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Discretionary Fiscal Policy in the EMU Context: An empirical approach (1981-2010)

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Abstract. The paper attempts to investigate how the Maastricht criteria and the Stability and Growth Pact have impaired the capacity of EZ national authorities to conduct discretionary fiscal policy. We estimate fiscal determinants for the structural public deficit over the period of 1981-2010, estimating panel data equations in order to increase the strength of the test by enhancing the time series dimension of the data by the cross section. We argue that the degree of the countrecyclicality of discretionary fiscal policy has been reduced significantly after the Maastricht Treaty. Also, the empirical evidence shows that national fiscal rules have a significant positive impact in budgetary outcomes.

Keywords: discretionary fiscal policy, countercyclicatlity, flexibility, Stability and Growth Pact, business cycle.

1 Introduction

The main objective of the empirical analysis is to examine to what extent the constraints of both Maastricht criteria and Stability and Growth Pact (SGP) have affected the way national authorities conduct their discretionary fiscal policy. Provided that the monetary policy of all countries in eurozone is managed by the ECB, the fiscal policy undertakes the responsibility to operate as a stabilizing tool of the business cycle and to counteract the negative asymmetric shocks. Consequently, it is the foremost tool in the quiver of governments to deal with their country-specific fluctuations. For this reason, we would expect that the process of European integration should be linked to the adoption by the member-states of more countercyclical discretionary fiscal policies. On the other hand, the existence of the Pact sets constraints and limitations on the conduct of fiscal policy. The question we want to answer is whether these constraints prevent the stabilizing role of fiscal policy and if this hypothesis is supported by the empirical findings.

Making clear what the stabilizing role of authorities means, the governments tend to implement restrictive monetary and fiscal policies during booms and loose policies during recessions so as to stabilize the cycle. A rational assumption is that we should expect that European monetary union would be associated with the conduct of more strongly countercyclical fiscal policies which will affect negatively the budget outcome in times of economic recession as this is the way fiscal policy plays a stabilizing role in business cycles.

This analysis is based on that of Gali and Perotti (2003) aiming to amend and extend it. Specifically, we use historical data until the year of 2010 and we add in our model the variable of national fiscal rules. The latter enables us to evaluate whether the national fiscal rules can counteract political indiscipline and provide balanced budget outcomes. The division of the EZ countries into two subgroups (north – south) will provide us useful conclusions about the different effects the constraints have had on rich north and poor south.

From a methodological perspective, our empirical approach focuses on the variables that constitute indicators of discretionary fiscal policy such as the structural deficit or cyclically unadjusted deficit. It is essential to make a distinction between the changes in fiscal policy that occur as specific measures decided by national authorities discretionarity and the changes as a result of the general economic conditions that affect the automatic stabilizers. The level of the deficit consists of the cyclical deficit which is the result of business cycle fluctuations rising during recessions and falling during booms since the cyclical deficit acts as an automatic stabilizer and the structural deficit which shows how large the deficit would be if the economy were operating at full employment (potential real output) and demonstrates the impacts of the actions adopted by the national authorities whose objective is to cope with the endogenous or exogenous (such as the financing of a war) fluctuations of the cycle. A typical example of the cyclical deficit is the reduction of tax revenues and the increase of payments for social insurance during recessions.

2 Methodological Framework

The first step is to examine the stationarity characteristics of each time series. Actually, there are numerous econometric techniques to test for the existence of a unit root. In the current study, we use the popular Augmented Dickey – Fuller methodology (ADF) (Dickey and Fuller, 1979).[1]

The ADF test is based on the following regression (Kaskarelis 1993):

$$\Delta Y_t = a + bt + \rho Y_{t-1} + \sum_{i=1}^{m} \gamma \Delta Y_{t-i} + \varepsilon_t$$

where Δ is the first difference operator, t is time and ε_t is the error term.

In case the cyclical component is stationary, the secular component has a unit root and Y follows a random walk process i.e. the change in Y is absolutely random. Algebraically a random walk has the following form: $Y_t = Y_{t-1} + \varepsilon_t$. Furthermore, if $\alpha \neq 0$, then Y follows a random walk process with a drift. A drift process is represented as follows: $Y_t = Y_{t-1} + \alpha + \varepsilon_t$. Note that the lag dependent polynomial is incorporated with the aim to deal with the potential serial correlation of the residuals.

However, it is well-known that regarding panel data series, the standard unit root tests based on individual time series are not the appropriate techniques to employ as they do not work effectively. This is why we tend to apply panel data unit root tests that are employed in the investigation of statistical properties in panel data analysis. The results provided by the panel data unit root tests will be more reliable since the panel data analysis increases the strength of the test by enhancing the time series dimension of the data by the cross section. There are several panel unit root tests, some of the most popular are the following: the ADF - Fisher Chi-square (Maddala and Wu,1999), PP – Fisher Chi-square (Choi, 2001), the LLC (Levin, Lin and Chu, 2002) and the IPS (Im, Pesaran and Shin, 2003)[2]. For our analysis, we use the method of ADF – Fisher Chi-square as an alternative approach to

[1] There are several unit root tests that can be used such as the test of Zivot and Andrews (1992) , the IPS test (Im et *al.* 1997), the MW test (Maddala and Wu, 1999), or the Choi test (Choi, 2001).

[2] While the LLC test allows for heterogeneity of individual deterministic effects and a heterogeneous serial correlation structure, it assumes the presence of a homogeneous autoregressive root under the alternative. The latter is identified as a serious limitation for the LLC test. The LLC test procedure involves using pooled t-statistics of the estimator to evaluate the hypothesis of non-stationarity of each individual time series. The more recently developed IPS tests overcame the limitation of the LLC test by allowing for heterogeneity of the autoregressive root under the alternative. The IPS test is simple to calculate and allows for residual serial correlation and heterogeneity of dynamics across groups. However, simulations indicate that the IPS test is sensitive to a correct choice of lag orders in the underlying ADF regressions; the power of the t-bar test is more favorably affected by a rise in time dimension of the data than the cross-section units of the data; and the interpretation of the IPS test results are difficult because of the heterogeneous nature of the alternative hypothesis. Maddala and Wu's (1999) and Choi's (2001) tests were similar in the way that both suggested panel unit root tests performed using a Fisher statistic, but they were developed to overcome the shortcomings of the LLC and the IPS tests. Maddala and Wu's (1999) and Choi's (2001) tests solves the problems related to previously mentioned tests by providing the combination of

the unit root tests. The ADF – Fisher Chi-square test combines the p-values from the individual unit root tests and allows for individual unit root processes so that p-values vary across cross-sections.

The ADF - Fisher Chi-square is based on the following regression (Baltagi, 2001; Fischer, 1932):

$$P = -2 \sum_{i=1}^{n} lnp_i$$

The hypothesis that we have to evaluate is H_0: $\rho_i = 1$ against the alternative H_1: $\rho_i < 1$ (the series are weakly stationary or trend stationary). The ADF - Fisher Chi-square test was applied both on the initial original variables of the models and their first differences. Most of the original variables are non-stationary however their first differences are stationary.

Moreover, in order to choose the appropriate coefficient covariance method, we work in full accordance with the Arellano asymptotics (1987). If T (number of periods) is greater than N (number of cross sections) and T<2N we use the method of White diagonal with Cross Section weights, while if T>2N we use the method of White Cross section with Cross Section SUR weights. As a result, for models 2,4 we use the method of White diagonal while for models 1,3, the method of White Cross section.

Finally, our sample consists of the data of the 11 first members – states of eurozone (Austria, Belgium, Finland, France, Germany, Greece[3], Netherlands, Ireland, Italy, Portugal, Spain) for the time period of 1981 – 2010 capturing inter alia the traces of the current crisis. Source of the data is the database of OECD.

3 Panel Data Regressions and Empirical Analysis Results

A useful starting point for our empirical analysis would be to regress the following relation:

$$d_t = a_0 + \beta_x X_t + d_{t-1} + u_t \quad (1)$$

where d_t is the deficit of general government as a share of GDP, X_t is the output gap and d_{t-1} is the lagged variable of deficit.

The concept is to regress an indicator of fiscal policy on a cyclical indicator, so we will estimate the relation between the cyclically unadjusted deficit of general government and the output gap which is an economic measure of the difference between the actual output of an economy and the potential output (the output that can be produced at full employment). The use of the lagged variable helps us to account for the likely of error autocorrelation and it allows explanatory variables to have effects beyond the current period.

Even though this relation does not identify the systemic response of national authorities as discretionary policy to the fluctuations of the cycle, it provides a useful descriptive relation between public finances and cyclical activity. Our results demonstrate the contribution of cyclical conditions on the implementation of balanced or surplus budgets and hence on the ensuring of the sustainability of public debt.

The table displays the results for our specification. Even if our model is simplistic, it has an appealing interpretative capacity. The explanatory variables are statistically significant at the significance level of 95%. Particularly, the results demonstrate a clear positive relation between the level of cyclically unadjusted deficit and the output gap. A reduction in the negative output gap or an increase in the positive output gap by 1%, would reduce the level of deficit by 0,5%. It would be wrong to conclude

probability values for a unit root tests applied to each group in the data set. With this in mind, we employed the LLC, the IPS, ADF-Fisher and PP-Fisher panel unit root tests in this paper. For the LLC and IPS test, the optimal lag length is determined according to Schwarz criteria.

[3] Greece joined EMU in 2001.

that the national authorities tend to conduct procyclical fiscal policy due to the fact that we have not used the appropriate indicators of discretionary policy in our specification.

Interpreting the empirical results of the model 1, they highlight the weaknesses in the structure of SGP. Regarding the Excessive Deficit Procedure (EDP) which entagles the imposition of fines in case there is a deficit in excess of 3% of GDP, we approve of the reviews which state that the SGP restricts the necessary flexibility fiscal policy should have in order to stabilize the cycle. Moreover, the SGP should take into account the growth rate of member-states and also their position into the business cycle since the rule refers to the cyclically unadjusted deficit (debt dynamics equation: $g - t + (r - x)b = \dot{b}$) and to the structural deficit.

In order to examine how authorities utilize fiscal policy as a tool to stabilize the fluctuation of business cycle, we use the structural deficit as an indicator of fiscal policy stance. Firstly, we should determine properly the timing of fiscal policy decisions so as to define the nature of the variable the national authorities react to. Actually, the measures are usually decided approximately a year before their implementation, excluding exceptional cases. Therefore, national authorities' decisions should be based on the expectation of the output gap, conditional available on information available in the period t-1 ($E_{t-1}\ X_t$). However, reality proves that the process of policy making is characterized by complexity and inconsistency, so a plausible assumption would be that the structural deficit responds to the output gap in the period t-1, rejecting a forward looking approach. Furthermore, in our model we incorporate the variable of the measure of gross debt relative to potential output gap as a debt stabilization motive (Gali and Perotti, 2003; Bohn, 1998; Wyplosz, 2002) and the variable of the lagged dependent variable (by one year) in order to avoid autocorrelation error and to deal with endogeneity possibilities[4]. The introduction of these two explanatory variables enables us also to take into account the initial limitations faced by the government. The resulting specification we estimate is the following:

$$d_t^* = a_0 + \beta_x X_{t-1} + \beta_b b_{t-1} + b_s d_{t-1}^* + u_t \qquad (2)$$

where d_t^* is the structural deficit divided by potential output, X_{t-1} is the output gap for the period t-1, b_{t-1} is the gross debt of general government as a share of GDP for the period t-1 and d_{t-1}^* is the lagged dependent variable.

A negative (positive) value of the coefficient β_x implies that fiscal authorities use discretionary fiscal policy in a countercyclical (procyclical) way. A negative value of the coefficient β_b, as well as a value of the coefficient b_s less than 1, implies that policymakers are subject to initial restrictions regarding the level of deficit and debt (Gali and Perotti, 2003). The higher the initial level of debt or deficit, the lower they conduct strongly countercyclical discretionary policy. Since our primary objective is to detect whether the constraints of Maastricht criteria and SGP have impaired the way policymakers conduct discretionary fiscal policy, we split our sample into two sub periods: the pre-Maastricht period and the post-Maastricht period. The first sub period covers observations for the period from 1981 to 1991 (one year before the criteria of Maastricht Treaty come into force). The empirical results for this period will demonstrate the tendency of policymakers in fiscal policy making process and how they conduct discretionary policy without constraints and limitations. We estimate the following version:

$$d_t^* = a_0 + \beta_{xBM} X_{t-1} + \beta_b b_{t-1} + b_s d_{t-1}^* + u_t \qquad (2a)$$

where the initials BM and AM refer to pre-Maastricht and post-Maastricht periods respectively.

Looking at the results of the model 2a from the table, in the pre-Maastrich period when governments had at their disposal also the monetary policy as a stabilizing tool, they tended to utilize the tools of

[4] Dealing with the problem of endogeneity is a complicated task. In econometric theory, it is vague whether a variable is endogenous or exogenous. It depends on the assumptions made by the analyst and his theoretical background. A way to deal with the "fear" of endogeneity is to use an instrumental variable which allows consistent estimation when the dependent variable causes at least one of the explanatory variables. That means that there is a reverse causation and our results are biased.

fiscal policy in a systemic countercyclical way. The coefficient of output gap has a negative value which indicates that policymakers conduct restrictive fiscal policy during booms and loose fiscal policy during recessions. As far as the initial restrictions are concerned, we notice that initial limitations exist only in respect of the initial level of deficit, while the higher the initial debt, the lower the structural deficit national authorities set discretionarily. The magnitude of the gross debt does not constitute a deterrent factor for the adoption of countercyclical fiscal policy. Note that both the model and the independent variables are statistically significant at the 0.05 level.

The second sub period under examination covers the period from 1992 (when the criteria of Maastricht came into force regarding the membership in eurozone) to 2010 including the effects of the adoption of the supranational rule for EZ member states.

$$d_t^* = a_0 + \beta_{xAM} X_{t-1} + \beta_b b_{t-1} + b_s d_{t-1}^* + u_t \qquad (2b)$$

The results of the analysis support our hypothesis that the integration of monetary policy with a clear mandate to the focus on the target of price stability is associated with countercyclical fiscal policies in the EMU countries even if the flexibility of fiscal policy is being reduced when the medium-term target of the SGP has not been achieved. Nevertheless, even though the explanatory variable is not statistically significant at level lower than 20%, there is an indicative tendency of a significant reduction in the degree of countercyclicality of discretionary fiscal policy. Additionally, it is concluded that the supranational fiscal rule for the level of deficit has significantly limited the capacity of policymakers to use fiscal policy a stabilizing tool of the cycle as the empirical data confirm the failure of member-states (especially France and Germany) to comply with the rule.

Now, we repeat the same exercise, having divided our sample into two sub groups. We split our sample of countries into the poor south or PIGS (including Greece, Italy, Spain, Portugal and Ireland) and the rich north (including Germany, France, Finland, Austria, Belgium and Netherlands). This will enable us to extract the different features and the asymmetries between the two sub groups as far as the conduct of fiscal policy is related. The pattern that emerges, shows that the southern European countries run systematically countercyclical discretionary fiscal policies in the post-Maastricht period which is statistically significant at 0,05 level, but there is a reduction in the degree of countercyclicality from the pre-Maastricht period which is statistically significant at 0,10 level. On the other hand, regarding the northern countries, they appear to conduct procyclical discretionary policies in the post-Maastricht period in contrast to the previous when there is a statistically significant negative relation between structural deficit and output gap. The above finding demonstrates an aspect of the decreasing synchronization among the counterparts of eurozone[5].

Following the lead of several authors, we also incorporate into our model the independent variable of national numerical fiscal rules (Iara and Wolff,2010; Debrun et al., 2008 Ayuso-i-Casals et al., 2006; Commission, 2007; Deroose et al., 2006). Apart from the rules imposed by the SGP, there are numerous national fiscal rules which are designed to prevent the decline of public finances and to hit the profligacy of governments. A concise definition of the national fiscal rule is the one proposed by Kopits and Symansky (1998) which defines the national fiscal rule as "a permanent constraint on fiscal policy, expressed in terms of a summary indicator of fiscal performance". In order to meet the needs of the scientific research, Commission firstly compiled a dataset on national fiscal rules in force across EU countries and then created the Fiscal Rule Strength Index which evaluates numerically the strength and the efficiency of domestic fiscal rules. Five criteria have been taken into consideration: the statutory/legal base of the rule, the room for setting or revising objectives, the nature of the body in charge of monitoring respect and enforcement of the rule, the enforcement mechanisms of the rule and the media visibility of the rule[6]. The ranking of the index takes values from -1,12 to 1,54[7]. The use of

[5] Papageorgiou et al. (2010) testify a decreasing synchronization among the counterparts of the emu zone after the introduction of the euro coin".

[6] http://ec.europa.eu/economy_finance/db_indicators/fiscal_governance/documents/fiscal_rules_calculation_fiscal_rule_index_2010.pdf

the variable of national fiscal rules enables us to evaluate the contribution of domestic restrictions on the conduct of balanced budgetary outcomes and to what extend their strength affects the level of the structural deficit produced. The resulting specification that we estimate is thus:

$$d_t^* = a_0 + \beta_x X_{t-1} + \beta_b b_{t-1} + b_s d_{t-1}^* + \beta_f f_t + u_t \quad (3)$$

The most natural interpretation of the above findings is that there is an undeniably positive relation between domestic fiscal rules index and the level of structural deficit. The higher the fiscal rule strength index is for a country, the greater contribution of domestic constraints on the level of deficit produced. However, this relation is not statistically significant at a level lower than 25%. Moreover we find that the presence of national numerical fiscal rules increase the extent of countercyclicality of fiscal policy. Finally, it must be noted that there is a strong negative relation between the output gap for the period t-1 and the structural deficit for the period which proves one more time that governments run strongly countercyclical discretionary fiscal policy.

4 Concluding Remarks

This paper made an attempt to answer a crucial economic question regarding the degree to which the limitations of Maastricht criteria and SGP have impaired the ability of national authorities to run countercyclical discretionary fiscal policy in the EMU context approaching the time period 1981-2010.

Estimating the model adopted, several interesting conclusions emerge. Firstly, discretionary fiscal policy has become less countercyclical overtime as we have found a significant reduction in the degree of countercyclicality of discretionary fiscal policy. Secondly, there are differences in the manner the two sub groups of EZ countries conduct their discretionary fiscal policy indicating inter alia a decreasing synchronization among the member states of euro area. More precisely, the countries that form the PIGS are found to run to some extent countercyclical policies while the northern countries tend to conduct procyclical fiscal policies after the process of monetary integration. Finally, the empirical findings confirm the popular view that the adoption of national fiscal rules is associated with more sound fiscal policy and fiscal discipline.

A question remain unanswered is the extent to which the new version of the revised SGP that is associated with more severe rules, enforcement mechanisms and automatic sanctions, will affect the degree of flexibility of discretionary fiscal policy to be used as a stabilizing tool. Also, a further refinement of our approach would account for the existence of political business cycle in the formulation of fiscal policy.

Concluding, we want to stress that readers should take into account the limitations associated with the empirical analysis and not to overestimate the findings provided. What is more, we would rather to consider our remarks and findings as useful caveats to the debate opened about the future of EMU. It is apparent that future and more extended research on the topic would be of great interest.

5 Appendix

Table of the Panel Data Regression Results

Independent variables	Model 1	Model 2 (a-b)		Model 2 (southern countries)	
Output gap t-1		-0.167585 (-2.017307)*	-0.047525 (-1.243943)	-0.255622 (-1.823910)**	-0,089698 (-1,917188)**

[7] http://ec.europa.eu/economy_finance/db_indicators/fiscal_governance/fiscal_rules/index_en.htm

Independent variables	Model 1	Model 2 (a-b)		Model 2 (southern countries)	
Gross debt t-1		0.087848 (2.383029)*	0.024174 (3.791262)*	0,151052 (5,757249)*	0,027754 (3,016101)*
Lagged adjusted deficit		0.288348 (2.084699)*	0.813873 (19.52911)*	0,336790 (2,133473)*	0,812107 (15,27963)*
Output gap	0.499090 (5.510424)*				
Deficit t-1	0.715293 (9.988716)*				
Fiscal Rules Index					
Constant	-0.741778 (-3.126519)*	-9.828870 (-3.392398)*	-2.192489 (-4.494069)*	-17,11492 (-8,660905)*	-2,889977 (-3,542233)*
R2	0.759422	0.841258	0.874724	0.694813	0,838122
Durbin-Watson stat	1.530709	1.612692	1.856546	1.559896	1,693448
F-stat	75.08105	32.23887	104.7353	8,130985	64,34871
Countries included	11	10	11	5	5
Total panel observations	283	86	209	33	95
Coef. Covariance Method	White Cross section	White diagonal	White diagonal	White Cross section	White Cross section
Period	1981 - 2010	1981 - 1991	1992 - 2010	1981 – 1991	1992 - 2010

Independent variables	Model 2 (northern countries)		Model 3
Output gap t-1	-0.131373 (-2.161651)*	0.065972 (1.050242)	-0.092046 (-2.108149)*
Gross debt t-1	0.012280 (0.639387)	0.015535 (1.723184)**	0.019723 (2.666155)*
Lagged adjusted deficit	0.363182 (4.012788)*	0.7443 (11.70722)*	0.823360 (20.25733)*
Output gap			
Deficit t-1			
Fiscal Rules Index			0.202563 (1.152632)
Constant	-3.303735 (-2.4966613)*	-1.329439 (-2.037808)*	-1.823903 (-3.387655)*
R2	0.852416	0.839483	0.872487
Durbin-Watson stat	2.263396	2.062901	1.928381
F-stat	37.13004	68.64201	91.88301
Countries included	5	6	11
Total panel observations	53	114	114
Coef. Covariance Method	White Cross section	White Cross section	White diagonal
Period	1981 - 1991	1992 - 2010	1992 - 2010

In parenthesis are depicted the t-stat values. Model 1: dependent variable is the cyclically unadjusted deficit as a share of GDP. Model 2,3: dependent variable is the structural deficit as a share of potential GDP. * the independent variable is statistically significant at 0.05, ** the independent variable is statistically significant at 0.10.

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