Fiscal, monetary and wage policies in a MU: is there a need for fiscal rules?*

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Preliminary version - do not quote
Comments and suggestions are very welcome

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Abstract

In this paper, I examine the interaction of monetary, fiscal and wage policies and their effects on prices in a Monetary Union (MU). The model shows that, relative to the one country case, in a MU fiscal activism is always bigger and the capacity of the Central bank to keep inflation close to targets is much smaller. Furthermore, the common monetary policy has potentially asymmetric effects, that depend on the size of the different countries in the union and the structure of the national wage setting process.

The good news for monetary unions is that fiscal constraints on the national fiscal budgets are effective in re-establishing monetary dominance. They also ensure an ex-post policy mix of stability-oriented monetary and fiscal policies and moderate wage inflation. Some convergence in the structure of labor markets may, however, still be necessary.

1 Introduction

The much discussed fiscal criteria in the Stability and Growth Pact come from fears that the EMU may increase fiscal activism. Two arguments are usually set forth in the debate to support this position, namely opportunistic behavior by national governments and the need for coping with structural differences at the national level.

Surprisingly, the study of the strategic behaviour of policymakers is normally limited to fiscal authorities and federal central bank (CB), with no reference to

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the third important determinant of inflation and unemployment, the behavior of national wage setters.

In this paper, I examine the interaction of monetary, fiscal and wage policies and their effects on prices in a Monetary Union (MU) hit by economic shocks. I show that fiscal activism is related with both entry in MU and with structural differences in the national labour markets, and I analyse in detail the effect of both factors. The inclusion of labour markets allows me to deal with some questions that are central in the agenda of both politicians and economists. The traditional result that entry in a monetary union increases the incentives to the use of discretionary fiscal policy is reinforced by the explicit inclusion of unions; as a consequence, fiscal contraints on government deficits appear essential in a MU when the wage component is taken into due consideration. I also show that different structures of national labour markets make monetary policy more difficult in a MU than in the one country case, therefore some harmonization of labour markets between participants countries to a MU may be necessary.

More specifically, this paper argues that :

- First and most important, fiscal activism is always increased by entry in MU. This conclusion does not depend on any switch in preferences, and should be considered as an inevitable fact for any country joining a MU.

- The capacity of the Central bank to keep inflation close to targets without continuous interventions is much smaller in a MU than in the one country case. Furthermore, the model shows that the unique monetary policy can lead to very different price dynamics in different countries of the union. A conservative central bank can reduce but not eliminate this problem.

- The effects of the common monetary policy are influenced by the structure of the national wage setting process. The model shows that some convergence in the structure of labor markets may therefore be necessary. As in Calmfors and Driffil (), decentralized wage bargaining produces higher wage inflation and unemployment in the country and should not be encouraged.

- The good news for central banks of monetary unions is that fiscal constraints on the national fiscal budgets are effective in re-establishing monetary dominance. They also ensure an ex-post policy mix of stability-oriented monetary policy, sustainable fiscal policies and moderate wage inflation.

- From the methodological point of view, the paper takes into account the structural break of the EMU and provides an analytical and conceptual framework for assessing the potential causes for asymmetry in a MU.

The structure of the paper is as follows. Section 2 presents and describes in detail the model. The solution of the game between fiscal, monetary and wage-setting authorities is provided in section 3, both with explicit expectations and with backward induction. Section 4 presents the main results and deals with the policy implications of the model. Finally, section 5 summarizes the findings.

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2 The model

2.1 Description of the model

The model is a one-shot game. My choice of a game theory model is motivated by the relevance of the Lucas critique in the context of the paper. One important implication of the Lucas critique is that any structural change in a part of an economc system also changes the behaviour of all other agents. In the case of a Monetary Union, the transfer of monetary policy at a supra-national level implies that one cannot expect the unions and the government to behave in the same way, even if they are exactly the same as before and so are their preferences. I consider a Barro-Gordon (1983) type of model and concentrate on a country belonging to a monetary union. Some basic hypotheses of the model are described here.

I assume some structural parameters of labour markets as given, because there are no signs of a very rapid change of the national labour market as a consequence of the EMU, and even less of the creation of an EU-wide labour market.

The model focuses on stabilization of the cycle, not on sistematic biases. Therefore, I assume that the the long run targets are agreed among the different players and the tastes differ on stabilization only. Even under this optimistic scenario the dynamics are quite rich, and several problems arise.

The central bank of a monetary union reacts to union-wide economic indicators, and its actions may propagate shocks to one country to the others. Similarly, fiscal policy has spillovers on neighbouring countries. I am neglecting both monetary and fiscal externalities in order to to allow a simple treatment of the strategic interaction of the players. For a paper taking into account the "Domino effect"[1] of fiscal policies caused by monetary externalities, see Onorante (2002).

In the model, both workers' unions and fiscal authorities have a larger preference for output stabilization than the Central Bank. I believe this hypotesis is justified in Europe by the statute of the ECB. To ensure a simpler model I assume that the governments have totally delegated the objective of inflation satbilization to the central bank. This parametrization is not restrictive, as its relaxation does not alter the qualitative results of the model.

Shocks are, by definition, surprises. They are hard to observe, they never come with a label (supply, demand), even econometricians have problems in identifying them ex post. On the other hand, macro variables like output are directly observable, and one can reasonably assume that public institutions have information from the departments of statistics in advance on the general public. I chose therefore to use a reduced form description of the economies and to impose an observable shock to the output level. This choice is not mainstream and it complicates slightly the notation, but I think it is easier to justify.

In order to limit the complexity of the formulas, I will focus on the case which is most perceived to be problematic: an asymmetric shock to output that

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[1] XXX Domino effect of fiscal policies

cannot be dealt with by the common monetary policy.

The common monetary policy   is decided by a federal Central Bank (CB). The CB is interested in union-wide inflation $\tilde{p}$ and (possibly) output $\tilde{y}$, both expressed as deviations from targets, and seeks to minimize the following loss function:

$$\min_{\tilde{r}} \ L_{CB} = (\tilde{p}^2 + \beta \tilde{y}^2) \tag{1}$$

The parameter β expresses the relative aversion of the CB to inflation and unemployment.

The CB chooses a union-wide policy variable $\tilde{r}$, such as a nominal interest rate, after observing the deviations from targets of inflation and output of the whole union. Variables with a tilda denote union-wide aggregates. A union-wide variable is defined as the weighted sum of the corresponding national variables with the weights ϕ denoting the size of each country in the MU: $\tilde{x} = \Sigma_i \phi_i x_i, \{\phi_i : \Sigma_i \phi_i = 1\}$

The national fiscal policy   is decided by the government, seeking to minimize a loss function including national (without tilda) output y and deficit g arising from discretionary fiscal policy:

$$\min_{g} \ L_G = (y^2 + \gamma g^2) \tag{2}$$

conditional to the observed shocks and wage policies, and backward inducting on the CB. The parameter γ expresses the relative preference for deficit stabilization. The target variable p is not included because the goal of price stability has been assigned to the CB for the whole union. I will explicitly model only one country, with weight ϕ in the MU.

The national wages   are determined as the outcome of a decentralized bargaining process. For tractability, I suppose that in the country there are $1/\psi$ identical unions, each of them representing a fraction ψ of workers. Each union $j = 1, 2, ..1/\psi$ minimizes a loss function of the form

$$\min_{w_j} \ L_{Uj} = (y^2 + \omega \left(w_j - p \right)^2) \tag{3}$$

including deviations from target unemployment y and real wage inflation $(w_j - p)$ of the workers it represents. The collective outcome (symmetric Nash Equilibrium) of the decentralized wage negotiation is the level of wages w in the country:

$$
\begin{aligned}
w \ &= \ \Sigma_j \psi_j w_j \\
&= \ w_j \ \forall j
\end{aligned}
\tag{4}
$$

The national macro variables (inflation and output) are linearly related to the output shock (η), the growth rate of wages (w) and the policy instruments ($g, \tilde{r}$). Some prices are set in advance, therefore the aggregate supply curve is upward sloping. As a consequence, monetary, fiscal, and wage policies affect output and inflation by moving aggregate demand:

$$
\begin{aligned}
y &= g - \tilde{r} - \lambda w - \eta \\
p &= g - \tilde{r} + \lambda w
\end{aligned}
\tag{5}
$$

where $\tilde{r}$ is the union-wide interest rate chosen by the CB, g is the fiscal policy stance of the national government, w is the national wage level, η an observable shock to revenue and $\lambda < 1$ is a structural parameter describing the effect of wage inflation on price inflation. Appendix A shows that the equations are compatible with a standard AS-AD model.

The assumption that fiscal and monetary policy are perfect substitutes follows Nordhaus (1994). The assumption is obviously a simplification and ignores relevant second order effects such as the different effect that fiscal and monetary policy have on interest rates, exchange rates, and sectoral prices. However, I have shown in a previous paper that a more general setup would not change the qualitative conclusions.

The order of the moves has been chosen in a way that most reflects the actual setup of the EMU. In a game between unions, fiscal and monetary authorities, the participants come to some understanding of the strategy of the others. As a consequence, at each step of the game the players will take as given the preceding decisions and form expectations (backward induct) on the following ones. I will then discard the simplest case, the Nash Equilibrium, in which each authority takes as given the decisions of the others, because I consider it little more than a theoretical case.

Instead, I chose the following order of the moves: the shock η comes obviously first, the workers' unions determine (each of them playing Nash to the others) the national wage level w, then the national fiscal policy g is decided, finally the CB observes the union-wide aggregates and chooses $\tilde{r}$ accordingly.

The choice of letting the CB move last is quite common in the literature, and easy to justify[2]. First, in most MUs monetary policy makers have a coherent and understandable strategy that explicitly depends on macro variables, while fiscal policy tends to be more erratic and depend on elections, personalities and coalitions, but hardly on moral suasion by the CB. Also, monetary policy is fast in reacting to external changes in the economy, including changes in the fiscal stance of member states, while fiscal policy is the result of a long process of negotiation by policymakers and hardly qualifies as a variable that the CB can directly influence in the short run.

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[2] This is often referred to in the literature as fiscal dominance. Monetary dominance of a single central bank over many fiscal authorities in a monetary union is even less realistic than the Nash Equilibrium. In the EMU, monetary dominance is ensured by the SGP.

The choice of letting the unions play before the fiscal authority comes from similar considerations: first, there may be (and normally there are) many unions in a country, and their reactions are therefore more difficult to anticipate than those of the fiscal policy to an increase in unemployment. Second, wages are normally determined for many years and the contracting process is much more dispersed and slower than the one leading to fiscal policy.

3 Solution of the model

3.1 The role of expectations

The Central Bank reacts to the effect on union-wide variables. In case of a asymmetric shock in a country with weight $\phi \in (0,1]$ the aggregate variables react as:

$$
\begin{aligned}
\tilde{y} &= \phi(g - \lambda w - \eta) - \tilde{r} \\
\tilde{p} &= \phi(g + \lambda w) - \tilde{r}
\end{aligned}
\tag{6}
$$

Solving the Central Bank's minimization problem gives the following expression for r:

$$
\tilde{r} = \phi(g + \alpha_1 \lambda w - \alpha_2 \eta)
\tag{7}
$$

with $\alpha_1 = \frac{(1-\beta)}{1+\beta}$, $\alpha_2 = \frac{\beta}{1+\beta}$. The interest rate is decreased in the event of a negative output shock unless the CB is a pure inflation targeter ($\beta = 0$) and is always increased in response of a fiscal expansion. The response to an increase in the wage level is theoretically ambiguous, but positive for normal values of the parameters ($\beta < 1$), that is unless the CB cares more about output that about prices. Finally, the reaction of the CB is proportional to the size of the country in the MU.

The national government targets the national aggregates

$$
\begin{aligned}
y &= g - \tilde{r}^e - \lambda w - \eta \\
p &= g - \tilde{r}^e + \lambda w
\end{aligned}
\tag{8}
$$

and the resulting fiscal policy is

$$
g = \frac{1}{1+\gamma}\left(\tilde{r}^e + \lambda w + \eta\right)
\tag{9}
$$

The fiscal authority faces a cost in changing the fiscal stance. Hence, the multiplicator outside the parentheses is less than one, and decreasing in γ, the parameter that indicates the cost of discretionary fiscal policy moves. The fiscal policy stance is eased if a negative shock hits the economy, in order to compensate for the additional unemployment coming from an excessive wage inflation, or to smooth the domestic real effects of an expected monetary tightening.

Finally, wages are set by unions playing Nash with each other. The Nash equilibrium describes the solution under no cooperation: each union in the country plays as if the other unions had decided their wages already. As a consequence, the effects of a wage increase on macroeconomic variables perceived by the average union are given by $\lambda\psi$: the smaller the size ψ of the union, the less the effect of a wage increase on prices and unemployment will be taken into consideration.

$$
\begin{aligned}
y &= (g^e - \tilde{r}^e) - \lambda\psi w - \eta \\
p &= (g^e - \tilde{r}^e) + \lambda\psi w
\end{aligned}
\tag{10}
$$

the resulting wage inflation is

$$
w = \frac{(\omega - \omega\lambda\psi + \lambda\psi)(g^e - \tilde{r}^e) - \lambda\psi\eta}{(\lambda\psi - 1)^2\,\omega + (\lambda\psi)^2}
\tag{11}
$$

3.2 Results with Backward Induction

This section shows the solution of the model when the expectations are formed by backward induction. The CB moves last, after observing the moves of all the other players:

$$
\tilde{r} = \phi(\tilde{g} + \alpha_1\lambda\tilde{w} - \alpha_2\tilde{\eta})
\tag{12}
$$

For all possible values of ϕ (excluding 1) the federal central bank lowers the interest rates in response to a negative shock and increases them in response to wage inflation and public deficit. The size of the intervention is proportional to ϕ.

The Government observes η and w and backward inducts on the ECB. Substituting (12) into the expectations of (9) one obtains the expression for fiscal policy:

$$
g = (1 - \phi)\frac{(1 + \phi\alpha_1)\lambda w + (1 - \phi\alpha_2)\eta}{(1 - \phi)^2 + \gamma}
\tag{13}
$$

For all possible values of ϕ (excluding 1) the backward inducting government eases fiscal stance in response to both a negative shock and an increase in nominal wages.

The unions backward induct on both CB and government, therefore (12) and (13) are substituted into (11) in order to obtain the expression for the wages:

$$
w = \frac{\left(1 - 2\phi + \phi\alpha_2\gamma + \phi^2\right)\omega B + (-\phi\alpha_2\gamma + \gamma)A}{\left((1 - \phi)^2 + \gamma + \lambda\psi\left(\gamma(\phi\alpha_1 - 1) - 2(\phi - 1)^2\right)\right)\omega B - \lambda\psi\gamma(1 + \phi\alpha_1)A}\eta
\tag{14}
$$

with

$$A = \frac{dy}{dw} = -\lambda\psi\gamma\frac{(\phi\alpha_1+1)}{(1-\phi)^2+\gamma}$$
$$B = \frac{d(w-p)}{dw} = 1 + \lambda\psi\frac{\gamma(\phi\alpha_1-1)-2(\phi-1)^2}{(1-\phi)^2+\gamma}$$

Equations (12,13 and 14) constitute the complete solution of the model with backward induction. In order to get a better intuition of its economic implications, the next section highlights some specific issues.

4 Results and policy implications

4.1 Entering the monetary union

Before entering the MU, the country can be thought of as belonging to a MU with itself only. The outcomes are thus described by (14) and (13) under the assumption that $\phi = 1$.

$$
\begin{aligned}
w &= \frac{(1+\lambda\psi(\alpha_1-1))\alpha_2\omega + (\alpha_2-1)\lambda\psi(1+\alpha_1)}{(1+\lambda\psi(\alpha_1-1))^2\omega + (\lambda\psi)^2(1+\alpha_1)^2}\eta \\
g &= 0 \\
\tilde{p} &= (1-\alpha_1)\lambda w + \alpha_2\eta
\end{aligned}
\tag{15}
$$

Comparing the previous equations with (13), one can immediately see that the structure of policy interaction differs fundamentally. Before entering the MU, the national central bank is always able to "discipline" fiscal policy according to its own preferences (in this case, $g = 0$). An even stronger result holds: if the national central bank is a pure inflation targeter, both government and wage setters have to adapt their policy in such a way that the inflation target is attained. This result follows from equations (15), where $\beta = 0$ (pure inflation targeting) implies $\alpha_1 = 1$, $\alpha_2 = 0$. Substituting into the third equation, one obtains $\tilde{p} = 0$. Neither result holds after entrance in the MU, and both fiscal and monetary targets are missed after a shock.

One can conclude that, despite the agreement of the long run targets between the different authorities, the statement of Dixit and Lambertini (2000 a,b,c) that "fiscal discretion destroys monetary commitment" is confirmed even in the short-run perspective of this paper. The deficit bias is exacerbated in a monetary union, where every individual country is tempted to take advantage of the common monetary policy by running deficits with much of the costs in terms of higher interest rates affecting the other member countries. The new element is that the wage setters internalize the new fiscal behavior in their expectations and tend to exploit the new framework in a similar way, further increasing the incentives to the use of discretional fiscal policy.

4.2 Size of the country and structural differences

The complexity and non linearity of the expressions for the variance of fiscal policy and prices make the close-form solution (12,13,14) cumbersome. Thus,

I prefer a graphical representation. Figure << variance of fiscal interventions after a unit shock>> illustrates the average fiscal expansion after a negative output shock for all values of ϕ and ψ. The other parameters have been chosen in order to illustrate the results, different values have been tried and they do not change the qualitative conclusions. The color of the surface depends on the value of the data point, and two lighter bands have been imposed at $\phi = 1$ and $\phi = 0.1$ to highlight respectively the one country case and the average-sized member of a monetary union.

- <<variance of fiscal interventions after a unit shock>>

The results for the one country case (equation 15) are confirmed by the simulation: for every level of centralization of wage bargaining, the CB is able to fully control the fiscal policy, and the variability is then zero. When the country enters the monetary union (lighter band at $\phi = 0.1$) this effect of discipline is maintained only if the wage bargaining is centralized ($\psi = 1$) so that wage setters internalize the effect on prices of higher wages. The more the wage is determined by decentralized bargaining, the more fiscal policy intervenes actively to offset the unemployment that arises as externality.

- <<variance of prices after a unit shock>>

The results on price variability are consistent with the previous findings. In the one country case, the variance of prices is extremely limited (see again the $\phi = 1$ lighter stripe). In a monetary union, two different forces drive the prices: on the one hand, fiscal policy takes advantage of the reduced capacity of the central bank to respond, and this increases the prices. On the other hand, a centralized wage setting is able to limit the inflation of wages (and thus prices) accordingly, while this is not true of decentralized bargaining. The interaction of these two forces produces the u-shaped stripe at $\phi = 0.1$. The variance is minimal when the two forces offset each other, maximal if wages are reduced (one union, $\psi = 1$) or fiscal policy is expanded in order to preserve employment after a high wage increase ($\psi = 0$).

4.3   Which type of federal central bank?

In the model a country belonging to a monetary union knows that the central bank targets only aggregate quantities, and is ready to take advantage of the opportunity to free ride when possible. The result that in a MU the central bank cannot fully control the development of prices should not, however, lead to the conclusion that the profile of the CB is irrelevant. The CB can "present itself to the public" as belonging to one of three types: a "soft" central bank uses an active Taylor rule, including both inflation and unemployment in its objective function ($\beta > 0$); a "hard CB" is a pure inflation targeter ($\beta = 0$); the CB is "passive" if monetary policy is taken as given by the other players

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($\phi = 0$).[3] This last image of the bank is the one the ECB is trying to give to the outside (cfr. Issing). As a matter of fact, a pure inflation targeter can be shown to be preferable to a 'passive CB'.

Figure <<taylor rule vs pure inflation targeting>> compares the "soft" central bank ($\beta > 0$) with the pure inflation targeter ($\beta = 0$). The plot is the absolute difference in the variance of prices, the colors highlight when the variance is smaller in the case of an active central bank (white color) or in the case of pure inflation targeting (dark areas).

- <<taylor rule vs pure inflation targeting>>

The picture shows the fundamental role played by the labour market. When wage contacting is strongly decentralized (ψ close to zero), a central bank committed to "punish" the inflationary effect of excessive wages always obtains a low variance of inflation. This is not always true if the labor market is centralized enough.

The role of ϕ is also extremely important: in the one country case ($\phi = 1$, far away edge of the graph), there are many values of ψ for which the central bank can target both inflation and unemployment. The case is different in a MU (ϕ small, near edge of the graph), because the inefficiencies of a decentralized labor market are multiplied by the opportunistic behavior of the fiscal authorities. Pure inflation targeting appears then to be the best option to reduce the variability of inflation for almost all labor market structures. Incidentally, the gain is biggest in absolute values for those countries whose ϕ lies between 10 and 20 per cent (like many countries belonging to the EMU).

The final question is whether the CB should try to persuade the national governments to consider its policy as given, or whether it should cultivate the image of a strict inflation targeter. Picture <<inflation targeting vs inaction>> provides a clear-cut answer to this question by showing the difference in price variance obtained under the two regimes. The darker area highlights the points in which the difference is close to zero, all the other values are negative.

- <<inflation targeting vs inaction>>

As expected, a very small country (near edge of the graph) is indifferent between the two regimes, because the central bank does not react to its domestic variables in any case. Another narrow indifference set is located around the value of ψ in which the effects of fiscal and wages policies exactly offset each other. Its exact location depends on the specific parametrization of the simulation. In every other case, inflation targeting is strictly superior to inaction in the control of inflation variability.

A general conclusion could be that the central bank of a MU does not have the same choice that a national central bank would face. The possibility of free riding by the national governments and the incapacity of the CB to target

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[3]Another way to define the passive monetary policy is to say that the CB acts as if the country had weight zero in the union. Since the reaction is proportional to the size of the country, this amouts to saying that the CB does not react at all.

national imbalances individually impose pure inflation targeting as the regime that best allows to keep inflation under control.

4.4   Constraining fiscal policy

In Europe, the consideration that a monetary union may multiply the effects of any deficit bias led to the establishment of the fiscal criteria in the Stability and Growth Pact. The budgetary rules aim at tying the governments' hands and insulating the central bank from possible pressures arising from undisciplined members of the union. The Pact states that the medium term budgetary position must be of "close to balance or in surplus"; automatic stabilizers would be allowed to float, but discretionary fiscal policy will not be possible. Hence, $g = 0$ in our model.

Are fiscal constraints really necessary in a monetary union? The answer provided by picture <<effect on prices of a unitary shock>> shows that the final effect on inflation of a shock can vary from the necessary flexibility (in case of a centralized labor market) to the very opposite, an increase in the final prices that further deteriorates the competitive position of the country affected.

- <<effect on prices of a unitary shock>>

The previous picture <<variance of prices after a unit shock>> confirms that the inflation is more difficult to control in a MU than in the one country case. The answer seems therefore decidedly positive.

Are fiscal criteria really helpful? Consider how fiscal policy affects the dynamics of wages (with backward induction on the CB) and ex post monetary policy: from (11) and (7) and imposing $g = 0$ one obtains for every $\psi, \phi < 1$ that

$$
\begin{aligned}
\frac{dr}{dg} &= \phi > 0 \\
\frac{dw}{dg^e} &= \frac{(\phi - 1)(-\omega + \omega\lambda\psi - \lambda\psi)}{(\omega - \omega\lambda\psi + \lambda\psi)\phi\alpha_1\lambda + \lambda^2\psi^2 + (\lambda\psi - 1)^2\omega} > 0
\end{aligned}
\tag{16}
$$

Equations (16) show the fundamental role played by the constraints to fiscal policy in allowing the central bank to control inflation. Removing the fiscal bias influences both the ex post monetary policy and disciplines the ex ante wage dynamics; the effect is even larger if one considers that an unconstrained fiscal policy would respond positively to wage inflation. One should notice that even though the model has been built on symmetric loss functions for all the players, the fiscal constraints become binding only on the inflationary side, and never impede budget consolidation when necessary. The result of the fiscal constraints is implicit coordination characterized by cyclically adjusted budgets in balance, low interest rates and controlled inflation. Once again there is not an explicit welfare analysis in the paper, but there is a strong consensus in the literature (e.g. Nordhaus, 1994) that an equilibrium of sustainable fiscal policies and loose

monetary policy is better than a combination of loose fiscal and tight monetary policy.

5   Conclusions

The paper develops a model of policy interactions in a monetary union, focusing on wage dynamics, fiscal and monetary activism and their consequences on inflation. The simple and "optimistic"[4] model is capable of grasping and expliciting the strategic interactions of the different policymakers, and to highlight some relevant problems that are central in the current policy debate:

- First and most important, fiscal activism is always increased by entry in MU. This conclusion does not depend on any switch in preferences, and should be considered as an inevitable fact for any country joining a MU.

- The capacity of the Central bank to keep inflation close to targets without continuous interventions is much smaller in a MU than in the one country case. Furthermore, the model shows that the unique monetary policy can lead to very different price dynamics in different countries of the union. A conservative central bank can reduce but not eliminate this problem.

- The effects of the common monetary policy are influenced by the structure of the national wage setting process. The model shows that some convergence in the structure of labor markets may therefore be necessary. As a general rule, decentralized wage bargaining produces higher wage inflation and unemployment in the country and should not be encouraged.

- The good news for monetary unions is that fiscal constraints on the national fiscal budgets are effective in re-establishing monetary dominance. They also ensure an ex-post policy mix of stability-oriented monetary policy, sustainable fiscal policies and moderate wage inflation.

- From the methodological point of view, the paper takes into account the structural break of the EMU and provides an analytical and conceptual framework for assessing the potential causes for asymmetry in the MU.

The goal of the paper was not to take into account all possible factors, but to disentangle a relevant mechanism of interaction among players which is typical of a monetary union. There are, however, several ways in which the paper could be developed. First, the analytical framework is extremely simplified and could be enriched by adding sistematic biases for the national governments and the unions, in order to obtain results that are valid for the steady state and not only for the cyclical fluctuations. Alternatively, the asymmetry in the preferences of the governants in responding to a positive or a negative shock could be explicitely modeled. Other relevant phenomena, such as international spillovers,

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[4]The model is optimistic simply because the agents agree on the long run targets and their preferences differ on the degree of stabilization only.

the exchange rate of the common currency, differences in tastes between the countries, may affect the results in various ways. These are interesting topics for future research.

6 Appendix

Here I show the derivation of from a simple AD-AS framework with some prices set in advance and rational expectations formed before the shocks are observed.

Demand and supply can be represented as:

$$
\begin{aligned}
y^d &= -p + \phi(g-r) + e^d \\
p &= y^s + \lambda w + e^s
\end{aligned}
\tag{17}
$$

where all the variables are expressed in difference from targets (m, g, w) or long run levels (y, p). The demand and supply shocks are e^d and e^s, α and λ are fixed parameters.

which shows that the wage inflation is reflected on inflation, with a parameter $\lambda < 1$, since wages are only one of the production factors in the economy.
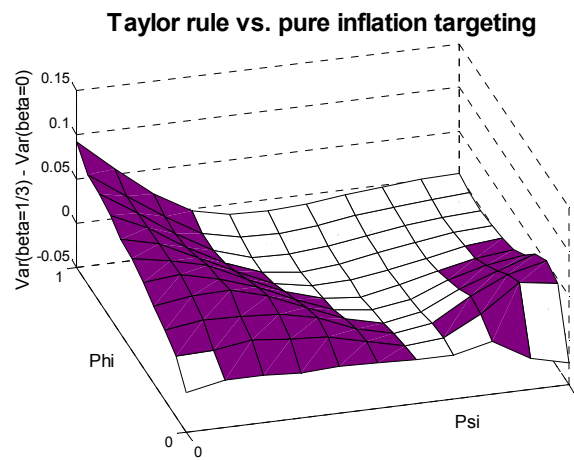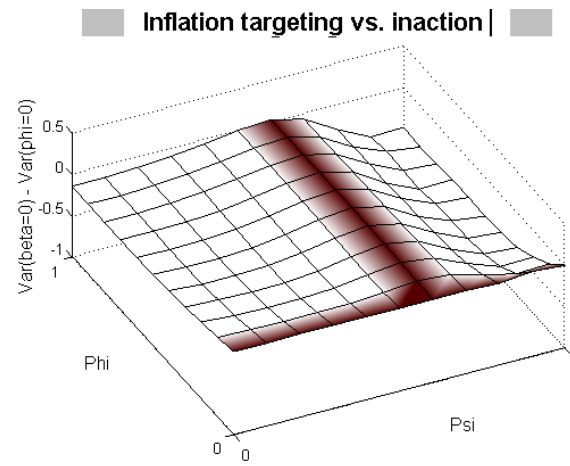
The reduced form is obtained by solving for the equilibrium $(y^d = y^s)$ and rescaling the equations:

$$
\begin{aligned}
y &= \phi(g-r) - \lambda w + (e_d - e_s) \\
p &= \phi(g-r) + \lambda w + (e_d + e_s)
\end{aligned}
\tag{18}
$$

After renaming the parameters, one obtains the final equations (5).
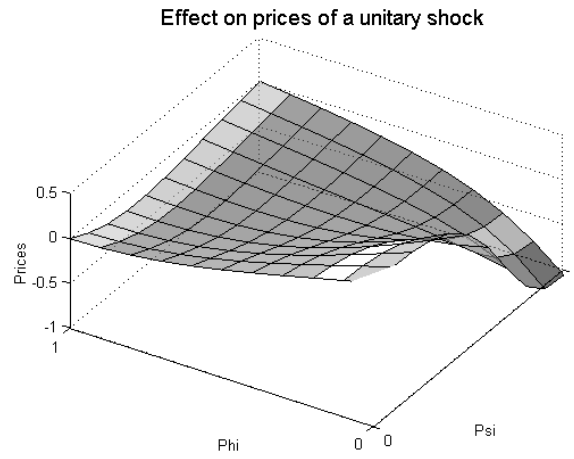
7 Bibliography

8 PICTURES

Inflation targeting vs. inaction

Var(beta=0) - Var(phi=0)

0.5
0
-0.5
-1

Phi

Psi

Taylor rule vs. pure inflation targeting

Var(beta=1/3) - Var(beta=0)

0.15
0.1
0.05
0
-0.05

Phi

Psi

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Effect on prices of a unitary shock

Figure 1:
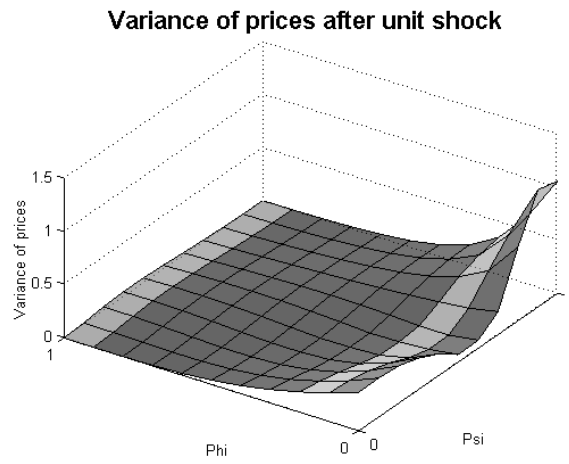

Variance of prices after unit shock
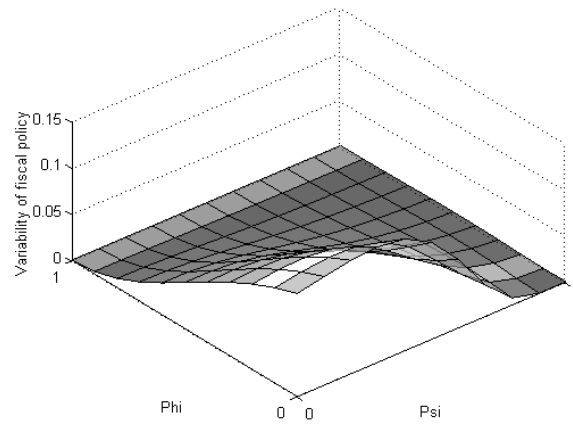
Figure 2:

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Variance of fiscal interventions after unit shock

Figure 3:

Average fiscal policy after a unit shock

Figure 4: