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« **How to stabilize inflation without damaging
employment:
Strenghtening the power of unions** ».

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How to stabilize inflation without damaging employment: Strenghtening the power of unions[*]

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Abstract: The aim of this paper is to assess the impact of union bargaining power on inflation and employment in a case of efficiency bargaining, in a context of a strategic game between Central Bank and social partners.

Keywords : monetary policy, employment, inflation, union bargaining power, efficiency bargaining

JEL classification : E24, E52, E58, J52

1 Introduction

Since the birth of the the Eurozone, the European Central Bank (ECB) has mainly aimed at stabilizing inflation. Many observers have pointed to the potentially damaging effects of such a monetary policy on employment. However, since the 2008 economic crisis, the European Monetary Union (EMU) has faced a low inflation and high unemployment level.

A way to better understand this economic situation may be to consider the institutional environment in the analysis of the functioning of the labor market. In particular, the presence of unions could play a key role, as shown

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by Cukierman & Lippi (1999).[1] These authors consider a strategic game between the monetary authority and a union. Nevertheless, the bargaining process between social partners (the firms and the union) is not explicitly taken into consideration. In this paper, we propose to enhance this approach by introducing an efficiency bargaining process, like Mac Donald & Solow (1981). The aim of this paper is to assess the impact of union bargaining power on inflation and employment, in the context of a strategic game between Central Bank and social partners.

Section 2 presents the analytical framework. Section 3 describes the equilibrium of the economy. Section 4 analyzes the impact of a modification of the union bargaining power. Finally, we conclude in section 5.

2   The framework

The economy consists in one union, firms and the Central Bank. The game between these actors is a Stackelberg two-stage game in which the Central Bank plays as leader, and union and firms play as followers. In the first stage, the Central Bank minimizes its loss function with regard to inflation rate, knowing the nominal wage and level of employment at the negotiated equilibrium between union and firms. Firms and union bargain employment and nominal wage, consideringthe expected level of prices as given. Once the Central Bank determines the optimal inflation rate, the negotiated equilibrium is fully determined. As in any game with sequential decisions, the resolution is backwards. From then on, we first have to express the bargaining process between union and firms. Then, we will be able to introduce these results into the Central Bank optimization program. This section aims at presenting the behavior of each economic agent.

2.1   Union, firms and bargaining

We assume that the union represents the interests of all workers whose population amounts to $\bar{L} = 1$. The objective of the union is to maximize the sum of utilities of all its members. Notice that the utility function of a worker is given by $v(R_t) = R_t^{\beta}$, where R_t represents the real revenue, and $\beta < 1$. The real revenue corresponds to the real wage W_t/P_t for employee and to $\bar{W}/P_t$ for unemployed worker, where $\bar{W}$ is the nominal unemployment benefit, assumed to be fixed and P_t the general level of prices at the period t.

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[1]See also Grüner & Hefeker (1999), Cukierman & Lippi (2001), Diana & Zimmer (2005) and Sidiropoulos & Zimmer (2009).

Consequently, the objective function V_t of the union is:[2]

$$V_t = L_t \left[\left(\frac{W_t}{P_t} \right)^\beta - \left(\frac{\bar{W}}{P_t} \right)^\beta \right] \tag{1}$$

where L_t stands for the level of employment. This equation means that the union's concerns are twofold: it cares about the employment level of its members and about the surplus of employees with respect to an unemployed worker.

On the supply side, the production Y_t of the representative firm is given by the following function:

$$Y_t = L_t^\alpha, \text{ with } \alpha \in (0,1) \tag{2}$$

The objective of the firm is to maximize its real profit:

$$\Psi_t = L_t^\alpha - \frac{W_t}{P_t} L_t \tag{3}$$

In this model, firms and union determine together wage and employment in the economy. The outcome of the bargaining process is the solution of the following expected generalized Nash bargaining function, with respect to the nominal wage W_t and the level of employment L_t:

$$\max_{(W_t, L_t)} E_{t-1}[S_t] = E_{t-1} \left[\left\{ L_t \left[\left(\frac{W_t}{P_t} \right)^\beta - \left(\frac{\bar{W}}{P_t} \right)^\beta \right] \right\}^\gamma \left\{ L_t^\alpha - \frac{W_t}{P_t} L_t \right\}^{1-\gamma} \right] \tag{4}$$

where E_{t-1} denotes the expectations operator and $\gamma \in (0,1)$ represents the bargaining power of the union. In the extreme case where $\gamma = 0$, the model becomes a simple competitive labor market. The other extreme case, where $\gamma = 1$, corresponds to a monopoly-union model. From the first order conditions, we obtain:

$$W_t^B = \left(\frac{\alpha + \gamma(1-\alpha)}{\alpha + \gamma(1-\alpha)(1-\beta)} \right)^{\frac{1}{\beta}} \bar{W} \tag{5}$$

$$L_t^B = \left(\frac{[\alpha + \gamma(1-\alpha)]^{1-\beta}}{\alpha + \gamma(1-\alpha)(1-\beta)} \right)^{\frac{1}{\beta(\alpha-1)}} \left(\frac{\bar{W}}{P_t^e} \right)^{\frac{1}{\alpha-1}} \tag{6}$$

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[2]Notice that since the union maximizes the utility of both employees and unemployed workers, the original objective function can be written
$\tilde{V}_t = L_t (W_t/P_t)^\beta + (\bar{L} - L_t) (\bar{W}/P_t)^\beta$. In other words, $\tilde{V}_t = V_t + \bar{L} (\bar{W}/P_t)^\beta$. Since $\bar{L} (\bar{W}/P_t)^\beta$ is given for the union, maximizing V_t equals maximizing $\tilde{V}_t$.

where P_t^e is the expected level of prices in $t-1$ for period t.

The nominal bargained wage given by relation (5) is obviously higher than the unemployment benefit ($W_t^B > \bar{W}$), and increasing with γ the bargaining power of the union ($dW_t^B/d\gamma > 0$). Moreover, as the aim of the union is to maximize the surplus of employees, we remark easily that there is a positive relation between W_t^B and $\bar{W}$.

The bargained level of employment (relation (6)) is increasing with the union bargaining power ($dL_t^B/d\gamma > 0$), as the union also cares about employment.[3] Furthermore, a higher nominal unemployment benefit induces a lower level of optimal employment ($dL_t^B/d\bar{W} < 0$). Indeed, *ceteris paribus*, a rise in $\bar{W}$ implies a positive variation in the bargained wage W_t^B which in turn reduces the bargained employment L_t^B.

It is important to notice that the expected level of prices affects the bargained level of employment, and leaves unchanged the level of negotiated nominal wage. The latter result can be explained by the objective function of union V_t which focuses only on the surplus of employed workers.

2.2 The Central Bank

In this economy, the Central Bank has two objectives: inflation and employment. This monetary authority optimizes its objective function, with respect to the inflation rate, knowing the levels of bargaining employment and nominal wage. Its preferences can be expressed by a quadratic loss function Γ_t given by:

$$\Gamma_t = \frac{1}{2}\left[U_t^2 + I\Pi_t^2\right] \tag{7}$$

where U_t and Π_t respectively represent unemployment rate and inflation. $I > 0$ corresponds to the relative Central Bank preference for inflation stabilization which captures its degree of conservativeness. The program of the Central Bank can be expressed as follows:

$$
\begin{cases}
\min_{\Pi_t} \Gamma_t = \frac{1}{2}[U_t^2 + I\Pi_t^2] \\
\text{st} \quad W_t^B = \left(\dfrac{\alpha + \gamma(1-\alpha)}{\alpha + \gamma(1-\alpha)(1-\beta)}\right)^{\frac{1}{\beta}} \bar{W} \\
\quad\quad L_t^B = \left(\dfrac{[\alpha + \gamma(1-\alpha)]^{1-\beta}}{\alpha + \gamma(1-\alpha)(1-\beta)}\right)^{\frac{1}{\beta(\alpha-1)}} \left(\dfrac{\bar{W}}{P_t^e}\right)^{\frac{1}{\alpha-1}}
\end{cases} \tag{8}
$$

[3]From the first order conditions, we obtain the standard contract curve of the efficiency bargaining model, leading to an increasing relation between employment and nominal wage: $L_t^B = \left[\dfrac{1}{\alpha\beta P_t}\left((\beta-1)W_t^B + \bar{W}^\beta(W_t^B)(1-\beta)\right)\right]^{\frac{1}{\alpha-1}}$ with $dL_t^B/W_t^B > 0$.

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Notice that $U_t = -\ln L_t = -l_t \geq 0$, with l_t the logarithm of employment given by the following expression, with $\bar{w} = \ln \bar{W}$:

$$l_t = \ln B - \frac{1}{1-\alpha}(\bar{w} - \Pi_t - p_{t-1}) \tag{9}$$

where

$$B(\gamma) = \left(\frac{[\alpha + \gamma(1-\alpha)]^{1-\beta}}{\alpha + \gamma(1-\alpha)(1-\beta)}\right)^{\frac{1}{\beta(\alpha-1)}}, \text{ with } B'(\gamma) > 0 \tag{10}$$

3 Equilibrium

To be able to characterize the equilibrium of this economy, we first compute the optimal level of inflation determined by the Central Bank. Then, we introduce this last result into the bargained level of employment, as the negotiated nominal wage does not depend on inflation.

At first stage, the resolution of Central Bank program, given by (8) leads to the following optimal inflation rate:

$$\Pi_t^* = \frac{-\ln B(1-\alpha) + (\bar{w} - p_{t-1})}{1 + I(1-\alpha)^2} \tag{11}$$

The optimal inflation rate depends on several variables, including the degree of conservatism (I), the (log) nominal unemployment benefit ($\bar{w}$) and the level of prices at the previous period (p_{t-1}).

More precisely, the more conservative the Central Bank (a higher I), the lower the optimal inflation rate. In this case, the Central Bank gives an important weight to the stabilization of inflation in the economy.

Furthermore, the optimal inflation rate is increasing with the unemployment benefit $\bar{w}$. Indeed, as shown by the objective function of the monetary authority (equation (7)), the Central Bank is concerned by the stabilization of unemployment. Through relations (5) and (6), we know that the bargained level of employment is decreasing with this benefit. So, the Central Bank has to set a higher level of inflation, in order to reduce the real wage, allowing a higher level of employment.

Finally, the optimal inflation rate decreases with the level of prices in the previous period p_{t-1}. In other words, the higher the previous price level, the more ambitious the Central Bank's disinflation policy. Knowing that $\Pi_t = p_t - p_{t-1}$, the relation (11) shows a positive correlation between current and previous price levels. In this context, higher previous prices leads to higher current prices, but to a lesser extent than the rise of previous prices.

Knowing now the optimal level of the inflation rate, we can compute the level of employment at the equilibrium. Introducing relation (11) into the negotiated employment (9), we obtain:

$$l_t^* = \frac{I(1-\alpha)^2}{1 + I(1-\alpha)^2} \left(\ln B - \frac{1}{1-\alpha}(\bar{w} - p_{t-1}) \right) \tag{12}$$

The equilibrium level of employment is decreases with the unemployment benefit. Indeed, as underlined above (see equations (5) and (6)), the bargained equilibrium relies on the unemployment benefit. A higher unemployment allowance leads to a higher bargained wage and lower employment. These effects are still observed after introducing the optimal behavior of the Central Bank.

The impact of the previous price level p_{t-1} on employment is more complex, and the behavior of the Central Bank plays a crucial role. We can notice that an increase in previous price leads to a reduction of unemployment. To understand this effect, it is important to shed light on the relation between the current price level p_t, the previous price level p_{t-1} and the inflation rate Π_t, as explained above. As a consequence, an increase in the previous price level tends to raise the current prices, and therefore reduces the real bargained wage. This drop has a positive impact on employment.

Until now, we have not discussed the effect of union bargaining power on equilibrium. This will be the object of the next section, where we also present the influence of the Central Bank's degree of conservatism.

4 Impact of union bargaining power

In this economy, union bargaining power is measured by γ. The objective of this section is to analyze its influence on employment, wage and inflation, summarized by relations (12), (5) and (11).

The analysis of the strategic game between the social partners (union and firms) and the Central Bank yields interesting findings. Using equations (12), (11), (10) and (5), we can easily compute the following derivatives:

$$\frac{\partial l_t^*(\gamma)}{\partial \gamma} = \frac{\partial l_t^*}{\partial B}\frac{\partial B}{\partial \gamma} > 0, \ \frac{\partial \Pi_t^*(\gamma)}{\partial \gamma} < 0 \text{ and } \frac{\partial W_t^*(\gamma)}{\partial \gamma} > 0$$

In other words, a higher union bargaining power leads to a higher level of employment and nominal wage, but also a lower level of inflation in the economy.

The Central Bank faces a trade off because a greater stabilization of inflation is at the expense of employment. Indeed, by reducing the level of current prices P_t, the monetary authority decreases inflation. Nevertheless, at the same time, the real cost of labor increases, diminishing employment.

Increasing union bargaining power, in the optimal contract framework, leads to higher wages and employment. In this context, the Central Bank can afford to reduce inflation without damaging employment. In fact, the negative effect of a lower level of current prices on employment is offset by a more powerful union, negotiating higher level of employment.[4] In a nutshell, if a Central Bank focuses on inflation, in order to not penalize employment, union bargaining power should be strengthened.

5 Conclusion

In this economy, social partners (union and firms) bargain employment and nominal wage (optimal contract framework), and the Central Bank determines the inflation rate in order to stabilize inflation and employment. At the equilibrium, a more powerful union enables the monetary authority to be more efficient in stabilizing inflation without damaging on employment.

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[4]However, the extent of these effects depends of the degree of the Central Bank's conservatism. Notice that $\left| \dfrac{\partial l_t^*(\gamma)}{\partial \gamma} \right|$ is all the more lower as I is greater. On the contrary, $\left| \dfrac{\partial \Pi_t^*(\gamma)}{\partial \gamma} \right|$ is all the more higher as I is greater. More precisely, in case of a more independent Central Bank (higher I), the impact of greater union bargaining power on inflation is amplified. As a consequence, the impact on employment is attenuated.

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