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Article

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The analysis of budget rules and macroeconomic implications in several developed economies

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Abstract: The purpose of budget rules can be explored from the perspective of the expected results, obtained by their enforcement. On one hand, they are meant to improve or at least maintain certain levels of the budgetary deficit and public debt. On the other hand, they can help or limit the economic development perspectives of states, influencing important macroeconomic variables. Starting with the evolution of the budgetary deficit, under the hypothesis that the most important determinant lies within the budget rules implementation process, this analysis is focused on the influence of several budget rules on the nominal interest

rate. Our motivation is based on the need to present the differences between the analyzed countries in order to reveal if there were effects from the recession periods. The numeric part was made using panel data from eight west European countries along with Australia and New Zealand. The analysis is compound of a two method estimation of the relationship between nominal interest rate and several factors that are strongly connected with the budget rules.

Keywords: budgetary deficit, public debt, interest rate, golden rule of public finance

JEL Classification: E62, H62, H72

1. Introduction

1.1. Budgetary performance: the evolution of the approach

The approach regarding the analysis of budgetary performance has known several changes. At first, the main aspect of the analysis was the comparison between the state's achieved results, on the one hand, and the planned objectives and the cost of achieving those results, on the other hand (Plumb, 2003). As this wasn't the most accurate way to evaluate the budgetary performance, the method of analysis has been improved by using non-financial performance indicators. The necessity of this kind of approach comes due to several reasons: constraints regarding the control of expenditure and the improvement of the allocation and efficient use of the funds, changes in the command of credit rules (Anderson, 2008), the need to increase the quality of the management in the public sector (Bellamy and Evans, 1995). According to the data provided by the OECD, the authorities started using the performance indicators in drawing up their budgets only 5 years ago. Based on

the purposes they needed to answer, these indicators have been included in the process of budgeting with the sole purpose of presentation (***presentational performance budgeting***), they have been used to change the outcome of the public policy (***performance-informed budgeting***) and they have directly determined the allocation of resources based on the previous results (***direct performance budgeting***)¹. The second method is also the most used one and there are numerous empirical results for Europe (Posseth and Van Nipsen, 2009), Latin America (Arizti and others, 2009) as well as for USA, Canada and Australia (Hilton and Joyce, 2007).

1.2. Budgetary rules: definition and classification

When we mention a budgetary rule, we think about the way in which public revenues are assigned in the process of distributing the public goods and services.

¹ Although all methods are performance based (*Performance-based budgeting*), Hilton and Joyce consider that resource allocation is influenced also by the political factor, meaning that this method is not based fully on performance.

The studies in this area have labeled the budgetary rules based on the expected effect when applying them. Following Groneck's (2008) classification we have two categories: rules that allow the existence of public deficit (deficit-assignment rules) and macroeconomic rules that constraint a fiscal indicator, such as the public deficit ratio². Rules that are considered in the first category are rules that assume a public deficit threshold (the Maastricht Treaty, 1993), the Golden Rule of Public Finance³, and rules that are included in the second category are anti-deficit rules⁴, or rules that limit the growth level of public expenditure (Dothan and Thompson, 2009).

In section 2 we have reviewed preconditions stated and supported by researchers for a state to be able to successfully adopt a rule from one of the 2 categories previously mentioned. Also we have shown the results of the implementation of those policies.

² It is wished for this type of rule to have positive influence on the deficit and on the economic growth

³ Golden Rule of Public Finance: this budget rule allows the government only to run deficits if those deficits are used to finance investments in the public capital stock.

⁴ These have been instituted in the USA with the purpose of restricting the borrowing power of the authorities.

2. Using budgetary rules

The countries that took part in the Maastricht Treaty have used budgetary rules in order to ensure a sound fiscal discipline and their public deficit to reach a certain level. The understanding of this kind of rule was different for the European authorities than that of the American authorities. While the Europeans were focusing only on the accepted level of the public deficit (Germany), the American government was focusing on the way this rule was implemented (Corsetti and Roubini, 1996).

The case of the USA has been largely debated in the technical literature (Auerbach, 2008; Creel and Farvaque, 2009). The first time when budgetary rules were used was in the 1974 through a law that did not limit the public expenditure. The law proposed by Gramm, Rudman and Hollings⁵ is well-known because it severely limited the political power of the rulers. The nineties have been prolific years for the budgetary

⁵ Balanced Budget and Emergency Deficit Control Reaffirmation Act: this was enforced in 1987 and its main goal was to reduce public deficit before 1993.

reforms because the result was the implementation of a rule that implied that the public expenditure has to be financed from available funds⁶. This system has been adopted in the early 2007.

2.1 Objectives and preconditions

The main goal is to achieve performance. Before we can talk about preconditions and the effects of adopting budgetary rules, we must remind the fact that the involvement of the political factor can become an issue when defining and applying these rules (Creel, 2003). Using the classification that Groneck provided, we have mentioned a series of preconditions and suggestions for optimal adoption of the budgetary rules.

a) The Golden Rule of Public Finance

The Golden Rule of Public Finance has been adopted by several countries, the most important of them being Germany and Great Britain. The latter has

⁶ The system is known as PAYGO, or “pay-as-you-go”

implemented it in 1997 as a long-term strategy which pursues the achievement of welfare. Being a type of rule that doesn't constraint the level of public deficit, the countries that wish to apply this rule must have an adequate fiscal discipline. In the opposite case, issues regarding the equity of the costs and regarding the lack of clarity may appear (Kell, 2001). Along with this rule, Great Britain has enforced a law that prevents over-investing (Creel, Veroni and Saraceno, 2009). To be more specific, the level of public debt in respect to the GDP has to be kept at a prudent and stable level⁷.

b) Balanced-budget rules

The USA is one of the most important countries that have adopted this kind of rules, their main goal being the decrease of the public deficit. Inman (1996) has identified a series of preconditions that are necessary to be met for a balanced-budget rule to function. These are:

⁷ This level has been set by the Treasury Chancellor at 40% of the GDP.

- Ex-post accounting⁸. Facts have shown that using a set of rules ex-ante would result in an overestimation of the public revenues and an underestimation of the public expenses. Using an ex-post set of rules, the projections are more accurate and the differences between projections and reality can be adjusted periodically.
- The rules have to be constitutionally grounded. The states where the budgetary rules were statutory (meaning that a rule could be overturned by only a majority vote) had bigger public deficits than those which had constitutionally grounded budgetary rules. Because the states which used statutory rules were so few, the way that the law enforcer organism has been chosen, shows that, best results came in the situations where this organism had been elected by vote and not appointed by the governor or state legislature⁹.

⁸ In practice, there are 2 approaches regarding the way budgetary rules are set. The first approach, ex-ante, refers to the process of forecasting the size of the public expenditure and revenue based on assumptions while the second approach (ex-post) is based only on the results recorded in the past.

⁹ The deficit has been reduced with 156\$ per capita in the first category compared with 60\$ per capita for the second category (Inman,1996).

- Respecting the no-carryover rule. After testing for the evidence of this rule, Alt and Lowry (1994) concluded that the states which don't allow the transfer of the expenditure from year to year reacted faster (by reducing the public deficit) at public revenue shocks.

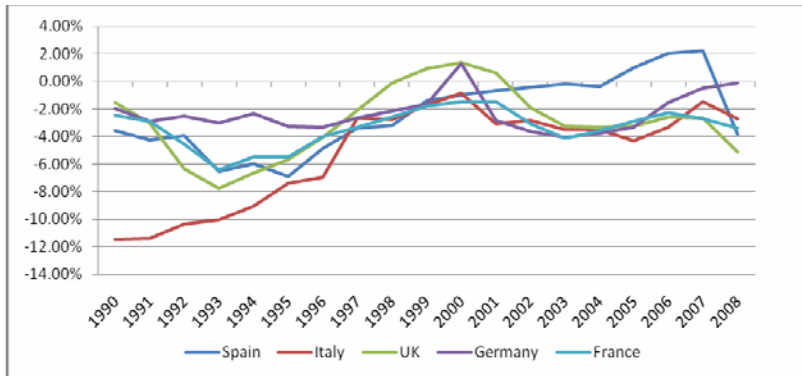
2.2 Public deficit and public debt

As we have seen, a budgetary rule is linked directly or indirectly to the public deficit or to the public debt. Seen as a permanent constraint on a key fiscal performance indicator (Kopits and Symansky, 1998), a budgetary rule can influence the evolution of the public expenditure and the public deficit. For the case of USA, Auerbach (2008) studied the influence of different regimes of budgetary rules on the evolution of a group of public expenses on a period of 45 years. We find out that public debt is also influenced by golden rules (as the one set with the Maastricht Treaty), having a role in the evolution of the public deficit.

In the following section we show the evolution of the public deficit and public debt for a number of

countries in Europe¹⁰ (Germany, UK, France, Spain and Italy) as well as for other geographical areas such as the Scandinavian area (Sweden, Denmark, Norway) or Oceania (Australia and New Zealand). We have shown the evolution of the public deficit in Figure 1a, 1b, and 1c on a period of 19 years (from 1990 to 2008).

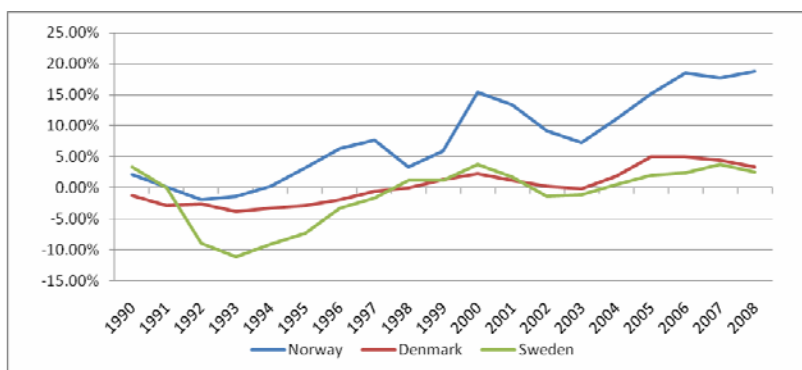
Figure 1a: Evolution of the budgetary deficit for the selected countries (as % of GDP)



Source: International Monetary Fund's WEO database

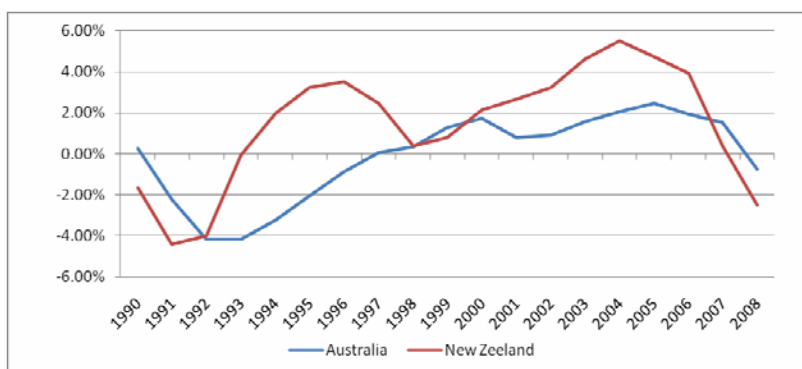
¹⁰ We have selected them based on importance in the community

Figure 1b: Evolution of the budgetary deficit for the selected countries (as % of GDP)



Source: International Monetary Fund's WEO database

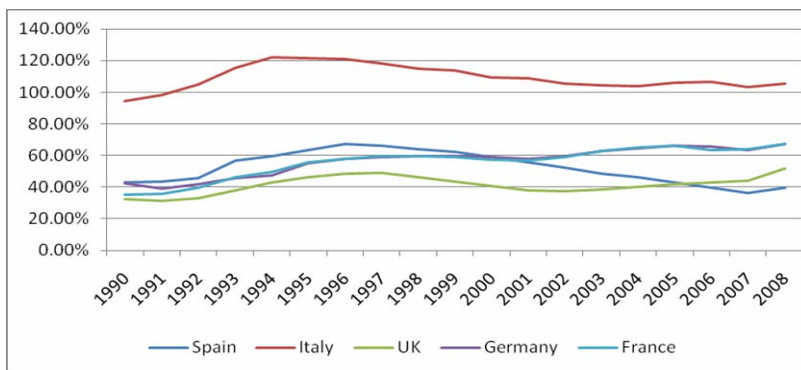
Figure 1c: Evolution of the budgetary deficit for the selected countries (as % of GDP)



Source: International Monetary Fund's WEO database

In order to have a more objective image concerning the public deficits of the countries we study, we wish to explain the evolution of the public deficit through the evolution of public debt. For instance, Italy has reduced its deficit during 1990-1997 from -11.439% to -2.671%, based on the growth of the public debt from 94.7% to 118.1%. The way the public debt¹¹ evolved is reproduced in Figure 2a, 2b, and 2c.

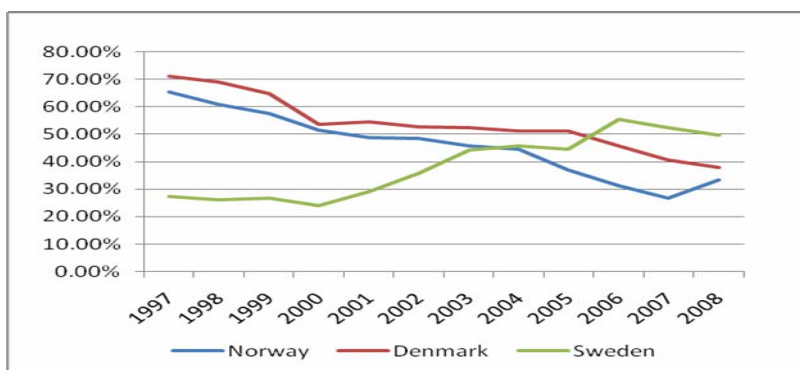
Figure 2a: Evolution of the public debt for the selected countries (as % of GDP)



Source: IMF statistics

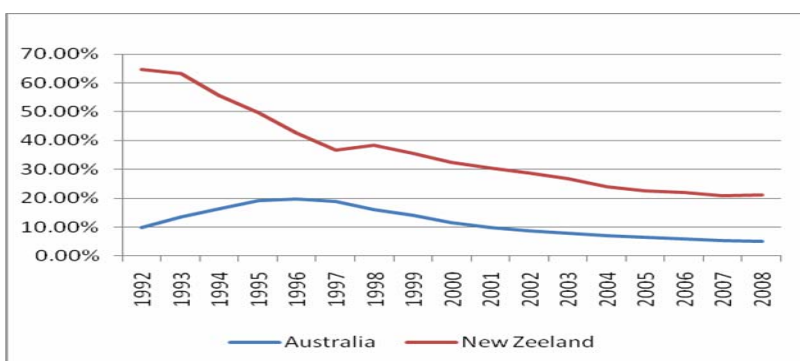
¹¹ For Australia and New Zealand we have considered as public debt proxy the following indicator: *General Government Debt*, estimated by the OECD.

Figure 2b: Evolution of the public debt for the selected countries (as % of GDP)



Source: IMF statistics

Figure 2c: Evolution of the public debt for the selected countries (as % of GDP)



Source: IMF statistics

To strengthen our classification, we have shown in Table 1, what kind of rule each country adopted and the year it has been enforced. Linking this with the evolution of the public deficit we can analyze the following aspects:

- If there is any homogeneity in the areas regarding the way the budgetary rules have been adopted
- The efficiency/non-efficiency of the rules and the time they have been used.

Regarding the first aspect we can see that among the countries in the Euro zone the existence of public deficit is not something rare and we can also state that this has been higher before the adoption of the Euro currency.

Table 1: Budget rules classification

Country	Type of budget rule	Enforcement year	Observations
Spain	Golden rule [1]	2001	General Budgetary Law
Italy	Golden rule [1]	1997	Pay-as-you go system
United Kingdom	Golden rule [1]	1997	With a restrictive investment rule
Germany	Golden rule [1]	1997	Stability Growth Pact
France	Golden rule [1]	2001	Organic Budget law
Australia	Balanced Budget rule [2]	1998	-
New Zealand	Balanced Budget rule [2]	1994	-
Norway	Balanced Budget rule [2]	1992	-
Denmark	Golden rule [1]	1997	Stability Growth Pact
Sweden	Golden rule [1]	1996	State Budget Act

Source: adapted from Groneck (2008)

These countries have adopted rules from the first category (golden rule or fixing a threshold for the public deficit). In the case of the Oceania countries, as well as for those in the Nordic area we can observe a similar evolution (the countries we studied and are in these 2

categories having recorded budgetary surpluses after 1997, respectively 1999). The impact of the no-deficit budgetary rules has been felt immediately in New Zealand in 1994 and in Australia in 1998.

We can also observe that these rules have transmitted an improvement tendency of the public deficit, with negative signals starting with the year 2007 which marked the economic recession.

3. Analyzing budgetary rules: influences on macroeconomic variables

Empirical studies have shown that the usage of budget rules can affect some important financial variables such as the yield of government bonds (Inman, 1996), the nominal interest rate (Arisen and Hauern, 2008) or the level of the public debt.

In order to measure the outcomes of a balanced budget rule, some conditions are needed to be fulfilled: if we want realistic results, the deficit time series has to be

large enough because it takes time until its effects are incorporated into the real economy, the rule has to be exogenous from the deficit and the independent variables that are related both with the budget rule and the deficit must be considered in any analysis (Inman, 1996).

3.1 Methodology

This study compares the costs derived from adopting an anti-deficit budget rule in respect with those incurred when adopting a golden rule. Because in the analyzed period there were changes in the economic cycle, we tested the hypothesis proposed by Corsetti and Roubini (1996), which states that the reactions to negative cyclical factors such as recession, allows a higher flexibility in state's actions (hence lower costs) for the rules of the second category. We identified the costs as being an observable macroeconomic variable, the nominal interest rate.

There are numerous studies in the technical literature that carried out an analysis on the relationship between the budgetary deficit levels and the nominal interest rate. The obtained results can only confirm the heterogeneity concerning the influence's way.

Starting from a recent study (Arisen and Hauern, 2008) and also according the information analyzed in the second section, we made a comparison of the golden and balanced budget rules effects upon the nominal interest rate using several explanatory variables. The model that we used describes a small open economy and has the following specification¹²:

$$i_{i,t} = \delta_0 + \delta_1 i_{i,t}^* + \delta_2 s_{i,t}^e + \delta_3 \pi_{i,t}^e + \delta_4 \log m_{i,t} + \delta_5 d_{i,t} + \varepsilon_{i,t} \quad (1)$$

The above equation shows that the nominal interest rate ($i_{i,t}$) is explained by internal factors such as: the expected inflation ($\pi_{i,t}^e$), the money supply ($m_{i,t}$), together with several external like: the international

¹² For the money supply we used the logarithm of the M1 aggregates, excepting Norway (M2) and Sweden (M3). The Central Bank of Great Britain uses the M0 and M4 aggregates but it makes approximations for the equivalent aggregates used by countries form the Euro Zone (we used the M1 proxy).

interest rate ($i_{i,t}^*$) and the expected depreciation ($s_{i,t}^e$).

The dependent variable could be also lagged by one period in order to include past effects as much as possible. Finally the budgetary deficit ($d_{i,t}$) was taken as a specific country regressor.

For the parameter estimation we used two methods specifically OLS (Ordinary Least Squares) and GMM technique (Generalized Moments Method). The first set of panel data included the countries that have a golden rule of public finances, which mean all except New Zealand, Australia and Norway. The main reason for using the GMM estimation is that sometimes when the regressors are auto-correlated (i.e. they are not totally exogenous (Wooldrige, 2001)), the results may be biased. For the two data panel sets we estimated the model's parameters including progressively each explanatory factor using the OLS estimation and for the entire dataset we used both methods with all exogenous variables along with a lag of the dependent variable, comparing the results.

3.2 Data description

The data for the 10 countries were selected from IMF, OECD and from several central bank statistics for a 19 years period (1990 – 2009), with annual frequency.

As a dependent we used the nominal long term rate interest provided by OECD and for the independent variables we considered the following: the international interest rate was approximated by the US government bond yield with 15 years maturity (IFS – line 61), the expected depreciation as the exchange rate between US dollar and the national currency of each country, inflation as the changes in the CPI (OECD Consumer Price Index), the money supply as the narrow money aggregate. For the budgetary deficit we extracted values from International Monetary Fund's WEO (World Economic Outlook) database.

3.3 Empirical results

3.3.1 OLS Results

Progressive analysis implies that the parameters will be estimated step by step, such that every new exogenous variable is included at each new step. Results are presented in the next table:

Table 2: Estimated coefficients through OLS by type of budget rule

Golden rule					
	Coefficient (Std. dev.)				
OLS	Reg1	Reg2	Reg3	Reg4	Reg5
Budgetary deficit	-0.453 (0.057)	-0.234 (0.033)	-0.263 (0.035)	-0.248 (0.025)	-0.250 (0.025)
International interest rate		1.561 (0.082)	1.474 (0.083)	1.1395 (0.066)	1.064 (0.072)
Expected depreciation			0.0008 (0.0004)	0.0014 (0.0003)	0.0011 (0.0003)
Expected inflation				0.555 (0.049)	0.564 (0.048)
Money supply					-0.0020 (0.0010)
R-Squared	0.3183	0.8080	0.8148	0.9073	0.9113

Table 2: Estimated coefficients through OLS by type of budget rule (cont.)

	Balanced Budget rule				
	Coefficient (Std. dev.)				
OLS	Reg1	Reg2	Reg3	Reg4	Reg5
Budgetary deficit	-0.198 (0.038)	-0.081 (0.022)	-0.049 (0.030)	-0.061 (0.025)	-0.061 (0.025)
International interest rate		1.150 (0.094)	1.207 (0.100)	1.110 (0.086)	1.074 (0.090)
Expected depreciation			-0.0009 (0.0006)	-0.0005 (0.0005)	6.69e-5 (0.0007)
Expected inflation				0.341 (0.071)	0.364 (0.072)
Money supply					-0.0011 (0.0009)
R-Squared	0.3281	0.8209	0.8289	0.8830	0.8862

Source: Own Calculations

In the first case we can observe that the dependent variable (the nominal interest rate) is explained by a single independent factor (the budgetary deficit) along with the intercept. The first important thing that we observe is the type of the connection, namely how the budgetary deficit influences in a negative way the level of the nominal interest rate, fact that is largely discussed in various studies¹³. Secondly, the magnitude of the influence is higher in the states with a golden rule (a 45 basis point decrease in the nominal interest rate

¹³ Gale and Orszag (2003) count about 30 studies that find robustly positive effects of deficits on interest rates and about 30 that do not.

for every 100 b.p. increase of the deficit). When we add another regressor, the long term international interest rate the R^2 increases from 31.82% to 80.80% respectively from 32.81% to 82.09%, which can mean that the models with this two variables are better, assuming that we work under OLS restrictive conditions. In both cases the magnitude of the budgetary deficit on our dependent macroeconomic variable falls to about a half in comparison to the first situation. Once we add the exchange rate as a proxy for the expected depreciation we notice two different results. The coefficient of the budgetary deficit and of the exchange rate in the model with the balanced budget rule becomes statistically insignificant for an accepted level of 95%. But the influence, positive in the golden rule model and negative in the other, of this variable is very small and its inclusion does not affect in any way the performance of the models.

Inflation is an important exogenous variable that has a positive direct influence on the dependent variable, in accordance with one's expectations. Its importance can be also explained by a higher R^2 in both models which increases from 81.48% to 90.75% and

from 82.89% to 88.3%. In the first model the budgetary deficit coefficient decreases by 2 basis points explaining a connection between the deficit and inflation. The deficits may be considered inflationary the state can record deficits by having bigger public expenditures, that is when more money are injected into the real economy. The expected depreciation remains insignificantly in the BBR model. The money supply has a very small negative influence as an explanatory variable.

3.3.2 GMM Results

Because the dataset wasn't large enough to perform a separate analysis considering the split by the specific type of budget rule, we included all 10 countries into a GMM estimation comparing with the OLS ones. The output is presented in the Table 3.

Table 3: Estimated coefficients through OLS/GMM with one lag

	OLS Coefficient (Std. Error)	GMM Coefficient (Std. Error)
International interest rate	0.489834 (0.055020)	1.104687 (0.232581)
Expected depreciation	0.029993 (0.020187)	-1.326532 (0.453274)
Inflation	0.252101 (0.042311)	0.468939 (0.337862)
Money supply	-0.107883 (0.023966)	3.319549 (3.610501)
Budgetary deficit	-0.029999 (0.012306)	-0.346559 (0.093960)
Interest rate (-1)	0.530213 (0.038287)	0.228957 (0.354193)

Source: Own Calculations

Although the coefficient sign remains the same (negative) the results are way different. The GMM results show a decrease of 34 basis points for an increase of one percentage point of the deficit while the OLS results are ten time smaller (only 3 basis points). The insignificantly variables were the exchange rate for the OLS respectively inflation and the money supply in the GMM estimation. Also we used the dependent variable lagged with one period. Comparing with the 3.3.1 results, it's obviously that the GMM estimations are closer to them, and may be considered less biased.

4. Conclusions

This paper tried to bring some new evidence in the relationship between state budgetary performances via the main types of budget rules. It is obviously that a balanced budget rule has some positive effects since Australia and New Zealand recorded surpluses for half of the period along with the reduction of the public debt as we noticed in the second section. Even better results are recorded for Norway. But it may be interesting to see what determined each country to choose its actual budget rule.

Actually, adopting a BBR rule excludes the possibility of a state to finance the deficit through public borrowing thing that can slow down its development in the public sector. For the states that can use loans, our results are supported by the crowding out theory that claims a reduction in private investing. Indeed if the nominal interest rate may drop because the lack of demand.

In the OLS estimations, judging by the R^2 criterion, we have found out that the most important internal explanatory variable is the budgetary deficit and

as for the external influence, the international interest rate has the biggest influence. This is also because their coefficients are the largest ones.

More, the obtained results confirm the strong heterogeneity pointed out in the theoretical review. This fact can only create new points for future research by considering a larger number of states included in the analysis. We have shown that there is a connection between the type of the budget rule and the interest rate because it this financial variable reacts differently in the considered models.

We considered these estimation methods because they have some advantages for a large number of countries, but in our analysis, by using only ten countries the results should be used with caution.

As a final concluding remark of the theoretical and empirical study we can say that when a state wants to enforce a budgetary rule, things like the needs of its economy, the available resources and the actual fiscal discipline have to be considered as fundamental factors for the decision process.

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