E C O N O M I C S  B U L L E T I N

# Multilateral surveillance in the Stability and Growth Pact: an analysis through information sharing

Montserrat Ferré
*Universitat Rovira i Virgili*

## *Abstract*

In this article we use the concept of information sharing from oligopolistic games to analyse the multilateral surveillance of budget positions introduced with the Stability and Growth Pact. In a game between one monetary authority and various fiscal authorities, we will show that the multilateral surveillance does not lead to closer to target average budget deficits compared to a benchmark case of no surveillance.

I would like to thank Carolina Manzano, Bernd Theilen and Antonio Quesada for helpful comments.
**Citation:** Ferré, Montserrat, (2004) "Multilateral surveillance in the Stability and Growth Pact: an analysis through information sharing." *Economics Bulletin*, Vol. 5, No. 15 pp. 1−7
**Submitted:** April 29, 2004. **Accepted:** August 7, 2004.
**URL:** http://www.economicsbulletin.com/2004/volume5/EB−04E60006A.pdf

## 1. Introduction.

The Stability and Growth Pact (SGP) in the European Monetary Union (EMU) requires its member countries to avoid excessive deficit positions defined as general government deficits below 3% of GDP. One of the arguments put forward (Eichengren and Wyplosz (1998)) for introducing the SGP was related to the advantages of policy coordination: if countries coordinate their fiscal policies, then they take into account the effects of their deficits on each other. In an attempt to enforce policy coordination, the European Union introduced the multilateral surveillance of budget positions in the EC Treaty and reinforced this concept in Council regulations[1]. Multilateral surveillance obliges countries to provide information at regular intervals about their midterm objectives and about developments that might affect their budgetary position. In this article we will look at whether multilateral surveillance actually helps to explain the recent failure of a few member countries of EMU to achieve the SGP public deficit target.

The analysis of a monetary union such as EMU can be developed as a game between one monetary authority and various fiscal authorities –see, for instance, Beetsma and Bovenberg (1998), Chari and Kehoe (2002) and Dixit and Lambertini (2003), among others. A crucial issue in this research with decentralized fiscal authorities has been how to introduce fiscal coordination. In this paper we will use the multilateral surveillance concept to look at the issue of coordination from a new perspective. We will link the fact that member states of EMU must provide information about their budgetary position with the concept of "information sharing" used in the analysis of oligopoly. There is an extensive literature (Gal-Or (1985), Shapiro (1986), Vives (1984), Ziv (1993)) that has studied the motivation of oligopolists to share their private information with rivals, known as *information sharing*.

In this article we will show that information sharing, as envisaged in the EC treaty in the form of multilateral surveillance, does not necessarily lead to closer to target average budget deficits. To this end, in Section 2 we 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 reaction functions of the players with and without information sharing, and finally section 4 will conclude.

## 2. The model.

Our model will represent a monetary union with one central monetary authority and various ($j$) 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 ($\Pi$). All the variables are country-specific except for the monetary union´s nominal interest rate. As member countries will differ in size, each country will

[1] Council Regulation (EC) No 1466/97 of 7 July 1997.

have a weight in the monetary union average[2]. In our case, we consider two asymmetric countries, where one will have a weight $a$ and the other one a weight $b$, with $a+b=1$.

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

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

with *j = 1, 2.*

In equation (1) $d_j$ is the budget deficit, $i$ is the monetary union nominal interest rate, $\Pi_j^e$ is the inflation expectation formed by the public and $\varepsilon_j$ is a demand shock assumed to have a zero mean. The parameter $\gamma$ measures the effectiveness of fiscal policy, and the parameter $\phi$ is the real interest elasticity of aggregate demand. Equation (2) is a supply (Phillips) equation, where $\Pi_j$ is inflation in each country and $u_j$ is a supply shock with zero mean.

Since the works of Kydland and Prescott (1977) and Barro and Gordon (1983), it is generally accepted that policymakers have preferences over some variables that correspond to quadratic loss functions. In this article, the monetary authority will aim at maintaining price stability and, to a certain degree, at stabilizing output. The monetary authority will use the nominal interest rate as the instrument of monetary policy. This attempts to reflect the European Central Bank (ECB) operating procedure. As a result, the objective function of the monetary authority will be:

$$\max_i -\frac{1}{2}\left\{\alpha\bar{y}^2 + \overline{\Pi}^2\right\} \quad (3)$$

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. The objective function (3) implies that the monetary authority aims at stabilising the business cycle and has a zero inflation target. To represent the fact that the ECB is conservative in the Rogoff (1985) sense, we will assume that $\alpha < 1$.

It is also traditional in the literature that the fiscal authority cares more about output stabilisation than price stability. In this article we will assume that the fiscal authority cares about output stabilization and also takes into account the SGP deficit objective. In particular, the fiscal authority would like to deviate as little as possible from a target value $\hat{d}$ for the budget deficit[3]. The objective function of the fiscal authority will be:

$$\max_{d_j} -\frac{1}{2}\left\{y_j^2 + \theta(d_j - \hat{d})^2\right\} \quad (4)$$

[2] Variables with a bar on top will represent union averages.

[3] Similar to *Beetsma, Debrun and Klaaseen (2001), Buti, Roeger and In´t Veld (2001),Uhlig (2002) and Ferré (2003).*

## 3. The game.

The game that represents the interaction between the monetary authority and the various fiscal authorities will have the following timing. In the first place, the public will set its inflation expectations. Secondly, fiscal authorities will choose their budget deficit. In the third place, (i) if there is information sharing, fiscal authorities will let each other know what their budget deficit will be, and (ii) if there is no information sharing, we proceed to the next step. Finally, the central bank sets the nominal interest rate *i*.

The model is solved by backward induction, so we will first find the optimal rule for the central bank. The monetary authority first order condition will give us:

$$i = \frac{\gamma}{\phi}\bar{d} + \frac{1}{\phi}\bar{\varepsilon} - \frac{1}{\phi(\alpha\omega^2 + 1)}\bar{u} \tag{5}$$

The optimal interest rate rule (5) will increase with the average budget deficit and with positive demand and negative supply (average) shocks.

The fiscal authorities of each country know the interest rate rule (5) followed by the monetary authority, so they will incorporate this knowledge in their value function. We will use information sharing to distinguish between two scenarios. The first one will be the non-cooperative case, where each fiscal authority does not know what the other one is doing –the *imperfect information* game-. We will use this as a benchmark case to compare it with the second scenario. The second scenario will be the one envisaged by the SGP, where each fiscal authority will let the other one know about its action –the *information share* game-.

### 3.1 Non-cooperation of the fiscal authorities: the imperfect information game.

When the fiscal authorities act under imperfect information we will solve each authorities´ objective function as a Nash equilibrium game where each authority forms an expectation of the other one´s deficit. The reaction function for each authority will be:

$$d_1 = \frac{1}{\gamma^2 b^2 + \theta}\left[\gamma^2 b^2 E(d_2) + \gamma b(\bar{\varepsilon} - \varepsilon_1) - \frac{\gamma b}{\alpha\omega^2 + 1}\bar{u} + \theta\hat{d}\right] \tag{6}$$

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

$$d_2 = \frac{1}{\gamma^2 a^2 + \theta}\left[\gamma^2 a^2 E(d_1) + \gamma a(\bar{\varepsilon} - \varepsilon_2) - \frac{\gamma a}{\alpha\omega^2 + 1}\bar{u} + \theta\hat{d}\right] \tag{7}$$

Taking expectations of (6) and (7) and substituting the new expressions into each other allows us to find what $E(d_1)$ and $E(d_2)$ are. In this case, $E(d_1) = E(d_2) = \hat{d}$ . Substituting this back into (6) and (7) we obtain the optimal rules for each authority:

$$d_1 = \hat{d} + \frac{\gamma b}{\gamma^2 b^2 + \theta}(\bar{\varepsilon} - \varepsilon_1) - \frac{\gamma b}{(\gamma^2 b^2 + \theta)(\alpha\omega^2 + 1)}\bar{u} \tag{8}$$

and

$$d_2 = \hat{d} + \frac{\gamma a}{\gamma^2 a^2 + \theta}(\bar{\varepsilon} - \varepsilon_2) - \frac{\gamma a}{(\gamma^2 a^2 + \theta)(\alpha\omega^2 + 1)}\bar{u} \quad (9)$$

We can calculate the average deficit from the last two expressions:

$$\bar{d} = \hat{d} + \frac{\gamma ab}{\gamma^2 b^2 + \theta}(\bar{\varepsilon} - \varepsilon_1) + \frac{\gamma ab}{\gamma^2 a^2 + \theta}(\bar{\varepsilon} - \varepsilon_2) - \frac{\gamma ab\left[(\gamma^2 a^2 + \theta) + (\gamma^2 b^2 + \theta)\right]}{(\gamma^2 b^2 + \theta)(\gamma^2 a^2 + \theta)(\alpha\omega^2 + 1)}\bar{u} \quad (10)$$

### 3.2 Cooperation of the fiscal authorities: the information sharing game.

In the cooperative game, we consider that each of the fiscal authorities knows what the other one´s budget deficit will be, because they share that information. The optimal rule for authority 1 is:

$$d_1 = \frac{1}{\theta^2 + \gamma^2\theta(a^2 + b^2)}\left[\gamma b\theta(\bar{\varepsilon} - \varepsilon_1) - \frac{\gamma^2 b^2 \gamma a + \gamma b(\gamma^2 a^2 + \theta)}{\alpha\omega^2 + 1}\bar{u} + \theta(\gamma^2 a^2 + \gamma^2 b^2 + \theta)\hat{d}\right] (11)$$

and for authority 2:

$$d_2 = \frac{1}{\theta^2 + \gamma^2\theta(a^2 + b^2)}\left[\gamma a\theta(\bar{\varepsilon} - \varepsilon_2) - \frac{\gamma^2 a^2 \gamma b + \gamma a(\gamma^2 b^2 + \theta)}{\alpha\omega^2 + 1}\bar{u} + \theta(\gamma^2 a^2 + \gamma^2 b^2 + \theta)\hat{d}\right] (12)$$

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

$$\bar{d} = \frac{ab\gamma(\bar{\varepsilon} - b\varepsilon_1 - a\varepsilon_2)}{\theta + \gamma^2(a^2 + b^2)} - \frac{ab\gamma(\gamma^2 + 2\theta)}{\left[\theta^2 + \gamma^2\theta(a^2 + b^2)\right](\alpha\omega^2 + 1)}\bar{u} + \hat{d} \quad (13)$$

### 3.3 Comparison of the results

In order to simplify the comparisons between one regime and the other one, let us assume that the two countries are of equal size ($a = b$). In this case, expression (10) becomes:

$$\bar{d} = -\frac{2b^2\gamma}{(\gamma^2 b^2 + \theta)(\alpha\omega^2 + 1)}\bar{u} + \hat{d} \qquad (14)$$

and expression (13) becomes:

$$\bar{d} = -\frac{b^2\gamma(\gamma^2 + 2\theta)}{(\theta^2 + 2b^2\gamma^2\theta)(\alpha\omega^2 + 1)}\bar{u} + \hat{d} \qquad (15)$$

The term affecting $\bar{u}$ in (14) is unambiguously smaller than that of (15). This implies that in the presence of a negative supply shock, the average deficit will exceed the target on average under both regimes, but more so in the information sharing (cooperative) game. In fact, in the cooperative game the average deficit has higher fluctuations around the target than the non-cooperative game.

The intuition for the result just obtained lies in the expectations formed in the non-cooperative game. In the non-cooperative game, countries expect that the other country will set the budget deficit equal to the target. On the contrary, in the information sharing game each country knows what the other player will do and they reinforce their actions: the higher one country sets its deficit, the higher the other one will set it as well. By looking at the monetary authority rule (5), we can see that the higher the average deficit is, the higher will be the interest rate. If one authority sets a high deficit, this will be counteracted by the monetary authority by raising the interest rate. In turn, the other authority, who knows that, tries to compensate for the effect of the higher interest rate by setting a higher deficit.

## 4. Conclusion

The introduction of the Stability and Growth Pact has been the subject of a heated debate. Further, two of the main players in EMU, Germany and France, recently experienced a sluggish growth of their economies and had difficulty in keeping their budget deficit under the 3% target. In this paper we have looked at whether the multilateral surveillance of budget positions introduced with the SGP has helped in actually delivering the objective of a target deficit. By introducing the information sharing concept widely used in oligopolistic games, we have been able to show that this mechanism actually does not help in order to deliver closer to target and less volatile deficits on average.

## 5. References

Barro, R. and D. Gordon (1983) "A Positive Theory of Monetary Policy in a Natural-Rate Model" *Journal of Political Economy* **91**, 589-610.

Beetsma, R. and L. Bovenberg (1998) "Monetary Union without Fiscal Coordination may Discipline Policymakers", *Journal of International Economics* **45**, 239 – 258.

Beetsma, R., X. Debrun and F. Klaassen (2001) "Is Fiscal Policy Coordination in EMU Desirable?", *Swedish Economic Policy Review* **8**, 57 – 98.

Buti, M., W. Roeger and J. In´t Veld (2001) "Stabilizing Output and Inflation: Policy Conflicts and Co-operation under a Stability Pact", *Journal of Common Market Studies* **39**, 801-828.

Chari, V. and P. Kehoe (2002) "Time Inconsistency and Free-riding in a Monetary Union", *NBER Working Paper* No. 9370.

Clarida, R., J. Galí and M. Gertler (1999) "The Science of Monetary Policy: A New Keynesian Perspective", *Journal of Economic Literature* **37**, 1661-1707.

Gal-Or, E. (1985) "Information Sharing in Oligopoly" *Econometrica* **53**, 329 – 343.

Dixit, A. and L. Lambertini (2001) "Monetary-Fiscal Policy Interactions and Commitment" *European Economic Review* **45**, 977-987.

Dixit, A. and L. Lambertini (2003) "Symbiosis of Monetary and Fiscal Policies in a Monetary Union" *Journal of International Economics* **60**, 235 – 247.

Eichengreen, B. and C. Wyplosz (1998) "The Stability Pact: more than a minor nuisance?" *Economic Policy* **13**, 65 – 113.

Ferré, M. (2003) "Should Fiscal Authorities Cooperate in a Monetary Union with Public Deficit Targets?" *Document de Treball* 4 – 2003, Universitat Rovira i Virgili.

Kydland, F. and E. Prescott (1977) "Rules Rather than Indiscretion: The Inconsistency of Optimal Plans" *Journal of Political Economy* **85**, 473-492.

Rogoff, K. (1985) "The Optimal Degree of Commitment to an Intermediate Monetary Target" *Quarterly Journal of Economics* **100**, 1169-1189.

Shapiro, C. (1986) "Exchange of Cost Information in Oligopoly" *Review of Economic Studies* **53**, 433 – 446.

Uhlig, H. (2002) "One Money, But many Fiscal Policies in Europe: What are the Consequences" *CentER Discussion Paper* No. 2002-32.

Vives, X. (1984) "Duopoly Information Equilibrium: Cournot and Bertrand" *Journal of Economic Theory* **34**, 71 – 94.

Ziv, A. (1993) "Information Sharing in Oligopoly: the Truth-Telling Problem" *RAND Journal of Economics* **24**, 455 – 465.