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August 2010

Online at <https://mpra.ub.uni-muenchen.de/24713/>

MPRA Paper No. 24713, posted 03 Sep 2010 08:00 UTC

# **CENTRAL BANK REACTION TO PUBLIC DEFICIT AND SOUND PUBLIC FINANCE: THE CASE OF THE EUROPEAN MONETARY UNION**

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## **Abstract**

The paper aims to shed light on the relation between monetary and fiscal policy in EMU, focusing on the interest rates and deficit dynamics. We present a theoretical model in which monetary and fiscal policy independently interact through their own instrument, namely, the rate of interest for the central bank and deficit spending for governments. We demonstrate that the possibility of the two policy authorities producing not conflicting results depends on the idea each has of the workings of the economic system and on the influence each variable has on inflation and equilibrium income. Furthermore the inflationary opinion of the ECB about deficit spending leads to the result that public finance becomes surely unsound, unless governments stop using expansionary instruments. We provocatively conclude that the limits set by the Maastricht Treaty are a necessary solution to avoid unsound public finance.

**JEL classification:** F42, F53, E63.

## **1.Introduction**

Modern economic theories have profoundly reduced the role of policy both in theoretical and applied terms. These results have, as corner stone the statements that “only unanticipated money matters” (Lucas 1972, Sargent and Wallace 1975) and that public expenditure has not any permanent effect on equilibrium income (Barro 1974). They have been reinforced by the conclusions about the general limits of discretionary policies in the shape of time inconsistency (Kydland and Prescott 1977).

The main overall idea is that there is a long run convergence toward the equilibrium income and that all what the policy authority has to do is grant price stability to accelerate the market movement toward this value. Stabilization policies – according to this point of view - can neither reduce cycle movements nor have permanent positive effects on long run growth rates.

These are the foundations of the European Monetary Union in which national fiscal policies are strictly subordinated to the inflation targeting of the European Central bank. National governments are obliged to respect rigid parameters and cannot use fiscal policy freely to increase

growth and employment. Deficit spending and public debt has been transformed into a policy objective and the interest rate – fixed by the central bank – almost the sole main policy instrument. Furthermore the Maastricht Treaty and the Stability and Growth Pact with their parameters and procedures to achieve sound public finance, ensure that fiscal policy authorities share the price stability objective. In the framework of the European monetary union there is, therefore, just a very little room for policy coordination.

Unfortunately – as testified by an extensive literature criticizing the architecture of economic policy in Europe<sup>1</sup> - when the Central bank changes interest rates it affects public finance both through its direct effect on debt and through the effect on equilibrium income via investments and consumption. Inflation targeting, could in this respect be very counterproductive due to its indirect effect on aggregate demand, which in turn can have permanent effects on long-run level of output growth<sup>2</sup>.

These policy features are the result – besides the questionable theoretical underpinnings - of the excess deficit spending financed through debt. The unsound management of public finances was undoubtedly the cause during the 1980s of great real and financial instability and the adverse effects on the working of the economic system we have observed till now. Before the 1980s fiscal policy intervention was very often accompanied by an accommodating monetary one, while during the decade in question – once it was realized that this mix had excess inflationary effects – fiscal

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<sup>1</sup>A large group of economists – European economists for an alternative economic policy in Europe - each year writes a memorandum to summarize the contents of the alternative economic policy and garner new consensus around it. See for instance Euromemorandum Group (2006) and Fitoussi and Saraceno (2004). Several critiques can be also found on a special number of Oxford Review of Economic Policy (vol.21 no.4, 2005) entirely dedicated to the macroeconomic role of fiscal policy. See in particular Allsopp and Vines (2005), Krugmann (2005), Solow (2005).

<sup>2</sup>“According to the conventional inflation targeting approach in order to achieve long-run price stability the CBs need to respond to any change in the current or expected rate of inflation, [...] by raising the real interest rate, hence curbing the aggregate demand and current output. But what if current output is also affected by the level and time path of aggregate demand?”. Fontana, Palacio-Vera (2005) p.1. The theoretical foundation of this statement is that money is endogenous and therefore dependent on current output: any manoeuvre to control money – in order to be effective – must have effects on current output. See Symposium (2002).

expansion was financed through debt and accompanied by interest rates increase. The main cause of the unsound public finance was thus the particular policy mix in those years<sup>3</sup>.

The paper aims to shed light on the relation between monetary and fiscal policy in EMU, observing the interest rates and deficit dynamics in particular. We demonstrate, that the dominance of the ECB on fiscal policy leads to the result that – without the constraint of the Maastricht Treaty – public finance becomes unsound, unless governments stop using expansionary instruments.

We present a theoretical model in which monetary and fiscal policy independently interact in a single currency area through their own instruments, which are, for the central bank the rate of interest and for governments, deficit spending. We assume that there is a single supranational Central Bank, while the fiscal policy is national. We demonstrate that the possibility of two policy authorities not producing conflicting results depends on the idea each has on the working of the economic system and on the influence each variable has on inflation and equilibrium income.

The paper is organized as follows: in the next section we recall the question of coordination, reviewing, according to the literature, the advantages and disadvantages of having separate policy authorities and whether or not it is beneficial to share policy strategies.

In section three, once recalled the policy strategies in Europe, we build the model. The analytical core of the paper is based on the reaction functions of the two policy authorities. Each policy strategy can influence the other one in a two actors-game whose final result depends on the weight each variable has – or the weight is thought to have each variable - on its final target. In particular we study the possible reciprocal reactions of the central bank through interest rates movements to deficit increase and of government spending to interest rates increase, the former targeting inflation, the latter having an employment objective. Due to the fact that the central bank – following the European institution behaviour – fixes the cost of money, the government reaction through deficit spending depends on the effects which fiscal policy thinks interest rates have on

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<sup>3</sup> Cfr. Tobin (2001) for similar conclusions about policy mix in the United States of America.

output. In turn the reaction of the monetary policy authority depends on how much it thinks this behaviour can affect the inflation target. The possibility of there being two convergent strategies relies on the eventual sharing of the reference model of the economic system functioning. In particular if monetary policy has the belief that deficit spending is inflationary, fiscal authority cannot use it as stabilization instrument because of its explosive path of expansion. In this case an equilibrium condition - a Nash equilibrium - does exist, but it does not result from the spontaneous action of policy authorities (not convergent). In the light of these analytical conclusions it can be stated that since the Central Bank targets inflation and deficit spending is considered to be inflationary, fiscal policy spending criteria must be set to prevent public accounts to go on an explosive path. Therefore – given the ECB’s policy strategy – the Maastricht Treaty is a necessary solution to avoid unsound dynamics of public finance.

Section 4 contains alternative results of the model. If monetary policy does not assign any weight to the inflationary effects of deficit spending the two strategies could converge toward common values of deficit and interest rates which also represent a Nash equilibrium. But even in this context of non conflicting strategies, if each policy authority reacted to expected inflationary effects of their action, the equilibrium would be further away and lead real and financial instability. Finally section 5 draws some conclusions.

## **2. Reciprocal effects of policy strategies**

Economic policy theory has almost unanimously concluded that it is better to have two policy authorities rather than one because of the reciprocal control each can exert on the other. To tell the truth recent economic policy theory has concluded that because of the longer time horizon and the non-strictly elective mechanism of central bank institutions it is better to reduce the power of fiscal policy and increase that of the monetary one<sup>4</sup>. The latter should provide the guidelines for general

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<sup>4</sup> The early basics of this conclusion goes back to the Buchanan and Tullock (1962).

policy action in order to build a stable economic environment leading to a full employment equilibrium. In this context governments may have just redistributive tasks.

However this conclusion is based on the general pre-analytical idea that market works better if there is a limited external intervention, rather than on the unequivocal empirical results concerning policy effectiveness<sup>5</sup>. The dominance of monetary over fiscal policy would appear to pre-empt the debate on co-ordination: it is a false problem, because it is sufficient to realize price stability in order to reach full employment. In Europe the issue of coordination is linked on the side of fiscal policy to the contribution by Sargent and Wallace (1981) about the sustainability of debt and on the side of monetary policy to the time inconsistency problem (Kydland and Prescott (1977)). Furthermore in the Barro-Gordon (1983) contribution the subject of coordination is completely neglected and the existence of fiscal policy action is ignored. The conclusions reached in these seminal contributions gave shape to the current relation between monetary and fiscal policy action in Europe. But several critical contributions such as Nordhaus (1994), Kirsanova, Stehm and Vines (2005) and Chadha and Nolan (2007) have concluded that – even in modern policy regimes under which fiscal and monetary policy are independent – economic policy in a single country gives better results if both authorities cooperate to reach their goals. Therefore results are not so unequivocal as the European mainstream asserts.

Since economists started to reflect on the reciprocal effects of monetary authorities on fiscal ones, they identified the following features according to which the economic system can have gains or losses from a shared policy strategy.

The gains are essentially linked to

- a) the non coincidence of the number of instruments with the number of targets.

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<sup>5</sup> These results have been questioned and some economists have shown, also empirically, that monetary policy can be effective to reduce unemployment, without leading to higher inflation (Clarida, Gali and Gertler 1999). Other studies have reached no single conclusion on the working of Ricardian equivalence (Bernheim 1987, Seater 1993, Becker 1997 and Gruen 1991 offer a review of the subject). More recently an extensive literature has shown that the fiscal multipliers are positive ( Hemming, Kelly and Mahfouz 2002 and Hemming, Mahfouz and Schimmelpfening, 2002). Many critiques of the limited efficacy of fiscal policy can be found on a special number of Oxford Review of Economic Policy (vol.21 no.4, 2005) entirely dedicated to the macroeconomic role of fiscal policy. See in particular Allsopp and Vines (2005), Krugmann (2005), Solow (2005).

The number of objectives is often greater than the number of instruments a policy authority can use to reach those objectives. As Tinbergen (1952) stated the number of targets it is possible to reach depends upon the number of independent instruments it is possible to use. Furthermore each policy authority has its own instrument. While the effects are observable on more than one target, the need for coordination, under this respect, is obvious.

b) the effects of fiscal policy on interest rates

Since monetary policy fixes the repurchase rate, which is the reference value for internal interest rates, the government policies are able to modify them through effects on the internal rating of the country. Therefore public expenditure can influence capital formation through the so called crowding-out or crowding-in effects.

c) the effects of monetary policy on deficit and debt dynamics.

The fact that monetary policy fixes the reference value for internal interest rates has an evident influence on the dynamic of deficit and debt for the future. Because the public balance dynamic in turn has effects on equilibrium income, the number of independent instruments is reduced.

Losses arising from co-ordination may be summarized as follows:

a) Different opinions about the targets.

When policy authorities have different systems of values they do not share targets. For example policy authority could give to its targets higher priority than monetary policy authority. If this were to happen co-ordination would mean downgrading the target and giving it a similar weight to that of the other policy authority.

b) Different time horizons.

Even if an independent central bank very often has in its organizational structure some kind of government control, the political cycle is no doubt shorter than that of monetary policy. According to Kydland and Prescott (1977) due to the phenomenon of time inconsistency, what is aimed to be achieved in the short run is not necessarily desirable for the future. Different time horizons and

different preferences during different time intervals make economic policy coordination unsuitable for achieving certain the economic system goals.

c) Different economic theories used for reference

Points a) and b) lead to the reflection that economists can have different reference paradigms. As Schumpeter stated each paradigm derives from a particular vision of the organization of the society and relies on some particular hypotheses. These hypotheses synthesize the vision of the world and are not directly questionable. Different positions about economic policy efficacy derives from different hypotheses introduced in the models. It would be a tall order to coordinate the activity of two policy authorities if their reference paradigms were in conflict. The final result would be the impossibility to reach any target.

There are therefore valid reasons in favour and against policy coordination which are worth considering. However the history of the 1980s has taught us that a single fiscal-monetary policy authority is not going to do better. Yet the reciprocal control is somewhat different from the complete dominance of monetary policy as occurs in Europe.

In the next two sections we will seek to demonstrate that also the sole action of monetary policy does not lead to better results especially if we look at the effects on public finance.

### **3. Fiscal and monetary policy strategies in EMU**

In our model we suppose that we have two policy authorities – monetary and fiscal one – and that they act independently<sup>6</sup>. We also suppose as a first step that there is neither an external limit to the interest rate movements by the Central Bank, nor fiscal constraints on deficit and debt expansions. Both policy authorities behave in such a way as to reach their objectives and react to the behaviour of the other, when it affects them. We therefore have to build two reaction functions

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<sup>6</sup> See Nordhaus (1994) and Lambertini-Rovelli (2004).



in which each policy authority reacts, through the shift of its own instrument to the changes in the other authority's instrument.

### **3.1 The monetary policy reaction function in EMU**

In order to build the monetary policy reaction function we have to start describing how the European Central Bank behaves and the targets it seeks to reach. The primary objective of the ECB's monetary policy is to maintain price stability as laid down in the Article 105 of the Maastricht treaty.

According to the ECB- as emerges from the official publications of the monetary institution – it is widely accepted that in the long run – after all adjustments in the economy have worked through – a change in the quantity of money in the economy will be reflected in a change in the general level of prices. But it will not induce permanent changes in real variables such as real output or unemployment. This general principle, referred to as "the long-run neutrality of money", underlies all standard macroeconomic thinking<sup>7</sup>. Real income or the level of employment are, in the long term, essentially determined by real factors, such as technology, population growth or the preferences of economic agents (ECB 2004).

Ultimately – according to the European Central Bank - inflation is a monetary phenomenon. The proof of this circumstance is that prolonged periods of high inflation – as stated once again in the official publication of the ECB - are typically associated with high monetary growth. While other factors (such as variations in aggregate demand, technological changes or commodity price shocks) can influence price developments over shorter horizons, over time their effects can be offset by a change in monetary policy<sup>8</sup>

The Central Bank contributes to raising the growth potential of the economy by maintaining an environment of stable prices. It cannot enhance economic growth by expanding the money

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<sup>7</sup> European Central Bank (2004) pp.41-44

<sup>8</sup> European Central Bank (2004).

supply or keeping short-term interest rates at a level inconsistent with price stability. It can only influence the general level of prices.

In brief, because inflation is a monetary phenomenon, the Central bank has to control the quantity of money growth to ensure an environment of price stability.

The quantity of money growth – the European Central bank admits - is not directly controllable – because it is endogenously determined through the complex working of the economic system. Therefore the monetary policy authority uses an indirect instrument – namely the rate of interest to influence the endogenous process of means of payment creation.<sup>9</sup>. As Figure (a) illustrates the Central Bank fixes the official interest rates in order to directly influence expectations and bank interest rates. This in turn influences credit money, asset prices and exchange rates.

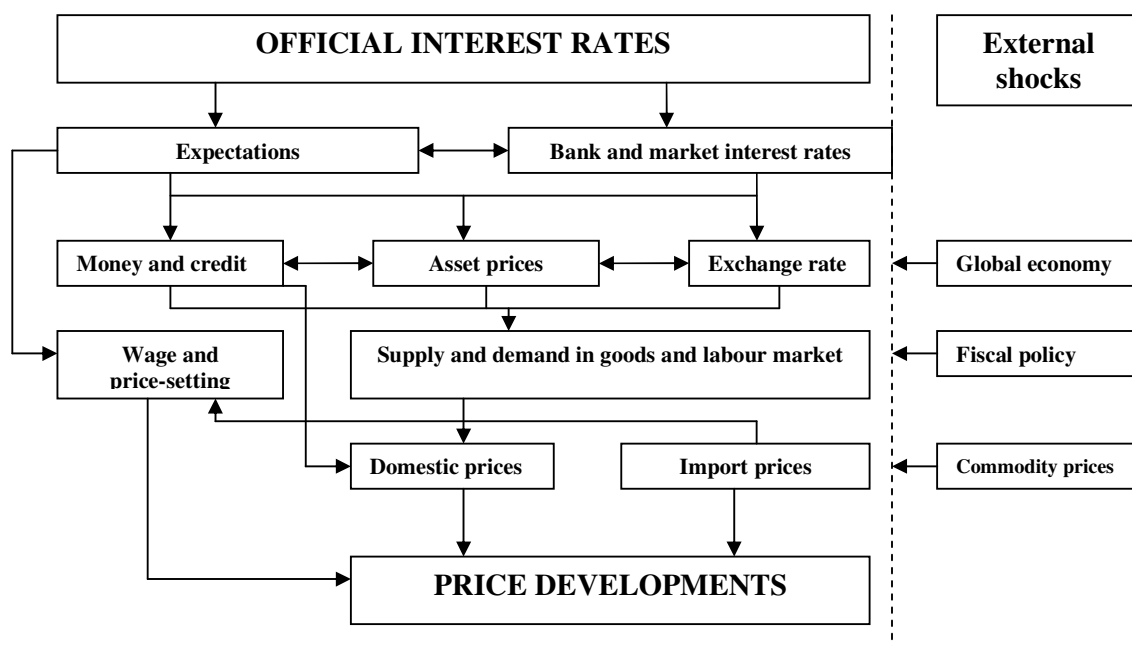


Figure a. A stylised illustration of the transmission mechanism from interest rates to prices

Source: European Central Bank (2004) p. 45.

This endogenous process of means of payment creation gives additional resources the aggregate demand which together with the aggregate supply - in which expectations and wages

<sup>9</sup> The effects of interest-rate control strategy were investigated by Kaldor (1982) who pointed out that using the interest rate as an inflation control strategy has very negative effects on equilibrium income. Under this respect Kaldor criticized the NCM theory and its view of market functioning.

have a central role- finally determine the level of prices and prices developments. Obviously external shocks – although they seems to be marginal - can occur to influence this complex mechanism of prices determination and they can come from changes in global economy, changes in fiscal policy and changes in commodity prices. In particular fiscal policy not only has effects on prices, exerting a pressure on demand, but it is also directly inflationary because public bonds are included in the definition the European Central Bank gives of  $M_3$ <sup>10</sup> and obviously because public deficit potentially creates real and financial instability.

In brief it is possible to say that – according to the European Central Bank – it is possible to exert an effect on prices by controlling the endogenous process of money growth through the changes in movements of interest rates.

We can formalize this description through a monetary policy loss-function which depends upon money growth:

$$L_M = L_M(m)$$

Where  $m$  is given by:

$$m = ky + \pi - hr$$

according to which money growth is a direct function of equilibrium income and inflation and an inverse function of official interest rates.

We can consider the loss function in a given period of time and write it in its explicit form

$$L_M = -\frac{1}{2}(ky + \pi - hr)^2$$

This minimization process – as described in the figure a reproduced above - is subject to the following constraints.

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<sup>10</sup> This is what the ECB stated in its monthly bulletin (April 2004): “most, but not all increases in MFI [monetary and financial institutions] credit to general government are – directly or indirectly associated with a correspondingly rise in  $M_3$ [...] If the MFIs buy government securities, from resident households or firms, both credit to general government and  $M_3$  would rise by the same amount. In cases where MFIs grant loans to the central government, [...] as soon as these funds are used to pay the private sector (via wages and salaries),  $M_3$  will be affected” ECB (2004), p.55

$$sub \begin{cases} y = -\rho(r - \pi^e) + \varphi_M D \\ \pi = \sigma y + \pi^e \\ \pi^e = \pi_{t-1} + \lambda D \end{cases}$$

where the first one is the usual IS curve, where the effect on aggregate demand of a fiscal expansion  $\varphi_M D$  has been explicitly considered. According to the theories espoused by the European central Bank the value of  $\varphi_M$  is very near to zero or negative<sup>11</sup>. Furthermore  $\xi E$  is the effect of the exchange rate on aggregate demand showing that an increase of E (appreciation) decreases exports and increases imports.

The second constraint is the usual AS curve which describes inflation as a direct function of output and inflation expectation. For the sake of simplicity, we suppose that inflation expectations are adaptive, but any hypothesis on price expectations could be introduced. Besides the effects on aggregate demand of goods, deficit spending influences inflation expectations because of its potential future effects on real and financial instability. Moreover – as explicitly admitted by the European Central Bank – when monetary and financial institutions buy debt to finance deficit, they increase broad money growth directly through the variation in their balance sheet and indirectly via the increase in incomes. This mechanism shows the direct effect of deficit spending on inflation expectations<sup>12</sup>. This conclusion is described by the third equation of the constraint.

Substituting the IS in the AS and defining expectations we have the following constraint:

$$\pi = -\sigma\rho r + (1 + \sigma\rho)\pi_{t-1} + (1 + \sigma\rho)\lambda D + \varphi_M D - \sigma\xi E$$

Which is the target – price stability – which the European Central Bank seeks to reach.

Substituting in the loss function, deriving and solving for the instrument  $r$  – the rate of interest, we have the monetary policy reaction function:

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<sup>11</sup> These have been called non Keynesian effects of Keynesian policies. See on the subject Giavazzi Pagano (1996) and for a deeper knowledge of the literature see Bernheim (1987), Seater (1993) Becker (1997), Gruen (1991), Giavazzi and Pagano (1990), Briotti (2005). The papers failed to reach a univocal conclusion on the working of the so called Ricardian equivalence.

<sup>12</sup> See again ECB (2004), p.55

$$(1) \quad r = \frac{k}{\sigma\rho+h} y + \frac{1+\sigma\rho}{\sigma\rho+h} \pi_{t-1} + \frac{(1+\sigma\rho)\lambda + \varphi_M}{\sigma\rho+h} D - \frac{\sigma\xi}{\sigma\rho+h} E$$

According to which the central bank fixes the rate of interest observing current income, preceding period inflation, government deficit spending and exchange rate. Equation (1) is a kind of Taylor rule obtained from a microfoundation process in which deficit spending has been introduced explicitly. The monetary institution reacts to fiscal policy expansions in the following way:

$$(1') \quad \frac{\delta r}{\delta D} = \frac{(1+\sigma\rho)\lambda + \varphi_M}{\sigma\rho+h}$$

If deficit spending grows interest rates also grow. They grow higher, the higher the inflationary effect of deficit spending  $\lambda$ , the greater the income effect of the fiscal expansion  $\varphi_M$  and reduce lower, the higher the effect of interest rate increase in reducing money growth  $h$ .

### 3.2 Fiscal policy reaction function without deficit constraints

The government would like to increase aggregate equilibrium income because it seeks to increase employment. The fiscal policy authority knows that this may affect equilibrium income through its influence on aggregate demand. In turn this influence depends on the expansionary effects of deficit spending and on the indirect effects that government spending exerts on prices and expectations.

Formalizing these simple sentences, we may write the fiscal policy authority loss function:

$$L_F = L_F \left[ -\frac{1}{2} (y - y^T) \right]^2$$

Where  $y^T$  is the fiscal policy income target to be realized;  $y$  is the aggregate equilibrium income given on the side of demand by the following:

$$y = m - \pi + \varphi_F D + \varphi_F A - \rho(r - \pi^e) - \xi E$$

As in any demand function  $y$  increases as money grow  $m$  increase following the real balance effect, as deficit spending  $D$  increases, as autonomous demand  $A$  increases as states the

income multiplier  $\varphi_F$ , as inflation expectations  $\pi^e$  increase because of the effect on the real interest rates, and reduces as inflation  $\pi$  increases, as nominal interest rate  $r$  increases and as the exchange rate  $E$  increase.

However the level of equilibrium income depends also on what happens on the other side of the market. In other words governments are subject to following constraints:

$$sub \begin{cases} \pi = \sigma y + \pi^e \\ \pi^e = \pi_{t-1} \end{cases}$$

which is the usual AS curve. It has to be noted that following our model, fiscal policy does not think that deficit spending directly influences inflation expectations.

Substituting the AS constraints in the equation representing the aggregate demand, and deriving an unique value of income we can substitute it in the loss function. We can then derive and solve for the instrument  $D$ . We have the following reaction function:

$$(2) \quad D_t = \frac{\rho}{\varphi_F} r + \frac{(1-\rho)}{\varphi_F} \pi_{t-1} - A - \frac{1}{\varphi_F} m + \frac{1+\sigma}{\varphi_F} y^T + \frac{\xi}{\varphi_F} E$$

According to this reaction function, fiscal policy, in order to assure a certain value of equilibrium income, has to react positively to interest rate movements. If the target equilibrium income increases, deficit spending has to increase as well. The effect of inflation expectations depends on the value of  $(1-\rho)$ . If the effect of inflation expectations on aggregate demand is higher than the negative effect on aggregate supply - or in other words if  $\rho > 1$  - deficit spending has to decrease in order to maintain the same equilibrium income. Deficit spending has to decrease if autonomous demand increase, if the money growth increases and if exchange rate increase because of the effect on the current account balance of an appreciation of the currency

In particular the deficit reaction to interest rate movements is given by the following:

$$(2') \quad \frac{\partial D}{\partial r} = \frac{\rho}{\varphi_F}$$

Which shows that the deficit reaction is greater the greater is the effect of interest rates on aggregate demand and is smaller the greater is the multiplier effect of government spending on equilibrium income.

### 3.3 Policy equilibrium in EMU

We can now compare the two policies reaction functions:

$$r = \frac{k}{\sigma\rho + h} y + \frac{1 + \sigma\rho}{\sigma\rho + h} \pi_{t-1} + \frac{(1 + \sigma\rho)\lambda + \varphi_M}{\sigma\rho + h} D - \frac{\sigma\xi}{\sigma\rho + h} E$$

$$D_t = \frac{\rho}{\varphi_F} r + \frac{(1 - \rho)}{\varphi_F} \pi_{t-1} - A - \frac{1}{\varphi_F} m + \frac{1 + \sigma}{\varphi_F} y^T + \frac{\xi}{\varphi_F} E$$

The values of  $r$  and  $D$  solving simultaneously the two equations do exist. For the sake of our paper it does not worth while to write them entirely in the text but they are reproduced in appendix. They increase if the value of equilibrium or planned income increases and if expected inflation increases, but they decrease if autonomous demand or money growth increases. The size of the effects depend naturally on the influence inflation and target equilibrium income have on the considered variables. Importantly, if  $\lambda$  is very high the solutions are negative. In this case the economically significant value of  $r$  and  $D$  for the two reaction functions never coincide.

The values that solve the two equations simultaneously represent a Nash equilibrium condition because none of the two policy “players” has anything to gain by changing its own strategy unilaterally. This equilibrium condition results from a convergent path if the reaction of monetary policy to deficit increase is smaller than the reaction of fiscal policy to interest rates increase.

More formally, in order to have a convergent policy strategy equilibrium condition, the following has to hold:

$$\frac{\partial r_{MP}}{\partial D_{MP}} < \frac{\partial r_{FP}}{\partial D_{FP}}$$

The partial derivative of the monetary policy reaction function in relation to the key variables has to be smaller than that of the fiscal policy reaction function:

$$\frac{(1 + \sigma\rho)\lambda + \varphi_M}{\sigma\rho + h} < \frac{\varphi_F}{\rho}$$

This could happen only if deficit spending is not considered to be inflationary ( $\lambda = 0$ ) and at the same time is not considered by monetary policy authority to be effective on aggregate equilibrium income or if  $\varphi_M > \varphi_F$  less than  $\sigma\rho + h > \rho$ .

The case of EMU can be better discussed through a graphical representation (Figure (1)).

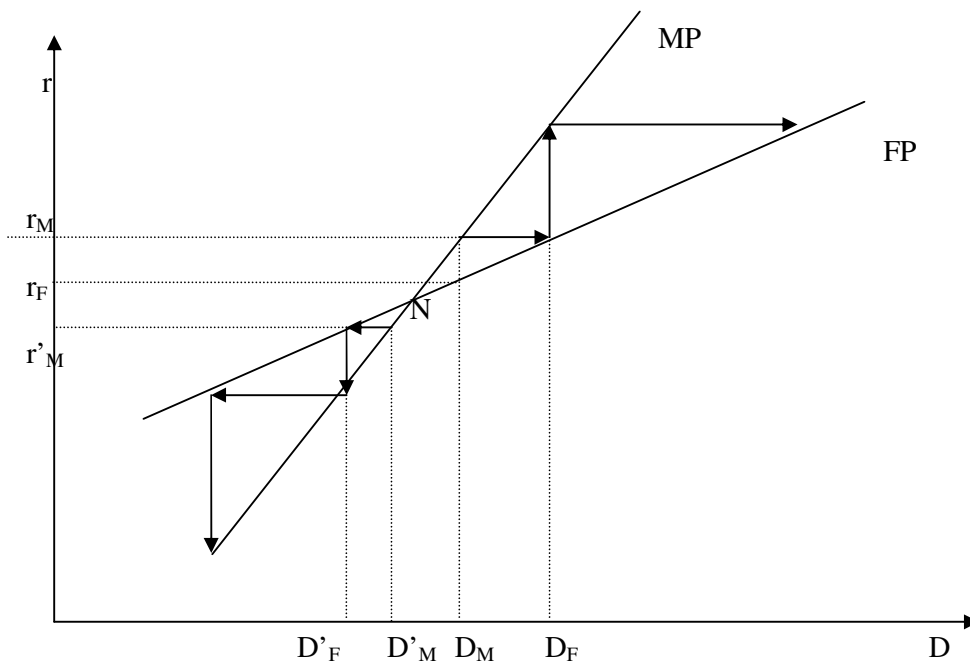
Let us depict in a panel  $(r, D)$  the reaction functions: the line MP is described by equation (1) while the line FP is described by equation (2). The slope of the lines is determined as indicated in (1') and (2'). Because the two lines result from a constrained maximization process, each point on one of them represents an optimal choice of monetary and fiscal policy authority respectively.

Suppose that  $\lambda > 0$  but not very high so that the solutions are both positive. In this case monetary policy reaction function has a slope higher than fiscal one:

$$\frac{(1 + \sigma\rho)\lambda + \varphi_M}{\sigma\rho + h} > \frac{\varphi_F}{\rho}$$

Therefore the line representing the monetary policy reaction function has a slope higher than fiscal policy reaction function.





**Figure 1. Non convergent policy strategies**

The point N marks the Nash equilibrium or in other words the values of  $r$  and  $D$  that at the same time are consistent with the optimal monetary policy strategy and with the optimal fiscal policy strategy. Every point to the right of the point N shows that the interest rate strategy is not consistent with the deficit spending strategy. If the Central Bank fixes as interest rate  $r_M$  would like a deficit equal to  $D_M$ . However fiscal policy authority fixes a deficit equal to  $D_F$ , because it is the one consistent with its employment strategy once the rate of interest is given. This in turn would cause a new reaction of the Central Bank and an ever expanding path of deficit and interest rates.

To the left side of the Nash equilibrium the interest and deficit paths are not convergent either, although the situation for the economic system is not as explosive before. The interest rate policy strategy of the central bank is consistent with a deficit higher than that preferred by the fiscal

policy. Hence it is the first step of a virtual path in which a consolidation strategy of public accounts is achieved with no costs for equilibrium employment<sup>13</sup>.

It is to be noted that - under these conditions of policy behaviour – achievement of a Nash equilibrium is just a coincidence. Furthermore, even if it does come about, any change in other variables that shift the intercept of the two lines results in a divergence path. In particular if the Nash equilibrium stays on the left (lower equilibrium values of  $r$  and  $D$ ) the fiscal policy authority is not free to change its target equilibrium income without causing increasing deficit and debt and increasingly deteriorated public accounts. By contrast if Nash equilibrium stays on the right side (higher equilibrium values of  $r$  and  $D$ ) fiscal policy has increasing resources to achieve its targets. Instruments are available when they are not necessary.

Finally if  $\lambda$  is positive and very high the equilibrium values of  $r$  and  $D$  are both negative and the economically relevant sections of the two curves point to an explosive path of interest rates and deficit dynamics. In this case it is impossible to use deficit as stabilization instrument.

### 3.4 Non inflationary deficit and non-restrictive interest rates.

Let us now examine the case in which monetary policy is less reactive on interest rates than fiscal policy on deficit. Formally:

$$\frac{(1 + \sigma\rho)\lambda + \varphi_M}{\sigma\rho + h} < \frac{\varphi_F}{\rho}$$

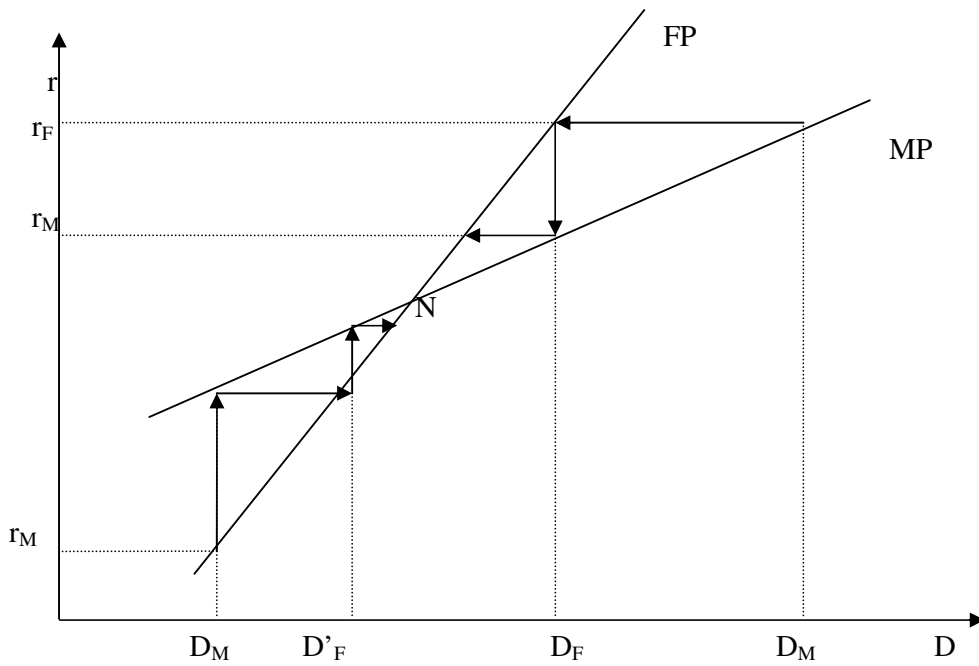
This means that a interest rate reaction to a deficit movement is lower than before because for example, the Central Bank does not think the government spending is inflationary *per se*. On her side, the fiscal policy authority is willing to accept a higher interest rate at a certain level of deficit, than that fixed by the monetary policy authority. Hence when it realizes that market rates are lower again reduces deficit spending. This in turn, other things being equal induces the central bank to a

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<sup>13</sup> This result has been interpreted as the Keynesian effect of non-Keynesian fiscal policy (Giavazzi and Pagano (1996) but it is the sound public finance is the result of the accommodating monetary policy strategy. See Canale et alii (2007)

further reduction of interest rates, which in turn increases income and reduces once again fiscal policy reaction until the common solution of the two equations is reached.

The convergence path is depicted in figure 2. Under these conditions the fiscal authorities are free to change their target equilibrium income and to use whatever instrument they prefer because public accounts would not – other things being equal - ever become unsound.



**Figure 2. Convergent policy strategies**

Unfortunately deficit spending with an accommodating monetary policy can cause financial and real instability.

Suppose that for some reason – also induced by policy strategies themselves – inflation expectations grow. The increase in inflation expectations gives us the measure of the change of the value of the intercept of the two lines. Following the monetary policy reaction function the MP line shifts upward (see figure 3).

$$\frac{\partial r}{\partial \pi_{t-1}} = \frac{1 + \sigma \rho}{\sigma \rho + h}$$

while following fiscal policy reaction function the FP curve shifts downward if  $\rho < 1$ . i.e. if inflation does not positively influence aggregate demand.

$$\frac{\partial D}{\partial \pi_{t-1}} = \frac{(1 - \rho)}{\varphi_F}$$

The Nash equilibrium is now the result of both higher interest rates and deficit. If there is no further influence on inflation the final result can be consistent with a stable economic environment. By contrast if expectations grow ever higher – for example from the obvious consequences following the issuing of public debt - the Nash equilibrium shifts continuously rightward causing great real and financial instability as in 1980s.

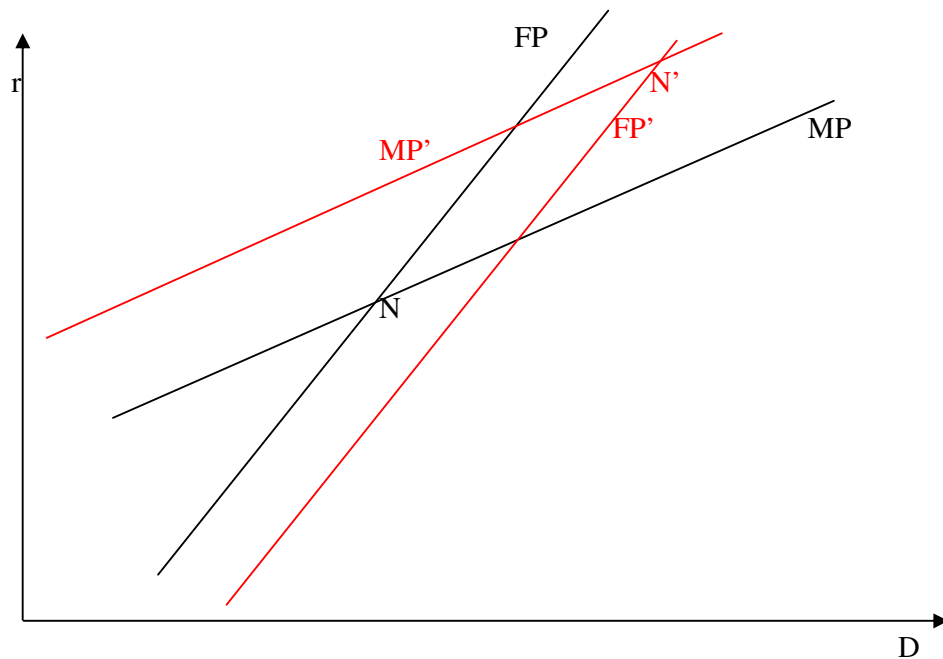


Figure 3. Moving equilibrium

## 5. Conclusions

In the European Monetary Union there is the dominance of monetary policy over fiscal policy. In other words the capacity of fiscal policy to influence full employment equilibrium is hardly influenced by monetary policy reaction. Indeed monetary policy reacts very hardly to deficit spending, eliminating any possibility of individual governments achieving their income target. Analysis of the prescriptions of the Maastricht Treaty and the Stability and Growth Pact put the situation in a different light: since deficit reaction increases when interest rates reaction increases, fixed parameters are necessary limits to avoid a very unsound public finance. The economists who set such limits and decided on the excessive deficit procedure were aware that when monetary policy reacts to deficit spending, public accounts progressively deteriorate causing great financial and real instability. Therefore it is better, given the preferences of the Central Bank, to assign a fixed limit to the possibility of increasing deficit and debt.

In a few words Europe moved from a monetary policy completely subordinated to fiscal policy, to a fiscal policy completely subordinated to monetary policy. In both cases we seem to have a single policy authority. But as - Alan Blinder (1982) maintains - it is better to have two policy authorities because there is no proof that having just one is better. And it is better that governments and central banks act independently.

In the theoretical foundations of EMU there is therefore a logical fault: having adverse effects arising from the action of just one “monetary-fiscal policy authority” does not automatically mean that all the policy action has to be guided by the Central Bank. In this direction the contribution of Chadha and Nolan (2007) according to which “conducting stabilization policy incorporates not only a set of monetary policy choices [...] but also fiscal policy that gives considerable force to automatic stabilizers”<sup>14</sup>.

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<sup>14</sup> Chadha and Nolan (2007), abstract.

Such considerations suggest the need to rethink to the global architecture of economic policy in Europe – in order to step up the right “interaction” between the ECB and governments – to aim at a grater political union among EMU countries.

## APPENDIX<sup>15</sup>

*Solutions with  $\lambda > 0$*

$$r = \frac{1}{\sigma\rho\varphi_F + h\varphi_F - \lambda\rho - \lambda\sigma\rho^2 - \rho\varphi_M} \left[ \varphi_F k y + (\lambda - \lambda\rho - \rho\varphi_M + \sigma\rho\varphi_F + \varphi_M + \lambda\sigma\rho - \lambda\sigma\rho^2 + \varphi_F) \pi_{t-1} + (\lambda + \varphi_M + \sigma\varphi_M + \lambda\sigma\rho + \lambda\sigma + \lambda\sigma^2\rho) y_T - (\lambda\sigma\rho + \varphi_M + \lambda)(\varphi_F A + m) \right]$$

$$D = \frac{1}{\sigma\rho\varphi_F + h\varphi_F - \lambda\rho - \lambda\sigma\rho^2 - \rho\varphi_M} \left[ \rho k y + (\sigma\rho + \rho - h\rho + h) \pi_{t-1} + (h\sigma + \sigma\rho + \sigma^2\rho + h) y_T - (\sigma\rho + h)(\varphi_F A + m) \right]$$

Both solutions could be negative if  $\lambda$  is large

*Solutions with  $\lambda = 0$*

$$r = \frac{1}{\sigma\rho\varphi_F + h\varphi_F - \rho\varphi_M} \left[ \varphi_F k y + (-\rho\varphi_M + \sigma\rho\varphi_F + \varphi_M + \varphi_F) \pi_{t-1} + (\varphi_M + \sigma\varphi_M) y_T - \varphi_M (\varphi_F A + m) \right]$$

$$D = \frac{1}{\sigma\rho\varphi_F + h\varphi_F - \rho\varphi_M} \left[ \rho k y + (\sigma\rho + \rho - h\rho + h) \pi_{t-1} + (h\sigma + \sigma\rho + \sigma^2\rho + h) y_T - (\sigma\rho + h)(\varphi_F A + m) \right]$$

Both solutions are positive

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<sup>15</sup> We considered  $\xi = 0$ , i.e non effect of the exchange rate on aggregate demand.

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