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Euro Area Monetary Policy Effects on Member States' Business Cycles
- Does One Size Fit All? -

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Abstract

The paper attempts to explore the monetary policy strategy set by the European Central Bank, where one interest rate is set for all the countries in the Euro Area, denominated as the "one size fits all policy", and the significance of its impact on the Economic Monetary Union countries business cycles between two periods that range from 1999 until 2017. The process englobes a discussion on how such policy is determined, the previous theory that regards the construction of a common currency area, a quick look of the structure of the ECB as an institution and the consequence of its monetary policy in Euro Area countries.

Key words: Currency Areas, ECB, EMU, Monetary Policy, OCA

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Abbreviations

ECB	European Central Bank
EMU	Economic and Monetary Union
ERM	Exchange Rate Mechanism
EU	European Union
OCA	Optimal Currency Area

1. Introduction[1]

As an essential part of the European unity and cooperation, the Economic and Monetary Union (EMU) gathers all member states of the European Union in order to integrate its economies and further on managing the application of common economic policies throughout the union. Even closer integration has been undertaken by a group of member states forming the Euro Area, which have accepted to not only aim towards mutual economic aims through coordinated policies, but also to give up sovereign monetary policy and use a single currency under the control of a common European Central Bank (European Commission, 2018). The Euro Area originates from 1999 when 11 out of then 15 member states of the EU abandoned their respective national currency to instead adopt the Euro and leave the supervision of the monetary policy to the ECB. Not only was this of ground-breaking nature in the history of international monetary policy but also for the European unification itself. Being deprived of vital macroeconomic tools, namely devaluation and interest rate adjustments, implies in fact giving up a large amount of sovereignty as a nation state. It thus meant the highest degree of incorporated political and economic union the continent had ever experienced (Dyson, 2000).

The monetary union was historic and pioneering in the post-war period of European collaboration. A shift of economic and political power of such magnitude had not been observed since the treaty of Rome 1957 where the founding six countries of the European cooperation; Belgium, France, Germany, Italy, the Netherlands and Luxembourg formed the European Economic Union (EEC) and agreed on a common market with free movement of goods, people, services and capital (EU-Lex, 2017). Some decades later the collaboration had progressed into a proper union stretching over a large part of the European continent. The ambitions for a common currency and monetary policy had been a vision for years within the EU. Henceforward in 1999 the national currencies for the eleven original states of the Euro Area were drastically locked together to form the Euro and an entirely new currency arose on the global market. Several independent countries were now to be controlled by a single central bank and a mutual monetary policy. The former system of the Exchange Rate Mechanism (ERM I), which had functioned as an economic stabiliser by controlling and keeping the exchange rate between the national currencies stable, was phased out. It was instead replaced by the new single currency and the new mechanism simply called ERM II, which in a similar manner is

[1] The authors are grateful for the valued comments and consultation from Klas Fregert at Lund University.

managed such as to prevent the exchange rate between the euro and other currencies used in the EU to fluctuate beyond certain limits (European Commission, 2018).

The physical entrance of the Euro currency occurred 2002 and further on eight more member-states have joined making it a 19 countries strong monetary union. The new major player in world economics and cooperation was naturally a great accomplishment for the European unity and hence a distinctive economic statement from the EU to the world. However, remaining was the management of the monetary policy of the new union and currency, containing economies of various different characteristics and historical backgrounds. Germany with its *Bundesbank*, which had long been an anchor for other EU-currencies, was now to use the same currency as economies such as the ones of Greece and Italy, and thus sharing the same monetary policy. A task the EU had not previously faced. The single currency had certainly potential in a continent of prosperous development and was aimed to facilitate the economic integration and mutual growth as a union, but nonetheless it implied huge challenges. Applying monetary policy on a national scale indicates observing the business cycle and adjusting interest rates accordingly to stabilise and promote the best possible economic developments. Nevertheless, working with monetary policy which stretches over a large number of different economies experiencing phases of the cycle at different times, and with diverse fiscal policies, is a challenge of another nature. The main objective set by the ECB was to stabilise the inflation rate and keep it below 2 %. Thus implying adjusting the interest-rates so that the annual increase of the harmonised index of consumer prices remained lower than the decisive 2 % limit. A reasonable aim which is set by many Central Banks with the key interest rate as its tool. Predicting the inflation and adjusting the interest rate accordingly in a union consisting of countries with varying consumer patterns, housing and financial markets henceforth demands enormous precision and could naturally be of uttermost difficulty (Dyson, 2000).

Studies have shown that there are significant macroeconomic imbalances within the Euro Area, and research highlights particularly disparity between the northern and southern parts of the area. The imbalances show substantial diverging levels of macroeconomic factors such as capital, spending, consumer prices and unemployment. Adjusting monetary policy for the entire union stresses overall fiscal discipline, which have been lacking due to no existing centralised fiscal authority. The risk is thus that countries reacts differently to the set interest rates, and hence the monetary union loses efficiency and actual control of their prime economic tool for keeping the Euro Area and the single currency stable. The differentiating financial structures of the countries is argued to have caused a too expansionary monetary policy in certain countries, and thus even extending the imbalances. With regards to the business cycles

of the Euro Area members, studies of data show that the disparities between Northern and Southern countries are drastic to the extent that they seem to be negatively correlated (Gros, 2012).

In the times of post-financial crisis, the Euro Area has thus been questioned for its capabilities and the efficiency of its monetary policy. The difficulties it is facing, namely the macroeconomic imbalances, the lack of common fiscal discipline and different political and economic characteristics of its member states have challenged the visionary idea of the single-currency union; and hence the major flagship of the entire European cooperation and unity. The purpose of this paper is subsequently to examine the level of impact which the ECB interest rate has on the business cycles of the member states. Hence the defining research question of the paper is "Does the ECB "one size fits all" monetary policy strategy function efficiently throughout the EMU?"

An analysis of the research and findings of the topic will be made along with econometric regression analysis of business cycles data of the Euro Area countries. Data of output gap, interest rate, primary government balance and inflation for each Euro Area member state was extracted from the OECD database. Output gap is used as a measurement for a member state's business cycle and is set as the dependent variable. Further on interest rate and primary government balance is set as the independent variable to test for the impact of the ECB's monetary policy on the business cycles. Data of inflation was utilized in calculating the optimal interest rates through the Taylor rule. The data is thereafter separated in two periods; a pre- and post-financial crisis period to test for variation before and after the Euro Area debt crisis. We are thus specifically interested in the various effects of the monetary policy on the different countries making up the EMU. Are the differences of these impacts such extent that it can be concluded that the 'one size fits all' is not applicable, or can a general trend of sufficient convergence be observed? Another aspect of study in this paper is the differences pre- and post-financial crisis.

With the calculations for optimal interest rates, a further comparison to what the ECB interest rate is made. It can henceforth be analysed whether some national economies show tendencies of being more suited to the ECB monetary policy than others.

Finally, with results from the regression we undertake an estimation procedure, where the average growth rate is calculated, providing a space for an exercise in the results of the passed monetary policy as well as results utilizing the optimal interest rates, this leads us to a comparative analysis.

The findings of this paper are in accordance with the previous research and common consensus regarding the EMU and its role as a currency area. Within lies great potential, although the common monetary policy faces problems, as it struggles to fully integrate with the criteria concerning Optimal Currency Areas (OCA). The non-similarities in member states' business cycles remain a huge challenge for the efficiency of a mutual interest rate which leads us to question again if the "one size fits all" monetary policy strategy is optimal.

The paper commences with a literature review of the topic, examining the previous research done in the field of currency areas and how it relates to EMU and the monetary policy of the ECB. A theory section is followed which treats the theoretical aspects of currency areas and the management of a common monetary policy by analysing the procedure and the institution that perform them. Subsequently the econometric testing is described in the methodology section, and the dataset is presented. Finalising, the paper's results are analysed and presented along with final concluding remarks.

2. Previous Research

A substantial portion of the present discussion and consensus in terms of monetary unions and currency areas originate from Robert A. Mundell's influential paper on the topic from 1961 (Mundell, 1961). Mundell's research proposes a theory of optimum currency areas (OCA), referring to the visionary monetary plans in Europe. Mundell argues in the paper that economies with similar characteristics have potential to benefit from a single currency given some significant criteria. According to Mundell, it is essential that there is a certain level of labour and capital mobility as well as flexible wages and price levels in order to reach success as a currency area. This indication of a developed economic integration implies that labour can move easily around the union without visa processes nor other slowing bureaucratic administration. Similarly, capital needs to flow freely so that trading between each other is facilitated and exchanging financial possessions occurs smoothly. The theory claims that this promotes a boosting economy as trade is stimulated, as well as enabling the allocation of capital to the economic entities within the currency area where it is currently most needed. The mobility of capital is incorporated in the next criteria which highlights the importance of a shared currency risk system; so that economic entities, countries or regions need to distribute the economic resources to the weaker parts for the good of the union as a whole. This is currently observed in the case of the Greek debt crisis, and the difficulties of establishing this kind of idea in the domestic politics of individual surplus countries such as Germany. Mundell lastly discusses the significance of similar business cycles; in order to operate a common monetary policy of a currency area, it is necessary that the countries' business cycles correlate sufficiently so that booms and busts are shared, and the Central Bank's policies can efficiently control inflation, prevent stagnation and keep price levels targets throughout the entire union.

Mundell stresses that these criteria are crucial for the currency area to be able to respond to demands shocks. The theory exemplifies it by stating an imaginary scenario where demand is shifted from country A to country B within a currency area; causing a rise of unemployment in A and inflationary pressure in country B. Mundell hence states that the necessity of mobility of labour and capital is demonstrated in this scenario. The shift in demand will cause labour to move from A to B and mitigate the unemployment as well as the inflationary pressure in the two countries. As wages and price levels are flexible these will accordingly respond to the shift in demand and the labour movements, making a mutual monetary policy for both A and B efficient and functioning.

Mundell's paper and theory of optimum currency areas from 1961 have been highly influential in the discussion of currency areas and have hence been both criticised and developed. McKinnon (1963) published a paper which not only treats labour mobility in the geographical aspect but also in terms of industrial differences. In this scenario the countries, or regions of a currency area, A and B are both specialised in different industries and hence produce different type of goods. Hence if the demand for the A-products decreases as a consequence of some shock in region A and is due to the highly specialised production not able to produce the products of type B. Here as in the case of Mundell's theory, the mobility of labour and capital as well as flexibility of wages and price levels will hence mitigate the problems arising. If such mobility is existing throughout the area, then the theory claims that it is suitable as a monetary union. McKinnon (1963) also contributed to the OCA theory by stating the significance of the openness of the economy. The higher the degree of openness in an economy is, the more suitable to be part of a currency area it is argued to be. The openness of the economy implies a stimulated trading environment which in turn results in less risk for money illusion, i.e. the misleading belief of one's wealth based on nominal rather than real terms. A flexible exchange rate would thus be inefficient for adjusting wage and price levels and consequently it is beneficial to be part of a currency area according to the theory.

Further on the theory was developed by Peter Kenen (1969) who questioned the idea of absolute labour mobility and instead put focus on the products diversification of a region or a country (Kenen, 1969). If a region does not have a diversified production, and for simplicity only produces and hence exports a sole product, it creates a huge vulnerability to demand shocks. A sudden drastic drop in demand for this type of product results in an extreme loss of export revenue, which however is possible to alleviate through a flexible exchange rate according to Kenen (1969). It is argued that this is due to the fact that a depreciation of the exchange rate will make it more attracting to import from the region as foreign currency increased in relative purchasing power, i.e. the importer trades cheaper due to the depreciation of the exporter's currency, and the loss in revenue is thus compensated and relieved. For a region with a low degree of product diversification and a fixed exchange rate, this mechanism for responding to demand shocks would not be possible. It is henceforth the conclusion of Kenen that highly diversified national economies are more resistant to demand shocks and are thus more suitable to benefit from a common currency area.

The theories established around OCAs have entered an empirical phase with the creation of the EMU and work has been done to test these theories using the Euro Area as a platform for the testing. The economic integration in Europe has to a high extent developed accordingly to

the OCA theories. The free movements of labour and capital within the EU is a crucial step of integration in order for a currency area to be formed, as Mundell stated in his paper 1961. The other factors defining an OCA, such as openness of economy, product diversification, high levels of common trade, flexibility of price and wage levels and similar business cycles have been of great interest for economists to study in the case of EMU. In many senses the EMU does have many of the criteria needed for being a suitable currency area, and the economic integration of Europe is already rooted as it has been ongoing since the 50ies (Mongelli, 2002). However some characteristics of EMU do not match the OCA theory, namely the fiscal and financial integration and the synchronisation of business cycles. The imbalances in macroeconomic aspects between mainly the northern and southern countries and lack of fiscal integration across of the Euro Area interferes with the criteria of the OCA theory, and has consequently been causing problems (Gros, 2012).

It has been argued by researchers that, although formal convergence requirements as part of the Maastricht criteria, the selection of members into EMU has been characterised by political motives rather than criteria of technical nature (Vieira and Vieira, 2011). The authors reason that differences in economic structure between parts of the region were overlooked at the onset of the EMU during the end of 1990ies for political reasons. The symbolic importance of EMU for Europe's unity, collaboration and integration is a very strong political drive which could possibly have had such impact when forming the union that it disregarded what studies of OCAs had constituted. It is also discussed that countries willing to adopt the Euro but did not meet the requirements of the OCA theory, would eventually do so by entering EMU. The monetary integration would successively help these lagging national economies to catch up and meet the criteria of the OCA theory (Frankel and Rose, 1998).

Comparisons with the US in the late 1990ies revealed some lacking properties of EMU being an OCA. In terms of labour mobility, studies showed that it was up to three times higher in the US than in Europe. It was shown that drastic US unemployment increases due to demand shocks were less damaging than in Europe due to a much higher level of labour force movements across regions. Furthermore, research showed that it was lacking in sufficient wage and price flexibility, financial market and fiscal integration as well as similarities in inflation and shocks to some extent. This further enforces the argument that the EMU creation was to a higher extent driven by political ambitions rather than economic theory-based policies (Mongelli, 2002). More recent literature by Mongelli also point to these very facts that OCA theory was put aside in favour of political purposes. In a thorough study Mongelli (2008) highlights the ten years anniversary of the decision to move to the third and final stage of the

EMU process from an OCA perspective. Again, it presents flaws in the creation of the EMU which was caused by it not being driven entirely from a technical view point with the economic theory of OCA as the backbone, but rather as the political flagship of the European unification progress (Mongelli, 2008).

Hence literature regarding the OCA theory and the development of EMU does in significant consensus conclude that although numerous advantages, there are many crucial flaws which is a consequence of not backing policy-making with a theoretical and research-based ground. This has resulted in a monetary policy which has been hard to manage throughout the entire currency area and its various regions and differentiating business cycles.

3. Theory/Model

The European Central Bank

To study a monetary union like the Euro Area we should also develop an understanding under which conditions this union has been established, as well as the role and model of the European Central Bank that in its own acts as one of the main agents in economic policy within the monetary union. Under the Maastricht Treaty the format in which the European Central Bank was constituted had been stated. From the possible structures brought forward, it is agreeable to say that the ECB was based on the German model of central banking. This model consists of an institution that has price stability as the center of its objectives, alongside a structure that is shielded from political influence in order to maintain the focus on the price stability objective above other policies, such as stabilization of output. This however does not limit the actions of the ECB but rather prioritize price stability over any other policy, pursuing other policies is possible if price stability is not jeopardized (De Grauwe, 2009).

The economic school of thinking that supports the independence of central banks is regarded as the monetarist school of thought, which ascended after heterodox economic policies fell out of favor around 1970's, gaining momentum with economists such as Milton Friedman (1968). As De Grauwe (2009) suggests, the implication of an independent central bank revolve around better performance for output gap and price stability, even though this research has its reservations. The ECB is henceforth considered as one of the most independent central banks in western economies.

This independence however comes with the question of accountability. The ECB is not as accountable for ample public and political exposure such as the Federal Reserve Bank for example. It is susceptible for changes and responsibilities exerted by the European Council, but the changes in its policies, members and representatives is not as open and a much more bureaucratic process than a national central bank. In contrast with the FED which is accountable by the United Stated Congress in its policy performance, the ECB has the European Parliament, but such institution is much decentralized in the sense that there is a lack of unity in correcting ECB policies relies in much wider spectrum of political implications within the member countries.

The ECB has the responsibility and control over monetary policies but as far as it concerns regulations and control of national financial and banking systems this responsibility

is delegated to the host countries with a so called, *host country responsibility & host country control*. This enables national banks and economies to formally legislate and regulate their banking systems, which also has led to asymmetries within financial systems in the Euro Area, as the increasing and varied foreign ownership of private banks throughout the country (De Grauwe and Westerman, 2009).

Another complex factor of the ECB is its governing structure for approval of policies. When it was first founded, a simple majority would convey a decision in which policy would be taken. This however, represented a problem, where governors of smaller economies could organize themselves to vote for policies unfavorable to the main economies in the region. This could lead to the approval of policies that would be counterproductive for the bigger magnitude of economies in the Euro Area, leading to negative impacts in the region.

To address this issue, changes have been made in a way that the size of a country's economy would influence its power of vote. This has been implemented more recently when the number of members inside the Euro Area surpassed 19, as seen in the ECB's bulleting 2002, "the frequency in which they can participate in the voting will depend of the relative size of the country they come from". When devising the adequate interest rates, the ECB brings forward the magnitude of the economies within the monetary union, having this as a medium for its policies. Such approach has been criticized in the grounds that it leaves much to be accounted for smaller European economies and exposing decision for the wider region to the pursuit of national interests.

Finally, one of the core issues when understanding the position of central banks regards its main goal. For the Fed the first objective to be discussed besides price stability is the movements of employment, giving the central bank certain responsibilities regarding this issue which in turn can be heavily associated with output stabilization. When we consider the ECB, a closer read in the Maastricht Treaty shows that the current interpretation of the ECB is restrictively associated with price stability (De Grauwe, 2009). From this point we move on to describe the theory and methodology behind the ECB's Monetary Policy Strategy.

ECB's Instruments for Monetary Policy

To carry out its function as a central bank, the ECB is candid for a set of tools that are traditionally assorted to this sort of monetary institutions. These tools consist mainly in Open Market operations, Standing Facilities and Minimum Reserves. We proceed in describing these tools to understand how the ECB controls short-term interest rates.

The ECB uses four different procedures in Open market operations in order to conduct policies in influencing the money market, structuring liquidity and interest rates. This is the most common and frequent tool utilized by the central bank. In these procedures the ECB establishes a repo rate where through refinancing of reverse transaction in tender procedures it negotiates with in the market and financial institutions. Thereafter changing liquidity levels in the Eurosystem and establishing the short-term interest rates. These procedures consist of (European Central Bank, 2018):

- **Main refinancing operator**. These are assessed as the main provider of liquidity and refinancing for the financial sector in the Eurosystem. Provided usually with the maturity of one week, these tender transactions are decentralized and operated by the National Central Banks with the objective of carrying out the ECB's open market operations strategy.
- **Long-term refinancing operators**. Similar to the main refinancing operator this process has a longer maturity of up to 48 months. As these operations are non-regulatory the ECB activates them when it deems necessary for their desired monetary policies.
- **Fine-tuning operations.** When an unexpected fluctuations in the ECB's liquidity target occur or the bank intends to steer interest rates policy. These can be done through tender processes of reverse transactions or other means according to what the ECB's deems more effective in dealing with a respective anomaly.
- **Structural operations.** The finality of these operations is to stabilize and balance the position of the Eurosystem in regard with the financial sector. The ECB evaluates changes needed to attain certain equilibria and in regard with which institution these operations need to occur.

The second instruments of the ECB are denominated as Standing Facilities. These are defined as operations that can be taken by National Central Banks in order to attend overnight liquidity and operate in overnight markets with interest rates that are usually 1% above the main refinancing operator (De Grauwe, 2009). For the overnight lending marker there are Marginal Lending facilities as well as Deposit Facilities for overnight deposits.

The last typical instrument in the ECB monetary policy arsenal is the establishment of Minimum Reserves for banks. Here the ECB has established the level of reserve banks must keep. The establishment of the Minimum Reserve impacts the banks capacity in credit expansion, as well as the money stock available in the market. From the argument of losing

competiveness with international banks that don't have Minimum Reserve constraints; private banks receive a calculated interest on the reserve quota that is held (De Grauwe, 2009).

Monetary Policy Strategy

The main goal of the ECB, which is the pursue of price stability, has been translated in the inflation target of below, but around the mark, of 2% a year. As the foundation for achieving this goal, the ECB relies on two pillars that define its Monetary Policy Strategy. One is the total money stock available in the Euro Area and the changes in such stock. This is calculated with the quantity theory and expressed through the log linear form:

$$m + v = p + y$$

The ECB monitors the money growth according to its estimations and forecasts of output growth accompanied by future inflation targeting and velocity forecast. With this model the ECB will forecast money growth that if exceeded might or might not spark a reaction of the bank for raising or lowering short-term interest rates, depending on the economic conjecture (De Grauwe, 2009).

The second pillar that derives the ECB utilizes to derive its Monetary Policy Strategy, is a collection of variables that promote a concrete estimation for forecasting future inflation. Within these variables are included: wages, exchange rate, bonds prices, measures of real economic activity, and various indices of price, business and consumer activities (ECB Monthly Bulletin, January, 1999, p.49).

Overall, after stablishing a target of 2% inflation, the ECB has done a commendable job in keeping its promise of maintaining this target. From December 1999 up until June 2018, the average rate of Harmonized Index of Consumer Prices (HICP) has been 1.7%. Considering that the ECB has a complex task of setting interest rates and adjusting monetary policies for a relation of 19 economies with complications of asymmetric shocks, this result even if indicates the restrictiveness of the ECB towards price stability, shows that the institution has found some success here.

However this brings a discussion in which the strict objective of price stability might compromise the overall wellbeing of European economies, when the central bank is faced with the trade-off between its inflation target and financial stability. In the last two decades this trade-off has come into play more explicitly, leading some authors to contest the inflexibility of ECB in situations of financial instability, with the argument that in face of bubbles in asset markets "central banks should have put their inflation target aside so as to guarantee financial stability" (De Grauwe, 2009, p.207).

The Taylor Rule for Optimal interest rates

When we consider the strategy behind monetary policy strategy there are a range of variables that come into account. From the evolution and differentiation of price levels, to forecasting the increase in money supply and real output, the debate between discretionary monetary policy and a set of rules has been constantly evolving. From the article of John B. Taylor (1992), we decided to utilize the simple rule devised by author. Where, under the assumption of rational expectations, the formula is designed to indicate the optimal interest rate to be set by the monetary authority. With the objective of responding to changes in output and inflation, given an established inflation target. The rule in question is the following:

$$i^* = \bar{r} + \pi + 0{,}5(\pi - \pi^*) + 0{,}5(y - \bar{y})$$

The optimal interest rate is calculated from the previous inflation rates, output gad and the suggested stabilizing parameters of 0.5 proposed by Taylor (1992). This strategy was undertaken on the intent of simulating and further analyzing the results obtained from the regression with the interest rate set in the period under study by the ECB and compare it with the result of what a proposed optimal interest rate strategy would have looked like.

This is an exercise of comparing the dimensions and reach of these two different approaches for monetary policy. It is important to state that we acknowledge the complexity in devising monetary policy. A mechanical rule should not be the absolute parameter for establishing complex economic stimuli that are susceptible and related to a diverse ray of other factors not included in this research.

However, we have focused on the study of pure monetary strategy, and by comparing these two lines of policy, the discussion of the “one size fits all” monetary policy can be discussed in further depth.

The Hodrick-Prescott Filter for Business Cycles

With the objective of capturing the essence of cyclical components in the output trend, and administering it in a model where we could correlate the variables of monetary and fiscal policy within the different phases of the GDP trend, we applied the Hodrick-Prescott filter. By following the treatment the composition of approximated percentage growth rates cycles has been achieved (Hodrick, R. and Prescott, E. 1997, Sorensen, P. and Whitta-Jacobsen, H. 2010). Through those filtered cycles we were able to observe the changes in business cycles. We were able to apply our model and obtain estimations as well as coefficients of correlation in order to

interpret the effect of the ECB's monetary policy, optimal interest rates and ultimately compare these effects through the multiple countries in the Euro Area.

4. Data and Methodology

Data

The data for all variables used was gathered for the 14 available EMU states from the OECD database (data for Cyprus, Lithuania, Slovakia, Latvia and Malta are not available in the database or don't have enough parameters for analysis) in addition to the general aggregate Euro Area. All variables are presented in quarterly data and the time span ranges from Q1:1999-Q4:2017 (OECD, 2018). This time span was then divided into two periods. Where Period 1 ranges from Q1:1999-Q4:2008 and Period 2 concerns Q1:2009-Q4:2017. To test the degree of impact of the ECB monetary policy in the Euro Area, data for ECB interest rates throughout the member states was collected to use as exogenous variable. As the endogenous variable, the member states' business cycles are estimated with data of output gaps. The following variables are thus applied in the model:

Business Cycles

The endogenous variable is a measurement of each member state's business cycle in the Euro Area. The data used is output gap from the OECD database which implies the economies' deviations of actual GDP from potential GDP as % of potential GDP. To study the extent of impact which the monetary policy of ECB has on the Euro Area, this variable is tested to see if it is significantly affected by the interest rate as well as the other control variables.

Interest rates

The main tool for the monetary policy of ECB is setting the key interest rates throughout the currency area. This is thus set as the exogenous variable to test the level of significance of its effect on the economies' business cycles. Hence the most essential variable in examining the impact the common monetary policy in fact has on this currency area with such varied fiscal and economic structures between countries.

Primary Government Budget Balance

Data presenting the Euro Area governments' proposed revenues and spending for a financial year. It is presented as a percent of potential GDP, and it is either a budget surplus if a positive value or a budget deficit if a negative value. This variable indicates whether the Euro Area states are running expansionary or contractionary fiscal policies. A budget surplus hence implies a contractionary fiscal policy as public spending is lowered and/or taxes are raised in order to fight inflationary pressures. Vice versa, a budget deficit implies an expansionary fiscal policy as public spending increases and/or taxes are lowered to fight recessionary pressures and

risk of deflation. A hugely relevant and significant variable because of its association with business cycles. As the Euro Area is solely a monetary, and not a fiscal union, all countries run their sovereign fiscal policy to stabilise the financial balances. It is henceforth an exogenous variable of great interest in the regression analysis.

Stationarity

From dealing with output growth and business cycle fluctuations we expected our dependent variable to be stationary from theory. As data treatment we have performed the Augmented Dickey-Fueller test in all our dependent and independent variables, finding that as expected they fulfil the stationarity criteria as expected.

Model

As we discuss the business cycles of countries within the Euro Area and the effect of a unified monetary policy on their peaks and troughs, we focus on the building our model in a way that would express the relationship between the monetary policies that were applied in future periods of the business cycles, as well as what we have understood as the fiscal stance on such countries. The variable we decided to consider to represent fiscal policy as a representation of fiscal stance has been primary government budget balance, being the budget in which the said state has managed to uphold during the periods, be it a contractionary/austerity stance (which would translate into positive primary balance, or an expansionary stance (which would be indicated by a negative primary government budget balance).

Similar assumption is made in regards of what type of monetary policy has been introduced, as a reduction in interest rates is seen as an expansionary monetary policy and an increase in interest rates as a contractionary monetary policy. Nevertheless, whichever state of these two independent variables we understand that there is a delayed response in their impact for changes in the business cycle. Therefore, we have chosen a Finite Distributed Lag (FDL) model, where the regressors have two lags each, depicted as followed:

$$Y_t = \beta_0 + \beta_1 X_{t-1} + \beta_2 X_{t-2} + \beta_3 Z_{t-1} + \beta_4 Z_{t-2} + \varepsilon_t$$

Where $Y_t$is the cyclical component of the output gap shown through the Hodrick-Prescott Filter, $X_{t-1}$is the one time lag of the short-term interest rate set by the ECB, X_{t-2} is the two time lag of the short-term interest rate, Z_{t-1} represent the first lag of the primary budget

balance for each respective country and Z_{t-2} the primary budget balance in with a lag of two terms.

With the intent of studying the relationship of interest rates and primary budget balance on business cycles of countries in the Euro Area, this model has been reproduced with data from the business cycles of all countries under study, followed by the regression of the aggregate Euro Area itself.

The broad repetition of this model for the data of 14 countries has been done with the basis of acquiring a broad sense of the relationship of the regressors on a plurality of economies and their cycles. The time gaps have been chosen on the intent of investigating if there would have been a change in the relationship of business cycles with interest rates and government primary balance in a period leading up to the 2008 Euro Area debt crisis and the period post-crises.

The reason for choosing two lags for each of the independent variables are the denominated response time for the reaction on the business cycle to occur. As a short-term interest rate is set we expect to observe the impact of such change throughout the next two periods, being that we expected the desired or predictable reaction (Sorensen, P. and Whitta-Jacobsen, H. 2010) to be presented on the second period. Similar should occur in the case of primary budget balance, in the case of the position taken by the government today will impact the business cycle on the following two quarters.

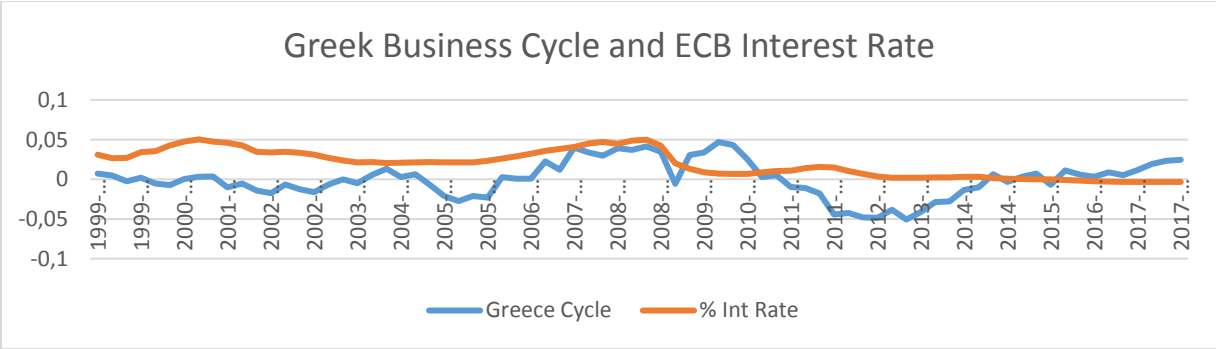
In order to further discuss the "one size fits all policy", we estimated the optimal interest rate through the Taylor rule (1992), for all the countries being examined. After obtaining this data, the X variable in our model above is substituted while all other parameters kept the same. This exercise was done with the intent of comparing results from different sources and further testing the monetary policy strategy. Where we were able to compare the result in a simulation where countries followed the optimal interest rate as a monetary policy strategy.

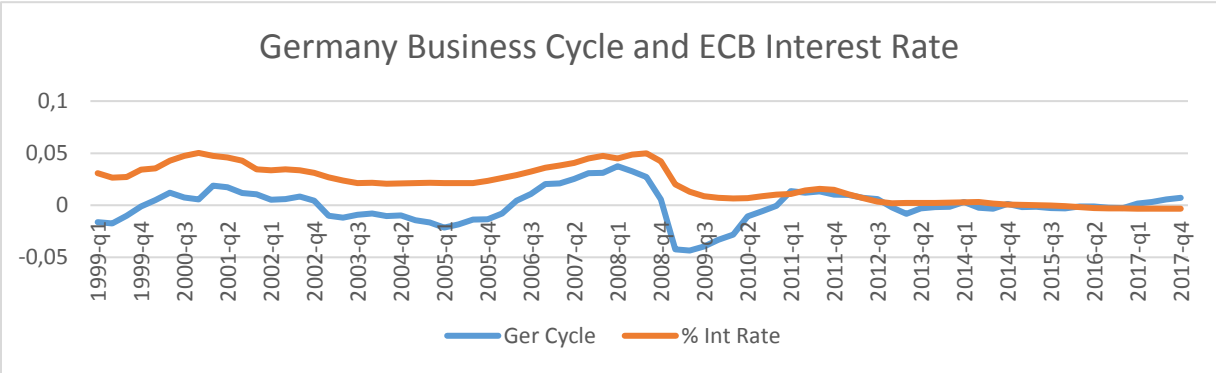
5. Results

As argued by several economic researchers, the problem facing the EMU is the fact that it is managing a common monetary policy in a union with economies of a range of different

characteristics (Dyson, 2000). According to established theories concerning currency areas, a mutual monetary policy is dependent on a number of other factors which allows for a sufficient level of economic integration within the area. The significance of free mobility of labour and capital as well as similar business cycles, as previously described, is of main importance for the sake of the well-being of the currency area (Mundell, 1961). It is thus from these grounds that this paper has been focusing on examining the impact of the ECB's monetary policy and the difficulties it can be facing due to the Euro Area's flaws in these aspects.

A simple visualisation of the business cycles throughout the EMU indicates the interference with the essential criteria regarding OCA theory. As the European Cooperation has long worked for further political and economic integration, the EMU does have much potential and free movement of labour and capital is in fact operating throughout the entire union. A level of economic integration is most definitely reached, and there are requirements in order to adopt the Euro as currency which measure price stability, soundness and sustainability of public finances, exchange rate stability through ERM II and long-term interest rate (European Commission, 2018). However, the capacities of countries absorbing asymmetric shocks vary, as well as the country's capacity for mandating adequate and stabilizing fiscal policy. This can be observed when, for instance, analysing two counter-pole economies of the EMU; Germany and Greece.





The German business cycle follows quite smoothly the movements of the set ECB interest rate and is a visualised example of a functioning monetary policy. Germany also is and has de facto been the dominant economy of the EMU as well as the entire EU. The German economy is the largest, but most importantly has shown a high degree of macroeconomic stability and a fiscal discipline not comparable to other economies in the currency area, mainly in the southern regions (Gros, 2012). The Greek business cycle on the other hand shows signs of an unhealthy relation to the interest rate. It demonstrates no real correlation and indications of pursuing the interest rates movements. In the years of 2008-09 a contradictory situation appears as the interest rate in fact is slightly decreasing and kept low, although the cycle has already shown clear tendencies of an upward phase and thus a boom. Low interest rates in combination with this peaking cycle would imply a dangerous situation where an economy already in risk of overheating causing inflationary pressures is stimulated even further with increased public consumption and less savings due to the favourable interest rates. It is thus an indication of the macroeconomic imbalances within the EMU and the problems the common monetary policy consequently faces.

Proceeding with this analysis (refer to Table 1 in Appendix), the data involving business cycles, interest rates and primary balance, was run as regressions concluding rather contradictory results to what was expected. The monetary policy of the ECB tends to affect some countries' cycles more than others and with clear different magnitudes, however still having a significant impact in most business cycles. This contradicts previous research and the graphical visualisations of the different behaviors of the business cycles in response to the interest rate.

Most business cycles in the first period, pre-financial crisis, seem to mostly react to the interest rate in the two-lagged model, as the desired effect should be higher interest rates leading to a down phase-going cycles and hence a negative impact. The significant results for the one-lagged models show positive impact which is quite irregular, however this could be misguiding as the change in interest rates need time to be absorbed by the economy and give the desired effect. The focus of attention and interpretation is hence on the two-lagged models where the effect of the interest rates have had time to influence the business cycle.

An interpretation of this firstly specifies that the monetary policy does have an effect on the EMU as a currency area to some extent, however taking into account that a number of economies do not respond in the same proportions or as the ECB's monetary policy strategy desired. As reasoned previously, we asses that the 'one size fits all' monetary policy may

become inefficient and potentially counterproductive to some countries because of the irregular effect on business cycle movements. As shown in our results that the proportion in which monetary policy affects business cycles can vary distinctively, potentially leading to undesired outcomes. A highly interesting aspect is the substantial difference after the financial crisis, where more significant results can be observed while some countries badly hit by the debt crisis, such as Greece and Ireland, are showing the worst results. This can be interpreted as the results of tighter convergence requirements and austerity packages. The problematic factors of the 'one size fits all' monetary policy may also represent underlying causes.

When we use our model in the general Euro Area business cycle we can observe that the one lag interest rate has a positive coefficient and high significance. In the period from 1999 to 2017 and the second period, from 2009 to 2017, we can observe that the two-lag interest rates reacts negatively as expected, as an increase in it will lead to a negative reaction of the business cycle. These results show that in extended period, the ECB's monetary policy has been having an impact in the region's business cycle.

However, the observed result for the second period, from 2009 to 2017 are interesting as they indicate that monetary policy had had been absorbed by the Euro Area business cycle, projecting the idea that the ECB's monetary policies are having a strong impact throughout the Euro Area.

We have developed a table (in Appendix) for analysis of all the countries' business cycles that have gone through the established model. There is a certain level of synchronization of the effect of the ECB's monetary policy throughout the countries in the Euro Area.

When we compare the results for coefficients utilizing the optimal interest rates calculated with the Taylor rule, we found that in more occasions the magnitude or significance of the results yielded were worse than the interests rates set by the ECB. This result can be considered positive as it indicates that even with the discrepancies in the effect of its monetary policy, the ECB can impact business cycles.

After the assessment of the regression, we move on to the analysis of estimation of average output growth. From Table 2 (Appendix), we can observe that frequently the average output growth of actual business cycles tend to be relatively smaller than the estimated output, may they be with the simulated optimal interest rates or the ECB's established interest rates. From this result we interpret that in our model we were not able to capture all the different shocks or the most impactful ones that affected the Euro Area and its countries in the periods under study.

6. Conclusion

The question regarding the ECB's monetary policy strategy, where a position of a "one size fits all" is adopted has been tested in this paper. Through a simple repetitive model the impact of such policy has been inspected. The assumption that a standard policy can successfully fulfil the needs of various business cycles from very structurally different countries seems to be erroneous. However, through our test we have found that the ECB's monetary policy has significantly impacted most of the countries under study, be it in a period before or after the 2008 Euro Area debt crisis. Closely looking at the results we have concluded that the ECB's "one size fits all" strategy is indeed regulating and affecting countries business cycles, but in a very dispersed and varied manner. Nevertheless the monetary authority is being successful in affecting Euro Area countries but the magnitude and overall success of such impact can still be considered relatively irregular.

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Appendix

Table 1: Regression Results

Business Cycles/Explanatory variables	Coeffiecient of Correlation			
	Period 1		Period 2	
	t-1	t-2	t-1	t-2
Euroare				
Interest Rate	0.00731***	-0.00137	0.0206***	-0.0226***
Primary Balance	-0.000168	1.44e-05	0.0159***	-0.0161***
Optimal IR	0.00451***	-0.000883	0.00326**	-0.00315***
OIR Primary balance	-0.000140	9.16e-05	0.0151*	-0.0139*
Austria				
Interest Rate	0.0168***	-0.00898*	0.0259***	-0.0247***
Primary Balance	-0.000223	-5.66e-05	0.00681	-0.00563
Optimal IR	0.00733***	-0.00391*	0.00696***	-0.00279*
OIR Primary balance	-0.000183	-0.000224	-0.000899	0.00703
Belgium				
Interest Rate	0.0158***	-0.00963*	0.0252***	-0.0203***
Primary Balance	-0.000143	-0.000287**	0.0162*	-0.0131
Optimal IR	0.00284*	-0.000540	0.00417***	-0.000979
OIR Primary balance	-8.17e-05	-0.000371**	0.00734*	0.00191
Estonia				
Interest Rate	0.0446***	-0.0262***	0.0368***	-0.0485***
Primary Balance	-0.00335***	0.000975*	0.0705**	-0.0678***
Optimal IR	-	-	-	-
OIR Primary balance	-	-	-	-
Finland				
Interest Rate	0.0217***	-0.00175	0.0332**	-0.0328**
Primary Balance	-0.000678***	6.22e-05	0.0374**	-0.0364**
Optimal IR	0.00435**	0.00284	0.00722***	-0.00355*
OIR Primary balance	-0.000803***	0.000404**	0.0441***	-0.0298**
France				
Interest Rate	0.0230***	-0.0143***	0.0159***	-0.0136**
Primary Balance	-0.000249*	0.000461***	0.0210***	-0.0177***
Optimal IR	0.00771**	-0,0027	0.00293**	-0.00132
OIR Primary balance	-6,44E-05	0,000149	0.0208***	-0.0162**

Table 1: Regression Results

Business Cycles/Explanatory variables	Coeffiecient of Correlation			
	Period 1		Period 2	
	t-1	t-2	t-1	t-2
Germany				
Interest Rate	0.00732	0.00159	0.0213**	-0.0253***
Primary Balance	0.000401*	-7.97e-05	0.0185***	-0.0208***
Optimal IR	0.00622***	-0.000542	0.00229	-0.000725
OIR Primary balance	0.000265	-3.09e-05	0.0154***	-0.0179***
Greece				
Interest Rate	0.0356***	-0.0309***	-0.0286*	-0.0144
Primary Balance	0.000589	-0.000241	-0.00729	0.00248
Optimal IR	0.00688**	0.00542	0.000745	-0.00266**
OIR Primary balance	-1.88e-05	-0.000646***	0.000745	-0.00266**
Ireland				
Interest Rate	0.0496**	-0.0376*	-0.0127	-0.0176
Primary Balance	-0.00129**	0.000381	-0.0384	0.0369
Optimal IR	0.00873**	-0.00259	0.00365*	-0.00255
OIR Primary balance	-0.00139**	0.000610	-0.0440	0.0474*
Italy				
Interest Rate	0.0163***	-0.0106*	0.0279***	-0.0342***
Primary Balance	-2.11e-05	0.000205	0.00626	-0.00946**
Optimal IR	0.00734**	-0.00800**	0.00501***	-0.00477***
OIR Primary balance	0.000511	0.000137	-0.000185	-0.000127
Luxembourg				
Interest Rate	0.0495***	-0,0327	0.0687***	-0.0708***
Primary Balance	-0.00191	-0,0017	0.0105***	-0.00916***
Optimal IR	0.0150***	-0.00735**	0.000448	0.000317
OIR Primary balance	-0.00220	-1.41e-05	0.00332	-0.00162
Netherlands				
Interest Rate	0.0184***	-0.00158	0.0218***	-0.0189***
Primary Balance	-0.000284***	0.000117	-0.000291	0.00269
Optimal IR	0.00852***	-0.00415	0.00482***	-0.00405***
OIR Primary balance	-0.000305	0.000219	-0.000527	0.00280

Business Cycles/Explanatory variables	Coeffiecient of Correlation			
	Period 1		Period 2	
	t-1	t-2	t-1	t-2
Portugal				
Interest Rate	0.0129**	-0.000757	0.0466***	-0.0637***
Primary Balance	-0.000918***	0.000760***	-0.0230**	0.0191*
Optimal IR	0.00263	0.000551	0.00668***	-0.00789***
OIR Primary balance	-0.000596*	0.000122	-0.00772	0.00663
Slovenia				
Interest Rate	0.00122**	0.000272	0.0312**	-0.0261**
Primary Balance	0.000655	0.00124**	-0.00533	0.00745
Optimal IR	0.00707***	-0.00166	0.00221	-0.00323*
OIR Primary balance	0.000450	0.000934*	-0.00734	0.00779
Spain				
Interest Rate	0.0200***	-0.00868	0.00502	-0.0252***
Primary Balance	-0.000462	0.000709*	-0.00526	0.00120
Optimal IR	0.00634**	-0.00104	0.00476***	-0.00473***
OIR Primary balance	-0.000913	0.00111*	-0.0110*	0.00935

*Note: Period 1 is from first quarter of 1999, to the fourth quarter of 2008. Period 2 is from first quarter of 2009, to the fourth quarter of 2017. For representation of p-values, we have that *** p<0.01, ** p<0.05, * p<0.*

Table 2 : Summary of Business cycles and estimations

Business Cycle/Estimations	Average growth rate and Stadard Deviation			
	Period 1		Period 2	
	Mean	Std. Dev.	Mean	Std. Dev.
Euroarea				
Actual Business Cycle	0,001717	0,007044	-0,0019	0,00811
Estimated Business Cycle	0,009954	0,006352	0,00296	0,00533
Estimated BC With Optimal Interest Rate	0,008524	0,00521	0,00455	0,00402
Austria				
Actual Business Cycle	0,002963	0,01307	-0,0033	0,01095
Estimated Business Cycle	0,017116	0,009591	-0,0031	0,0173
Estimated BC With Optimal Interest Rate	0,020224	0,008098	0,01257	0,0076
Belgium				
Actual Business Cycle	0,002513	0,012176	-0,0028	0,01103
Estimated Business Cycle	0,017302	0,007949	0,0068	0,00532
Estimated BC With Optimal Interest Rate	0,019807	0,005024	0,01131	0,00772
Estonia				
Actual Business Cycle	0,016312	0,056344	-0,0181	0,04562
Estimated Business Cycle	0,093691	0,031354	0,03673	0,02642
Finland				
Actual Business Cycle	0,005354	0,022917	-0,0059	0,0171
Estimated Business Cycle	0,025038	0,018909	-0,0304	0,01172
Estimated BC With Optimal Interest Rate	0,022902	0,021208	-0,0171	0,02282
France				
Actual Business Cycle	0,003097	0,01235	-0,0034	0,00874
Estimated Business Cycle	0,006717	0,011318	0,00227	0,00644
Estimated BC With Optimal Interest Rate	0,013557	0,006253	0,00223	0,00647
Germany				
Actual Business Cycle	0,003603	0,014963	-0,004	0,01322
Estimated Business Cycle	0,00916	0,009475	0,00438	0,00832
Estimated BC With Optimal Interest Rate	0,010173	0,010531	0,00632	0,00667
Greece				
Actual Business Cycle	0,001915	0,024338	-0,0021	0,02889
Estimated Business Cycle	0,013232	0,009956	0,01621	0,02101
Estimated BC With Optimal Interest Rate	0,034206	0,023491	0,01866	0,01867
Ireland				
Actual Business Cycle	0,012235	0,036349	-0,0136	0,05782
Estimated Business Cycle	0,059111	0,020116	0,0439	0,02596
Estimated BC With Optimal Interest Rate	0,058608	0,018562	0,04423	0,02531

Business Cycle/Estimations	Average growth rate and Stadard Deviation			
	Period 1		Period 2	
	Mean	Std. Dev.	Mean	Std. Dev.
Italy				
Actual Business Cycle	0,003144	0,012026	-0,0035	0,01121
Estimated Business Cycle	0,009581	0,007669	0,00507	0,00731
Estimated BC With Optimal Interest Rate	0,001694	0,003684	0,00656	0,0057
Luxembourg				
Actual Business Cycle	0,005463	0,030729	-0,0061	0,02256
Estimated Business Cycle	0,047785	0,020367	0,0121	0,01373
Estimated BC With Optimal Interest Rate	0,040342	0,020968	0,0178	0,00212
Netherlands				
Actual Business Cycle	0,003364	0,019122	-0,0037	0,00861
Estimated Business Cycle	0,0147	0,017186	0,00363	0,00509
Estimated BC With Optimal Interest Rate	0,021132	0,011837	0,00339	0,00537
Portugal				
Actual Business Cycle	0,002084	0,014378	-0,0023	0,01823
Estimated Business Cycle	0,014033	0,012405	0,00943	0,01536
Estimated BC With Optimal Interest Rate	0,025486	0,006804	0,0091	0,01556
Slovenia				
Actual Business Cycle	0,005079	0,0269	-0,0056	0,01574
Estimated Business Cycle	-0,02193	0,004824	0,02538	0,03555
Estimated BC With Optimal Interest Rate	-0,01915	0,03244	0,00964	0,00645
Spain				
Actual Business Cycle	0,004274	0,018322	-0,0047	0,01487
Estimated Business Cycle	0,013344	0,012594	0,0051	0,01188
Estimated BC With Optimal Interest Rate	0,017629	0,007675	0,0069	0,01031

Note: Period 1 is from first quarter of 1999, to the fourth quarter of 2008. Period 2 is from first quarter of 2009, to the fourth quarter of 2017.

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Interest Rate	0.00732	0.00159	0.0213**	-0.0253***
Primary Balance	0.000401*	-7.97e-05	0.0185***	-0.0208***
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Interest Rate	0.0356***	-0.0309***	-0.0286*	-0.0144
Primary Balance	0.000589	-0.000241	-0.00729	0.00248
Luxembourg				
Interest Rate	0.0495***	-0,0327	0.0687***	-0.0708***
Primary Balance	-0.00191	-0,0017	0.0105***	-0.00916***
Portugal				
Interest Rate	0.0129**	-0.000757	0.0466***	-0.0637***
Primary Balance	-0.000918***	0.000760***	-0.0230**	0.0191*