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The optimal fiscal rule in the context of accession to the Eurozone

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The aim of the paper is to compare the macroeconomic effects of fiscal rules that can be applied in the context of the future full participation of Poland in the Economic and Monetary Union. The results of our analyses show that we observe the smallest changes in the structural balance when fiscal policy is aimed at both GDP stabilisation and business cycles synchronisation. Unfortunately, when we analyse the characteristics of the fiscal rule we discover that the possibility of effective practical application of such a rule is very limited. The reason for this may be the lack of transparency and delays we face in publishing macroeconomic data, which is indispensable for fiscal rule application.

Keywords: fiscal policy; fiscal rules; EMU; business cycles; synchronisation; budget deficit

JEL classification: E32, E61, E62, H62

1. Introduction

Polish accession to the euro area will lead to fundamental changes in terms of the use of macroeconomic policy. Following future full participation of Poland in the Economic and Monetary Union (EMU) there will be no possibility to absorb asymmetric shocks by means of the Polish monetary policy. This means that the most important tool of economic stabilisation will be fiscal policy. It will be responsible not only for mitigating fluctuations of economic activity but also will become the only available instrument for improving the level of business cycle synchronisation between Poland and the euro area. The importance of such synchronisation is one of the principles of optimum currency area theory (see, for example, Frankel & Rose, 1998; Piłat, 2011). However, the fiscal rules binding in Poland as a member of the European Union and future member of Eurozone, that is the Stability and Growth Pact and Fiscal Compact,[1] do not take into account the synchronisation of business cycles.

Fiscal rules that would be optimal from the point of view of mitigating economic fluctuations are nowadays a popular subject of numerous studies in the economic literature (see, for example, Benigno & Woodford, 2003; Mackiewicz, 2007). However, there is a lack of research concerning fiscal policy that is optimal from the point of view of business cycle synchronisation.

The purpose of this article is to compare the fiscal rule, for which the optimality criterion is the convergence of business cycles in Poland and the euro area, with the rule aimed at eliminating economic fluctuations in Poland. This problem seems to be of great

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importance, especially after Polish accession to the euro area. Thus, one of the fundamental tasks of fiscal policy will be to increase the level of synchronisation of fluctuations in Poland to the fluctuations observed in the Eurozone as a whole.

2. The use of rules in fiscal policy

The problem of applying the rules in economic policy, and also fiscal policy rules, has been present in the literature since the 1940s, when Milton Friedman drew attention to some imperfections of a policy conducted in a discretionary manner. Buchanan and Wagner (1977) argued that it is crucial to introduce a rule-based fiscal policy because politicians tend to increase a budget deficit, which is – according to these authors – typical for democracy. The issue of applying the rules was incorporated into the theoretical research programme on a wider scale in the 1970s in the context of the problem of time inconsistency (Kydland & Prescott, 1977). From that time until the 1990s, the main interest of researchers focused on monetary policy rules, in particular on the Taylor (1993) rule (see Taylor, 2000).

The establishment of the EMU was the starting point of the debate about the role of rules in shaping fiscal policy. Buiter and Grafe (2002) present a comprehensive review of the reasons for the application of the rules in the EMU. According to the authors, the main argument in favour of introducing fiscal rules is the existence of externalities, which cause the costs of the decisions made by one country to be partly transferred to other countries. In the case of full independence (when the union does not exist), if any country conducts a policy that is perceived by financial markets to be irresponsible, it usually leads to an increase in the risk premium, which burdens the debt instruments of this country. Then, if the fiscal policy is not adjusted, the reaction of the market is the introduction of credit rationing. This means state insolvency and eventually it forces the government to tighten fiscal policy.

The existence of strong economic ties in the union may, however, result in such a situation that all its Member States are interested in avoiding the insolvency of any member of the union. The losses incurred by investors in one country could have negative effects on the remaining states of the union. The contagion effects may be another mechanism of propagation of adverse developments caused by the insolvency. In this way, the effects of irresponsible fiscal policy are partly passed on to other states, which gives rise to moral hazard and can lead to an excessive deficit.

The application of fiscal rules in the euro area is desirable not only because of the fact that some states tend to have excessive debt, but also due to the fact that they can act as instruments of counter-cyclical fiscal policy. It is especially important in the monetary union. However, empirical studies reveal that, contrary to the normative theory, fiscal policy is often pro-cyclical. Gavin, Hausmann, Perotti, and Talvif (1996) were the first to observe that in some South American countries limited access to capital markets was the cause of pro-cyclical fiscal policy. Catão and Sutton (2002) obtained similar results for a bigger group of less developed countries. Talvi and Vegh (2005) pointed out that whereas fiscal policy in the countries of the G7 is strongly counter-cyclical, in developing countries it tends to be pro-cyclical. Similar results were achieved by Lane (2003), Alesina and Tabellini (2005) and Bogdanov (2010). On the other hand, Staehr (2008) obtained that, on average, fiscal policy in Central European Countries was more counter-cyclical than in the Eurozone countries.

The analyses concerning cyclicality of fiscal policy have been of special importance since the beginning of the recent financial crisis. On the one hand, empirical results

indicate that during the crisis fiscal multipliers are significantly higher (see Auerbach & Gorodnichenko, 2012; Baum & Koester, 2011) and many countries introduced large stimulus packages leading to counter-cyclical fiscal policy. On the other hand, some countries with high public debt introduced austerity plans, in order to avoid insolvency and because of the negative impact of high public debt on financial markets (see for example Gajewski, 2014). As a result, austerity plans led to a pro-cyclical fiscal policy and, because of high fiscal multipliers, decreased GDP growth more than was predicted (see Blanchard & Leigh, 2013).

3. The construction of theoretical fiscal rule

From a macroeconomic point of view, a key criterion for the selection of a good fiscal rule is its compatibility with the established fiscal policy. In the context of Poland's future accession to the Eurozone, two possible criteria for fiscal policy optimisation were analysed in this paper:

- output gap reduction in Poland,
- synchronisation of economic fluctuations in Poland and the euro area.

Minimising the output gap is one of the standard objectives of fiscal policy (see Benigno & Woodford, 2003). At the same time, after Poland's accession to the euro area, due to the change in the role of monetary policy, the role of fiscal policy as a tool for eliminating asymmetric shocks will increase. Moreover, fiscal policy can have a significant impact on the degree of synchronisation of economic fluctuations. For these reasons, in this study, we examined the shape of fiscal policy aimed at both reduction of the output gap in Poland and increasing the level of synchronisation of economic fluctuations in Poland and the euro area.

Let us assume the following loss function (L):

$$L = \alpha\tilde{y}^2 + (1-\alpha)(\tilde{y} - \tilde{y}^e)^2 \tag{1}$$

where: $\tilde{y}$ – output gap in Poland, $\tilde{y}^e$ – output gap in the euro area, $0 \leq \alpha \leq 1$.

The minimum of the loss function defines the optimal fiscal rule. The lower the value of the parameter α, the more we concentrate on synchronisation of fluctuations in Poland and the euro area. For $\alpha = 0$ fiscal policy is aimed only at neutralising asymmetric shocks, while for $\alpha =$ it is aimed at reduction of economic fluctuations, regardless of whether they are the result of economic fluctuations across the euro area or asymmetric shocks in the Polish economy. Thus, in the first case we assume that shocks occurring across the whole union are neutralised by the common monetary policy, while in the second case by fiscal policies of individual countries.

In the analysed model the instrument of fiscal policy is the structural balance of public finances. Taking into account the presence of a relationship between fiscal policy and economic fluctuations[2] we obtain:

$$\tilde{y} = \tilde{y}_0 - \beta B \tag{2}$$

where: B is the balance of the general government sector,[3] $\tilde{y}_0$ is the output gap for balanced budget, and $\beta > 0$.

The balance of the general government sector consists of structural and cyclical components:[4]

$$B = B^S + \varpi_{B,Y}\tilde{y} \tag{3}$$

where: B^S is the structural balance of the general government sector, $\varpi_{B,Y}$ is the marginal sensitivity of the budget balance with respect to the cycle, $\varpi_{B,Y} \geq 0$.

From equations (2) and (3) we obtain:

$$\tilde{y} = \frac{\tilde{y}_0 - \beta B^S}{1 + \beta \varpi_{B,Y}} \tag{4}$$

By substituting equation (4) into the loss function we get a formula:

$$L = \alpha \left(\frac{\tilde{y}_0 - \beta B^S}{1 + \beta \varpi_{B,Y}} \right)^2 + (1 - \alpha) \left(\frac{\tilde{y}_0 - \beta B^S}{1 + \beta \varpi_{B,Y}} - \tilde{y}^e \right)^2 \tag{5}$$

We can obtain the following necessary condition of loss function minimisation:

$$B^S = \frac{\tilde{y}_0 - (1 - \alpha)\left(1 + \beta \varpi_{B,Y}\right)\tilde{y}^e}{\beta} \tag{6}$$

The sufficient condition of minimisation is satisfied due to the convexity of the loss function.[5]

The optimal budget balance given by equation (6) depends on estimates of the impact of fiscal policy on the Polish economy and the impact of economic fluctuations on public revenue and expenditure.[6] These estimates were conducted on the basis of Polish data covering the period 1995–2010.

The marginal sensitivity of the budget balance with respect to output depends on output elasticities of public revenue and expenditure. Public revenues were decomposed into the following categories: corporate income tax, indirect taxes, personal income tax and social security contributions.

In the case of corporate income tax, indirect taxes and social security contributions, progression does not occur. Thus, the average tax changes proportionally to the tax base: $\theta_{CIT,Y} = \theta_{\pi,Y}$, $\theta_{IT,Y} = \frac{C}{C+C^G}\theta_{IT,Y}$,[7] $\theta_{SSC,Y} = \theta_{w,Y} + \theta_{L,Y}$, where: $\theta_{CIT,Y}$ = output elasticity of corporate income tax, $\theta_{IT,Y}$ = output elasticity of indirect tax, C = private consumption, C^G = public consumption, $\theta_{SSC,Y}$ = output elasticity of social security contributions, $\theta_{w,Y}$ = output elasticity of wages, $\theta_{L,Y}$ = output elasticity of employment.

Personal income tax is a progressive tax. The greater the difference between marginal and average tax rates, the stronger the impact of fluctuations in average wage on revenues from personal income tax. Thus, we obtain:

$$\theta_{PIT,Y} = \left(\sum_{j=1}^{n} R_{PIT,j} \frac{MT_j}{AT_j} \right) \theta_{w,Y} + \theta_{L,Y} \tag{7}$$

where: $\theta_{PIT,Y}$ = output elasticity of PIT revenues, MT_j = marginal tax rate for jth group of taxpayers, AT_j = average tax rate for the jth group of taxpayers, $R_{PIT,j}$ = the share of tax revenues obtained from the jth group of taxpayers in total PIT revenues (see Giorno, Richardson, Roseveare, & van den Noord, 1995).

Among public expenditures only those on unemployment benefits are sensitive to economic fluctuations. The level of public spending on unemployment benefits depends on the number of unemployed and the average level of the benefit per one unemployed person. Under the assumption that the average benefit per one unemployed person does not change during the cycle and that the labour force does not respond to economic fluctuations we get: $\theta_{UB,Y} = -\frac{1-u}{u}\theta_{L,Y}$, where: $\theta_{UB,Y}$ is the output elasticity of unemployment benefit, and u is the unemployment rate.

The ratios of marginal to average tax rate in PIT were calculated on the basis of Polish Ministry of Finance annual data. The output elasticities of profit, consumption, employment, and wages were estimated on the basis of quarterly data from the Polish Statistical Office. Because we analysed short-term relationships, growth-rate equations were applied.[8] We obtained the following estimates:[9] $\pi_{t,i} = \underset{(-0.023)}{-0.007} + \underset{(4.237)}{1.188}\, y_{t,i}$, $c_{t,i} = \underset{(1.540)}{0.010} + \underset{(5.832)}{0.705}\, y_{t,i}$, $\Delta l_{t,i} = \underset{(0273)}{0.001} + \underset{(4.577)}{0.346}\, \Delta y_{t,i}$, $w_{t,i} = \underset{(1.060)}{0.007} + \underset{(4.033)}{0.558}\, y_{t,i}$ where: $\pi_{t,i}$,$y_{t,i}$,$c_{t,i}$,$l_{t,i}$,$w_{t,i}$ = growth rates of profit, output, consumption, employment and wages respectively, t = year, i = quarter.

As a result, we estimated that the marginal sensitivity of the budget balance with respect to the cycle ($\varpi_{B,Y}$) is equal to 0.29.

The fiscal rule described by equation (6) depends not only on marginal sensitivities of public expenditure and revenue with respect to the cycle, but also on the level of fiscal multiplier (β). In order to guarantee the stationarity of variables and also due to the fact that the short-term fiscal policy impact on GDP is analysed, the model was estimated on first differences. Apart from the fiscal policy variable (structural budget balance), exogenous variables were added which show the impact of the monetary system and external macroeconomic situation on GDP. After removing the statistically insignificant lagged variables we obtained: $\Delta Y_{t,i} = \underset{(0.945)}{0.107} - \underset{(-2.269)}{0.218}\, \Delta B^{S}_{t,i} + \underset{(5.552)}{0.008}\, \Delta m_{t,i} + \underset{(8.332)}{0.011}\, \Delta m_{t-1,i} + \underset{(8.281)}{0.725}\, \Delta Y^{e}_{t,i}$ where: $Y_{t,i}$, $Y^{e}_{t,i}$ = real GDP in Poland and euro area respectively, and $m_{t,i}$ = real money supply.

Comparing our results with other studies we can notice that the fiscal multiplier in the Polish economy is relatively low. As shown by Baum and Koester (2011) in most studies, short-term fiscal multipliers in absolute terms are between 0.2 and 2.0 (see also Afonso & Sousa, 2009; Coenen, Erceg, Freedman, Furceri, & Kumhof, 2010).[10]

On the basis of the estimated parameters we can show that that the analysed fiscal policy rule in the Polish economy is defined by following equation:

$$B^{S} = 4.831\tilde{y}_0 - 5.121(1-\alpha)\tilde{y}^{e} \tag{8}$$

Fiscal policy focused only on the synchronisation of the business cycle in Poland and the euro area (i.e. for $\alpha = 1$) would mean the appearance of considerable fluctuations of the structural balance of the general government sector, sometimes even higher than 10% of GDP. Fiscal policy aimed only at eliminating fluctuations in Poland (for $\alpha = 0$) would involve even larger changes in the level of fiscal policy restrictiveness. What's interesting during the analysed period is that relatively small changes in the shape of the structural balance would be needed if fiscal policy was to be aimed at eliminating both the fluctuations and the synchronisation of the business cycle in Poland and the euro. Such a fiscal policy, which is carried out in accordance with the fiscal rule defined by equation (8) for $\alpha = 0.5$, is illustrated in Figure 1.

The use of a fiscal rule (shown in Figure 1), in which we have both criteria of optimality, that is the synchronisation of the business cycles and the reduction of the output gap, would mean that after the accession to the Eurozone active fiscal policy in Poland would, to a greater extent, be aimed at reducing asymmetric shocks rather than minimising shocks occurring across the whole Economic and Monetary Union.

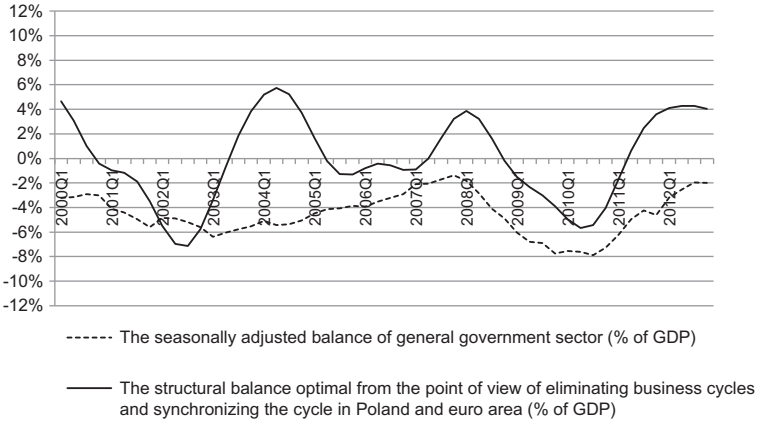

Figure 1. Fiscal policy in Poland aimed at both reducing the fluctuations and synchronisation of the business cycles.
Source: Based on data from the Central Statistical Office and Eurostat.

4. Conditions for rule efficiency

The fiscal rule should have a number of features that will support its use in practice. As pointed out by Buiter (2003) the rules in different countries of the monetary union should be conducted in such manner that it is consistent with the policy of the euro area as a whole. It can be assumed that the analysed rule meets this condition. The fiscal policy conducted in accordance with the rule primarily reduces asymmetric shocks in particular countries, whereas the European Central Bank reduces the effects of common shocks.

Kopits and Symansky (1998) made an attempt to create a more general list of features of an efficient fiscal rule. They conclude that the rule should be transparent, simple and precisely defined. Transparency is associated with a clear definition of the mechanisms for the rule application and preventing 'creative accounting' by their reference to the precise standards of budgetary accounting. The requirement of simplicity is similar to the above criterion and makes it possible for the society to understand the rule and be able to better monitor its compliance. A rule precisely defined means the unambiguous definition of an economic indicator that is the subject of the regulation.

Examining the fiscal rule presented in our study, it can be observed that it does not fulfil the criterion of simplicity. It is difficult to present the rule in such a way that it would be clear and acceptable to the public and most policy-makers. Examining the rule in terms of the other criteria we can see that on the one hand it relates precisely to economic indicators, but on the other hand various options for calculating key values (e.g. output gap and marginal sensitivity of budget balance with respect to the cycle) significantly reduce the transparency. Moreover, GDP data are published with a considerable delay and the estimate of the output gap for the given year is changing with increasing duration of the sample It additionally complicates the use of the rule.

One of conditions of the practical application of the fiscal rule is that its use does not require frequent, rapid changes in the deficit. The rule focused only on minimising fluctuations in Poland or exclusively on synchronising the cycle does not satisfy this condition.

In conclusion, the analysed fiscal rule can be applied in the euro area; however, the possibility of its practical application is limited for the following reasons.

- The rule lacks simplicity. The need to involve a complex statistical method makes it difficult to verify by the public whether the rule has been broken. In such a case the rule lacks efficiency.
- The shape of the optimal rule depends on the methodology of calculating the structural deficit. It gives the fiscal authorities the possibility of adjusting the rule to the current political objectives.
- To apply a fiscal rule we need to calculate the output gap, which can be problematic because of the lags in publishing the indispensable statistical data.

5. Summary

Due to the Poland's future accession to the Eurozone, the role of fiscal policy as a tool for economic stabilisation will become particularly important. The fiscal policy will be aimed not only at reducing cyclical fluctuations, but also synchronising business cycles in Poland and the euro area.

In this paper we empirically compare two objectives of fiscal rule: minimising the output in Poland and synchronisation of business cycles in Poland and the euro area. Results show that fiscal policy focused only on the synchronisation of the business cycles would lead to significant fluctuations of the structural budget balance. Fiscal policy aimed only at minimising the output gap in Poland would involve even larger changes in the levels of restrictiveness of fiscal policy. In our analysis we observe the smallest changes in the budget balance when the fiscal policy is aimed at both eliminating economic fluctuations and increasing the level of business cycles synchronisation.

The fiscal rule that makes the level of the structural balance conditional on the degree of business cycle synchronisation seems to be a reasonable solution for Poland in the case of its future full participation in the Economic and Monetary Union. Then, the policy of the European Central Bank should be aimed at reducing the output gap across the whole union, while the fiscal policy of an individual country should be aimed at neutralising asymmetric shocks. However, the analysis of the characteristics of the fiscal rule has shown that the possibility of its practical application is rather limited. The main reasons for these limitations are the lack of transparency of this rule and problems with obtaining the newest macroeconomic data, which is connected with the data publishing agenda.

Notes

1. Poland, despite not being a member of Eurozone yet, has signed Fiscal Compact.
2. To find more on the interaction between fiscal policy and economic fluctuations see for example. Belullo and Dužman (2011), Gnip (2011).
3. It should be noted that individual public revenue and expenditure may differently affect the level of GDP (see for example Baxter & King, 1993; Brunila, Buti, & in't Veld, 2002).
4. For more on the impact of decomposition of the deficit on the structural and cyclical component see Giorno, Richardson, Rosevear, and van den Noord (1995) and Krajewski (2004).
5. For $\beta \neq 0$.
6. That is estimates of parameters β, $\varpi_{B,Y}$.
7. The tax base of indirect taxes consists of private and public consumption. Only private consumption is sensitive to output.

8. The growth rate of employment is a non-stationary variable for Polish data, so the first differences were used in this case.
9. T-student statistics are shown in brackets.
10. Estimates of fiscal multipliers are even higher for the times of crisis (see Auerbach & Gorodnichenko, 2012; Christiano, Eichenbaum, & Rebelo, 2011).

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