down and the output goes below it s potential level. Conversely, restrictive monetary policy is used when the economy operates above its potential level and is exhibiting an expansionary or boom phase of the business cycle. In both of the afore-

mentioned cases the central bank is fostering countercyclical policy, while in case it would adopt an expansionary policy in case of expansions or a restrictive policy in case of recession, it would be the case that monetary policy is procyclical and completely ineffective. Nevertheless the problem of procyclicality is rarely attributed to monetary policy while most often to fiscal policy.

An expansionary monetary policy is directed towards increasing aggregate demand and restoring total employment and can be achieved increasing the quantity of money and credit in the economy, i.e. by lowering interest rates or decreasing the reserve requirement. A restrictive monetary policy is used when inflation pressure occurs. It is used to control and limit inflation. Inflation is a rise in the general price level of goods and services in an economy over a longer period of time resulting in a decline in the value of money and purchasing power (ECB, 2011).[2] Thus, increasing interest rates or reserve requirement can prevent the economy from overheating.

2.2 Monetary policy rules

Although the objective of a central bank can be devoted to any of the main macroeconomic growth, i.e. from high employment and output stability to the stability of financial markets or stability in the foreign exchange market, most of the central banks in the world set price stability as its main long-run goal. As set forth in (Mishkin, 2013) inflation targeting has many advantages such as increased transparency and accountability, reduction in time-inconsistency problematics, improved performance and its consistency with democratic principles. On a daily basis, a central bank directly controls the tools of monetary policy (like open market operations, reserve requirements, the discount rate, and the interest rate on reserves), but these per se do not explain the monetary policy stance. Therefore, a central bank uses a variable that responds to the central bank's tools and indicates the stance (restrictive or expansive) of monetary policy. This variable is called an operating instrument (Mishkin, 2013).

A central bank like the Fed or ECB has at its disposal two basic types of policy instruments: reserve aggregates and interest rates [3]. This policy instrument represent a link to an intermediate target, such as a monetary aggregate or a long-term interest rate, which stands between the policy instrument and the goals of monetary policy such as price stability. (e.g., price stability, output growth). For example let's assume a central bank's price stability goal is consistent with a nominal growth of GDP of 4%.

[2]Deflation is a decrease in the general price level of goods and services over a longer period of time(ECB, 2011).

[3]Central banks in small countries can choose another policy instrument like the exchange rate (Cecchetti and Schoenholtz, 2015)

If this central bank uses monetary aggregates like M2 as intermediate target then it needs to find what size of growth in monetary aggregate M2 is needed to achieve the 4% growth in nominal GDP, and in turn achieve that increase in M2 by increasing the nonborrowed reserves (policy instrument). If this central bank opts for interest rates as intermediate target then it sets the equilibrium interest rate such that it assures the nominal GDP growth at 4% which in turn safeguards inflation.

Most of central banks in the world conduct monetary policy by using the latter intermediate target and setting a target for short term interest rates. In doing so, the set monetary policy rules as guidance in setting the targeted rate.

Monetary policy rules are understood as a positive or normative description of how policy instrument e.g. the short-term interest rate,the monetary base or the exchange rate, responds to changes in macroeconomic environment (Blattner and Margaritov, 2010). There are different kinds of monetary policy rules with different main targets and used to achieve different goals. Some are directed towards interest rates, while other have in focus exchange rates or money supply.

In setting targeted short-term interest rate, the Taylor rule is the first and most common. The Taylor rule results from an empirical study of the actual monetary policy of the Fed, during the 1987 - 1992 period (Taylor, 1993). In the general form the rule can be stated as a short-term interest rate rule, which takes the following form:

$$i_t = \pi_t + r^* + \alpha(\pi_t - \pi^*) + \beta(y_t - y^*) \tag{2.1}$$

where, the determination of short-term interest rate depends on the current level of inflation π_t, the equilibrium real interest rate $r*$, the gap between inflation and inflation target (π^*) as well as output gap ($y_t - y^*$).

The suggestions arising from Taylor Rule are a restrictive monetary policy of high interest rates when inflation exceeds the target or when output exceeds its potential level exerting inflationary pressures. In the same way, an expansionary monetary policy of low interest rates is indicated when inflation ranges at levels below the target or when the production's level is less than potential output levels. Thus the coefficient α should be greater than unity ($\alpha > 1$). This is known as the Taylor principle. If the opposite occurs ($\alpha < 1$), the real interest rate will fall as inflation rises, leading to even greater inflationary pressures in the future (Papadamou, Sidiropoulos and Vidra, 2018). The Taylor rule has been adopted in different forms to conform to the specific need. For example Taylor rule has been adopted by the ECB where policy interest rates should respond to deviations of inflation from its target and unemployment from its natural rate (Judd and Rudebusch, 1998)

Another adoption is The Orphanides-Rule dates back to (Orphanides, 2003) who

shows that the rule tracks the interest rate changes of US Federal Reserve rather well since the 1980s. Meanwhile, this rule has also been applied to the ECB. The original Orphanides-Rule can be written as follows (Belke and Klose,2019):

$$i_t - i_{t-1} = \alpha(\pi_{t+j} - \pi^*) + \beta(\Delta y_{t+j} - \Delta y^*_{t+j}) \tag{2.2}$$

This rule tries to predict the changes in the policy rate ($i_t - i_{t-1}$), by looking at deviations of the inflation rate from its target ($\pi_t - \pi*$) and of real economic growth from potential growth ($\Delta y_t - \Delta y*$). The reaction coefficients of the inflation and growth deviations are assumed to be 0.5 each. If we rearrange the equation we get

$$i_t = i_{t-1} + 0,5(\pi_{t+j} - \pi^*) + 0,5(\Delta y_{t+j} - \Delta y^*_{t+j}) \tag{2.3}$$

The Orphanides and Wieland (2008) rule is forward-looking as it includes forecasts for inflation and unemployment rate three quarters ahead. Estimation of the rule is based on the Federal Open Market Committees (FOMC)[4] projections on inflation and unemployment rate, considering the release time of the semi annual monetary policy report to the U.S. Congress. The unemployment rate in the original rule is replaced by the output gap that uses Okun's law [5]

Orphanides-Rule takes always the past interest rate as given while any changes to this rate stem from the deviations in inflation or growth. The main difference between this two rules is that Taylor-Rule in its basic formulation uses current values of inflation and the output gap instead of forecasts as in the Orphanides-Rule (Belke and Klose,2019).

2.3 Economic and Monetary Union

Having adopted the euro as their single currency, the EU Member States that are part of the euro area have relinquished their monetary sovereignty. The ECB, as the core of the established central banking system (i.e. the ESCB) takes on responsibility for the monetary policy in the euro area. The ESCB includes the national central banks (NCB) of all EU Member States, even those which have not adopted the euro, because

[4]The Federal Open Market Committee (FOMC) is the monetary policy making body of the Federal Reserve System. Its goal is to promote maximum employment, stable prices, and moderate interest rates over time. In case of the Euro area it is the Governing Council that sets the policy interest rates.

[5]Okun's law is an empirical relationship between changes in aggregate output (relative to its potential trend) and changes in the unemployment rate (relative to its natural rate). In other words, this law (named after economist Arthur Melvin Okun) is intended to tell us how much of a countryâs gross domestic product (GDP) may be lost when the unemployment rate is above its natural rate. It states that when unemployment falls by 1%, GDP rises by 3%. The law only holds when the unemployment rate is between 3% and 7.5% (Chen Mingyu, 2012).

the adoption of euro as a common currency is dependent upon economic performance of a member state. Such economic performance needed to join the Euro area is set forth in the Maastricht treaty and is based on the convergence criteria. There are four groups of economic convergence criteria a country needs to satisfy before adopting euro as a currency, which include the following:

1. Price stability - the inflation rate of a given member state must not exceed by more than 1,5 percentage points that of the three best-performing member states in terms of price stability during the year preceding the examination of the situation in that member state (Polasek and Amplatz, 2003).

2. Government finances - this set includes two measures:

   (a) the annual government deficit must not exceed 3% GDP at the end of the preceding financial year; or, if this is not the case, the ratio must have declined substantially and continuously and reached a level close to 3% (interpretation in trend terms) or, alternatively, must remain close to 3% while representing only an exceptional and temporary excess;

   (b) the gross government debt must not exceed 60% of GDP at the end of the preceding financial year; or if this is not the case, the ratio must have sufficiently diminished and must be approaching the reference value at a satisfactory pace (Polasek and Amplatz, 2003).

3. Exchange rates - a member state has respected the normal fluctuation margins provided for by the exchange-rate mechanism of the European Monetary System without severe tensions for at least the last two years before the examination; a member state shall not have devalued its currency's bilateral central rate against the euro on its own initiative for the same period (Convergence criteria, 2021).

4. Long-term interest rates - the nominal long-term interest rate must not exceed by more than 2 percentage points that of the three best-performing member states in terms of price stability (i.e. the reference countries for long-term interest rates, are those that are best in price stability) (Polasek and Amplatz, 2003).

If these criteria are satisfied for at least two years while a member state is in the Exchange Rate Mechanism II (ERM II)[6], which is like a "waiting room" for euro-

[6]The criteria are analysed by the European Commission and the ECB and closely monitored. The members of Euro area examine all the reports and make recommendations to the Council of the EU on whether a certain country is able to adopt the euro. In case of a favourable outcome, the ECB fixes a conversion rate between the national currency and the euro and then the common money can be adopted.(Majcen and Trunk, 2015)

adoption, then the country adopts euro as its currency and relinquishes its monetary sovereignty leaving the conduct of monetary policy to the ECB.

As aforementioned, the ECB is responsible for monetary policy in the Euro area, and its main goal is price stability, which by applying a hierarchical mandate, is followed by stable growth and financial stability (ECB, 2011). The targeted inflation rate is set below 2 percent. The objective of price stability refers to general level of prices and implies avoiding inflation and deflation.

The ECB's Governing Council adopted a quantitative definition of price stability in 1998: Price stability is defined as a year-on-year increase in the Harmonised Index of Consumer Prices (HICP) for the euro area of below 2% (ECB, 2011). HICP is specific price index,which is used for purpose of assessing whether price stability has been achieved. This index has been harmonised across the various countries of the euro area and most closely approximates the changes over time in the price of a representative basket of consumer expenditures (ECB, 2011).

2.4 Literature review

The introduction of the Euro brought a lot of advantages to the participating countries, the transparency of prices, the omission of currency fluctuations and the fact that the Euro has evolved into a new leading currency beside the US dollar. However, after the crisis many disadvantages of the common European currency became visible (Zipper and Lechner, 2019). According to a growing number of economists and analysts the basic concept of EMU with a centralised monetary and exchange rate policy and decentralised fiscal and structural policies cannot work. Some have always been sceptical about a unified currency, arguing that a "one size fits all" monetary policy will not work unless Europe's member states move to a fiscal and political union (Regling, 2010).

Feldstein for example wrote two papers in which he criticises the EMU countries. In his first paper (Feldstein, 2013) he emphasizes that EMU political leaders were talking about a move of the EMU towards a political union. According to Feldstein the introduction of the Euro was a political mistake, because geographic mobility and fiscal structure are not comparable to the United States. In his second paper on the EMU crisis two year later, he points out that the Euro was a flawed concept from the beginning. However, the target of this paper was to discuss some fiscal options to find a way out of the crisis. [7] Another possibility would be for example a direct tax incentive

[7]The solution for Feldstein would be a revenue neutral fiscal incentives strategy. That means for example investment should be stimulated through a temporary increase in the tax-deductible depreciation rate on new investments in plant and equipment. On the other side, the resulting revenue

for home builders. The revenue loss could be offset by an increase in tax rates "in a revenue neutral and distributionally neutral way" (Feldstein, 2010). Another example would be a decrease of the income taxes and then an increase in the value added tax. This would stimulate consumers to increase their spending before the value added tax rate will be increased. These fiscal changes should be enacted by the individual EMU countries (Zipper and Lechner, 2019).

Frankel reveals three major issues of the EMU: the asymmetry problem, the fiscal problem and the banking problem. The asymmetry problem is arising from the fact that members of the Euro area are not able to devalue their currency if necessary. The fiscal problem refers to the moral hazard problem and the inability of peripheral countries to observe the Maastricht criteria (especially budget deficit and government debt). Concerning banking supervision Frankel criticizes that European policy never took into consideration a supervision through the ECB which is a European institution. In his analysis he suggests that the ECB should buy US bonds in order to force a devaluation of the Euro. Furthermore, it would be a good idea for Germany to accept a higher than 2% inflation for many years. That means wage increases should be much higher than productivity gains for a certain period. A consequence of that policy would be a depreciation of the Euro (Frankel, 2015).

Eichengreen (Eichgreen, 2015) discusses about the weak weak growth, weak banks and too high government debt in the Euro area. He has opinion that major issue in the Euro area is the weak banking sector. Two thirds of external finance to non-banks is bank inter mediated. In the US the share is just one third. Therefore, a weak banking system is an obstacle for the whole economy. Eichengreen criticizes a too restrictive fiscal policy of EMU. He favors the introduction of Euro bonds or a fiscal union to increase the fiscal stimulus for the economy. The critique of Eichengreen is a mix of neoclassical and Keynesian views[8] With the Keynesians he shares the view of the introduction of Euro bonds and a more expansive fiscal policy

Otmar Issing was a member of the board of directors of the ECB and he was responsible for the development of the monetary policy strategy of the ECB (I. Issing concludes that EMU is no longer an optimum currency area[9], because politics "over-

loss should be compensated through a temporary increase in the corporate tax rate.

[8]Keynesian economics is a macroeconomic economic theory of total spending in the economy and its effects on output, employment, and inflation. Keynesian economics is considered a "demand-side" theory that focuses on changes in the economy over the short run. Keynesian economics focuses on using active government policy to manage aggregate demand in order to address or prevent economic recessions. Activist fiscal and monetary policy are the primary tools recommended by Keynesian economists to manage the economy and fight unemployment (Barnier, 2020).

[9]Mundell's theory of optimum currency areas was set forth in a article published in 1961 (Mundell, 1961), A Theory of Optimum Currency Areas, in which he raised a question: on what

came economic reservations" (Issing, 2011). Big issue for Issing is the growth of unit labor costs which is wages divided by productivity. Average growth of unit labor costs in Greece, Portugal, Italy, Spain and Cyprus was much higher than in Germany or in Austria between 1999 and 2009. With flexible exchange rates the peripheral countries could have corrected these divergences through depreciation of their currencies. The divergences in the growth of unit labor costs are reflected in the current account of these countries (Issing, 2011).

economic criteria could the decision by various regions of the world to adopt a common currency be based? Mundell develops a cost-benefit analysis of the monetary union. The benefits of adopting a common currency include a reduction of the various transaction costs generated by the existence of various currencies and a gain in the liquidity of the currency, attributable mainly to the expansion of its area of transactions, from which all financial markets would also benefit. The potential disadvantages would come from the elimination of the exchange rate between participants in the union: no longer would it be possible to let the exchange rate absorb shocks asymmetrically affecting the various regions of a monetary union (Swoboda, 1999)

3 Data and methodology

3.1 Methodology

To compare how well the common monetary policy fits country specific macroeconomics stabilization I use the outcome of three monetary policy rules and compare it with the ECB policy rate. The selected rules include:

1. the general Taylor rule adapted according to the ECB targeted inflation of two percent, which is set as follows:

$$i_t = 2 + 2 + 1,5 \times (\pi_t - \pi^*) + 0,5 \times (y_t - y^*) \tag{3.1}$$

2. the Taylor rule adopted by the ECB, which is the following:

$$i_t = 1 + 1,5 \times \pi \times (u_t - u^*) \tag{3.2}$$

   where $(u_t - u^*)$ represents the unemployment gap;

3. the general form of the Orphanides-Wieland rule (OW), set as:

$$i_t = i_{t-1} + 0,5 \times (\pi_{t+j} - \pi^*) + 0,5 \times (\Delta y_{t+j} - \Delta y^*_{t+j}) \tag{3.3}$$

3.2 Data

For the purpose of analysing I selected ten EMU countries, and in particular Belgium, Germany, France, Italy, Ireland, Greece, Portugal, Spain, Malta, Slovenia. Belgium, Germany, France and Italy are core of the Euro area which are compared to the peripheral countries of Euro area.

The analysis is based on the 2004-2019 period and the raw data are collected from the Eurostat statistic database. Main raw or primary data include:

- monthly inflation (Eurostat code: *prc_hicp_manr*),
- quarterly unemployment (Eurostat code: *une_rt_q*),
- the quarterly ECB rate (Eurostat code: *irt_st_q*) and

- the quarterly and seasonally adjusted real GDP (Eurostat code: *namq_10_gdp*).

The raw data has been adjusted to conform the needs set by the monetary policy rules. First, of all the rules need to be applied using quarterly frequencies. Collected raw data are all on quarterly basis except inflation which is measured on monthly basis. Therefore, inflation is constructed on quarterly basis as simple averages across three month periods.

Second, the rules require the measures of gap in case of inflation, GDP and unemployment. To find the gaps the Hodrick-Prescott filtering is applied. This is a standard algorithm used to retrieve the trend and cyclical patterns in the time-series data, i.e. to smooth a macroeconomic series.

Technically, the Hodrick-Prescott filter is a two-sided linear filter that computes the smoothed series s of y by minimizing the variance of y around s, subject to a penalty that constrains the second difference of s. That is, the filter chooses s to minimize:

$$\sum_{t=1}^{T}(y_t - s_t)^2 + \lambda \sum_{t=2}^{T-1}((s_{t+1} - s_t) - (s_t - s_{t-1}))^2 \tag{3.4}$$

where λ represents the penalty parameter that controls the smoothness of the series variance. The larger the λ, the smoother the variance (as $\lambda = \infty$ s approaches a linear trend). For annual, quarterly and monthly series it is standard to set λ equal to 100, 1600 and 14400, respectively. Given that my anlaysis embraces quarterly data, I set $\lambda = 1600$ to retrieve the trend values of GDP and unemployment and calculate their respective gaps.

Some selected countries were not Euro area members throughout the entire observed period. In these cases the ECB policy rate refers to the exact ECB rate in the period post the introduction of euro, while for the period before I use the policy rate applied by each single national bank under examination. For example, Slovenia joined the Euro area in 2007, so the ECB policy rate for Slovenia includes the policy rate applied by the Bank of Slovenia in the 2004-2006 period and the ECB rate for the 2007-2019 period.

3.3 Descriptive statistic

I compare the two main macroeconomic indicators, i.e. GDP and unemployment, for the set of selected countries in the observed 2004-2019 period. Table 1 shows the descriptive statistics of real GDP growth rates across the ten EMU countries. The smallest drop in GDP exhibited France amounting to -1,80%, followed by Italy with -2,25% and Belgium with -2,26%. The largest GDP drops are evidenced in Germany (-4,09%, 2009Q1), Slovenia (-4% 2009Q1) and Ireland (-4.18% 2017Q1). The biggest GDP growth had Ireland with 26.47 % in 2015Q1. The Irish economy grew after foreign companies that switched their base to Ireland were included in the value of its corporate sector, pushing up the value of the state's balance sheet. The process of switching tax domicile after a merger or acquisition, known as an "inversion", has increased in recent years, and Ireland has become a popular end destination in these corporate manoeuvres because of its low corporate tax regime (Inman, 2016). Greece is the second best country in GDP growth with 5.43% in 2006Q1 but, after the global and financial crises accompanied with the sovereign debt crisis, Greece never reached such growth levels again and shows an overall average growth rate of GDP in the 2004-2019 period being negative.

If averages are compared, it is possible to note that on average Malta and Ireland grow at highest rates, but the growth of Ireland is more than double uncertain or volatile than the same in Malta. The most stable growth has France with standard deviation of 0,58%.

Table 1: GDP growth rate in selected EMU countries from 2004-2019

Country	Min	Max	Mean	STDV
Belgium	-2,26%	2,32%	0,79%	0,72%
Germany	-4,09%	2,11%	0,70%	0,83%
Ireland	-4,18%	26,47%	1,35%	3,98%
Italy	-2,25%	1,62%	0,36%	0,73%
Spain	-2,29%	2,30%	0,65%	1,02%
France	-1,80%	1,50%	0,59%	0,58%
Portugal	-2,78%	2,07%	0,58%	0,95%
Greece	-3,14%	5,43%	-0,04%	1,65%
Malta	-3,52%	4,58%	1,64%	1,43%
Slovenia	-4,00%	3,15%	0,94%	1,30%

Table 2 compares the descriptive statistics of unemployment across the ten EMU countries. It is possible to note that on average highest unemployment rates are shown

for Greece (17,0%), Spain(16,9%), Portugal (10,7%) and Italy (9,4%), while the lowest for Malta (5,8%) and Germany (6,4%). The highest rates also exhibit the highest standard deviations, while the 9,2% average unemployment rate in France seems to be the most stable across the observed period. Germany has the minimum unemployment (3,3%) which is exhibited in 2019Q2 and 2019Q3. The closest to Germany is Malta with 3,3% in 2019Q3.

Table 2: Unemployment rate in selected EMU countries from 2004-2019

Country	Min	Max	Mean	STDV
Belgium	5,2%	8,9%	7,6%	0,97%
Germany	3,1%	11,2%	6,4%	2,4%
Ireland	4,4%	15,9%	9,1%	4,17%
Italy	5,9%	12,7%	9,4%	2,13%
Spain	8%	26,2%	16,9%	5,96%
France	7,3%	10,5%	9,2%	0,83%
Portugal	6,4%	17,3%	10,7%	2,98%
Greece	7,6%	27,7%	17,0%	7,06%
Malta	3,3%	7,5%	5,8%	1,21%
Slovenia	4,1%	10,7%	6,97%	1,85%

4 Results

In this Chapter I present the results of the analysis. The countries are listed according to their EU accession and additionally sorted according to the year of euro adoption. Recall that the ten countries in the analysis are Belgium, Germany, France, Italy, Ireland, Greece, Portugal, Spain, Malta and Slovenia. Belgium, Germany, France and Italy represent the EU founding countries, that also participated in the formation of EMU in 1999 and adopted euro in 2002. Ireland, Greece, Portugal and Spain are also countries that have euro since its introduction in 2002, but joined EU in 1973, 1981, 1986 and 1986, respectively. The last two countries I analyse, Malta and Slovenia, joined EU in 2004 when the largest EU enlargement occurred, and adopted euro in 2008 and 2007, respectively.

Figure 1 shows the comparison of the policy rules with the ECB rate for Belgium. It is possible to note that the OW rule movements follow the movements in the ECB policy rate, while there is small difference between the general and the ECB Taylor rule. On average the interest rate according the Taylor rule seems to outperform the same retrieved by the ECB and OW rule. Leaving aside the 2015-2019 period when the ECB rate is constantly negative it is visible that the ECB rate is lower than Taylor and OW rules, except in case of the financial and global crisis when all three rules suggest a need for a prompter and larger decrease in the short-term targeted rate given the exceptional economic conditions.

If I compare Belgium to Germany (Figure 2) I note that all rules seems to be more tight and exhibit more closer movements. The ECB rate for Germany is relatively close to general Taylor rule interest rate in time period 2004-2009. General and ECB Taylor rule interest rate are relatively close except in 2009 when the difference is more then 2 percentage points which leads to the difference of 4 percentage points between ECB rate and the ECB Taylor interest rate rule. In 2010 ECB rate and OW interest rate are decreasing and there is a big difference between general Taylor rule and ECB rate. The reason is that from 2010 to 2015 inflation is relatively close or smaller then targeted inflation. The output gap is mostly positive which means that the lines for general and ECB Taylor rule are increasing. In 2011 the Taylor rule is reaching its maximum value in time period 2010-2015. Germany can be characterized as a country with low inflation (almost always bellow or very close to 2%) and with positive output

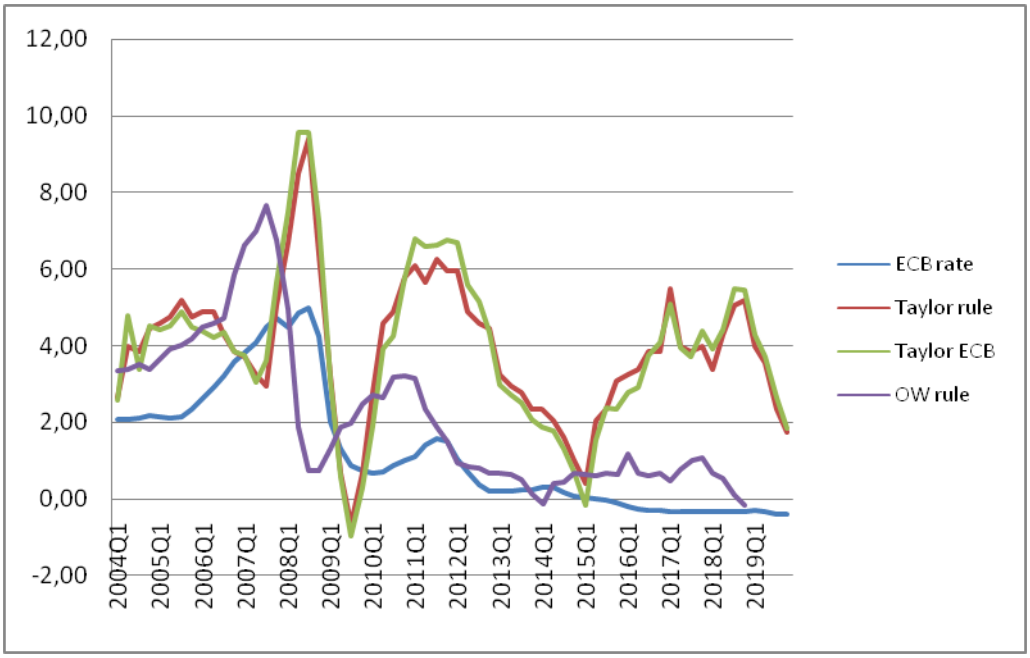

Figure 1: Comparison of monetary policy rules in Belgium 2004-2019

gap.

France is part of the core of euro area countries along with Germany. General and ECB Taylor rule interest rate are almost the same. If we look at the ECB rate and the Taylor rule interest rate they are relatively close till 2010, but most of the time the Taylor rule interest rate is higher. Till 2006 the ECB rate is relatively close to target of 2%. In 2007 the Taylor rule interest rate is lower then ECB rate, and the reason is that the inflation is lower then target inflation. The OW rule movements follow the movements in the ECB policy rate. In 2008 the Taylor rule interest rate is rapidly increasing. From 2009 the recommended Taylor rule interest rate is higher then ECB rate. After the 2007-2009 crises the ECB decides to implement lower rate to boost the economy. The recommended Taylor rule interest rate is above 3% in time period of 2009-2012, with some ups and downs. However this is time when the economy of France by the Taylor rule needed to have a higher rate then the ECB rule. In this period the highest level is 4,95%, while the highest by the ECB is 1,56%. We can see that there is a difference of almost 3,5 percentage points. By the Taylor rule we can conclude that with a higher rate it should be more interesting to save, then lend from a bank. From 2012 on, the ECB rate, and the Taylor interest rate are decreasing. In 2015 the Taylor rule interest rate reaches minimum of 0,65% which leads to expansionary monetary policy of low interests. 2015 is the last year that ECB has a positive value of interest rate. From then the ECB rate is negative and close to 0. Comparing the Taylor rule interest rate with ECB rate we can see that from 2015 to 2017, Taylor interest rate is close to target of 2%, with some ups in 2017 and 2018. The reason for ups in 2017 and

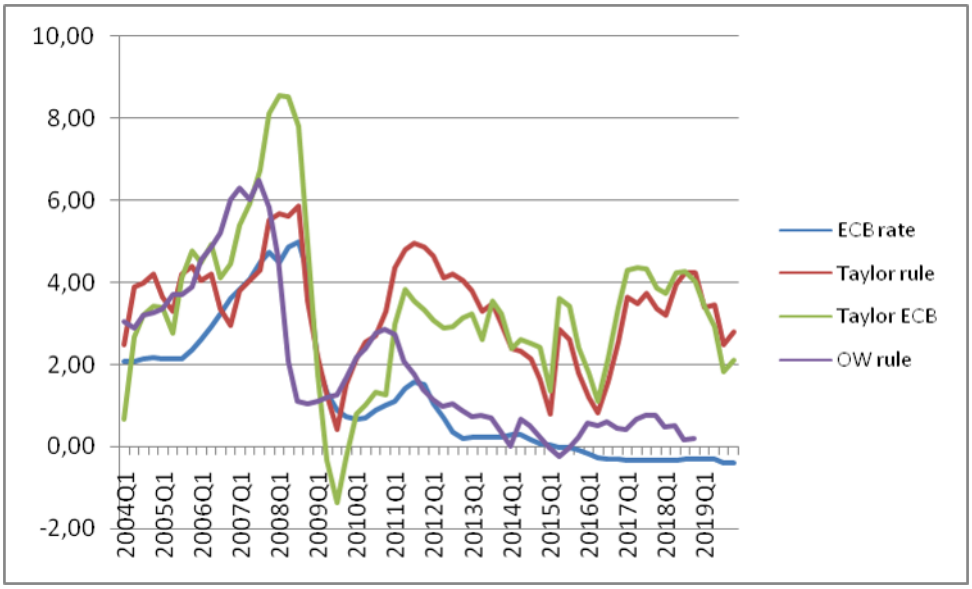

Figure 2: Comparison of monetary policy rules in Germany 2004-2019

2018 is that the GDP gap is mostly positive which means that the output exceeds it s potential level, and the inflation exceeds target inflation.

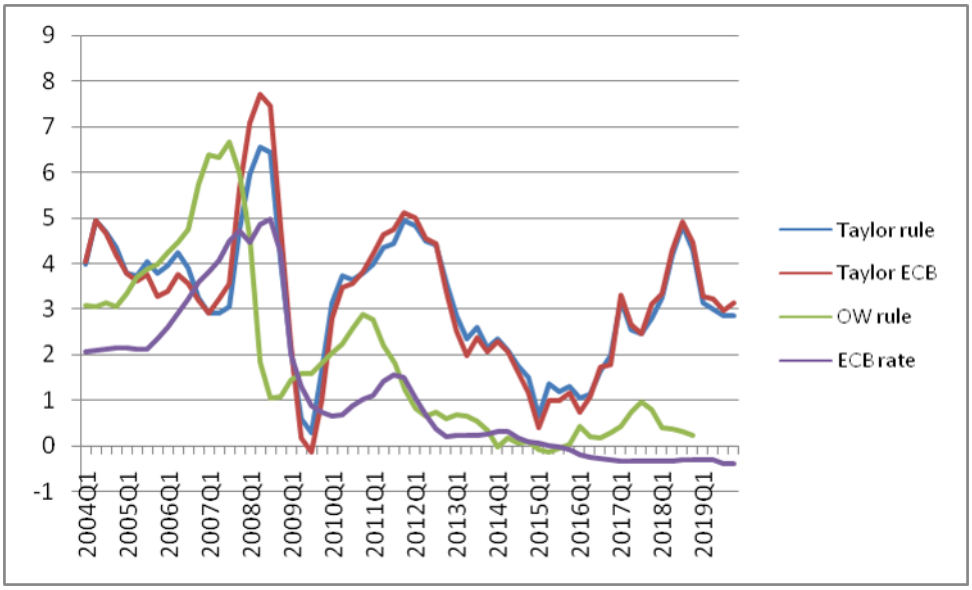

Figure 3: Comparison of monetary policy rules in France 2004-2019

As the first three countries analysed Italy also joined EU in 1957 and EMU in 1999, or accepted euro cash in 2002. Time period from 2004 to 2005 is relatively stable if we compare the general Taylor interest rate and the ECB rate. The ECB rate is close to 2% and the Taylor rule interest rate is close to 4%. There is a small difference between the general Taylor rule interest rate and the ECB Taylor rule. The OW interest rate and the ECB rate are moving together. In 2005 the ECB rate is

increasing and getting closer to the Taylor rule interest rate. In the crisis period the recommended Taylor rule interest rate reaches its maximum (7,11%). At this exact time the ECB rate is also the highest with 4,98%. From this action we can see that the ECB rate and the Taylor rule interest rate are going in the same direction. They rise together and they fall together in time period 2007-2010. In the last quarter of 2008 the actual and Taylor rule interest rate decline rapidly due to the output gap and inflation falling strongly. While the actual interest rates continue to decrease, the Taylor rule would have recommended increasing the interest rates. For example in 2011 when recommended Taylor rule interest rate is 6,11%, the actual interest rate is 1,5%. Since 2008 the ECB has tried to restore investor confidence and ensure liquidity in the financial market by keeping the interest rates low (ECB, 2011). From 2012 the Taylor rule is rapidly decreasing again, from approximately 6% in 2012 to 0,89% in 2014 which is almost 5 percentage points difference in short time period. The reason is deflation which is below or close to zero in the 2013-2016 period. From 2016-2019 the ECB rate is going below 0 with minimum of -0,40% but Taylor rule recommends positive rate close to 2%.

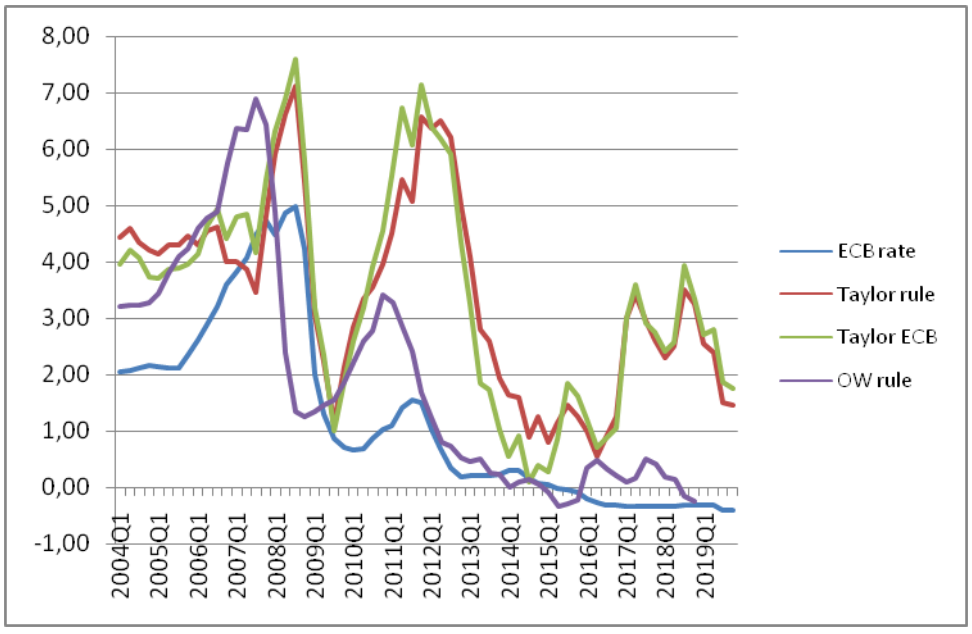

Figure 4: Comparison of monetary policy rules in Italy 2004-2019

Long time ago in 1973 Ireland became a member of the EU. Ireland joined EMU in 1999, and accepted euro cash in 2002. Ireland exhibits small differences between ECB Taylor rule interest rate and general Taylor rule interest rate. The ECB rate and OW interest rate are very close with an exception in 2007 and 2008. If we look figure 5 we can see that the ECB rate and Taylor rule comove. In the 2004-2008 period the Taylor rule interest rate is above the ECB rate because of the higher inflation and

positive output gap. In 2009 the Taylor rule interest rate is decreasing to a negative value (-3,17%) which is way below the ECB rate. The reason is deflation since, and the constant negative output gap from 2009-2015. In time period 2009 to 2011 Taylor rule recommends negative interest rates which means expansionary monetary policy. In 2011 the Taylor rule interest rate rapidly increases to 2,89% which is almost 5 percentage points difference in just one year. From 2011 the interest rate arising from the Taylor rule interest rate is finally again positive which leads to restrictive policy. Like in Italy while actual interest rates continue to decrease, the Taylor rule recommends increasing the interest rates until 2015. GDP gaps plays a big role in 2015, GDP grew 26,47% from 2014. As mentioned in chapter 3.1 the Irish economy grew by 26,47% in 2015, after foreign companies switched their base to Ireland and were included in the value of its corporate sector, pushing up the value of the states balance sheet. However after 2015 the recommended Taylor rule interest rate is close to 2% and the ECB rate is decreasing until -0,40%. This implies that a higher rate which is closer to 2% would suit Ireland more.

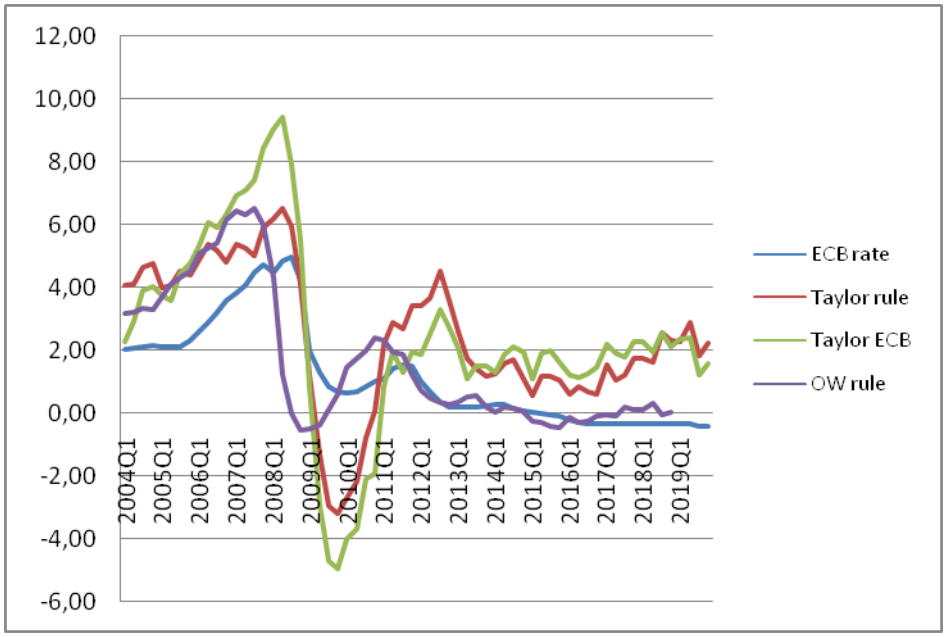

Figure 5: Comparison of monetary policy rules in Ireland 2004-2019

Greece joined EU in 1981. Greece become a member of EMU in 2001, accepting euro cash in 2002. Figure 6 for shows that the recommended Taylor rule interest rate is universally higher for Greece than the ECB rate, and the OW rule interest rate with exception in time period of 2013-2015. In time period of 2004-2006 the ECB rate is close to 2% and the recommended Taylor rule interest rate is approximately at 5,5% which makes 3 percentage points difference. It is obvious that in that time Greece needed higher interest rate because of the higher inflation. From 2006 the ECB

rate is increasing to 4,49% and the Taylor rule interest rate is rapidly decreasing from 6,24% in 2006Q3 to 4,91% in 2007. The reason is because the inflation of Greece finally decreased under 3%. During the crisis in 2007 and 2008 the Taylor rule interest rate has drastically increased to its maximum of 8,22% in 2008. On the other hand, the ECB rate in the exact same time is 4,98% which makes a difference more then 3 percentage points. The Taylor rule interest rate starts decreasing extremely fast in 2009 and it is again close to ECB rate which is 1,31%. The reason for that drastic change is because the inflation in just one quarter decreased from 3,1% to 1,8%, and then in the next quarters 2009Q2,Q3 stays at just 0,8%. By the Taylor rule this time period the Greece should apply expansionary monetary policy. The ECB rate along with OW rule interest rate have decreasing trends from 2010, while the Taylor rule interest rate show a rising trend, and we observe the biggest opposite movement between them so far. General Taylor interest rate is at it s maximum in 2010 with 9,41%, with the ECB rate being at 0,87%. That is almost 9 percentage points difference which cannot be good from any point of view. The reason again is the big inflation (above 5%). Afterwards incident the ECB Taylor and general Taylor interest rate tend to fall even under the ECB rate in the 2013-2019 period. In the end of 2015 the ECB rate had tendency of falling until 2019 with -0,40% the Taylor rules recommended positive interest rate with average of 2%.

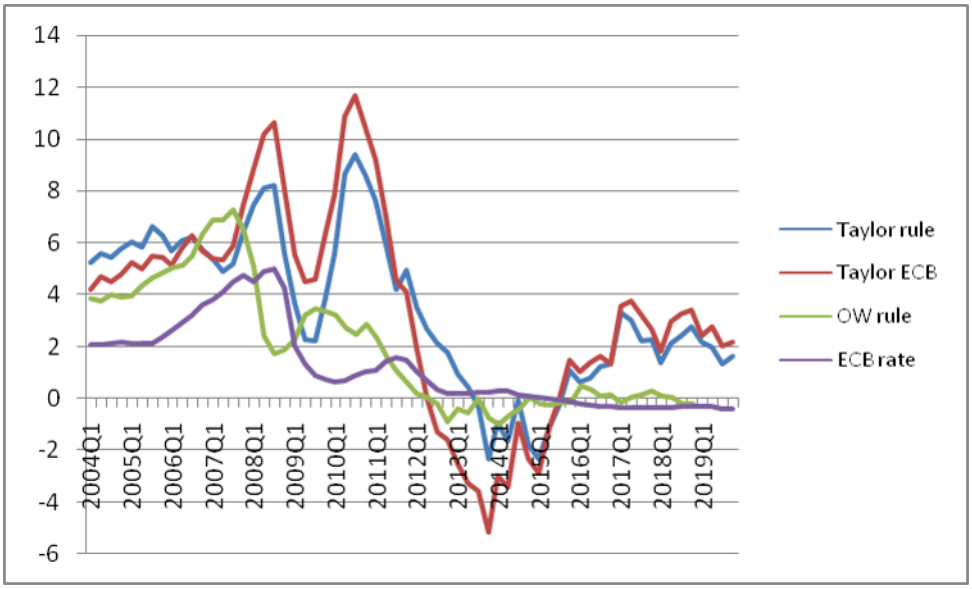

Figure 6: Comparison of monetary policy rules in Greece 2004-2019

Portugal joined EU in 1986, became a member of EMU in 1999 and accepted euro cash in 2002. Almost all the time recommended Taylor rule interest rate is higher then ECB rate with exception of third quarter of 2007, last quarter of 2008 and in 2009. During 2004 the Taylor rule interest rate is significantly higher then ECB rate with 3

percentage points of difference. In 2005 Taylor rule interest rate has decreases to 3,1% and it is just one percent higher then the ECB rate. Reason for that is smaller inflation then targeted one and negative output. However, during the financial crisis that struck the world in late 2008, figure 7 shows relative small interest rate deviations for ECB rate and recommended Taylor rule. The biggest interest rate deviations are between ECB Taylor rule and OW. In 2009 Taylor rule recommends expansionary monetary policy with negative rate of -1,29% while ECB rate and OW rule recommends also low but positive interest rates. Following years show us that interest rate deviations start to increase. While the ECB rate has tendency of decreasing, the Taylor rule interest rate has tendency of increasing to its maximum of 6,64% in the end of 2011. Portugal should have restrictive monetary policy with high interest rates but instead there is expansionary monetary policy. In my opinion the ECB monetary policy for Portugal did not fit well until 2014, when ECB rate and Taylor rule interest rate are almost the same because of inflation close to zero and negative output gap. Time period from 2015-2019 ECB rate is going below zero and Taylor rule recommends again restrictive monetary policy with higher interest rates. All in all the ECB monetary policy was not very beneficial for Portugal.

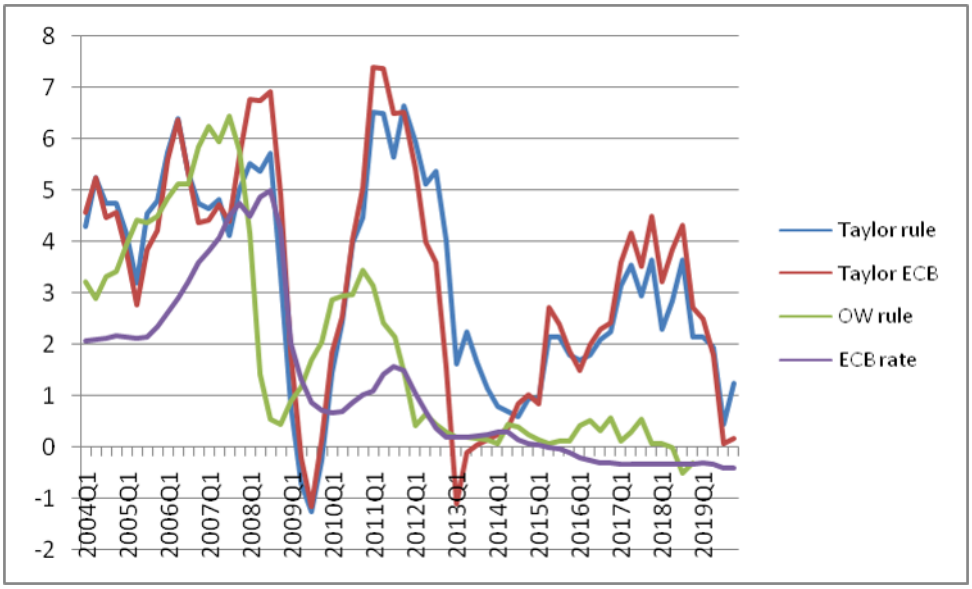

Figure 7: Comparison of monetary policy rules in Portugal 2004-2019

Spain joined EU and EMU same as Portugal. Figure 8 shows that in the 2004-2007 period a big difference between the Taylor rule interest rate and ECB rate with the highest value in 2006 of almost 5 percentage points. The 2004-2006 time period is the period of big inflation in Spain. First time that Taylor rule interest rate and ECB rate was almost the same was in 2007. In that moment Taylor rule decreased and ECB rate increased. During the financial crisis Taylor rule recommends more aggressive

restrictive monetary policy then ECB rate and OW. Situation in Spain is pretty similar like in Portugal. Taylor rule and ECB together with OW are in contradiction. After 2009 Taylor rule interest rate is rising again because after deflation there is big inflation with a difference more then 3 percentage points in just one year and the positive output gap. While ECB rate continues to decrease below 0, the general Taylor rule and ECB Taylor increase to 5% which is more then 5 percentage points difference. Spain needs restrictive monetary policy but instead gets expansionary.

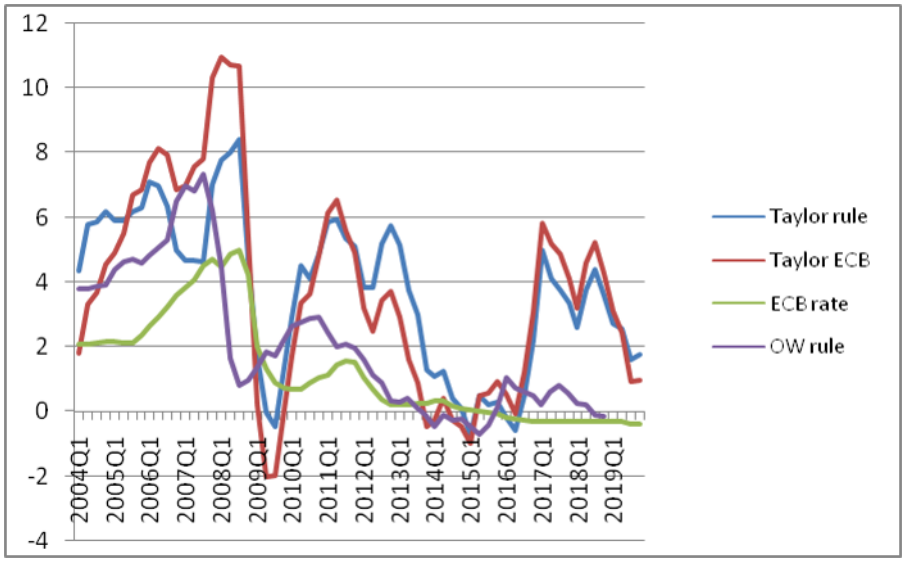

Figure 8: Comparison of monetary policy rules in Spain 2004-2019

Malta is almost the youngest EMU country in this research. It joined EU in 2004 and EMU in 2008. Time period from this research is from 2004 but Malta joined 2008. Therefore for this period the ECB rate corresponds to the rate applied by the Central Bank of Malta, which is its policy rate. As expected rules are close to ECB rate which in this case until 2007 is policy rate of Malta s central bank. Malta has a better inflation target before joining the EMU which confirms that one size does not fit all. All rules followed the movements of the ECB rate. Figure 9 shows that recommended Taylor rule interest rate is in general higher then the ECB rate with exception in 2007 and 2010. From that point of view we can see that Taylor rule most of the time recommends restrictive monetary policy. From 2004-2006 ECB rate is relatively stable and close to the target of 2%. In this time period Taylor rule interest rate is a bit higher and the difference is approximately 2%. The reason why the Taylor rule interest rate is a bit higher is because of higher inflation and mostly positive output gap. In 2007 Taylor rule interest rate rapidly decreases to -0,34% which is the biggest difference of 4 percentage points from that time. Taylor rule interest rate is so low due to deflation of -0,9%. After that Taylor rule interest rate has the trend of rising again and reaches its maximum in just one year to 8,96%. From then on Taylor rule interest rate decreases

rapidly and for the first time in the end of 2009 the ECB rate and the Taylor rule interest rate are almost the same. From that moment on Taylor rule interest rate increases again in time period from 2010 to 2013 because of the positive output gap while ECB rate is decreasing. From 2013 Taylor rule recommends interest rate close to target of 2% because of the inflation close to target, but the ECB rate has negative rates.

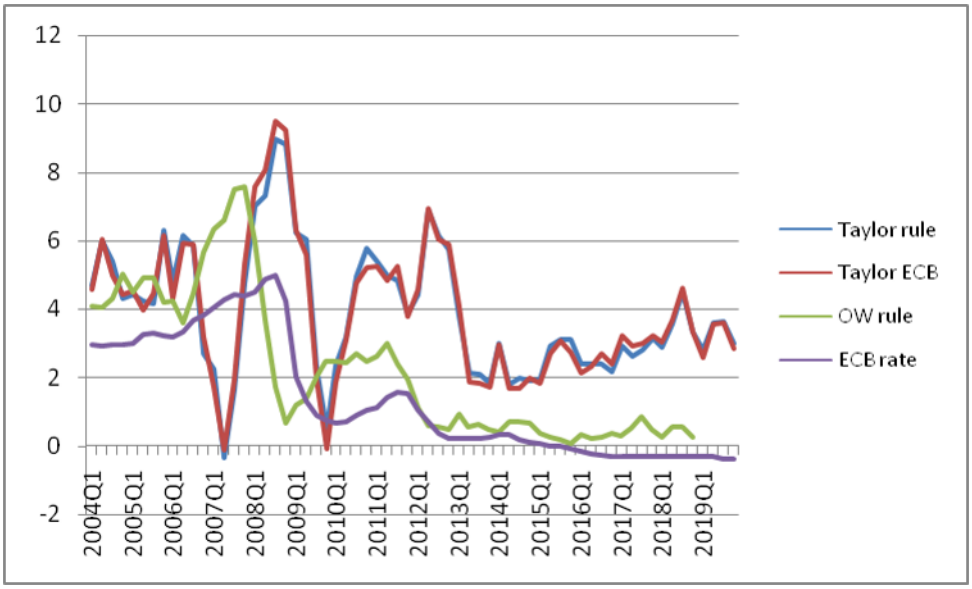

Figure 9: Comparison of monetary policy rules in Malta 2004-2019

On January 2007, Slovenia was the first of the ten states that joined the European Union in May 2004 to become a member of the Euro Area. Like Malta, until 2007 the ECB rate corresponds to Bank of Slovenia policy rate. So, as expected, all rates on Figure 10 move more tight and are closer. Slovenia exhibited inflation targeting before joining the EMU. After 2007 we can see that the ECB rate and Taylor rule interest rate are not were very close with exception in 2009 and 2010 and there is a big difference between them. During the financial and global crisis in 2008 the general Taylor interest rate, the ECB Taylor interest rate and the OW interest rate are much higher then the ECB rate. Reason for that is high inflation (more then 6%) and positive output gap. After 2008 rules drastically decreased and the same is true for the ECB rate. While the ECB rate and OW have tend to fall from 2010, the general and the ECB Taylor interest rate show tendency to rise, and this is the biggest discrepancy between them. The Taylor rule is at its maximum in 2012 with 5,69% and the ECB rate is at that point at 0,87%. That is almost 5 percentage points difference which cannot be beneficial. The reason for that stems from rising inflation from negative to 2,6% in just one year. By the general and ECB Taylor rule, Slovenia needs restrictive monetary policy and ECB rate and OW rule suggest expansionary monetary policy with negative rates.

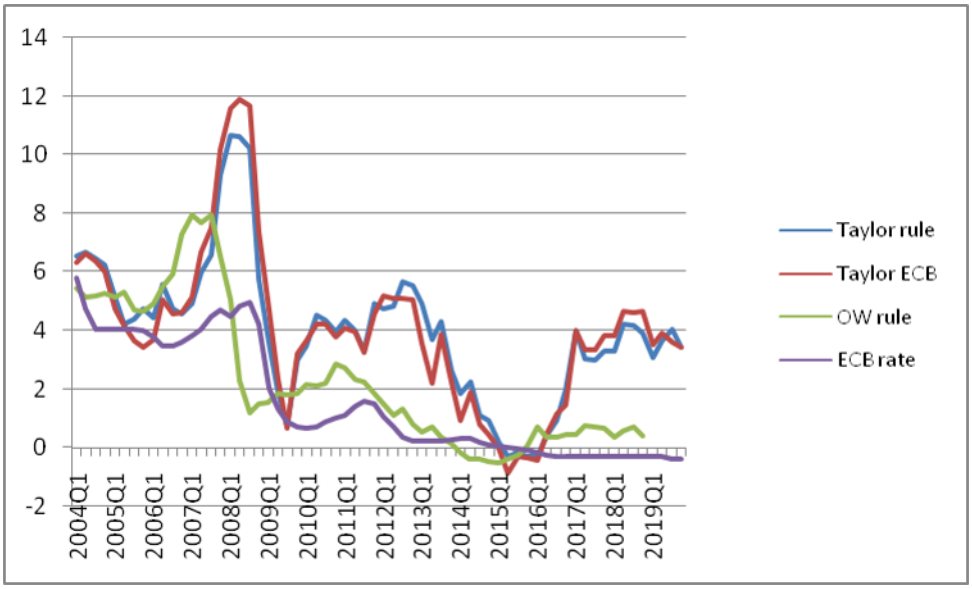

Figure 10: Comparison of monetary policy rules in Slovenia 2004-2019

To come with an overall conclusion, we can group countries in core and periphery. The peripheral group including Greece, Ireland, Portugal, Spain, Malta and Slovenia, while the core group consisting Belgium, France, Italy, and Germany (Nechio, 2011). Until 2008 all countries show closer movements between general and Taylor rule ECB interest rate, Ow interest rate, and ECB rate but in time and after financial and global crisis it is possible to say that significant disparities exist between core and peripheries countries.

Peripheral countries have higher unemployment gap and bigger inflation variation (Nechio, 2011). Core countries have closer movements, most of the time Taylor rule interest rate is close to ECB rate except in financial and economic crises. There is no big differences between Taylor rule interest rate and ECB rate if we leave aside that from 2015 ECB rate is negative. In my opinion, the ECB policy rules best performed for Germany because of the fast recover from the crises. From 2011-2019 Taylor rule is not going above 4% except in 2012. The most unstable country in core group is Italy. Italy shows the biggest volatility in Taylor rule from restrictive to expansionary and then again in restrictive in just two years. If we focus on peripheral countries, we can conclude that Ireland has the best achievement in time period 2011-2019. For i.e. the interest rates according to rules are close to ECB rate which shows the country is stable. The most unstable one are Greece, Spain and Portugal. By the Taylor rule Greece should have had restrictive monetary policy during global and financial crisis, while expansionary in time period from 2013-2016 . That is just quite opposite of for example Germany. Slovenia and Malta are in the average, they didn't have big deviations.

All in all mostly the peripheral countries fell into deep recession, which was followed by a debt crisis. By contrast, recovery in the euro-area core has been more robust. For core countries was suggested prompter and larger decrease in the short-term targeted rate and for peripheral larger increase (Nechio, 2011). The ECB's actual rate is either much too high or much too low for the economic health of the periphery.

5 Conclusion

The primary objective of this thesis is to investigate how well the European Central Bank's interest rate matches the monetary policy needs of ten selected Euro Area countries. For the purpose of this investigation three monetary rules are selected: general Taylor rule, the Taylor rule adopted by ECB and the Orphanides and Wieland rule. In theory Taylor rule is designed to provide 'recommendations' for how a central bank should set short term interest rates to achieve both the short-term goal of stabilizing the economy and a the long run goal of a desired inflation. It is a method to analyze the actions of a central bank (Loide, 2014). Taylor rule in its basic formulation uses current values of inflation and the output gap. The OW rule tries to predict the changes in the policy rate, by looking at deviations of the inflation rate from its target and of real economic growth from potential growth.

The analysis shows that one monetary policy does not fit for all member or to be precise is not optimal. The results indicates that the ECB rate moves close to the interest rates achieved by Taylor and OW rules in the case of Germany while being the farest in case of Greece. After Germany, Ireland has the closest movements between ECB rate an all other rules. There is no bigger deviations which implies that ECB policy rate suited good for Ireland. On the other hand Spain and Portugal have big deviations between ECB rate and Taylor rule interest rate. From that we can conclude that ECB policy rate did not fit well for Spain and Portugal. When members of a monetary union are experiencing different macroeconomic conditions, a single policy rate is unlikely to fit circumstance in all countries (Nechio, 2011).

6 Povzetek naloge v slovenskem jeziku

Evropska monetarna unija je nastala prvega januarja leta 1999 s tem ko je enajst držav članic Evropske unije uvedlo skupno valuto - Evro. Skupna valuta hkrati pomeni sprejem enotne denarne politike, za kar je bilo potrebno izpolniti Maastrichtske fiskalne konvergenčne kriterije glede proračunskega primankljaja in javnega dolga, ter monetarne konvergenčne kriterije glede inflacije, obrestne mere in deviznega tečaja. Glavni cilj take denarne politike je bil postaviti gospodarstvo na pot, ki vodi k stabilnosti cen in ustvarjanju pogojev potrebnih za gospodarsko rast.

Namen te diplomske naloge je bil raziskati kako dobro obrestna mera Evropske centralne banke (v nadaljevanju ECB) ustreza potrebam denarne politike desetih izbranih držav evroobmočja. Izbrane države so Nemčija, Francija, Grčija, Belgija, Španija, Portugalska, Slovenija, Malta, Italija in Irska. Za ugotavljanje učinkovitosti take obrestne mere sem uporabila tri denarna pravila in sicer, splošno Taylorjevo pravilo, Taylorjevo pravilo ki ga je sprejela ECB, in pravilo Orphanides in Wieland (v nadaljevanju OW). V teoriji nam Taylorjevo pravilo zgolj priporoča kako naj centralna banka določa kratkoročne obrestne mere, da doseže kratkoročni cilj stabilizacije gospodarstva ter dolgoročni cilj želene inflacije. Taylorjevo pravilo v svoji osnovni formulaciji uporablja trenutne vrednosti inflacije in proizvodno vrzel, medtem ko OW pravio poskuša napovedati spremembe obrestne mere s preučevanjem odstopanj stopnje inflacije od cilja in realne gospodarske rasti od potencialne rasti.

Analiza kaže, da enotna denarna politika ni primerna za vse članice oziroma ni optimalna. Rezultati kažejo na to, da se obrestne mere izračunane po Taylorjevem in OW pravilu najbolj približajo predvidenim obrestnim meram ECB v državah kot so Nemčija in Irska, kar pomeni da obrestna mera takim državam ustreza. Obenem pa opazimo, da se obrestne mere izračunane po Taylorjevem pravilu bistveno razlikujejo od obrestne mere ECB v državah kot so Grčija, Španija in Portugalska. Iz tega sklepamo, da skupna obrestna mera takim državam ne ustreza in opazimo da kadar se članice srečujejo z različnimi makroekonomskimi razmerami enotna stopnja monetarne politike ne ustreza vsem državam.

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