Master Thesis, autumn 2010
School of Economics and Management
Lund University

Is discretionary fiscal policy a mitigating mechanism that counteracts business cycle fluctuations in the European Monetary Union?

Authors: Sanna Agduhr Eronen, Sarah Ljunghammar

Supervisor: Klas Fregert, Per Hjertstrand

Abstract

The aim of this thesis is to evaluate the reaction in fiscal stance in EMU with the purpose to investigate if there is a need for discretionary fiscal policy as a stabilizing mechanism due to the existence of country-specific disparities in order to counteract business cycle fluctuations in the Monetary Union. The second objective is to analyse the role of discretionary fiscal policy during three downturns. The data range from 1992 to 2009 and consist of yearly time series. A Two-Stage Least Square model was used to calculate the reaction in cyclically adjusted primary government balance to the variation in output gap, government debt, monetary gap, election year and at last to the government behaviour in response to booms and busts. Statistically significant results from both country-specific and panel data show that discretionary fiscal policy has been countercyclical since 1992 and throughout the period. From the evaluation of discretionary fiscal policy behaviour during the three downturns it is clear that the general fiscal behaviour was more procyclical for the estimation groups during the first downturn as opposed to the latest two.

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1 Introduction

1.1 Background

The majority of the EMU member countries witnessed a convergence in real and financial macroeconomic variables during the pre- Maastricht Treaty (MT). This was partly due to the fiscal requirements introduced with the MT and that was furthermore deepened with the Stability Growth Pact (SGP). Limitations that are needed to ensure for the effectiveness of monetary policy but also may act as a straightjacket for fiscal policy makers in the European countries. A lack of symmetry weakens the monetary policy-makers main mechanism through which they stabilize the economy. A convergence in financial and real economic factors is therefore of importance in order to mitigate fluctuations in a symmetric way throughout the union. The existence of differentials increases the need for an alternative mechanism to counteract business cycle fluctuations. It has been argued that the fiscal policy might be a prominent alternative. Buti, In't and Roeger (2001) emphasize the role of fiscal policy as a stabilizing actor for the economy as a complement to monetary policy in a union that is characterized by differences in economic factors. They argue that if these differentials are persistent the need for country-specific fiscal policies increases. Taylor (2002) argues that discretionary fiscal policy can act counteractively to the business cycle since it has the ability to shift aggregate demand in the short run, and furthermore states that the objective should be equivalent to monetary policy namely to keep real GDP close to potential GDP and thereby keeping inflation around its target. National fiscal policy makers are however faced with the boundaries outlined by MT and SGP, they can for instance not boost the economy in a way that risks to exceed the budget balance limit, without a risk of penalty. An action that would have been possible without the constraints.

Fiscal policies can be decomposed into two different components, non-discretionary and discretionary fiscal policies. The first one operates automatically as a reaction to variations in employment and output. Discretionary policy on the contrary is actively performed by the government and is sometimes accused of being inefficient. Previous research has shown that discretionary fiscal policy was procyclical before MT, that is the government increased spending or did not cut taxes during booms or vice versa during busts. Studies that have sought to investigate fiscal behaviour after MT have on the contrary been conflicting. Some studies show that fiscal policies have been countercyclical during busts but not during booms, implying that it is hard to tighten budget in good times. This would imply that the

MT and SGP have not had a limiting role on fiscal discretionary policy. Another weakness of fiscal policy is that the government itself might seek to win short-term gains that are they may use fiscal policy in a non-utilizing way in order to win election. Such behaviour is most likely to be welfare worsening and not have a stabilizing effect on the economy in long run.

1.2 Discussion of a problem

The establishment of the European Monetary Market meant the loss of autonomous monetary policy for each of the eleven member countries. The main mechanism to stabilize business cycle fluctuations throughout the union is the interest rate controlled by the European Central Bank. The strength of the tool is however dependent on a homogenous economic structure in order to counteract booms and bust, if the countries do not share the same position in the cycle the instrument can create an opposite effect. Country-specific disparities in real and financial economic variables involve a risk, not only to the single country but also for the whole union. The requirements introduced with the Maastricht Treaty and the Stability Growth Pact aimed to converge the members toward each other. The limitations and boundaries have however been opposed with criticism with the argument that they reduces the effectiveness of fiscal policies. If there exists differences within the Euro zone, this might increase the role for discretionary fiscal policy. However fiscal discretionary policy itself suffers from the risk of amplifying the fluctuations instead of dampening. This is firstly due to difficulty to stop spending during booms, the second reason is that governments might engage in winning short-term gains in form of an election and therefore not act in accordance to what is economically suitable.

1.3 Objective

The purpose of this thesis is to investigate if country-specific disparities still are present and further more to measure the fiscal stance in EMU in order to see if discretionary fiscal policy mitigates business cycle fluctuations in the Monetary Union. It further aims to distinguish if fiscal policies are pro- or countercyclical during downturns.

1.4 Delimitation

Since our aim is to investigate how fiscal discretionary policy has behaved after the introduction of the euro, we will limit ourselves to the time period of 1992 to 2009. Previous studies have shown that fiscal behaviour was procyclical before the Maastricht Treaty. Studies since 1992 do however contradict each other, which is why we chose this period of time. In our study we analyse The European Monetary Union, thus 11 member countries are examined. We chose to exclude the newer members due to time limitations. Our control group

consists of three members of The European Union and are chosen in line with previous studies of Galí and Perrotti (2003). These countries are also used when analysing country-specific dispersion when comparing EMU and EU14. This is to bring consistency to our studies even though the inclusion of all EU member countries most likely would have generated a greater dispersion. Since we only seek to investigate the deliberate action of fiscal policies we will only estimate reaction in discretionary fiscal policy and not the automatic response in fiscal policy in other words non-discretionary fiscal policy.

1.5 Outline of the thesis

The thesis is divided into seven different chapters. The first chapter is an introduction, in which the reader is presented with the background, objective and delimitations of the essay. Chapter two presents the theoretical background and previous research. In chapter three we present sources and description of the data. The method is presented in chapter four, where reason for choice of method and the theory behind it is displayed. Chapter 5 consists of the estimated results, which is transposed into tables and figures. In Chapter six, we discuss the results in relation to the theory and also present the conclusions.

2 Theoretical background

2.1 Previous research

Extensive work on the role of discretionary fiscal policy in EMU after Maastricht has been done. Galí and Perotti (GP) (2003) investigated if the boundaries set by the MT and the SGP constrained fiscal policies in the member states and making it toothless. They furthermore examined if there is an increased need for more discretionary fiscal policy due to the lack of independent monetary policy in the EMU countries. The authors chose to examine the time period 1980-2002 after which they divided the period into two estimation periods pre- and post Maastricht. This made it possible to estimate if there was a change in fiscal response in relation to output and debt stabilization post Maastricht as opposed to before. They used the fiscal reaction function to estimate the effect on cyclically adjusted primary surplus with the variations in output gap, debt deviations and monetary gap. They conclude that MT and SGP have not limited fiscal policy-makers, and that discretionary fiscal policy has been counter-cyclical after the implementation of the Euro,

Debrun, Farquee, Beetsma and Atang (2006) continues the work of Galí and Perroti (2003), by extending the time period and emphasizes the potential risk of country specific disparities and adds dummy-variables to the reaction function in order to allow for heterogeneity between the countries. They further evaluate fiscal behaviour during different stages of the cycle in order to see if fiscal policies change in relation to the current state of the economy. The authors conclude that fiscal behaviour has generally been procyclical, which is more apparent during booms than in busts. Their results also show that there has been a shift in behaviour after Maastricht to a more countercyclical fiscal policy.

Bertrand, Myusken and Vermeulen (2008) extend the work of Galí and Perroti (2003) by lengthening the time period to 2006. In line with the previous studies presented above they allow for differences between pre- and post Maastricht. The authors also chose to distinguish between small and large countries in order to see if there is any difference in fiscal discretionary policy in relation to the size of the nation. They also investigate if supply and demand constraints induce a change in the behaviour of fiscal decisions. The estimation results contradict Galí and Perroti in the sense that it exhibit a procyclical fiscal discretionary policy post Maastricht, the estimation is however in line with GP in the pre-Maastricht period where both studies show procyclical fiscal discretionary policy. The results also show

that larger countries as opposed to small are more procyclical and reacts differently toward a change in demand and supply requirements.

2.2 Country-specific dispersion within the European Monetary Union

The requirements introduced by MT and SGP aimed to converge the differentials in the evolution and size of the member countries fiscal imbalances. The general and common criterias consists of limitations in national fiscal deficits and the stock of debt that each country is allowed to accumulate (J. Ferreiro, M. T. García-Del-Valle, C. Gómez, 2010)

The European Central Bank (ECB) sets the nominal interest rate in order to maintain the inflation objective (0-2%) and by managing the average real interest rate in EMU it is able to conduct monetary policy (M. Arghyroua,, A.Gregorioub, A. Kontonikas, 2009). The effectiveness of monetary policy and thereby the ability to counteract business cycles fluctuations depends on the convergence of macro-economic fundamentals across the member states. Implying that the average country-specific real interest rate differential needs to be coherent with the average EMU, that is be mean-reverting and also show a similar persistence pattern. Eichengreen (1997) emphasizes that an optimal currency area can be created when the loss of autonomy in independence of monetary policy is complemented with strong adjustment mechanisms in labour mobility and relative wages. He further points out that the potential costs increases with more dispersion and that that the supply shocks that hits the monetary union are most likely to be asymmetric due to the differences in economic structure between the central states and the more peripheral. He concludes that a monetary policy that aims to counteract a supply shock in one part will be procyclical in another part of the monetary union. Honohan and Lane (2003) argues that the convergence in a currency union that still incorporates national states, that is have their own wage-setting and fiscal policies that correspond to national interest do not respond to fluctuations in a coherent way as opposed to a federal state such as The United States. Debrun, Faruqee, Beetsma and Atang (2006) emphasize the potential risk that underline these differences, since labour markets and price adjustment under such a structure are sticky and not as mobile under a recession as might would have been needed to be countercyclical. The convergence process are therefore more likely to be smoother in the financial factors than compared to the real economic factor since these are more segmented and sluggish.

2.2.1 Convergence process, financial variables

Price differentials between financial assets holding the same risk characteristics are in theory the most likely to vanish with a deepened financial integration due to higher price transparency and lower transaction costs. Before the monetary union was established, the European market had a monetary base and one exchange rate that were more stable than the others, the D-mark. The stability of the d-mark induced the rest of the regions countries to stabilize each countries exchange rate toward it, holding some uncertainty. The currency risk however that faced each country that issued bonds in their own currency resulted in higher interest rate especially in the long term due to higher risk premium. The consequence of such an economic structure is heterogeneous levels of interest rates throughout the region, which also was the case. The Italian lire-denominated bonds for example experienced a five-percentage point higher interest rate compared to the German d-mark denominated bonds. This economic structure kept finance to be dominated by banks and short term financed. A monetary union on the contrary means a lower risk premium since the currency risk disappears and the opportunity to issue a common-currency bond rises. This results in the possibility to lengthen the term structure on the country-specific government debt. The introduction of the Euro also resulted in an increased demand for long-term euro denominated bonds. This is because financial institutions such as banks, insurance companies and so on are free to diversify and obtain euro-denominated bonds on new basis since they no longer are faced with currency liabilities. Lower portfolio risks, and hence lower interest rate has lengthened the long-term structure on finance (R.I McKinnon, 2004)

2.2.2 Convergence process, real economic variables

Real economic disparities in productivity and output are however more segmented and hence withholds a higher risk of costs with the loss of monetary autonomy. An alternative national policy option becomes more important as a way of counteracting national business cycle fluctuations according to Honohan and Lane (2003). They also emphasize the importance of mitigating the real-wage unemployment cycles that arise as a result from inflation differentials. Price-adjustment that that reacts to different business-cycle patterns might reflect increased inflation differentials. Implying higher relative costs of products produced in countries that experience booms as opposed to the equivalent product in a region that is in a downturn (Debrun, Farquee, Beetsma and Atang, 2006). Disparities may also rise as a consequence of exchange rate volatility between the Euro and other currencies, since a member

country that have a high share of trade with non-member countries faces the risk of variations in the exchange rate compared to another EMU-member who only trades with other members in the union which is why the openness to trade engender different inflationary pressure in a currency union (P. Honohan, P.R. Lane, 2003). Disparities in productivity growth are also an important factor to understand the cause for inflation differentials. Competition give rise to higher productivity, implying that production that is subject to a large share of external competition are more likely to accumulate productivity gains than sectors that are not. However since wage pressure also involves other sectors the effect will spread over to other sectors as well, resulting in higher prices in order to finance the increase in labour costs (Debrun, Farquee, Beetsma and Atang, 2006).

2.3 Discretionary and Non-discretionary fiscal policy

Changes in fiscal policies can be decomposed into discretionary fiscal policies and non-discretionary fiscal policies, the former depend on objectives and constraint set by fiscal authorities and the latter captures the automatic respond in fiscal components that are due to business cycle fluctuations (Gali and Perotti, 2003).

Since non-discretionary policies automatically responds to changes in the business cycle the causality to the variation in the budget balances are not controlled by the government, at least not in the short run. This means that changes in government spending or taxes are endogenous and results from the automatic stabilizers. In this thesis we will however focus on the cyclically adjusted balance, since we want to capture the response in fiscal behaviour, that is the fiscal stance that does not depend on the result of uncontrolled economic variation (Gali and Perotti, 2003).

By removing the cyclicality we extract the discretionary fiscal policy, which can be divided into a systematic component and a non-systematic component. The former correspond to economic conditions, when policy-makers systematically change fiscal policy in response to variation in actual or expected cyclical conditions. If for instance fiscal authorities wish to engage in a counter-cyclical policy they cut taxes or increase government spending in order to boost the economy in a recession or the contrary in an expansion. The non-systematic part is a component that results from either non economic situations or exogenous political processes (Gali and Perotti, 2003).

2.4 Fiscal reaction function, country-specific regressions

To understand the forces that drive fiscal policies in the European Monetary Union we apply the fiscal reaction function. Fiscal policy decisions are expected to react to differences in output gaps, government debt and to the monetary gap, this response is captured by the cyclically adjusted primary balance (Debrun, Farquee, Beetsma and Atang, 2006). In order to assess the fiscal behaviour of a single member country in EMU we conduct country-specific regressions.

$$B = f(GAP, D) \tag{2.1}$$

Where the cyclically adjusted primary balance, B, is a function of output gap and government gross debt according to the Maastricht criterion

2.4.1 Cyclically adjusted primary government balance

The cyclically adjusted primary government balance is the dependent variable in the reaction function, the variable can be interpreted as a measure that capture the stance of discretionary fiscal policy (Debrun, Farquee, Beetsma and Atang, 2006). It is constructed in order to remove the cyclicality part, the automatic response, to give an intuition of what the budget balance would be if real GDP was on its trend (M, Burda. C,Wyplosz, 2005). That is the cyclically adjusted primary balance explains discretionary fiscal policy and not the non-discretionary fiscal policy. A general method is used in order to separate the two, where the reference value of GDP, potential output is γ^*. The elasticity of tax is given by,α, while β is the elasticity of revenue. By deriving the τ^* and G_t^*, from the following expression we get the structural tax revenues and spending.

$$. \frac{\tau^*}{\tau_t} = \left(\frac{\gamma_t^*}{\gamma_t}\right)^{\alpha} ; \frac{G_t{}^*}{G_t}\left(\frac{\gamma_t^*}{\gamma_t}\right)^{\beta} \tag{2.2}$$

The expression explains what tax revenues and government spending would be if GDP were on its reference level. To derive the structural budget balance as a share of potential GDP τ_t^* and G_t^*, needs to be divided by the reference value of GDP which generates the following function:

$$b_t^* = g_t^* - t_t^* \tag{2.3}$$

Structural government balance is given by b_t^* and g_t^* and t_t^* structural government spending and revenues respectively. Discretionary fiscal policy is contractionary if g_t^* decreases or

t_t^* increases, in case of an opposite relationship there is a loosening in the fiscal stance (Gali and Perotti, 2003). The euro-members are however constrained by the objectives and requirements outlined by SGP. Fiscal policy-makers are within these boundaries authorised to decide the appropriate level of the government balance. The main objectives are to reduce output gap and to keep growth rate close to its trend. Adjustment in government savings prevails in response to deviations in output gap, which enables the stabilization of the economy through booms and busts, implying that an efficient fiscal policy reacts to changes in output by adjustment in government spending or revenues. In other words a reaction that aims to minimize the fluctuation in output gap. For this reason government spending should adjust as a response to the business cycle to ascertain a countercyclical fiscal policy. The need for a symmetric discretionary fiscal policy is mandatory in order to reach the long-term budget balance, the size of the contractionary fiscal policy at time t must be the same volume as the expansive fiscal policy during a future boom at time t+1. In a political perspective this is hard to achieve, since a counter-cyclical policy with increased government spending under a downturn is easier to pursue than a contractionary policy in a boom. If there is a lack of symmetry between the expansive and contractionary fiscal policy the member countries risk budget deficits and a growing government debt as well as a higher domestic price level relative the other countries and a worsening in terms of trade.[1]

2.4.2 Output gap

The difference between the actual GDP and the potential GDP is often defined as the output gap, and can be regarded as an indicator of the current state of the business cycle. The variable is implemented in the fiscal reaction function as an independent variable, and captures the discretionary fiscal policy. The reasoning behind involving the output gap is that the government reacts to fluctuations in output gap in either a procyclically or counter-cyclical manner. In case of procycliality the government policies act as a destabilizing mechanism, which undermine the role of the automatic stabilizers, implying that it is expansionary under booms and contractionary under busts (Debrun, Farquee, Beetsma and Atang, 2006). However if fiscal authorities counteracts and increases spending during recession they engage in counter-cyclical fiscal behaviour, implying that discretionary fiscal policy is effective. The government should minimize output fluctuations in order to maximize welfare in the economy, implying that even the positive output gap has a damaging effect on the economy since it leads to a greater variance in inflation. The objective to stabilize output is sometimes re-

[1] See for example regeringen.se

garded as equivalent to keeping unemployment and employment around its long-term equilibrium trend, because a bust in the economy leads to a downturn in the output gap hence a higher unemployment rate and distortion in production. A boom is welfare worsening due to its amplifying effects on a future downturn in the economy (G, Hjelm, 2008).

2.4.3 Government debt

The government debt is added as a second independent variable to the reaction function, in order to investigate how government debt effect the stance of discretionary fiscal policy. The accumulation of government debt can be expressed by the following simplified expression:

$$\Delta B = G - T + rB \tag{2.4}$$

where B represents debt, G is government spending and T is taxes and r is interest rate. The equation implies that the government debt will increase even though a nation succeeds to keep a budget balance equal to zero due to the interest rate. In order to decrease the volume of the debt the fiscal balance surplus needs to exceed the interest rate. (Burda and Wyplosz, 2005)

2.4.4 Lagged cyclically adjusted primary government balance

The last addition to the fiscal rule is the lagged independent variable, lagged cyclically adjusted primary government balance. According to Bertrand, Muysken and Vermeulen (2008) will a past deficit, thus a previous negative cyclically adjusted primary balance have an expansionary effect on discretionary fiscal policy, implying a negative effect on cyclically adjusted primary balance.

2.5 Fiscal reaction function, panel data

We extend our analysis by implementing panel data to ensure for country heterogeneity and to capture area-wide changes. The panel analysis provides information about how the member countries have reacted to the constraints imposed by the MT and SGP. If there are differences in fiscal policies between EMU members and EU members in regards to how fiscal policies react during booms and busts, if they have a tightening or loosening fiscal policy, if fiscal policies in EMU has been a substitute to monetary policy or not. By adding dummy-variables we are also able to see the respond to election year and during downturns.

$$B = f(GAP, D, M, E, R) \tag{2.5}$$

The expression above is the cyclically adjusted primary balance, B, as a function of output gap, gross government debt, D, monetary gap, M, Election year, E and at last R representing the respond to downturns.

2.5.1 Monetary Gap

The monetary gap is derived from the difference between the short-term interest and the benchmark rule (Taylor rule), set by ECB. By implementing the deviations from Taylor rule to the fiscal reaction function as an independent variable it enables the possibility analyze the interaction between fiscal policies and monetary policies. Taylor rule is given by the following expression:

$$i = \bar{r} + \pi + h(\pi - \pi^*) + b\left(y - \bar{y}\right) \tag{2.6}$$

i, is the interest rate, $\bar{r}$, $\bar{y}$ is the equilibrium interest rate and equilibrium output gap respectively, π is inflation rate whereas π^* denotes the inflation target. y_t is the output gap, h and b are policy parameters chosen by the policy makers and should be larger than zero (Sørensen & Whitta-Jacobsen, 2005). The monetary policy-makers main objective is to stabilize inflation around its target of 2%. Inflation targeting monetary policy implies that a demand shock would be stabilized with this type of instrument since employment and output responds in a similar fashion to the fluctuation in inflation. Whereas a supply shock on the contrary leads to a worsening welfare effect, due to the fact that inflation targeting in this case amplifies the fluctuations in output and employment.

The interdependence between monetary policy and fiscal policy depend on the types of shocks that hit the economy. Research from Muscatelli, Tirelli, Trecroci (2004) show that a demand shock leads to a complementary interaction between the two instruments. They further conclude that the relationship is clearly ambiguous since they substantiates the work of Buti (2001) who found that an output shock has a harmonising effect while inflation shock results in a substitution between the two policies.

2.5.2 Election year

The dummy variable election year is added to the function to capture if fiscal authorities change their fiscal policies in response to an election. If politicians seek to win short-term gains in terms of winning an election, they may encourage a fiscal policy that is not comprehensive with the current state of the economy and hence ignore the long-term negative effect of accumulating debt. Increasing spending or cutting taxes on short-term basis to win votes that are time-inconsistent policies can give rise to deficit-bias (A, Abiad, J.D, Ostry (2005). Annett (2006) argues that these problems are at risk of becoming even larger in a monetary union than compared to a similar situation in an independent nation since the risk of these types of deficit-bias may spread to the rest of the union. The reason is that the absence of a

national exchange rate and the risk premium as a tool for mitigating disturbances are forgone, and with that its diminishing effect on fiscal policy.

2.5.3 Procycliality in different states of the business cycle

By adding a dummy variable that captures fiscal decisions under different states of the business cycle allows us to acknowledge the difference in fiscal policies as a result from booms and busts. To cut spending or increase taxes under times of downfall and thereby induce a countercyclical fiscal policy is easier in bad times. In times of boom however, the risk a procyclical policy increases as the profits from the boom makes it harder to cut spending. Such a fiscal behaviour has a worsening effect of the economy since it leads to a deficit bias (Debrun, Farquee, Beetsma and Atang, 2006).

2.6 Hypothesis

Our hypothesis is that there still exists country-specific disparities and that there is a need for fiscal discretionary policy to act as stabilizing tool in order to counteract business cycle fluctuations.

3 Data

3.1 Sources and description of data

The data is ranged from December 1992 to December 2009. It consists of yearly time series data for eleven member states of the European Monetary Union. Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain. The data for the three countries in the control group, Denmark, Great Britain and Sweden is chosen on analogue grounds. The time period allows for an analysis of three different recessions the first one in the early nineties, the other in the beginning of 2000 and the recent one that started in 2008.

The cyclically adjusted primary government balance is constructed in line with the methodology used by OECD. Data for the variable as well as for government debt, short-term interest rate, long-term interest rate are downloaded from the database, datastream. OECD Economic Outlook, June 2009 issue was the source for the rest of our data, inflation rate and labour productivity. To derive the time series for "deviations from monetary gap", we calculate Taylor rule constructed in accordance to Debrun, Farquee, Beetsma and Atang (2006), based on the short-term interest rate.

Data for the output gap of the United States has been downloaded in order to use the series as our instrumental variable. Excel and Eviews are the main tools through which the evalutation and estimation are being performed.

4 Methodology

The methodology part will be divided into two parts, the first were we estimate country-specific regressions for each individual country, and in the second part we will estimate regressions for all countries together using panel data. The software used is Eviews 7.0 for all of the estimations. We explain why the OLS is not an appropriate method, and also review the method used, the IV-method.

4.1 Standard deviation of economic variables

Standard deviation for all of the eleven member countries in EMU and in the EU14 group will be calculated. This applies to all the variables that will be used in order to compare the convergence process within the Euro zone compared to EU. The result will thereafter be presented in graph in order to visualize the cross-country dispersion between EMU and EU14.

4.2 The fiscal reaction function

We follow previous research when choosing a suitable reaction function for the subject in matter. [2] The reaction function that we are estimating can be written on the form of a multiple regression,

$$b_{i,t}^{*} = c_i + a_1 E_{t-1}(gap_{i,t}) + a_2 d_{i,t-1} + u_{i,t} \qquad (4.1)$$

where primary balance, b, in country i at time t, can be written as a function of expected output gap E_{t-1}, and lagged debt, $d_{i,t-1}$. The primary cyclically adjusted balance is the cyclically adjusted balance, but less interest payments on government debt. The debt variable is interpreted as the debt relative to potential GDP, observed at the time when decisions are made for the budget. The variable $E_{t-1}(gap_{i,t})$ is expected output gap (Gali, Jordi, Perotti, Roberto, 2003)

4.3 Endogeneity and IV- method

Considering the multiple regression,

$$y_i = \alpha + \beta_1 X_{1,i} + \beta_2 X_{2,i} + \cdots + \beta X_{k,i} + u_i \qquad i = 1, \ldots, N \qquad (4.2)$$

[2] See for example Galí and Perotti (2003).

where $\text{cov}\{\varepsilon_i, \varepsilon_j\} = 0$, $i = 1, \ldots, N$ and $\varepsilon_t \sim IID(0, \sigma^2)$. One crucial Guess-Markov assumption for the OLS estimator is that the error term is uncorrelated with the explanatory variables.

$$E\{x_t \varepsilon_t\} = 0 \; for \; each \; t \tag{4.3}$$

If the assumption above does not hold, the regressor, x_t, is said to be endogenous, leading to an OLS estimator which is biased and inconsistent. An established explanation to this phenomenon is that the linear model is no longer the best approximation, and that is does not correspond to a conditional expectation. The condition stated above is also known as moment conditions, which are imposed to obtain the unknown parameters, so that that the following holds for the parameters β_1 and β_2.

$$E\{(y_i - X_{1i}\beta_1 - X_{2,i}\beta_2)X_{1,i}\} = 0 \tag{4.4}$$

$$E\{(y_i - X_{1i}\beta_1 - X_{2,i}\beta_2)X_{2,i}\} = 0 \tag{4.5}$$

These conditions are implied when estimating OLS, leading to an OLS estimator $b = (b_1, b_2)$ which is solved from:

$$\frac{1}{N}\sum_{i=1}^{N}(y_i - X_{1i}\beta_1 - X_{2i}\beta_2)X_{1i} = 0 \tag{4.6}$$

$$\frac{1}{N}\sum_{i=1}^{N}(y_i - X_{1i}\beta_1 - X_{2i}\beta_2)X_{2i} = 0 \tag{4.7}$$

However, if (4.3) does not hold, (4.7) is no longer valid, and it is not possible to solve for β_1 and β_2, i.e. they are not identified (Hamilton, 1994). To be able to obtain consistent estimates, a variable that can serve as a valid instrument, z_i, needs to be find, which is correlated with the endogenous regressor, but uncorrelated with the error term.[3] In the presence of an instrument, the moment condition (4.5) can be rewritten as

$$E\{(y_i - X_1\beta_1 - X_{2,i}\beta_2)Z_{1,i}\} = 0 \tag{4.8}$$

Given that the condition in (4.8) is not a linear combination of the conditions in (4.6) and (4.7), the IV estimator can be computed using the following equations;

$$\frac{1}{N}\sum_{i=1}^{N}\left(y_i - X_{1i}\hat{\beta}_{1,IV} - X_{2i}\hat{\beta}_{2,IV}\right)X_{1,i} = 0 \tag{4.9}$$

$$\frac{1}{N}\sum_{i=1}^{N}\left(y_i - X_{1i}\hat{\beta}_{1,IV} - X_{2i}\hat{\beta}_{2,IV}\right)z_{2i} = 0 \tag{4.10}$$

[3] See for example Wooldridge, Jeffrey, (2006).

Solving the equation, the IV estimator can be expressed as

$$\hat{\beta}_{IV} = (\sum_{i=1}^{N} Z_i X_i)^{-1} \sum_{i=1}^{N} Z_i y_i \tag{4.11}$$

where $X_i = (X_{1i}, X_{2i})$ and $Z_i = (X_{1i}, Z_{2i})$.

A problem which can emerge when using an IV method, is that it is often difficult to know which variable that can serve as instruments. The intercept and the exogenous variables fit as their own instruments, but an important requirement is that there are at least as many instruments as there are variables (Kennedy, Peter, 2008)

4.3.1 Two- stage least squares (2SLS)

The two-stage least squares method is a version of the IV-method, which is appropriate when dealing with multiple instruments. The estimates are computed in two steps. From a general perspective, the reduced form for the explanatory variable can be written like a reduced equation in vector form

$$X_k = Z\pi_k + v_k \tag{4.12}$$

In the first step of 2SLS, the reduced equation above is estimated using regular OLS, where the endogenous regressors are regressed upon the instruments. The second step is composed by the predicted values based on the instruments from the reduced form which replace the endogenous variables in the original equation, and this is estimated by OLS. Subsequently, the second step consists of a matrix of explanatory variables $\hat{X}$, according to

$$\hat{X} = Z(Z'Z)^{-1}Z'X \tag{4.13}$$

The second step of the 2SLS estimation is an OLS estimate which can be written as

$$\hat{\beta}_{IV} = \left(\hat{X}'\hat{X}\right)^{-1}\hat{X}y \tag{4.14}$$

One convenient feature of this procedure, is that it is easily performed using statistic software, such as Eviews.

4.3.2 Diagnostic test for IV estimation

In this section we employ diagnostic test, to insure for the effectiveness of our model.

4.3.2.1 The Hausman test

The Hausman test is used to test if the error terms are correlated with the regressors, which implies that and endogenous variable is present and an IV estimation is required. The null hypothesis for this test is that there exists no correlation between the errors and the regressors, and the regressions can be computed using OLS. The rationale of this test is that under the null hypothesis both the regression estimated by OLS and the one estimated by IV method are consistent and unbiased, but under the alternative hypothesis only the IV method is consistent, since we can confirm that the variable is endogenous.

$$b_{i,t}^{*} = c_i + a_1 E_{t-1}(gap_{i,t}) + a_2 b_{i,t-1} + a_3 d_{i,t-1} + u_{i,t} \quad (4.15)$$

In our reaction function above, there is a possibility that the output gap $E_{t-1}(gap_{i,t})$, is correlated with $u_{i,t}$, i.e. the variable is endogenous.

We carry out the procedure of the Hausman test by first regressing the endogenous variables on the exogenous variables and the instruments chosen, in a reduced form for output gap.

$$E_{t-1}(gap_{i,t}) = \pi_0 + \pi_1 b_{i,t-1} + \pi_2 d_{i,t-1} + v_2 \quad (4.16)$$

The residuals $\hat{v}_2$ from the reduced form are saved, and we estimate the following by OLS;

$$b_{i,t}^{*} = c_i + a_1 E_{t-1}(gap_{i,t}) + a_2 b_{i,t-1} + a_3 d_{i,t-1} + \delta_1 \hat{v}_2 + error \quad (4.17)$$

Where $u_{i,t}$ and v_2 are uncorrelated if δ_1=0, implying that output gap is not endogenous. The test statistic used is a t statistic, and a rejection is done if the residuals do not test significantly different from zero (Wooldridge, Jeffrey, 2006).

4.3.2.2 Sargan test

A method used to test if the instrument is uncorrelated with the error term is the overidentifying restrictions test or Sargan test, which we apply to investigate if the instruments can be used. The test is only valid when there are more instruments than endogenous variables, and in our case we have one overidentifying restrictions, since we have two instrumental variables for the endogenous variable. The general idea behind this test is that the instrument variables are not included as explanatory variables in the regression, and also that they are

uncorrelated with the error terms (P, Kennedy 2008).

We carry out the procedure of the test by computing the following. First we estimate the structural equation by 2SLS and save the residuals. The residuals are then regressed on the exogenous variables. The null hypothesis that we are testing is that the overidentifying restrictions are valid, thus if the error term are uncorrelated with the instruments. We use that $nR_1^2 \sim X_q^2$, meaning that the test statistics is calculated by obtaining the r-square from the regression, for then to multiply it with the number of observations, n. If the value calculated exceeds the critical value from the chi-square distribution, the null hypothesis can be rejected, and at least one of the instrumental variables is correlated with the error (Wooldridge, Jeffrey, 2006). One implication of the test is that the rejection of the null can be based on the fact that the instruments are correlated with the error term, or it can reject the null due to misspecification of the equation, indicating that the instruments should have been included as explanatory variables in the regression.

4.4 Estimating the fiscal reaction function using country specific regressions

We estimate country specific regressions for each individual country over the sample period from 1992 to 2009 using the equation

$$b_{i,t}^{*} = c_i + a_1 E_{t-1}(gap_{i,t}) + a_2 b_{i,t-1} + a_3 d_{i,t-1} + u_{i,t} \qquad (4.18)$$

where $b_{i,t}^{*}$ is primary balance in country i at time t, and can be written as a function of expected output gap E_{t-1}, lagged debt, $d_{i,t-1}$and lagged primary balance $b_{i,t-1}$. Since the expected output gap is based on information from the previous period, consequently we will use the country´s output gap, x_t which will serve as an approximation for the expected output gap (Gali, Jordi, Perotti, Roberto, 2003).

We account for the possible presence of autocorrelation, which can originate from two sources; exogenous shocks causing serial correlation or the emergence of autocorrelation as a result of the government´s attempt to gradually reach a certain target budget. With this motivation in mind, we add the lagged dependent variable as an explanatory variable in the reaction function (Gali, Jordi, Perotti, Roberto, 2003).

When estimating the reaction function, we cannot out rule the possibility that an OLS estimation will lead to a simultaneity bias, since exogenous fiscal shocks which are captured in the error term of the regression, can be correlated with the output gap. This can be due to the fact that changing a fiscal policy stance can lead to changes in the output gap, causing biased estimates for the coefficient in front of output gap. Therefore, we use the IV method

described earlier to obtain consistent estimated. In our case, we follow Gali and Perotti and use the country´s own lagged output gap and the output gap in the United States as instrumental variables. We use the output gap in the United States, so the instruments chosen have to be correlated through other mechanisms than having fiscal policies that are coordinated. This, combined with the fact that US data is easy to find, makes this instrument a plausible choice.

The equation is estimated using the Two stage least- squares method described, which is easily computed using Eviews. We choose the Newey West estimator to replace the OLS covariance matrix in order to obtain a heteroskedasticity consistent coefficient variance.

4.4.1 Unit root in country specific regression

A time series is non-stationary when containing a unit root. In an econometric context this phenomenon implies different mean values during a range of time and a variance that increases with the sample size as opposed to a stationary time series that tends and fluctuates around its mean value. The risk of spurious regressions arise when combining non-stationary series in a linear relationship. Such an estimation may incorporate erroneously statistics that falsely indicate a meaningful economic relationship, when all that is present is a time trends. The implication of this is that coefficients, R-square and t- statistics exhibits unreliable characteristics. Unit root test are therefore of importance since it allows us to correct for non-stationarity by taking first differences. We employ unit root test in order to detect non-stationarity in our series.

To test for unit root in our country specific regression we apply the Dickey- Fuller test. By taking the first difference from the simple AR(1) model (4.19) we generate the Dickey Fuller (DF) specification in (4.20). [4]

$$y_t = \rho_\alpha y_{t-1} + u_t \tag{4.19}$$

$$(1-L)y_t = \Delta y_t = (\rho_\alpha - 1)y_{t-1} + u_t \tag{4.20}$$

We set up the following hypothesis:

$$H_o = \rho_\alpha = 1$$
$$H_1 = \rho_\alpha < 1$$

[4] See for example R, Harris and R, Sollis (2005).

Under the null hypothesis the series contain a unit root, implying non-stationarity against the alternative hypothesis that the series does not contain a unit root, thus stationary. The Augmented Dickey-Fuller (ADF) test can be derived from the following expression:

$$\Delta y_t = \rho_\alpha y_{t-1} + \sum_{L=1}^{p_i} \rho_L \Delta y_{t-L} + u_t \tag{4.21}$$

By adding lags to the first difference of y_t we can control for correlation of the higher-order. When performing the ADF test we use the same hypothesis as in the DF test.

We execute the unit root test for each variable including a constant and a linear trend. The Schwarz information criterion (BIC) was used, to establish the lag length used.

4.5 Introduction to panel data modelling

A panel data model can be written on the form

$$y_{it} = X'_{it}\beta + Z_{it}\gamma + u_{it} \tag{4.22}$$

Where $i(= 1, \dots, N)$ can be for example individuals, households, firms, countries. $t(= 1, \dots, T)$ represents time of the observation, and the explanatory variables are expressed as the vector x_{it}. The variable z_t, is a deterministic component which can embrace different interpretations, for example random or fixed effects. The error terms u_{it} are residuals which have the properties IID$(0, \sigma_e^2)$. If a fixed effects model is estimated, the variable Z_{it}, is written as α_t, assuming heterogeneity which are captured by individual intercepts, but the intercept is however not allowed to change over time. On the contrary, if a random effects model is applied, homogeneity is assumed (R, Harris and R, Sollis, 2005).

4.5.1 Estimating the fiscal reaction function using panel data

The country- specific regressions are well suited for analysing the fiscal behaviour in each country, thus it will not distinguish any common pattern for all the countries, therefore we will also estimate regressions based upon panel data, where country heterogeneity is assumed to be present, which is captured by the fixed effects for the intercept. Another reason for using panel data is that the results from the country- specific regressions may also not be accurate, because of the lack of sufficient degrees of freedom, using panel data will often generate more efficient estimators than with the case with cross-section data (Verbekk, Marno 2008).

We estimate 2SLS as we did for the country- specific regressions. Choosing the option for fixed effects, means that Eviews will add the constants implied by the fixed effect to the

instrument list, so that this projection is also added to the instruments. The White cross-section is used to adjust for any presence of heteroskedasticity, and the possibility of auto-correlation in the model is accounted for as in the case with country specific estimates, by adding the lagged dependent variable.

To investigate how fiscal discretionary policy reacts to monetary policy, we add the independent variable monetary gap to the reaction function in the panel data. This allows us to analyse if discretionary fiscal policy act as a substitute to monetary policy or not. We calculate the monetary gap by using the benchmark rule, Taylor rule as presented in: 2.5.1. The Monetary gap is difference derived by subtracting the estimated benchmark from the short-term interest rate.

In line with previous studies, we add different dummy variables to be able to distinguish how the dependent variable varies with different political and economic factors within the economy. [5] A dummy for election year is added, identified by zeros for a year when no election is hold, and the number one for the years when an election is held. The dummy for behaviour under recessions is constructed the same way, using zeros for "bad times" definied as a negative output gap, and one´s for "good times".

We also estimate our control group using the same method.

4.5.2 Unit root testing in panel data

To test whether our panel data series are stationary or not we will conduct a panel unit root tests, by Im, Pesaran and Shin (1995, 1997) hereafter IPS.

$$\Delta y_{it} = \rho_i^* y_{i,t-1} + \sum_{L=1}^{p_i} \theta_{iL} \Delta y_{i,t-L} + z_{it}^{'} \gamma + u_{it} \tag{4.23}$$

To test for a unit root we use equation (4.5) under the following hypothesis. The null hypothesis states that each series in the panel contain a unit root for all *i*, against the alternative hypothesis that at least one of the individual series in the panel is stationary.

$$H_0 : \rho_i^* = 0$$
$$H_i : \rho_i^* < 0$$

An advantage imposed by IPS is that the test relaxes the assumption about homogeneity as opposed to earlier unit root tests, by letting ρ_i vary across the individual series and by allowing for different lags across cross sections in the model.

[5] See for example Bertrand (2008) and Annett (2006).

4.6 Cumulative change in output and cyclically adjusted primary government balance

To capture the behaviour in discretionary fiscal policy during time bad times, we use the same method as Galí and Perrotti (2003), but extend their work by adding a new period of downturn. By lengthening the period and adding a new recession we will be able to see if SGP with its limitations has had a dampening effect on fiscal policies. The three times of busts that we analyze are in the early nineties, the first years of the 21: st Century and the late crises that started in 2008.

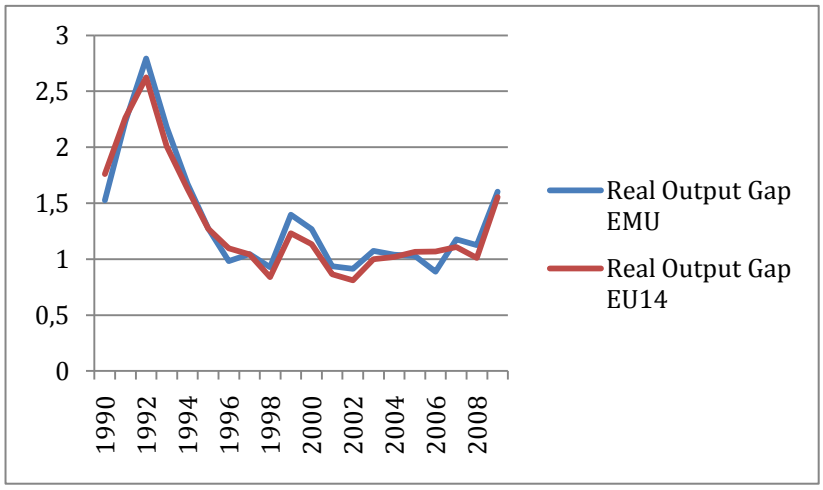
We define the bad times as the years of decline in each country´s output gap. By calculating the ratio between cumulative decline in output gap and cumulative change in cyclically government balance budget balance it is possible to extract the discretionary fiscal response. Analyzing the size and the sign of the ratio reveals if the government pursues in trying to counteract business-cycle fluctuations during recession by loosening fiscal policies or not. If the ratio shows a positive sign, indicating an increase in spending or cut in taxes with growing output gap, this can be interpreted as a deliberate counteractive action. The size can be interpreted as the strength of the discretionary fiscal policy.

5 Estimated results

5.1 Convergence between different macroeconomic variables in EMU and EU14

The results are presented in order to enable a comparative analysis between EMU and EU14, it visualizes the historical evolution of the financial and real economic factors.

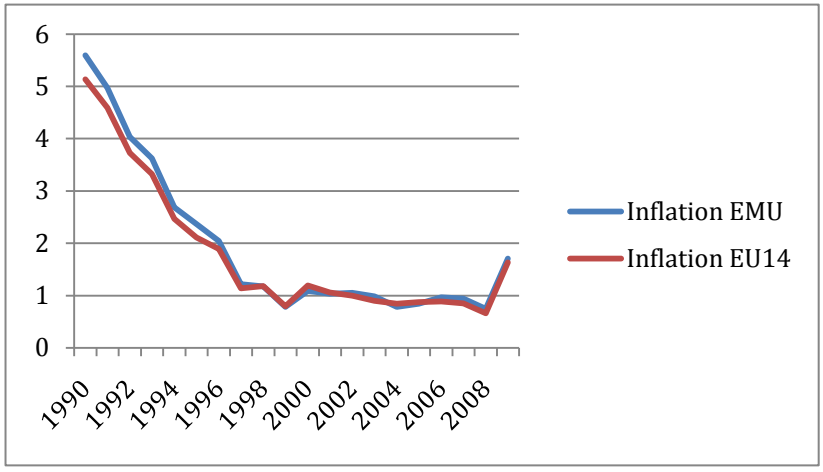
Graph 5.1 Dispersion between EMU and EU14, output gap



Notes: The graph is based on estimated standard deviations derived from annual time series of output gap in EMU and EU14.
Source: Datastream

As the graph shows the difference between the output gap in EMU and EU14 decreased after 1992. Differentials did however start to increase again after 1998, after which they do not follow a clear common pattern. After the recent crisis starting in 2008 both show a clear positive trend, stating that both groups experienced an increase in output gaps. Both EMU and EU14 have three peaks in output gap, the first one in 1992, the second in 1998 and the last one in 2009. It is not possible to distinguish if the output gap reached its peak in 2009 or if it kept accelerating.

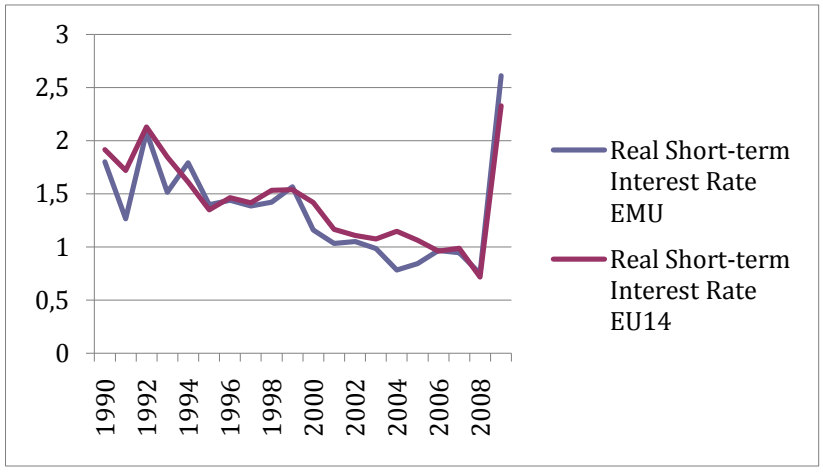
Graph 5.2 Dispersion between EMU and EU14, inflation rate



Notes: The graph is based on estimated standard deviations derived from annual inflation rate time series in EMU and EU14.
Source: OECD.Economic Outlook, June 2009 issue

The difference between the inflation rates in the Euro area and the EU member states have decreased as can be observed from the figure above. The greatest convergence process was during the period from 1990 until 1995. They vary in an almost exact manner after 1995.

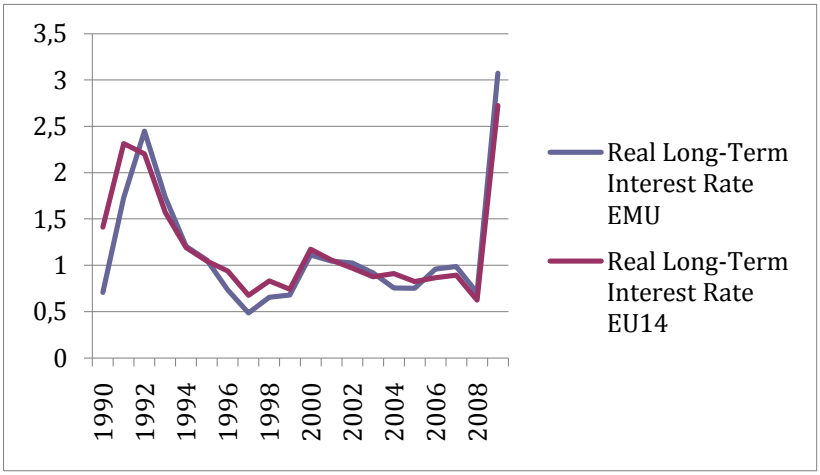
Graph 5.3 Dispersion between EMU and EU14, real short-term interest rate



Notes: The graph is based on the estimated standard deviations derived from annual real short-term interest rate time series in EMU and EU14.
Source: Datastream

The real short-term interest rate in EU14 has had a higher short term interest rate compared to EU14 throughout the period, with the exception of a short period after 1999. At this point of time EMU´s short-term interest rate peaked. Both EMU and EU14 show a negative trend. A clear break in the pattern can be displayed in 2008 when short-term interest accelerates a reaches it top for EMU that out range EU14. From the graph it is clear that there is a difference in fluctuation pattern, the two groups does not seem to follow each other.

Graph 5.4 Dispersion between EMU and EU14, real long-term interest rate



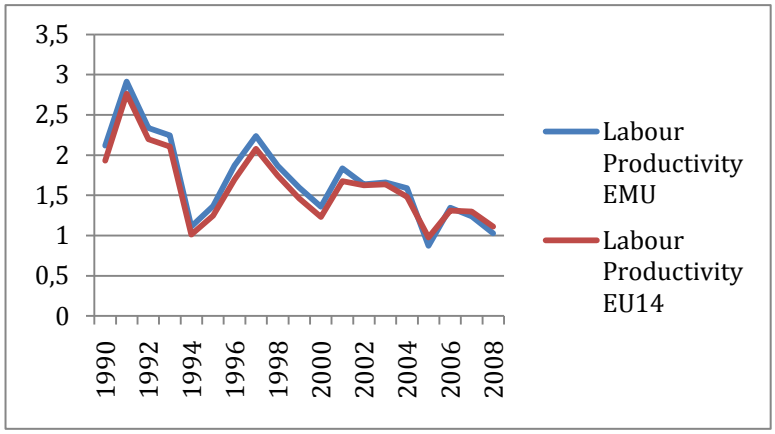
Note: The graph is based on estimated standard deviations derived from the annual real long-term interest rate time series in EMU and EU14.
Source: Datastream

By visually exploring the graph it is clear that the real long-term interest rate between the Euro area and the EU member states converged after 1992. However the differentials started to increase somewhat during a period in the mid 1990's but settled and started to fluctuate in a similar pattern until the recession in the early 2000s when disparities started increase. After 2008 both the long-term interest rates for EMU and EU14 start to accelerate. They both exceed all previous long-term interest levels that have occurred during the investigation period.

Dispersion in total factor productivity growth

Due to the lack of data for several of the EMU members we were unable to create a diagram on the same basis as for the other economic factors. According to theory this is the variable that should show the greatest differences between EMU and EU14, due to the immobility in labour movement between different sectors.

Graph 5.5 Dispersion between EMU and EU14, labour productivity growth



Note: The graph is based on estimated standard deviations derived from annual labour productivity growth time series in EMU and EU14.
Source: OECD.Economic Outlook, June 2009 issue

Graph 5.5 visually explains the fluctuations for all EMU members and EMU14, with the exception of Austria. The country was excluded because of lack of data for the whole period. The diagram displays a negative trend in labour productivity, which can be concluded for EMU and EU14 respectively. The does not seem to be a change of pattern in the differentials in labour productivity growth between the Euro area and the EU14. By exploring the graph it is possible to distinguish the appearance of high fluctuations in labour productivity, which is applicable on both EMU and EU14. Moreover it is possible to observe an increase in labour productivity in EMU in relation to EU14 after the crisis of 2000. This difference did no persist since labour productivity in EMU decreased to its initial level that it had before 2000. After that period they show a similar fluctuation pattern.

To sum up, we can see that there has been a convergence in the both financial and real markets. This can be assumed to be a consequence of the deepened integration between the member countries and due to higher transparency.

5.2 Estimated results, Country specific 2SLS

Table 5.1 displays the country specific, 2SLS results over the sample period 1992-2008. It visually shows the excepted coefficient for output gap, government debt and lagged cyclically primary government balance for each member of the EMU and the three EU members in the control group. It further contains p-values, t-statistic and standard deviation for each respective coefficient. The end of the table exhibits average values for EMU and the control group EU3.

Table 5.1 Country-specific discretionary fiscal policy, EMU and EU3
(Dependent variable: Cyclically Adjusted Primary Government Balance)

	Output gap			Lagged Debt			Lagged Cyclically Adj. Primary balance		
	Coeffi-cient	P-value	T-stat	Coeffi-cient	P-value	T-stat	Coeffi-cient	P-value	T-stat
AUT	0.191	0.164	1.474	0.200	0.011**	2.962	0.237	0.2922	1.098
	(0.130)			(0.068)			(0.216)		
BEL	0.303	0.132	1.607	0.066	0.005***	3.352	0.468	0.036**	2.339
	(0.188)			(0.020)			(0.200)		
DEU	0.017	0.935	0.082	0.093	0.235	1.246	-0.022	0.894	-0.136
	(0.201)			(0.075)			(0.164)		
ESP	-0.212	0.345	-0.979	0.107	0.126	1.635	1.212	0.008***	3.131
	(0.217)			(0.065)			(0.387)		
FIN	0.499	0.019**	2.653	0.004	0.936	0.082	0.409	0.018**	2.705
	(0.188)			(0.048)			(0.151)		
FRA	0.285	0.262	1.172	-0.024	0.565	-0.590	0.686	0.032**	2.397
	(0.243)			(0.041)			(0.286)		
GRC	-1.369	0.081*	-1.895	0.057	0.591	0.550	0.912	0.040**	2.276
	(0.722)			(0.104)			(0.401)		
IRE	-0.536	0.230	-1.259	0.018	0.626	0.499	0.930	0.053*	2.129
	(0.426)			(0.036)			(0.437)		
ITA	-0.116	0.470	-0.744	0.175	0.002***	3.952	0.352	0.004***	3.533
	(0.155)			(0.044)			(0.010)		
NLD	0.360	0.031**	2.444	0.034	0.379	0.913	-0.105	0.586	-0.560
	(0.147)			(0.037)			(0.188)		

PRT	-0.311	0.275	-1.139	-0.040	0.634	-0.487	0.136	0.417	0.839
	(0.273)			(0.083)			(0.162)		
DNK	0.048	0.872	0.164	0.000	0.990	-0.012	0.642	0.027**	2.484
	(0.295)			(0.023)			(0.258)		
GBR	-0.200	0.732	-0.350	0.101	0.524	0.656	1.065	0.004***	3.487
	(0.572)			(0.154)			(0.305)		
SWE	0.337	0.118	1.676	0.038	0.282	1.123	0.701	0.0001***	5.328
	(0.201)			(0.034)			(0.131)		
AVE EMU	-0.080			0.063			0.474		
AVEEU3	0.075			0.046			0.803		

*Notes: Column 1, displays the countries, Column 2, displays the estimated coefficient for output gap where standard deviations are in the parenthesis, column 3 exhibits the p-values, where ***, **, *** denotes significance levels 1%, 5% and 10% respectively. Column 4 shows the t-statistics. Column 5, 6, 7 displays coefficient, p-value and t-statistics for the lagged government debt. Lastly Column 8, 9 and 10 shows the coefficient, p-value and t-statistics for lagged cyclically adjusted primary balance.*

The average estimated result for the output coefficients is -0,080, hence negative for the average EMU members, indicating that discretionary fiscal policy has been procyclical after 1992. This indicates that a one percentage increase in output gap induces a loosening in cyclically adjusted primary balance with 8%. The similar conclusion can be drawn for the control group; Spain, Greece and Portugal have according to the results also had a procyclical discretionary fiscal policy. Greece stands out with a very negative estimation coefficient, which also is significant on a 10% level. This affects the average results, if Greece would have been excluded from the group the average would have been positive. In similarity to EMU the control group displays similar result of discretionary fiscal policy although with exception of Great Britain who in line with Greece has a very negative estimated coefficient. The control group does however in no case show significance in the estimated value of the output coefficient.

The average reaction to past government debt is a positive cyclically adjusted government balance. The table displays that all EMU members except France and Portugal responds to previous debt with a tightening in fiscal policy and thereby a positive sign on the coefficient of government debt. The estimated coefficient varies from -0,040 to 0,20, but the average is 0,063 indicating that average government respond to debt is to increase cyclically adjusted primary government balance with 6.3% for every accumulated percentage point in debt from the year before. Austria, Belgium and Italy are the only countries in EMU that

show significance in the estimated coefficient for government debt. The control group show an average of 0,043, with positive coefficients but none of them are significant. EU3 show a very similar reaction to additional debt as EMU.

The lagged dependent variable, cyclically adjusted primary government balance show figures that varies from -0,105 to 1,212 with an average of 0,474 in the Euro zone, the high variability between the countries estimates indicate that there might be different pressure on discretionary fiscal policy. For EU3 the average coefficient is higher with a value of 0,803. This implies a contractionary fiscal policy, which is not in line with previous research. All of the countries coefficients are significant for the member states with the exception of Austria, Netherlands and Portugal.

Table 5.2 R-square, country-specific discretionary fiscal policy, EMU and EU14

	AUT	BEL	DEU	ESP	FIN	FRA	GRC	IRE	ITA	NLD	PRT	DNK	GBR	SWE
R-square	0.371	0.711	0.154	0.576	0.855	0.605	0.368	0.380	0.785	0.345	0.007	0.420	0.618	0.828

Notes: The estimated R-square values based on the EMU and EU3 country-specific reaction function. The first row displays the countries and the second row the R-square values for each country.

The independent variables for the country-specific reactions function varies between an R-square value of 0,7% for Portugal to 85% for Finland. This range in explanation is somewhat strange.

5.3 Estimated result for Hausman Test and Sargan test

We perform the Hausman test on the country specific regressions for two countries, Austria and Belgium. The coefficient for the residuals in the regression is 1,000 for Austria as well as for Belgium. The p-value is 0,000, leading to a rejection of the null hypothesis that both OLS and IV would provide consistent estimates. Therefore, we can draw the conclusion that an IV estimation is required, since the test has showed that there is a difference between the estimates, one is biased and the other is not. This finding confirms that the method chosen is plausible.

The Sargan test is also applied using the same countries as in the Hausman test, Austria and Belgium. The r-squared value obtained for Austria is 0,003808. Multiplied with n, the number of observations, which is 17, we get 0,06474. The critical value from the chi-square distribution, given q=1 and the significance value 0,05, is 3,841. The observed value is smaller than the critical value, and we accept the null hypotheses that the over identified restrictions are valid. Following the same procedure for Belgium, the r-squared value is 0,038668, multiplied by n, gives 0,65736, which is smaller than the critical value 3,841. This

confirms the previous finding, where the null hypothesis cannot be rejected, and we conclude that the overidentifying restrictions are valid, thus the instrument is uncorrelated with the error.

5.4 Estimation results for Unit root test, country specific

The Augmented Dickey- Fuller test was used to test for unit roots.

5.3 Unit root test result for Country-specific reaction function

	Output gap			Government debt			Cyclically Adj. Primary balance		
	P-value	T-stat		P-value	T-stat		P-value	T-stat	
AUT	0.167	-2.980	Unit root	0.104	-3.300	Unit root	0.255	-2.769	Unit root
BEL	0.894	-1.124	Unit root	0.944	-0.812	Unit root	0.397	-2.332	Unit root
DEU	0.075 *	-3.491	Unit root	0.104	-3.289	Unit root	0.005 **	-5.288	Unit root
ESP	0.997	0.385	Unit root	0.999	0.966	Unit root	0.932	-0.890	Unit root
FIN	0.943	-0.808	Unit root	0.037 **	-3.981	No unit root	0.930	-0.918	Unit root
FRA	0.794	-1.476	Unit root	0.203	-2.848	Unit root	0.983	-0.301	Unit root
GRC	0.346	-2.448	Unit root	0.352	-2.432	Unit root	0.165	-3.004	Unit root
IRE	0.998	0.538	Unit root	0.100	1.109	Unit root	0.098*	-3.326	No unit root
ITA	0.805	-1.446	Unit root	0.100	-3.296	Unit root	0.181	-2.931	Unit root
NLD	0.283	-2.603	Unit root	0.994	0.119	Unit root	0.011**	-4.755	No unit root
PRT	0.599	-1.923	Unit root	0.992	0.017	Unit root	0.063 *	-3.593	Unit root
DNK	0.446	-2.223	Unit root	0.867	-1.233	Unit root	0.001 ***	-6.206	No unit root
GBR	0.996	0.309	Unit root	0.981	-0.335	Unit root	0.990	-0.065	Unit root
SWE	0.749	-1.507	Unit root	0.485	-2.086	Unit root	0.316	-2.521	Unit root

Notes: This table displays the result from the Augmented Dickey Fuller unit root test for each country and variables. Column 1 displays the countries. Column 2 estimated p-value, column 3 t-statistic, column 4 shows if the series contain unit root or not these applies for the output gap series. Column 4, 5 and 6 are the estimated tests and results for government debt. Column7, 8 and 9for lagged cyclically adjusted primary balance respectively, where the columns follow the same disposition for the last two series as for output gap.

Under the null hypothesis that a time series contain a unit root, we reject the alternative on the 5% confidence level, which is true for all of the output gap variables. Only the time series for Germany does not contain a unit root on a 10% significance level. All time series for government debt except Finland contains a unit root. Finland has a stationary time series on a 5% significance level. The time series for cyclically adjusted primary balance are stationary for Denmark on a 1% significance level. Germany and The Netherlands display stationary on a 5% significance level. On the 10% significance level we can accept the alternative hypothesis and conclude that Portugal and Ireland do not contain a unit root

5.5 Estimated results, Panel data, 2SLS

In the following section we will evaluate the results from our panel data analysis for both the Euro zone and EU3. Three different panel estimations to test for heterogeneity with fixed effects have been conducted. For the last two 2SLS, one independent, one lagged dependent and at last the lagged independent variables will be displayed with the contribution of a dummy variable.

Table 5.4 Estimated Discretionary fiscal policy, reaction to monetary gap, EMU
(Dependent variable: Cyclically adjusted primary balance)

	Coefficient	T-stat	P-value
C	-12.873 (0.377)	-34.109	0.0000***
Output Gap	0.255 (0.025)	10.160	0.0000***
Lagged Cyclically Adj. primary Government Balance	0.246 (0.015)	16.395	0.0000***
Lagged Government Debt	0.207 (0.006)	34.439	0.0000***
Monetary Gap	0.070 (0.022)	3.239	0.0012***
R-square	0.367		

Notes: Column 1 displays the independent variables, where standard deviations are in the parenthesis. Column 2displays the estimated coefficients, column 3 the estimated t-statistics and lastly column 3 the estimated P-values.

Table 5.2 displays the estimations results from 2SLS, panel data with fixed effect where deviations from Taylor Rule has been added as an independent variable. In contrast to the our country-specific results that showed an average procyclical discretionary fiscal policy, the panel data displays that the government reacts to business cycles fluctuations with countercyclical policy decisions. Column 4 for displays that all of the estimated coefficients are significant on a 1% significance level. We can therefore reject the null hypothesis and accept the alternative that our coefficients are different from zero. The positive sign in the estimated coefficient for output gap captures the fiscal policy reaction with the value of 0,255. Observing the lagged cyclically adjusted primary government balance it shows a positive value of 0,246 implying a loosening in fiscal stance. The reaction from past government debt is mildly countercyclical, with an estimated coefficient of 0,207. The estimated coefficient that captures the reaction in fiscal stance to monetary gap is positive but small. The value of 0,070 indicates that monetary and fiscal policies are not substitutes. The coefficient p-value is 0,0012 and therefore significant on a 1% significance level. The panel data with the addi-

tion of an independent variable, monetary gap explains 36,7 % of the variation in the reaction of discretionary fiscal policy.

Table 5.5 Estimated Discretionary fiscal policy, reaction to monetary gap, EU3
(Dependent variable: Cyclically adjusted primary balance)

	Coefficient	T-stat	P-value
C	-4.520 (0.886)	-5.100	0.0000***
Output Gap	-0.544 (0.099)	-5.475	0.0000***
Lagged Cyclically Adj. Primary Government Balance	1.337 (0.126)	10.595	0.0000***
Lagged Government Debt	0.066 (0.010)	6.295	0.0000***
Monetary Gap	-0.455 (0.056)	-8.071	0.0000***
R-square	0.103		

Notes: Column 1 displays the independent variables, where standard deviations are in the parenthesis. Column 2 the estimated coefficients, column 3 the estimated t-statistics and lastly column 3 the estimated P-values.

The table above displays the control groups' reaction function. The panel estimation results clearly seem to differ from the results derived from the panel estimation performed on the EMU members. All of the estimated coefficient are significant at the 1% level since the p-values are all smaller than 0,001. We reject the null hypothesis in all cases and accept the alternative that the coefficient is different from zero. The results indicate that the group has conducted a very procyclical discretionary fiscal policy, the estimated output gap coefficient show a negative sign, -0,544. The second independent variable, lagged cyclically adjusted primary balance is positive and in line with the panel data estimation from EMU, the coefficient is however very positive, 1,377 implying that the discretionary fiscal policy decisions response to past balances with a loosening in fiscal policy. The estimated coefficient for lagged government debt is positive, in similarity to EMU they tighten fiscal discretionary in response to past years debt. The reaction is however not strong, which is in contrast to the result derived from the estimation for EMU. The last independent variable, monetary gap exhibits an estimated value of -0,455. This implies in contrast to the results for the EMU countries that the control group use fiscal policy as a substitution for monetary policy. The R-square value is 0,103, which means that our independent variable explains 10,3% of the variation in the dependent variable.

Table 5.6 Estimated Discretionary fiscal policy, reaction to election year, EMU

(Dependent variable: Cyclically adjusted primary balance)

	Coefficient	T-stat	P-value
C	-9.820 (0.361)	-27.194	0.0000***
Output Gap	0.224 (0.012)	18.898	0.0000***
Lagged Cyclically Adj. Primary Government Balance	0.363 (0.015)	24.519	0.0000***
Lagged Government Debt	0.163 (0.006)	29.446	0.0000***
Electoral	-0.793 (0.036)	-22.133	0.0000***
R-square	0.455		

Notes: Column 1 displays the independent variables, where standard deviations are in the parenthesis. Column 2 the estimated coefficients, column 3 the estimated t-statistics and lastly column 3 the estimated P-values.

The estimated result presented in table 5.6 are derived in line with the previous panel data, it does however with the addition of a dummy variable for election year capture the reaction in governments discretionary fiscal policy to an election year. In this analysis we exclude monetary gap. In line with our previous panel estimation we can conclude that all of our coefficients are significant on the 1% significance level and thus accept the alternative hypothesis in all cases. The coefficient for discretionary fiscal policy, output gap has an almost precise value as for the previous case of our panel data estimation, the value is only marginally smaller, thus indicating less countercyclical fiscal discretionary fiscal policy. The lagged coefficient for cyclically adjusted primary government balance is however larger in contrast to previous findings. We can further observe that the estimation results for lagged public debt is 0,163 thus smaller than previous findings in panel data but closer to the average derived from the country-specific reaction curves. The reaction to past government debt is clearly a tightening in fiscal discretionary policy. The electoral dummy is negative and significant on the 1 % significance level. The value -0,793 implies that government loosen their fiscal discretionary policy when an election approaches. Such a policy can give rise to a deficit bias. The model explains 45,5% of the variation of the reaction in discretionary fiscal policy, which clearly much higher than the previous model.

Table 5.7 Estimated Discretionary fiscal policy, reaction to election year, EU3
(Dependent variable: Cyclically adjusted primary balance)

	Coefficient	T-stat	P-value
C	0.903 (0.345)	2.620	0.0089*
Output Gap	0.038 (0.036)	1.070	0.2849
Lagged Cyclically Adj. primary Government Balance	0.625 (0.057)	10.884	0.0000***
Lagged Government Debt	-0.001 (0.004)	-0.338	0.7355
Electoral	0.151 (0.084)	1.797	0.0727*
R-square	0.414		

Notes: Column 1 displays the independent variables, where standard deviations are in the parenthesis. Column 2 the estimated coefficients, column 3 the estimated t-statistics and lastly column 3 the estimated P-values.

The table above visually show the result retrained from our panel estimation with a dummy for election years. In line with the result for the panel test for EMU we find that EU3 also have a countercyclical discretionary fiscal policy, even though they do not respond as strongly with fiscal reaction as the EMU countries do, since the estimated coefficient is 0,038. The estimation is not significant on any significance level. The second independent variable the lagged cyclically adjusted primary balance has an estimated value of 0,625, which is significant on a 1% significance level. The lagged government debt displays an estimation coefficient value of -0,001, hence a loosening in fiscal discretionary policy in response to last years´ debt. A result that however is insignificant. The estimated result in fiscal stance in response to election year for the control group does not go in line with the findings for EMU, EU3 do in contrary show a tightening in fiscal discretionary policy. The effect is however only significant on a 10% level.

Table 5.8 Estimated Discretionary fiscal policy, reaction to booms and busts, EMU
(Dependent variable: Cyclically adjusted primary balance)

	Coefficients	T-stat	P-value
C	-12.482 (0.364)	-34.253	0.0000***
Output Gap	0.478 (0.052)	9.223	0.0000***
Cyclically Adj. primary Government Balance	0.334 (0.021)	16.194	0.0000***
Lagged Government Debt	0.207 (0.006)	36.247	0.0000***
Behavioural	-1.033 (0.154)	-6.718	0.0000***
R-square	0.371		

Notes: Column 1 displays the independent variables, where standard deviations are in the parenthesis. Column 2 the estimated coefficients, column 3 the estimated t-statistics and lastly column 3 the estimated P-values.

The last of the three different panel data estimation includes a dummy for government behaviour. We can conclude by observing the table that all of our coefficients are significant on a 1% significance level since our estimated p-value is clearly smaller den 0,001. By further examining the table we are able to detect a great difference in the estimation result for output gap, which is almost the double the value observed in our two previous panel data calculations. This clearly states a counteractive discretionary policy. The two lagged variables do however not vary much compared to previous estimations. The behavioural dummy variable shows a negative sign and the value of -1,033, implying a loosening in fiscal reaction. The coefficient indicates a procyclical behaviour in response to good times. 37,1% of the variation in fiscal policy decisions is explained by this model, clearly lower than the model with an election year dummy, but only marginally more explanatory than the first one with deviations from Taylor Rule.

Table 5.9 Estimated Discretionary fiscal policy, reaction to booms and busts, EU3
(Dependent variable: Cyclically adjusted primary balance)

	Coefficients	T-stat	P-value
C	-0.107 (0.501)	-0.213	0.8315
Output Gap	-0.463 (0.092)	-5.024	0.0000***
Cyclically Adj. primary Government Balance	0.658 (0.076)	8.686	0.0000***
Lagged Government Debt	-0.004 (0.005)	-0.895	0.3710
Behavioural	2.031 (0.235)	8.658	0.0000***
R-square	0.031		

Notes: Column 1 displays the independent variables, where standard deviations are in the parenthesis. Column 2 the estimated coefficients, column 3 the estimated t-statistics and lastly column 3 the estimated P-values.

Panel 5.9 exhibits the last result from EU3, all of the coefficients, except the one for lagged government debt are significant on a 1% significance level. Strangely the results show an output gap coefficient that is strongly negative, thus opposite in comparison to the rest of our result. These findings imply that the control group have procyclical discretionary fiscal policy, which is not corresponding to rest of our estimation results. The variable is significant and shows an opposite sign in comparison to our other results. The cyclically adjusted primary government balance is in line with the result derived from the EMU panel data. The lagged government debt has an estimated coefficient of -0,004, thus not in line with the control group it is further more not significant at any significance level. The dummy for behaviour is in strongly positive, 2,031 and also significant at a 1% level. The value is in stark contrast to the findings in EMU where the dummy is instead negative. The R-square is furthermore very small as compared to the other results.

5.6 Estimation result for unit root test, panel data

5.10 Unit root test result for panel data

	Output gap	Government debt	Cyclically adj. primary balance
EMU	0.0000***	0.0000***	0.0002***
	(-11.733)	(-14.019)	(-3.560)
EU3	0.3345	1.0000	0.4257
	(-0.428)	(7.133)	(-0.187)

Notes: IPS- test for unit root on panel data. The table displays the p-values, the values inside the parenthesis are the IPS t- statistics.

The test results for the IPS- test for the EMU- countries leads to rejection of the null hypothesis on a one-percentage significance level, implying stationarity in the series. For the control group, the test reveals the contrary, where the p-values indicate that we cannot reject the null hypothesis of a unit root, i.e. the series are non- stationary.

5.7 Estimated discretionary fiscal policy during bad times

Table 5.10 Discretionary fiscal behaviour during bad times

	Recession early 1990s			Recession early 2000s			Recession late 2000s		
	ΔOutput GAP	Δ Cy. Adj. Pr. Ba.	Ratio	ΔOutput GAP	Δ Cy. Adj. Pr. Ba	Ratio	ΔOutput GAP	Δ Cy. Adj. Pr. Ba	Ratio
AUS	-3.324	0.182	-0.055	-4.251	1.945	-0.458	-5.745	1.711	0.298
BEL	-4.137	0.760	-0.184	-2.274	0.038	-0.017	-7.897	-2.180	0.276
DEU	-5.808	1.757	-0.302	-2.778	-1.501	0.540	-7.957	-1.495	0.188
ESP	-6.431	1.137	-0.177	-1.927	0.656	-0.340	-6.940	-8.508	1.226
FIN	-15.57	-6.619	0.425	-3.308	-4.190	1.267	-9.726	-2.820	0.290
FRA	-4.120	-1.764	0.428	-2.628	-1.808	0.688	-5.875	-2.960	0.504
GRC	-4.270	1.836	-0.430	-0.516	-0.532	0.947	-4.388	-5.840	1.331
IRE	-7.872	10.047	-1.276	-3.212	-2.870	0.896	-14.037	-0.871	0.062
ITA	-5.393	6.997	-1.297	-2.051	-0.720	0.351	-7.747	-0.763	0.098
NLD	-3.222	3.839	-1.191	-4.959	-3.330	0.671	-6.688	-3.215	0.481
PRT	-9.382	0.919	-0.098	-4.287	1.903	-0.444	-6.005	-2.295	0.382
DNK	-2.209	-1.947	0.881	-3.285	-1.398	0.425	-7.697	-4.325	0.562
GBR	-7.519	-4.479	0.594	-1.319	-3.610	2.736	-7.294	-6.181	0.847
SWE	-9.037	-8.080	0.894	-2.526	-4.624	1.831	-11.193	-0.369	0.033
EMU	-6.320	1.736	-0.378	-2.926	-0.946	0.373	-7.546	-2.658	0.467
ALL	-6.307	0.327	-0.128	-2.809	-1.431	0.650	-7. 799	-2.865	0.470

Notes: Cumulative change in output gap. in primary cyclically adjusted balance and the ratio between them during three recessions. Source: Datastream and OECD Economic Outlook. June 2009 issue.

Following Galí and Perotti (2003) we assessed the effect on fiscal behaviour of the EMU members since the implementation of the MT by estimating the cumulative change in the output gap and the cumulative change in primary cyclically adjusted balance. measured as a share of GDP. The calculations are based on periods of recessions. since the effect of the constraints imposed by MT are more likely to prevail during a downturn. The discretionary fiscal response is captured from the ratio between the two variables. Three downturn have occurred since the early 1990s. the first one in the beginning of the 1990s. a second one in the early 2000 and the most recent in the late 2000s. By examining the sign and the size of the ratio for every country we can determine the deliberate counter-cyclical fiscal stance and its magnitude. Counter-cyclical discretionary fiscal behaviour is captured by the positive sign of the ratio. indicating that a negative output gap is followed by an increase in primary cyclically adjusted deficit and therefore a cumulative negative change in cyclically adjusted

primary balance (Konjunkturinstitutet. 2008). In line with Galí and Perotti we find that during the 1990s recession only France and Finland and the control group exhibited a countercyclically fiscal policy stance as opposed to the remaining EMU members. The average fiscal behaviour in EMU was procyclical. The fiscal policy stance during the recession of the early 2000s displays a different pattern; the average EMU member's exhibits a countercyclical fiscal stance. only Austria Belgium. Spain and Portugal are procyclical. During the latest downturn however all of the EMU members as well as the control group are countercyclical.

6 Robustness issues

The method that we have chosen is based on previous studies. were a 2SLS is conducted. When evaluating what kind of method that fitted the data best. we based our decision on the problem with endogeneity. thus IV estimation with 2SLS was the best. The earlier studies that sought to seek the same answers and also had used the same method did not show any indication of the presence of non-stationarity or the use of cointegration tests. Our results do however suffer from a problem with non-stationarity. A common solution for series that contain non-stationarity is to search for cointegration between the variables. If cointegration exists it indicates that the series have a long run relationship. implying that there would be no problem to base estimation on them. As a means to derive trustworthy estimations would be to combine the 2SLS with a model for cointegration. thus not use the ordinary way of testing for cointegration with basic cointegration test. The model needed is too complex too combined with endogeneity. Due to the lack of time we have to base our analysis on trying to combine what is applicable according to economic theory and based on the nature of the result.

7 Discussion and Conclusion

The aim of this thesis is to analyse the role of discretionary fiscal policy in EMU and to investigate if fiscal policy counteracts business cycle fluctuation. The second objective is to analyse the convergence process within the EMU in order to see if disparities still exists. if there are differentials in real and financial economic variables the we argue that the need for countercyclical fiscal policies increase. We apply the methodology used by Galí and Perrotti in order to capture the reaction in the stance of fiscal discretionary policy. The dependent variable of their choice. the cyclically adjusted primary deficit is in our method replaced by the cyclically adjusted primary balance. The choice of dependent variable is set with the objective to capture the effect of business cycle movements. previous government debt and previous balances. A country-specific 2SLS was conducted in order to estimate the single country's´ fiscal discretionary policy. We further more apply panel data to account for possible disparities in the Euro zone. The addition to panel data was to introduce monetary gap as an independent variable and two different dummies. behaviour and election year respectively. Moreover we use the ratio between the cyclically adjusted primary balance and output gap during the time of recession in order to calculate government behaviour during bad times. since that is the time were the boundaries of the new regulation are more likely to have a dampening effect on the fiscal policy makers decisions. Previous research in the field have reviled conflicting results. Galí and Perotti (2003) found that the discretionary fiscal policy was countercyclical. implying that SGP and MT did not have a negative effect. Bertrand. Muysken and Vermeulen (2008) estimation result show an opposite result that instead indicates procyclical fiscal discretionary fiscal policy.

An empirical research is pursued to capture the reaction in fiscal discretionary policy to the independent variables. We extend the work of previous researcher. with a lengthening of the time period. Previous estimation result were faced with a weakness. that is that the implementation of the MT and SGP may not fully been recognized in their results since it had been no real recessions. With the extension of the time period we are able to capture not only the two first busts but also the last downturn. This is the greatest contribution with our thesis.

The general estimation results for country-specific variables show that there was an overall convergence process that that started 1992 or even before that period. which proceeded during the following years until 1994-1996. Thereafter there is an increase difference between the variables in EMU and EU14 with the exception of inflation. The lack of differ-

entials can most likely be explained by the objective to keep inflation around its long-term target. The peak in short- and long-term interest rates that both EMU and the control group show after 2008 is probably not a convergence process toward each other instead it is probably a more contractionary monetary policy in response to recession. The estimated disparities are most likely to be larger if we would have extended our analysis to incorporated all the EMU- as well as all the EU members. since the economic structure of the newer member countries are more likely to be more different in comparison to the initial ones. There exist country-specific disparities. which imply a need for more countercyclical discretionary policy.

The derived result from the country-specific estimation exhibit an average of mildly procyclical fiscal behaviour. The average is however affected by the very procycliality of Greece. the result would have been countercyclical with the exclusion of the nation. EU3 also show a procyclical average. Only two of the estimations were significant on a 5% level. and one on a 10% level. From our panel analysis we find that EMU has had a countercyclical fiscal policy. since the coefficient for output gap is positive in all three panel estimation and the result is statistically significant on a 1% level. The panel estimation for the control group do however show conflicting results. two out of three estimations results are negative. implying a procyclical fiscal discretionary policy. which is in line with the country-specific result. One of the estimation does however show a mildly countercyclical fiscal stance. The conflicting result might be a result of non-stationarity. thus misleading. From the evaluation of the ratio between the cumulative change in cyclically adjusted primary balance and output gap. the result show a clear trend toward a more countercyclical fiscal policy. during the last recession all member countries as well EU3 show a countercyclical fiscal policy with no exception. Based on our panel estimation and the estimated ratios we conclude in line with Debrun. Farquee. Beetsma and Atang (2006) that emphasizes the need for countercyclical discretionary policy as a mitigating to cyclicality in the presence of disparities that the MT and SGP does not have a limiting role on fiscal discretionary policy today. Our results from the ratio do however show that fiscal discretionary policy during the bad times of the early nineties were mostly procyclical. this was also when disparities were the largest.

The estimated result shows that there is sensitivity to long-term debt in the relationship between the dependent variable and government debt. The interdependence is captured by the country-specific reaction function as well as in the panel estimation. There seems to be no difference between this response in the comparison between the Euro zone and EU3. The panel estimation for the control group does however exhibit result that is not in accordance

to the context. The result indicates a loosening in fiscal stance in response to last year government debt. This is not according to theory and not in line with our hypothesis. Since these also are the panel estimation that gave the conflicting results in the discussion above concerning output gap. we have again reason to believe that the results are erroneous. The general result is a tightening of discretionary fiscal policy in reaction to accumulated debt this is in line with the result from Galí and Perrotti (2003) and Bertrand. Muysken and Vermeulen (2008)

The relationship between last years' cyclically adjusted balance and the current cyclically adjusted primary balance is according to both our country-specific reaction function and our panel estimation a tightening reaction in discretionary fiscal policy. The result is not in line with previous research derived either from Galí and Perrotti (2003) or Bertrand. Muysken and Vermeulen (2008). The implication of this is that EMU and EU3 reacts to previous years balance with raising taxes or cuts in spending.

The reaction to monetary cap does not show that fiscal discretionary policy is a substitute for monetary policy. implying that a loosening in monetary policy is not followed with a tightening fiscal stance. This conclusion applies for EMU and is not in line with the results form Galí and Perrotti. The control group show similar results which shows that they could be substitutes.

Fiscal discretionary policy in EMU seems to be loosening. in the approach of an election this is in accordance to the findings of Annett (2006). which implies that government might cut taxes or increase spending in a way that is not utilizing for the economy. The estimated response for the control group on the other hand shows a tightening in fiscal stance in reaction to election year. This finding is however not significant.

The effect that visualizes in behaviour during good times is a loosening reaction in the dependent variable for the EMU countries and tightening for the control group. The response that is captured in our panel estimation for EMU therefore capture the difficulty to stop spending or raise taxes in good times. This is in line with the findings of Debrun. Faruqee. Beersma and Atang (2006). For the control group however there is at tightening effect implying contractionary fiscal discretionary policy.

References

A. Abiad. J.D. Ostry (2005) *Primary Surpluses and Sustainable debt Levels in Emerging Market Countries*. IMF policy discussion working paper

A. Annett. (2006) Enforcement and the Stability and Growth Pact: *How Fiscal Policy Did and Did Not Change Under Europe's Fiscal Framework*. IMF working paper.

Bertrand. Muysken and Vermeulen (2008) *Fiscal Policy and Monetary Integration in Europe*: An update. Meteor. Maastricht research school of Economics of Technology and Organization

Debrun. Faruqee. Beetsma and Atang (2006) *Three current Policy issues* IMF. working paper

Gali. Jordi. Perotti. Roberto. (2003*) Fiscal policy and monetary integration in Europe*. NBER working paper no. 9773. June 2003

G.Hjelm (2008) Konjunkturinstitutets finanspolitiska tankeram. Specialstudie nr 16

Hamilton. James (1994). *Times series analysis*. Princeton university press.

J.B. Taylor. (2002) *Reassessing Discretionary Fiscal Policy* . The Journal of Economic Perspectives

J. Ferreiro. M. T. García-Del-Valle. C. Gómez (2010)
Social preferences and fiscal policies: an analysis of the composition of public expenditures in the European Union. Journal of Post Keynesian Economics

J. Westerlund (2005) *Introduktion till ekonometri*. Studentlitteratur

Kennedy. Peter (2008) A guide to econometrics. Blackwell publishing

M. Arghyroua. A.Gregorioub. A. Kontonikas. (2009) *Do real interest rates converge? Evidence from the European union.* Journal of International Financial
Markets. Institutions & Money.

M. Burda. C. Wyplosz (2005) *Macroeconomics a European Text. fourth edition. Oxford University press.*

M. Buti J.In't Veld W. Roger (2001) *Stabilizing output and inflation: Policy Conflict and Co-opertaion under a Stability Pact.* Journal of Common Market Studies.

P. Honohan. P.R. Lane (2003) *Divergent inflation rates in EMU*. World Bank and CEPR.

R. Harris and R. Sollis (2005) *Applied time series modelling and forecasting.* Wiley

R.I McKinnon (2004) *Optimum currency areas and key currencies* JCM. Volume 42. Number 4.

Sørensen & Whitta-Jacobsen (2005) *Introducing advanced macroeconomics: Growth & Business Cycles* McGraw-Hill Education

V.A. Muscatelli. V. Tirelli. C. Trecroci (2004) *Fiscal and Monetary interactions: Empirical evidence and optimal policy using a New-Keynesian structure*. Journal of Macroeconomisc

Verbekk. Marno (2008). *A guide to modern econometrics*. John Wiley & Sons

Wooldridge. Jeffrey. (2006). *Introductory econometrics. a modern approach*. Thomson