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" Should fiscal authorities cooperate in a monetary union with public deficit targets"

Montserrat Ferré Carracedo

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Should fiscal authorities cooperate in a monetary union with public deficit targets?

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Abstract

In this paper we analyse the setting of optimal policies in a monetary union with one monetary authority and various fiscal authorities that have a public deficit target. We will show that fiscal cooperation among the fiscal authorities, in the presence of positive supply shocks, ends up producing higher public deficits than in a non-cooperative regime.

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1. Introduction.

The completion of the European Monetary Union (EMU) has focused considerable attention on the issue of the interaction between one monetary authority and various fiscal authorities. The implementation of the Stability and Growth Pact (SGP), including a target of a balanced budget and possible penalties in case of an excessive deficit, has also raised interest in the effects of limiting national fiscal policy. EMU and the SGP have thus lead to a debate on the consequences of introducing budgetary constraints and the need for coordination of fiscal policies.

One of the arguments for introducing the SGP in the EMU invokes the advantages of policy coordination (Eichengreen and Wyplosz (1998)). If countries coordinate their fiscal policies, then they take into account the effects of their deficits on neighbouring countries. The main research on EMU and SGP has looked at a scenario of one monetary authority and one national fiscal authority, implicitly considering that fiscal authorities act as one. But in reality this is not (yet) the case. Beetsma, Debrun and Klaassen (2001), Dixit and Lambertini (2003) and Uhlig (2002) have analysed a EMU with SGP scenario where there is one monetary authority and various fiscal authorities, where fiscal policies can be coordinated or not. The results of these studies regarding the advantages of policy coordination are mixed. Beetsma et alt. (2001) analyse a static model with positive spillovers from fiscal policy. They consider two symmetric countries and they find that when the shocks that hit the countries are highly correlated, fiscal coordination is most likely to be welfare decreasing. Dixit and Lambertini (2003) examine a static model with n asymmetric countries and they find that the desired output and inflation objectives can be achieved with and without fiscal coordination, and that the SGP is not necessary to achieve those goals. Nonetheless, these results depend on the assumption that monetary and fiscal authorities coincide on the desired levels of output and inflation. Uhlig (2002) considers a static model with n identical countries and concludes that all fiscal authorities would be better off in a cooperative equilibrium rather than acting on their own.

In this article we investigate a monetary union with a deficit target such as the one envisaged by the SGP, where national fiscal policies can be coordinated or not, and where the monetary authority and the fiscal authorities do not share the same objectives. We will use a static standard reduced form model with a supply and a demand shock and will analyse the setting of optimal policies. Each authority will have a loss function according to their preferences that they will try to minimize. In particular, the monetary authority will care about inflation and (less) about output, and the fiscal authorities will care about output and about their deficit target.

The main objective of the paper is to investigate what happens with the average union deficit if the fiscal authorities coordinate or not. Conventional wisdom would say that (see, for instance, Dixit and Lambertini (2003)) in the absence of any fiscal policy constraint, deficits would be higher if countries do not coordinate if the externalities are negative. This would be due to the fact that, by not coordinating their policies, countries do not take into account the effects of their deficit spending on neighbouring countries interest rates and inflation. In the model we use, there is a negative externality from fiscal policy onto the other countries through an interest rate effect. Welsch (2000) provides a quantitative analysis of the fiscal policy interaction in EMU, and he shows that the spillovers of domestic fiscal expansion work mainly through the interest rate effect.

We will show that fiscal cooperation among the fiscal authorities of a monetary union does not always produce the expected results in terms of lower interest rates and lower public deficits. The results of our article show that, in the presence of a positive supply shock, average deficits in a monetary union with fiscal coordination are higher than without coordination. And the same holds for the monetary union´s interest rate. What this would be suggesting is that in good times, the SGP would be introducing an upward bias on the deficit (and interest rate) if there was coordination of fiscal policies. If some of the aims of the SGP are to reduce the deficit bias of EMU countries and induce their national fiscal policy coordination, both things seem to work well for recessive episodes but not for positive growth episodes.

The structure of the paper will be as follows. Section 2 will introduce the model to be used and the objective functions of the players, that is, the monetary authority and the national fiscal authorities. Section 3 will analyse the effects on the union average public

deficit under the scenarios of cooperation and non-cooperation between the fiscal authorities. Finally, section 4 will conclude.

2. The model.

Our model will represent a monetary union with one central monetary authority and various fiscal authorities that have a public deficit target. For simplicity, we will work with only two countries, but the analysis could easily be extended to more countries. The model consists of two standard equations that determine the output gap (y) and inflation (Π). Clarida, Galí and Gertler (1999) summarise a dynamic general equilibrium model with money and temporary nominal price rigidities with two dynamic equations: an IS curve that relates the output gap inversely to the real interest rate, and a Phillips curve that relates inflation positively to the output gap. In this paper, we use a static version of this framework, similar to that of Buti, Roeger and In´t Veld (2001), extended here to consider various fiscal authorities, and similar to that of Uhlig (2002), extended here to analyse the consequences of coordination of fiscal authorities.

Each country´s output gap is given by a demand (IS) equation:

$$y_j = \gamma d_j - \phi(i - \Pi_j^e) + \varepsilon_j \qquad (1)$$

where everything is country-specific except for the monetary union´s nominal interest rate. In equation (1) d_j is the budget deficit, i is the monetary union nominal interest rate, Π_j^e is the inflation expectation formed by the public and ε_j is a demand shock assumed to have a zero mean. The parameter γ measures the effectiveness of fiscal policy, and the parameter ϕ is the real interest elasticity of aggregate demand.

Inflation in each country (Π_j) is determined from a supply (Phillips) equation:

$$y_j = \omega(\Pi_j - \Pi_j^e) + u_j \qquad (2)$$

where u_j is a supply shock[1] with zero mean. The parameter ω can be interpreted as the degree of labour market flexibility: if it has a high value, an inflation surprise entails a strong rise in supply by lowering real wages, and if it has a low value, real wages are rigid and supply responds little to unexpected inflation.

Rewriting (2) in terms of Π_j gives:

$$\Pi_j = \frac{1}{\omega} y_j + \Pi_j^e - \frac{1}{\omega} u_j \qquad (3)$$

The literature that looks at the strategic behaviour of monetary (and fiscal) policy has adopted, since the works of Kydland and Prescott (1977) and Barro and Gordon (1983), the view that policymakers have preferences over some variables that correspond to a quadratic loss functions. We will follow the literature and assume that our authorities have a quadratic objective function. The monetary authority will use the nominal interest rate as the instrument of monetary policy. This attempts to reflect the European Central Bank operating procedure. This monetary authority aims at maintaining price stability and, to a certain degree, at stabilizing output. As a result, it will have the following objective function:

$$\max_i -\frac{1}{2}\left\{\alpha \bar{y}^2 + \overline{\Pi}^2\right\}$$

where $\bar{y}$ and $\overline{\Pi}$ are the monetary union averages of the country specific output gaps and inflation rates, respectively, and α is the weight placed on output stabilization. Under this particular formulation of the objective function, the monetary authority aims at stabilising the business cycle and has a zero inflation target.

The fiscal authority of each country cares about output stabilization, as it is standard in the literature, but it would also like to deviate as little as possible from a target value $\hat{d}$ for the budget deficit. With this specification we are able to introduce the budgetary target or constraint in the optimizing behaviour of the fiscal authority, similarly to

[1] From now on, we will consider a positive supply shock (u > 0) as a shock that affects the output gap in

Beetsma, Debrun and Klaaseen (2001), Buti, Roeger and In´t Veld (2001) and Uhlig (2002). Therefore, the objective function of the fiscal authority will be:

$$\max_{d_j} -\frac{1}{2}\left\{y_j^2 + \theta(d_j - \hat{d})^2\right\}$$

Note that if $\alpha < 1$ in the monetary authority´s objective function, then the monetary authority is more "conservative", as in Rogoff (1985), than the fiscal authorities. We will assume that $\alpha < 1$ throughout the paper, to represent the fact that the ECB has been created as a conservative bank.

The union average versions of (1) and (3) are:

$$\bar{y} = \gamma\bar{d} - \phi(i - \overline{\Pi}^e) + \bar{\varepsilon} \tag{4}$$

$$\overline{\Pi} = \frac{1}{\omega}\bar{y} + \overline{\Pi}^e - \frac{1}{\omega}\bar{u} \tag{5}$$

As member countries will differ in size, each country will have a weight in the monetary union average. In our case, we consider two asymmetric countries, where one will have a weight a and the other one a weight b, with $a + b = 1$.

3. A Fiscal Leadership Game.

We will consider that the game that represents the interaction between the monetary authority and the various fiscal authorities is a fiscal leadership game. The fiscal leadership game has recently been adopted by Beetsma and Bovenberg (1998), Uhlig (2002) and Chari and Kehoe (2002) in the analysis of a monetary union with various fiscal authorities. In this game, fiscal authorities have the first-mover advantage and they will anticipate the reaction of the monetary authority. We believe that this game reproduces the actual game in EMU: the ECB has regular meetings throughout the year

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a positive way and inflation in a negative way.

so that fiscal authorities can somehow anticipate what the ECB will do when they are setting up their budget objectives. Further, government budget decisions cannot be adjusted as quickly as monetary policy, so that a particular choice of tax rates and spending provides the government with a first-mover advantage[2].

We will consider two scenarios. The first one will be the non-cooperative case, where each fiscal authority cares only about output stabilization in their country and their deficit target. The second scenario will be the cooperative case, where both fiscal authorities care about the joint monetary union output and individually about their deficit target.

The fiscal leadership game will have the following timing. In the first place, the public will set its inflation expectations. In this model inflation expectations are set rationally. In the second place, the fiscal authorities will choose their budget deficit d_j. Finally, the central bank sets the nominal interest rate i. As we solve the model by proceeding backwards, we start by finding the optimal interest rate rule, irrespective of whether the fiscal authorities behave in a coordinated manner or not.

The monetary authority first order condition will give us:

$$i = \frac{\gamma}{\phi}\bar{d} + \frac{\phi(\alpha\omega^2 + 1) + \omega}{\phi(\alpha\omega^2 + 1)}\overline{\Pi}^e + \frac{1}{\phi}\bar{\varepsilon} - \frac{1}{\phi(\alpha\omega^2 + 1)}\bar{u} \qquad (6)$$

This implies that $\bar{y}$ will be:

$$\bar{y} = \frac{1}{\alpha\omega^2 + 1}\left(\bar{u} - \omega\overline{\Pi}^e\right) \qquad (7)$$

and $\overline{\Pi}$ will be:

[2] We also looked at a monetary leadership game, where the monetary authority has the first-mover advantage, and at a Nash equilibrium game, where all the authorities move simultaneously. Neither game altered the main results of the paper, i.e., that under a positive supply shock, the public deficit and the interest rate are lower if fiscal authorities do not coordinate than if they coordinate. This analysis is available from the author upon request.

$$\overline{\Pi} = \frac{\alpha\omega^2}{\alpha\omega^2 + 1}\left(\overline{\Pi}^e - \frac{1}{\omega}\bar{u}\right) \tag{8}$$

Taking expectations of $\overline{\Pi}$ in (8), it can be seen that E($\overline{\Pi}$) = 0, so (6), (7) and (8) become:

$$i = \frac{\gamma}{\phi}\bar{d} + \frac{1}{\phi}\bar{\varepsilon} - \frac{1}{\phi\left(\alpha\omega^2 + 1\right)}\bar{u} \tag{9}$$

$$\bar{y} = \frac{1}{\alpha\omega^2 + 1}\bar{u} \tag{10}$$

$$\overline{\Pi} = \frac{-\alpha\omega}{\alpha\omega^2 + 1}\bar{u} \tag{11}$$

The optimal interest rate rule (9) will increase with the average budget deficit and with positive demand and negative supply (average) shocks. Notice that average output (10) and inflation (11) only depend on the supply shock in opposite directions. This implies that there are conflicting objectives of price and output stabilisation for the monetary authority. On the other hand, the monetary authority can perfectly offset the demand shocks. Countering demand shocks pushes output and inflation in the same direction and thus these type of shocks do not create a trade-off between output and inflation. Clarida, Galí and Gertler (1999) obtain these features in their model, which is a dynamic extended version of the one considered here, so that these results appear robust to the temporal characterisation of the model.

The fiscal authorities of each country know the interest rate rule (9) followed by the monetary authority, so they will incorporate this knowledge in their value function. We will consider first the non-cooperative scenario.

(a) Non-cooperation of the fiscal authorities.

Given that the average budget deficit is $\bar{d} = ad_1 + bd_2$, then:

$$y_1 = \gamma b(d_1 - d_2) - \bar{\varepsilon} + \varepsilon_1 + \frac{1}{\alpha\omega^2 + 1}\bar{u} \qquad (12)$$

In the non-cooperative game, we consider that the fiscal authorities of each country maximize the value function:

$$\max_{d_j} -\frac{1}{2}\left\{y_j^2 + \theta(d_j - \hat{d})^2\right\}, \quad \text{with } j = 1, 2.$$

The first order condition to this maximization will give us, for the first country:

$$d_1 = \frac{1}{\gamma^2 b^2 + \theta}\left[\gamma^2 b^2 d_2 + \gamma b(\bar{\varepsilon} - \varepsilon_1) - \frac{\gamma b}{\alpha\omega^2 + 1}\bar{u} + \theta\hat{d}\right] \qquad (13)$$

and similarly, for the fiscal authority of the other country:

$$d_2 = \frac{1}{\gamma^2 a^2 + \theta}\left[\gamma^2 a^2 d_1 + \gamma a(\bar{\varepsilon} - \varepsilon_2) - \frac{\gamma a}{\alpha\omega^2 + 1}\bar{u} + \theta\hat{d}\right] \qquad (14)$$

If we add up the deficits of each country in the non-cooperative game, and find the average deficit, we obtain the following expression:

$$\bar{d} = \frac{ab\gamma(\bar{\varepsilon} - b\varepsilon_1 - a\varepsilon_2)}{\theta + \gamma^2(a^2 + b^2)} - \frac{ab\gamma(\gamma^2 + 2\theta)}{\left[\theta^2 + \gamma^2\theta(a^2 + b^2)\right](\alpha\omega^2 + 1)}\bar{u} + \hat{d} \qquad (15)$$

(b) *Cooperation of the fiscal authorities.*

In the cooperative game, we consider that the fiscal authorities of each country care about the joint monetary union output and so they maximize the value function[3]:

[3] We also looked at an objective function as a weighted average of the fiscal authorities´ loss functions, and the main results of this paper still held.

$$\max_{d_j} -\frac{1}{2}\sum_{j=1}^{2}\left\{\bar{y}^2 + \theta(d_j - \hat{d})^2\right\}, \qquad \text{with } j = 1, 2.$$

The first order conditions to this maximization will give us:

$$d_1 = d_2 = \hat{d} \tag{16}$$

And thus, in the case of the cooperative game, we obtain that the average budget deficit is precisely the deficit target:

$$\bar{d} = \hat{d} \tag{17}$$

In the cooperative game, fiscal authorities set their budget deficits equal to the target $\hat{d}$, independently of the shocks hitting the economy. This is due to the fact that, if fiscal authorities act in a coordinated manner, they internalize the fact that their mutual actions partially offset each other and therefore they economize on the use of their instruments.

In order to see the main result obtained in this article, it is helpful to simplify expression (15) to the case of two symmetric countries with $a = b = 1/2$, which gives:

$$\bar{d} = -\frac{b\gamma}{\theta(\alpha\omega^2 + 1)}\bar{u} + \hat{d} \tag{18}$$

Therefore, in the presence of a positive supply shock to the monetary union as a whole, the average public deficit will be higher when there is coordination of fiscal policies (17) than when there is no coordination (18). If fiscal authorities coordinate in this model they behave as one big country[4]. In doing so they recognise that their fiscal reaction to the positive supply shock, (lower the deficit), will be compensated by the monetary authority (lowering the interest rate more), and so they end up not reacting to it at all. When fiscal authorities do not coordinate, they will each set up a lower deficit and the average budget deficit is therefore lower.

Furthermore, this result would also be true for interest rates: interest rates will be lower without fiscal coordination in the presence of a positive supply shock. Substituting (18) and (17) in the interest rate rule (9), we obtain that the interest rate in the non-cooperative game is:

$$i = \frac{\gamma}{\phi}\hat{d} + \frac{1}{\phi}\bar{\varepsilon} - \frac{(\gamma^2\varphi + \theta)}{\theta\phi(\alpha\omega^2 + 1)}\bar{u} \tag{19}$$

and in the cooperative game is:

$$i = \frac{\gamma}{\phi}\hat{d} + \frac{1}{\phi}\bar{\varepsilon} - \frac{1}{\phi(\alpha\omega^2 + 1)}\bar{u} \tag{20}$$

In the presence of a positive supply shock, the interest rate in the non-cooperative game is smaller than in the cooperative game. In the cooperative game, faced with a positive supply shock, the monetary authority has to set a higher interest rate due to the higher average budget deficit of the monetary union.

4. Conclusions.

In this article we have analysed a simple static model of a monetary union with one monetary authority and various fiscal authorities that have a public deficit target. We have found that, in the presence of positive supply average shocks, the interest rate and the average budget deficit of the monetary union would be higher if the fiscal authorities acted in a cooperative manner than in a non-cooperative manner.

This result has a direct implication for coordinating fiscal policies in the European Monetary Union under the Stability and Growth Pact. The restrictions established by the SGP are based on the premise that in expansive phases of the economy, the countries

[4] If there was only one country, we would find the same interest rule (for a one-country version) and $d = \hat{d}$. In other words, one country = cooperation. The fiscal authority knows that the monetary authority reacts to demand and supply shocks, so it focuses on its target.

will be able to improve their fiscal balances in order to have a margin of manoeuvre when the economy enters a recessive phase. According to the results obtained in this article, in expansive phases, if countries coordinate their fiscal policies they end up with a higher deficit than when there is no coordination. Therefore, if fiscal authorities coordinate in EMU with a SGP, then countries will not be as ready to face a negative supply shock as if they acted in a non-coordinated manner.

There are some limitations in the analysis carried out in this article. An obvious limitation is its static nature, particularly when looking at fiscal policy. Nonetheless, we are encouraged by the article of Clarida et alt. (1999) who analyse optimal monetary policy in a model with dynamics very close in nature to the one used in this article. Under discretion, the optimization problem for the central bank evolves into a sequence of one period decision problems, where future output and inflation are not affected by today´s actions. Therefore, if we were to adopt a dynamic model, the simplification adopted in this paper by using a static version of Clarida et alt. (1999) should not change the results obtained for the monetary policy rule, although it might for the fiscal policy rules. It would be interesting to see whether the results obtained here would hold in a dynamic version of the model.

It would also be interesting to see the evolution of budget deficits in monetary unions (with and without deficit constraints) to see whether deficits appear to be higher in monetary unions with fiscal cooperation or without cooperation. The studies that we are aware of are those of Van Rompuy et alt. (1991) and Lamfalussy (1989). They find that the average budgetary deficits of member states in monetary unions tend to be lower than the average deficit of independent countries in the European Union. In none of the monetary unions analysed by these studies does the federal authority impose restrictions on the budget deficits of the member states (with the exception of Germany). In terms of this article, this would imply lower deficits in a non-cooperative setting than in a cooperative setting[5].

[5] Remember that the cooperative case under fiscal leadership was the equivalent of a one country case.

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