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Why the ECB Should be Ultra-Liberal*

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Abstract

The statute of the ECB states that its primary target should be to maintain price stability. The theoretical foundation behind this target is that of a socially optimal conservative central banker. We challenge the robustness of this result in a model with endogenous labor market policy, decided upon by a politically motivated government. In this model, the socially optimal choice of central banker is an ultra-liberal, who eliminates both inflation and unemployment and removes the poltical distortion. Somewhat paradoxically, the labor union supports an ultra-conservative central banker, because this means a more generous labor market policy.

JEL-classification: E58; J51; H19
Keywords: Monetary institutions; Endogenous labor market policy; Lobbying labor union

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1 Introduction

When looking up the newly established European Central Bank's monetary policy strategy at its website, one finds the following informative sentence: "In order to fulfil the clearly defined mandate of maintaining price stability, the Treaty establishing the European Community accords the ESCB and, by implication, the Eurosystem a considerable degree of institutional independence..."[1]. This sentence thus not only reveals that the official policy of the central bank is one of price stability, but also that the way to achieve this goal has been to make the ECB largely independent of political considerations.

By now there exists a substantial theoretical economic literature which focuses on the optimal design of the central bank system, and when the statutes of the ECB were laid down, its founding fathers were clearly influenced by this literature. In economics, the question that has been asked is: How much weight should the central bank attach to inflation relative to real activity in its design of monetary policy? Starting with Rogoff (1985) the standard answer to this question - and the one that the statute of the ECB follows - has been that the central bank should attach a larger weight to inflation than the social planner, the reason being that this would eliminate or at least reduce the so-called "inflation bias". The source of this bias is the observation that the central banker has an incentive to lower real wages and increase employment by creating excessive inflation. When agents are forward looking, they realize this incentive and set wages correspondingly high. Thus in equilibrium unemployment is unchanged, but inflation is high. By appointing a conservative central banker then, a society can avoid this inflation bias because a conservative central banker - as the degree of conservativeness rises - has little or no incentive to inflate, and unemployment is invariant to the central bank's stance towards inflation.

This paper challenges the robustness of this standard result. We show, by combining the monetary policy model from the literature in the wake of the work by Barro and Gordon (1983) and Kydland and Prescott (1977) with the lobbying model of Grossman and Helpman (1994) that appointing an ultra-liberal central banker, i.e. one that has no concern about inflation whatsoever, maximizes social welfare when the endogenous political determination of unemployment benefits by a politically motivated government and decentralized wage setting are taken into account. The mechanism driving this result in our model is the following: Since an ultra-liberal central banker always picks the monetary policy which eliminates unemployment, the size of

[1] Source: www.ecb.int. In article 2 of the Statute of the European System of Central Banks (ESCB) and the European Central Bank, it is stated that "the primary objective of the ESCB shall be to maintain price stability."

the unemployment benefit level is no longer important to the union, because no workers will receive it. This means that the government is free to choose the level which eliminates inflation as well. Thus an ultra-liberal central banker removes all social loss in equilibrium. An ultra-conservative central banker cannot achieve the same since, although the inflation is set to zero, unemployment will be positive in equilibrium. This is where the political aspect of the model becomes relevant. Absent any political motivation, the government would choose zero unemployment by setting a low benefit level. However, this is not tolerable for the union and through its political influence it makes the government select a somewhat higher benefit level and hence a positive unemployment rate.

Numerous other papers have also challenged the orthodox view that a conservative central bank is socially optimal. These mainly fall into two branches, one that has incorporated dynamic aspects into the standard model, and one that has maintained the original static framework, but has made changes in the other aspects of the model. Since this paper belongs to the latter branch, we shall briefly review a portion of the recent literature from this branch here.

A repeated objection to the standard model has been that if social welfare depends on the inflation rate then, in a model with wage-setting labor unions, so should their objectives. The basic argument for this statement is that since the unions typically cover a large portion of the total population, their objective cannot be too different from the social welfare function.

Cubitt (1992) was the first to set up a model with these features, and he showed that if private non-atomistic agents - such as labor unions - can precommit to their actions, then the monetary authority may gain from being a follower rather than a leader in the policy game. Skott (1997) presents a model along the same lines but extends it to cover an arbitrary number of unions. He finds that when there is only a single monopoly union, the central bank should be ultra-liberal in the social optimum, because the union's fear of inflation makes the union moderate its wage demand. When there is more than one union, this conclusion still holds, but the output target of the central bank should in general be different from that of the social welfare function in order to avoid too large inflation.

Cukierman and Lippi (1999) repeat this result in a model almost similar to that of Skott and also present some evidence in favor of the theory. Using cross-section data from 19 OECD countries they find some support for their main theoretical result, which is that if unions are sufficiently inflation averse, then there will exist a hump-shaped relationship between the degree of centralization of the wage decision and the unemployment rate. In particular they show that the interaction between central bank independence and wage

bargaining centralization is an important link ignored by earlier empirical work which has rejected the existence of a hump-shaped relationship.

Coricelli, Cukierman and Dalmazzo (2000) extend the framework of Cukierman and Lippi (1999) to cover a discrete number of price setters as well as wage setters. They find that the Rogoff (1985)-result does extend to this case provided that there is more than one union and that the inflation aversion of the unions is not too high.

To our knowledge Piga (1998) is the only previous paper which directly combines lobbying with the theory of monetary delegation. He sets up a model with a two-tiered political system where lobbying by various parts of the constituency can influence the Congress which in turn influences the central bank on its policy stance. The two main results of his analysis are that if the lobbying pressure is high enough, then the inflation bias prevails for all finite levels of central bank conservativeness, and that monetary policy delegation is sub-optimal for the goal of price stability compared to labor market reform.

The rest of this paper is divided into three sections: In Section 2 the economic as well as the political model is set up. Section 3 presents the equilibrium, discusses some properties of equilibrium policy and derives the main results concerning the optimal choice of central banker. Finally Section 4 concludes.

2 The model

We consider a closed unionized economy with an independent central bank and a government which is susceptible to lobbying pressure.[2]

The players and the sequential structure of the game are as follows: First the government decides on the size of the unemployment benefit by maximizing its objective function given the expected decision rules in the following stages. In doing so, it is influenced by a lobbying labor union. In the second stage, the union in a decentralized fashion sets the nominal wage. That it does so decentralized means that it does not realize the influence its wage decision has subsequently on neither monetary policy nor the general price level, but only looks at the direct effect on the employment of its members. Third, the central bank sets the nominal money supply by minimizing its weighted loss of unemployment and inflation, and as the fourth and final

[2] The assumption that we are considering a closed economy is not in any way crucial to the results as long as not all domestic inflation is "imported". Clearly if domestic monetary policy cannot influence the price level, then the conservativeness of the central bank plays no role.

step the market allocations are decided. The main motivation for assuming this sequence of events is empirical. When looking at real world economies, it is appropriate to consider the decision on labor market policy as the one with the longest horizon, since labor market reforms are few and far between. Wage contracts on the other hand are renegotiated more often, typically every 1-3 years, while monetary policy can be and frequently is changed several times every year by the central banks.[3]

Before we move on any further with the technical specifications, it is worth noting a few things that are *not* included in our model. First of all there is no uncertainty. This obviously means that there is no stabilization role for policy. This clearly is not realistic since stabilization empirically is a very important determinant of both monetary and fiscal policy. However, our focus is not on stabilization, and adding uncertainty to the model will only serve to complicate the derivations without giving additional insights into the matter that we want to explore. A second factor that is left out of our model is that we only allow one side of the labor market to affect labor market policy. Obviously, firm owners would like to lobby as well since, as we shall see, their profits are reduced when the unemployment benefit is raised. The reason that we do not want to include this in the model is that we wish to focus on the union's ability to lobby, and that the results would remain qualitatively unaltered as long as the union receives relatively more weight in political decision making than firm owners.

As usual when dealing with this type of sequential games, we solve by backward induction. Hence, we start out by finding the equilibria in the goods and labor markets, next we move on to deciding the monetary policy rule of the central bank followed by the wage setting behavior of the union. The final step is to decide the political determination of the unemployment benefit level.

2.1 Market allocations

There is perfect competition in the goods market, and we assume that there is a large number of identical firms supplying the market. Each firm has an associated labor union who organizes the labor it hires. For simplicity we normalize the large number of firms to 1. This is without loss of generality since all we remove from the model is a multiplying factor representing the number of firms.

[3]While monetary policy typically is only changed a few times each year, most countries' central banks possess the ability to raise or lower the discount rate with quite small intervals, typically 1-2 weeks. Most often this ability is not used, however, if the present situation does not call for intervention.

Aggregate demand is a function of the real money supply, and we assume that it is given by the simple log-linear relation:

$$y^d = \alpha(m - p) \qquad \alpha > 0, \tag{1}$$

where m and p denote the logarithms of the nominal money supply and the domestic price level, respectively.

The representative firm has a Cobb-Douglas production function with labor as its only input, $Y = L^\gamma$, $\gamma > 0$. Maximizing profit and taking logs gives the labor demand function

$$l^d = \frac{1}{1-\gamma}(\log\gamma - (w - p)). \tag{2}$$

Now we can find the price level that clears the goods market given the wage rate, w, and the monetary rule, m:

$$p = \frac{\gamma}{\alpha(1-\gamma)+\gamma}(w - \log\gamma) + \frac{\alpha(1-\gamma)}{\alpha(1-\gamma)+\gamma}m. \tag{3}$$

Hence apart from a constant, the price level is a weighted average of the wage rate and the nominal money supply, where the weights are determined by the technical coefficients γ and α.

2.2 The central bank

We are now ready to move one step back to the stage of the game where the central bank sets the nominal money supply. It does so by minimizing its loss function

$$V^{CB} = u^2 + C\pi^2, \tag{4}$$

where u is the unemployment rate, $\pi = p - p_{-1}$ is the inflation rate and $C \geq 0$ measures the weight the central bank attaches to inflation relative to unemployment. Put differently, it measures the degree of central bank conservativeness in the sense of Rogoff (1985). We follow most of the literature on monetary or exchange rate policy when specifying the loss function as separable in two quadratic terms giving the loss from each of the arguments. This assumption is very important for the analytical tractability of the model, but clearly it is merely a convenient short cut for more general preferences which takes interaction of the two variables as well as other issues into account.

In the loss function in (4), it is implicitly assumed that $\pi = u = 0$ is optimal. This is done for pure expositional convenience. Nothing qualitatively

would be changed in the following by using other target values for inflation and unemployment.

Let us normalize the previous period's price level and the size of the labor force to $p_{-1} = 0$ and $N = 1$ such that $\pi = p$ and $\log N = 0$. Then we can write the central bank's minimization problem as

$$\min_m \quad \left(\frac{1}{1-\gamma}\frac{\gamma}{\alpha(1-\gamma)+\gamma}((w-m)-\log\gamma)\right)^2 + C\left(\left(\frac{\gamma}{\alpha(1-\gamma)+\gamma}(w-\log\gamma)\right)+\frac{\alpha(1-\gamma)}{\alpha(1-\gamma)+\gamma}m\right)^2. \tag{5}$$

From (5) we see that the monetary authority faces the usual trade off; raising the money supply will lower unemployment by raising aggregate demand, but it will also raise inflation. Given that the central bank only has one instrument, m, it cannot perfectly eliminate both its losses, so it has to choose the monetary policy so as to optimally trade off the two. As seen from (5), the way this trade off occurs depends crucially on the degree of central bank conservativeness. The more conservative the central bank, the more likely it is to implement a tight monetary policy because this will ensure low inflation.

Solving the minimization gives

$$m = \frac{\left(\frac{\gamma}{1-\gamma}\right)^2\left(\frac{1}{1-\gamma}\right)^2 - C\frac{\alpha\gamma}{1-\gamma}}{\left(\frac{\gamma}{1-\gamma}\right)^2\left(\frac{1}{1-\gamma}\right)^2 + C\alpha^2}(w-\log\gamma), \tag{6}$$

and we see that the monetary authority's reaction to wage developments depends on C, in the sense that

$$\frac{\partial m}{\partial w} \lesseqqgtr 0 \quad \Longleftrightarrow \quad C \gtreqqless \frac{\gamma}{\alpha(1-\gamma)^3}.$$

If the central bank is sufficiently conservative it will counteract the inflationary consequences of a high wage by lowering the nominal money supply. This result is completely equivalent to the one obtained by Coricelli et al. (2000) as well as in other papers in the literature.

2.3 Wage setting

In the rewinding of the game we have now come to the stage where the nominal wage is decided. We assume that this is done at a decentralized level, such that in this stage the atomistic unions have no influence on the

price level or on the monetary policy, both of which are macro variables, but only focus on the effect on the local employment effect of wage setting.[4] We apply the monopoly union structure such that the union sets the wage rate while the firm sets employment according to the labor demand schedule.

Until now the level of unemployment benefits has not entered the analysis, but it is natural to let it be a part of the union's preferences when it decides on the wage level. In a very general way we could express the union's loss function as

$$V^U = V(w - p, \beta, u)$$

with

$$V_1 < 0, V_2 \leq 0, V_3 > 0 \text{ and } V_{23} < 0. \tag{7}$$

Here $\beta = b - p$ denotes the logarithm of the real benefit level, and V_i is the partial derivative of V with respect to the i'th argument. The 3 first derivatives in (7) should be obvious, and simply states that the union's loss is decreasing in the benefit level and the real wage rate, and that the union is worse off when unemployment rises. The sign of the cross-derivative of the second and third argument states that if the unemployed receive only a small real income, then a rise in unemployment should be of greater concern to the union than when the unemployed are relatively well off.

One function that satisfies the restrictions in (7), and at the same time is easy to work with, is

$$V^U = \frac{1}{2\left(\beta - \underline{\beta}\right)} u^2 - \varphi(w - p). \tag{8}$$

The interpretation of V^U is as follows: $\underline{\beta}$ is (the logarithm of) the subsistence real benefit level as seen from the point of view of the union. If the unemployment benefit gets near this level any unemployment among its members becomes almost unbearable for the union, whereas for higher levels of β it may be able to accept some unemployment to get a higher real wage. Another appealing property of the functional form in (8) is that unemployment benefits only matter if there actually does exist unemployment in the economy. This highlights the interaction between unemployment benefits and the unemployment level. The other new parameter, $\varphi > 0$, measures the weight the union attaches to the real wage level of its employed members.

[4] If wage setting was centralized, the results of this paper would remain under the additional assumption of full indexation. In fact, all real allocations would be exactly the same in such a model as in the present one.

The log of the real benefit level is

$$\begin{aligned} \beta &= b - p \\ &= [\sigma + \iota p] - p. \end{aligned} \tag{9}$$

Hence it consists of three terms. First, a nominally fixed part, σ, which is determined by the political decision makers.[5] Second, an indexation term, ιp, where $0 \leq \iota \leq 1$ indicates the degree of indexation to the price level, and finally we adjust the nominal benefit level by the price level to arrive at the real benefit. We note that if there is full indexation, the political decision variable σ reduces to the real benefit level.

In the decentralized wage setting stage the atomistic union have fixed expectations concerning the price level, because each union's influence on the overall price level of the economy is negligible. This means that in the present derivations we can treat the price level as a constant. Minimizing (8) subject to (2) and (9) gives the wage rate:

$$w = \left(1 - \varphi(1-\iota)(1-\gamma)^2\right) p^e + \log\gamma + \varphi(1-\gamma)^2(\sigma - \underline{\beta}), \tag{10}$$

where p^e is the union's expectation of the price level.

We observe that the wage rate set by the union is increasing in the degree of indexation (when $p^e > 0$) and decreasing in $\underline{\beta}$. Regarding the influence of ι, the intuition is that when indexation increases, so does the expected real benefit level for a given level of strictly positive price expectations, and this means that the union can demand a higher wage without risking that some of its members are reduced to living at the subsistence level. With respect to the way $\underline{\beta}$ influences w, the intuition is exactly reversed. When the subsistence benefit level rises, the loss for the union of having some of its members unemployed increases, and this leads to a reduction in the wage rate so as to lower unemployment.

Expectations must be correct in equilibrium, so we can insert from (3) and (6) to find the equilibrium wage, price and unemployment levels as a function of the politically determined part of the benefit level:

$$w(\sigma) = \log\gamma + \varphi \frac{\left(\frac{\gamma}{1-\gamma}\right)^2 \frac{1}{\alpha^2 C} + (1-\gamma)^2}{1 + \varphi(1-\iota)\left(\frac{\gamma}{1-\gamma}\right)^2 \frac{1}{\alpha^2 C}} (\sigma - \underline{\beta}) \tag{11}$$

[5] Strictly speaking there are no nominally fixed variables in this model since all variables are measured in terms of last period's prices. It is still true, however, that σ is fixed relative to the price level of the current period.

$$p(\sigma) = \varphi \frac{\left(\frac{\gamma}{1-\gamma}\right)^2 \frac{1}{\alpha^2 C}}{1 + \varphi(1-\iota)\left(\frac{\gamma}{1-\gamma}\right)^2 \frac{1}{\alpha^2 C}} (\sigma - \underline{\beta}) \tag{12}$$

$$u(\sigma) = \varphi \frac{(1-\gamma)}{1 + \varphi(1-\iota)\left(\frac{\gamma}{1-\gamma}\right)^2 \frac{1}{\alpha^2 C}} (\sigma - \underline{\beta}). \tag{13}$$

Equations (11) to (13) express the full solution of a less complicated version of our model where there is no active government and the unemployment benefit is taken as an exogenous variable. They reveal that all three variables are increasing in the degree of indexation as long as $\sigma > \underline{\beta}$. Furthermore, equation (13) tells us that the real allocation in the economy, and not just the nominal variables, are indeed influenced by the degree of conservativeness of the central bank, absent full indexation in which case the normal result from the literature reappears. Again the reason is that when there is not full indexation the union's expected real wage is not a constant but is influenced by monetary policy (see (10) above). In turn this determines the equilibrium real wage and employment. We see that the more conservative the central bank, the higher unemployment, because a high level of C leads to low inflation. For a given value of σ this increases the real benefit level, raises the real wage demanded by the union and increases unemployment.[6] A positive relationship between central bank conservativeness and unemployment is in stark contrast to the standard results from the Barro-Gordon tradition where activity is independent of central bank conservativeness, although it mimics what has been found in more recent papers where labor unions are inflation averse. In these models, however, the traditional neutrality reappears when the unions neglect their own effect on inflation, see e.g. Skott (1997) or Cukierman and Lippi (1999), but in our model the result stands even though we have assumed decentralized wage setting.

Below we show that regardless of the degree of indexation, C will influence the equilibrium activity once the political determination of σ is taken into account, but the reasons for this and the mechanisms through which this effect work will become much clearer in the following section.

[6] Hall and Franzese (1996) present empirical evidence in favor of this result based on data from 17 OECD countries. They find that for low levels of wage bargaining coordination, unemployment is increasing in central bank conservativeness.

2.4 The political game

It is now time to consider how the unemployment benefit level is determined, and before we solve for the equilibrium, we briefly present the components of the political game in this subsection.

When we want to describe a political determination of any endogenous variable, it is clearly crucial how we specify the policy maker's preferences regarding this matter, and how she may be influenced in her choice by outside parties. For our present purposes, we shall assume that the policy maker has the following objective function

$$U^G(\sigma) = -V^W(\sigma) + \theta C_U(\sigma) \qquad \theta > 0, \tag{14}$$

where V^W denotes the "social" loss function, i.e. the function that expresses social welfare. It is given by

$$V^W(\sigma) = [u(\sigma)]^2 + G\,[\pi(\sigma)]^2\,,$$

so the only difference between this function and the central bank's loss function is that the central bank may attach a different weight to inflation relative to unemployment than what is expressed by social welfare considerations. To return to equation (14), the $C_U(\sigma)$-function is the contributions the government receive from the union, and θ measures the weight the government attaches to these contributions relative to overall social welfare.

By specifying the political objectives of the policy maker in this way we follow the so-called political contributions approach to political economy founded by Grossman and Helpman (1994). Although originally formulated as a direct monetary transfer from lobbyists to the policy maker, the interpretation has always been much broader than pure bribes which clearly is the most straightforward one. Normally this interpretation has either had the form of indirect political pressure through adjustment of campaign contribution, or more softly as public actions or statements from the lobbying groups to support or criticize the policy maker. Another distinctive feature of the political contributions model is that the only political interaction that is considered is the one between the incumbent policy maker and an exogenous set of lobbies. Hence it abstracts from two important issues, namely the determination of who has the power to legislate and the similar determination of who has the possibility of influencing the legislation.

Although strictly speaking the union is interested in the real benefit level and not just the politically determined part of it, σ, it makes no difference in our analysis to let the union's contributions be contingent on σ rather than on β, because both parties in the political game look forward to the latter

stages of the game and take into account the effect σ subsequently has on wage setting and monetary policy.

The central labor union gives contributions that maximize its objective function,

$$U^U(\sigma) = -V^U(\sigma) - C_U(\sigma), \tag{15}$$

where $V^U(\sigma)$ is the minimized value of the decentralized union's loss as function of the political decision variable, σ. From equations (14) and (15) it is noted that contributions are a linear, additively separable term in the objective functions of the two players in this policy game. As shown by Dixit, Grossman and Helpman (1997) it is possible to find the equilibrium of a comparable political game with more general preferences, but we use the more simple linear ones here in order to obtain analytical solutions for the variables of interest. Since we have already taken a significant short cut when specifying central bank, union and government preferences as sums of quadratic losses, it seems that this last simplification is a rather innocent one.

Before we proceed, we make two additional simplifying assumptions. First, we assume that the union uses a differentiable contribution function. This is an assumption commonly made in the lobbying literature, and it can be defended with the fact that when contributions are differentiable, the loss from making small mistakes is minimal. Second, we abstract from any indeterminacy in the division of the surplus from the political game between the two parties by focusing only on equilibrium policy.[7] Then the first order condition of the union's maximization problem implies that

$$\frac{\partial C_U(\sigma)}{\partial \sigma} = -\frac{\partial V^U(\sigma)}{\partial \sigma}.$$

Now, using the government's first order condition, we can find the condition for equilibrium:

$$\frac{\partial V^W(\sigma)}{\partial \sigma} + \theta \frac{\partial V^U(\sigma)}{\partial \sigma} = 0. \tag{16}$$

Hence we have reproduced the familiar result from the lobbying literature that, when using the political contributions approach to political economy, the government acts as if maximizing a weighted welfare function, where the contributing party receives a larger weight than the rest of society.

[7] To illustrate, suppose that the union considers two different contribution functions, $C_u^1(\sigma) = f(\sigma)$ and $C_u^2(\sigma) = f(\sigma) - k$. Then both of these will give the policy maker the same marginal incentives, but $C_u^2(\sigma)$ obviously gives the union a payoff that is k higher than $C_u^1(\sigma)$ no matter what policy is implemented. For the purpose of this paper the distribution of this bilateral surplus is irrelevant, and we shall proceed under the assumption that some unmodelled exogenous restriction will ensure that the surplus is divided in a "fair" way.

3 Equilibrium

In this section we shall solve for the political equilibrium and present some of its interesting properties. Once the preferences and the rules of the political game has been specified, as was done in the previous section, this becomes a simple task since all that is left to be done is to insert the expressions in (11) to (13) in the $V^U(\sigma)$ and $V^W(\sigma)$-functions. For the union's loss function this yields

$$V^U = -\varphi \log \gamma - \frac{1}{2} \frac{\varphi^2 (1-\gamma)^2}{1 + \varphi(1-\iota)\left(\frac{\gamma}{1-\gamma}\right)^2 \frac{1}{\alpha^2 C}} (\sigma - \underline{\beta}) \tag{17}$$

The union's loss is decreasing in the unemployment level, and we also note from (17) that there is a constant term, $-\varphi \log \gamma$, in the loss function that the union can never hope to eliminate. The reason for the appearance of this term is that it is simply impossible to achieve both zero unemployment and a high real wage. Another property is that if there is full indexation, the conservativeness of the central bank does not matter for the union's payoff for any given value of the benefit level. The reason is that, although both the nominal price and wage levels depend on C, these effects exactly cancel out, such that the real wage and consequently employment are independent of C when $\iota = 1$. As for the social loss, this is given by

$$V^W = \varphi^2 \frac{(1-\gamma)^2 + G\left[\left(\frac{\gamma}{1-\gamma}\right)^2 \frac{1}{\alpha^2 C}\right]^2}{\left(1 + \varphi(1-\iota)\left(\frac{\gamma}{1-\gamma}\right)^2 \frac{1}{\alpha^2 C}\right)^2} (\sigma - \underline{\beta})^2. \tag{18}$$

The social loss is minimized for $\sigma = \underline{\beta}$, since this will eliminate both inflation and unemployment. In the case of full indexation, where the union's loss was independent of central bank conservativeness, the social loss still depends on C. The reason is that it depends independently on the inflation rate and not just on the real wage rate, and obviously inflation *is* affected by central bank conservativeness.

By taking the derivatives of (17) and (18) and inserting in the first order condition, (16), we can find the equilibrium value of the politically determined variable, the nominally fixed part of unemployment benefits:

$$\sigma = \underline{\beta} + \frac{\theta(1-\gamma)^2}{4} \frac{1 + \varphi(1-\iota)\left(\frac{\gamma}{1-\gamma}\right)^2 \frac{1}{\alpha^2 C}}{(1-\gamma)^2 + G\left[\left(\frac{\gamma}{1-\gamma}\right)^2 \frac{1}{\alpha^2 C}\right]^2}. \tag{19}$$

However, this expression gives little information about the variable that matters, namely the real benefit level. When inserting (12) and (19) in (9) we find it to be:

$$\beta = \underline{\beta} + \frac{\theta(1-\gamma)^2}{4}\left[(1-\gamma)^2 + G\left[\left(\frac{\gamma}{1-\gamma}\right)^2 \frac{1}{\alpha^2 C}\right]^2\right]^{-1}. \tag{20}$$

By differentiation of (20) we find the properties of the equilibrium β which we summarize in

Proposition 1 *The equilibrium real benefit level depends in the following way on the central parameters of the model:*

$$\frac{\partial\beta}{\partial\theta} > 0; \quad \frac{\partial\beta}{\partial G} < 0; \quad \frac{\partial\beta}{\partial\iota} = 0 \text{ and } \frac{\partial\beta}{\partial C} > 0.$$

The first derivative simply reflects that when the union, which benefits from a higher benefit level, has more political power, then the benefit level is also higher in equilibrium. The second derivative similarly means that when the government is more inflation averse, then it will choose a lower benefit level. Again the intuition is clear: A higher G means a higher weight on inflation relative to contributions from the union, and this gets the government to choose a more disinflationary policy, namely a lower σ and hence a lower β. The decrease in β of course will spill over to lower wages and hence lower price inflation.

The third derivative in the Proposition 1 states that the real benefit level is independent of the degree of indexation. By inspecting equations (19) and (11)-(13), it is clear that this independence carries over to all real variables in the model. As we saw in the previous section, ι matters in the wage setting stage because an increase in indexation as seen from the point of view of the union leads to a higher real benefit level for any given expectation of the price level. Hence an increase in ι leads to a larger wage demand. However, in the political determination both parties take the effect of indexation on the price level and wage setting into account. By adjusting the nominally fixed part of the unemployment benefit correspondingly, the policy maker removes this influence in equilibrium.

The sign of the final derivative means that a more conservative central bank leads to a higher benefit level. This perhaps is a bit strange at first, but it is merely a reflection of the fact that an increase in C has two effects. One, which is only present when $\iota \neq 1$, originates in the political determination of σ. A more conservative central bank leads to more aggressive lobbying by the

union, because when benefits are not fully indexed a fall in inflation leads to a fall in the real wage and an increase in unemployment for a given value of σ (see equation (10)). This changes the weights attached to the two terms in the union's objective function and makes it lobby harder. Hence this effect tends to increase σ, but it only raises it by so much as the price level such that the total effect on β disappears in equilibrium. The other effect comes from the direct effect C has on inflation. As we can see from the numerator in equation (18), this effect tends to diminish the importance of σ for the government, and thus it will be more willing to give in to the union's pressure and select a higher benefit level. Since raising C both raises σ and lowers inflation, the total effect is to increase β.

Finally, we see that in two cases, the real benefit level reduces to the subsistence benefit level, namely for $\theta \to 0$ and for $C \to 0$. The first case reflects the fact that when the union has no political influence, it is socially optimal to let the benefit level be as low as possible. The second on the other hand reflects that when the central bank is ultra-liberal it can eliminate unemployment and thus it is of no consequence to anybody that the benefit level is as low as $\underline{\beta}$. This leaves the government free to choose the benefit level which eliminates inflation as well, and this benefit level happens to be $\underline{\beta}$ because this gives rise to the competitive labor market allocation.

If inserting (19) in (13) we find that the equilibrium unemployment rate is given by

$$u = \frac{\varphi\theta(1-\gamma)^3}{4}\left[(1-\gamma)^2 + G\left[\left(\frac{\gamma}{1-\gamma}\right)^2 \frac{1}{\alpha^2 C}\right]^2\right]^{-1}.$$

Real activity is thus influenced by the degree of central bank conservativeness, and we notice that unemployment is increasing in C.

As we already hinted at in the previous section, there are two channels through which central bank conservativeness influences the real outcome. First, if the unemployment benefit level is not fully indexed, then inflation aversion of the central bank has a direct effect on wage setting and hence on employment. However, this effect vanishes in equilibrium because all influence of indexation is removed by the government. The second effect of C remains. This is the one which stems from the government's inflation aversion. As the central bank gets more conservative, the inflation rate falls, but this will lower the government's incentive to an disinflationary labor market policy, and influenced by the union it selects a more generous unemployment benefit scheme, which in turn means higher wages and higher unemployment.

3.1 How conservative should the central bank be?

We conclude the description of equilibrium with a small experiment, which should be familiar to the reader. Imagine that a social planner could somehow dictate the conservativeness of the central bank. If we treat the parameter C as a pure preference parameter, this statement makes little sense, but if we think of the central bank's preferences as reflecting the preferences of the leader of the central bank, then it may be acceptable that we can change the attitudes of the monetary authority by appointing a new governor.[8] So the question remains: What type of central bank leader would be chosen by a social planner who takes into account the political determination of unemployment benefits?

In most similar models of strategic monetary policy from the Barro and Gordon (1983)-tradition, a question of this type has been easy to answer: Since central bank conservativeness does not affect activity, but reduces inflation, a social planner would in the absence of uncertainty simply appoint an ultra-conservative leader of the central bank, i.e. one that cares only about inflation and has no concern about activity, see e.g. Rogoff (1985) or Lockwood and Philippopoulos (1994).[9]

As we already saw in the previous section, a similar line of reasoning cannot be applied to the present model, since here the real allocation is not independent of central bank conservativeness. But we nevertheless seek an answer to the question: Is it still true here that an ultra-conservative central banker is socially optimal? The answer is no. To see this, insert the equilibrium unemployment benefit level from (19) in the social loss function (18) to arrive at

$$V^W = \left(\frac{\varphi\theta(1-\gamma)^2}{4}\right)^2 \frac{1}{(1-\gamma)^2 + G\left[\left(\frac{\gamma}{1-\gamma}\right)^2 \frac{1}{\alpha^2 C}\right]^2} \tag{21}$$

When looking at the above expression, we immediately notice that an ultra-liberal central banker ($C \to 0$) will eliminate all social loss. Hence ap-

[8] In the model analyzed in the present paper, it would clearly be in the interest of the social planner to appoint a new government which is not open to lobbying influence. We shall, however, not consider this issue here since it seems a bit far fetched to imagine a social planner who can change the government in democratic countries, and as shown in the text there is another way of achieving the first best outcome.

[9] This statement holds only when there is no uncertainty, as shown by Rogoff (1985). If there is demand or supply shocks then this may reduce the role for an ultra-concervative central banker, but it is still true that the optimally chosen central bank leader places more weight on inflation than society as a whole.

pointing an ultra-liberal central banker is a first best solution.[10] The reason is that an ultra-liberal central banker will always eliminate unemployment. Since the level of the unemployment benefit only matters to the union when there actually are some people who are unemployed, it will not use its influence in the political process to affect the policy decision of the government. Inflation, however, still enters the objective function of the policy maker, and since the ultra-liberal central bank makes no attempt of reducing inflation, this is a job left for the government. Without lobbying pressure from the union, the government can implement the first best policy, and in the resulting equilibrium both unemployment and inflation are zero. It is worthwhile examining why an ultra-conservative central bank cannot achieve the same. Such a central bank will of course always ensure that inflation is zero. This, however, does not eliminate the union's political influence as was the case for the ultra-liberal central bank, because in this case the equilibrium unemployment will depend on σ. This means that the government is influenced by the union when it sets the benefit, and hence it will not select the first best policy, but rather a benefit level that is too high compared to the social optimum. The result is that unemployment is positive in equilibrium and that consequently some of the social loss remains.

A second observation from (21) is that the degree of indexation of unemployment benefits does not matter for the social loss. Thus a social planner will be indifferent as to what indexation system to implement. As we saw in the previous section, the reason is that in the political part of the game the players exactly offset the effect of indexation by a similar change in the nominally fixed part of unemployment benefits, such that any effect of ι is removed in equilibrium.

Finally, we notice that the removal of the political distortion ($\theta = 0$) also eliminates all the social loss in equilibrium. This result mimics the one found by Piga (1998), but contrary to his findings our model also predicts that a similar result can be obtained by appointing an ultra-liberal central banker.

[10] This is only true in the present model, when the endogenous determination of σ is accounted for. If σ is treated as exogenous and is assumed to be larger than $\underline{\beta}$, then one finds that C influences the social loss in a rather different way. One can show, by minimizing the expression in equation (18), that in this case there exists an interior optimal value of central bank conservativeness which is

$$C = \frac{\left(\frac{\gamma}{1-\gamma}\right)^2 G}{\alpha^2(1-\gamma)^2\varphi(1-\iota)}.$$

Hence, only if social welfare is independent of the inflation rate, it is optimal that the central bank is also indifferent to inflation. Furthermore, if there is full indexation, an ultra-conservative central banker maximizes social welfare.

It it also interesting to take a brief look at how the union looks at central bank conservativeness. We can again insert to get the equilibrium value of the union's loss function:[11]

$$V^U = -\varphi \log \gamma - \frac{\theta}{2}\left(\frac{\varphi(1-\gamma)^2}{2}\right)^2 \frac{1}{(1-\gamma)^2 + G\left[\left(\frac{\gamma}{1-\gamma}\right)^2 \frac{1}{\alpha^2 C}\right]^2}, \tag{22}$$

such that the union paradoxically prefers an ultra-conservative central banker. The reason is that this will achieve the most political influence by the union and consequently a more generous unemployment benefit system. With a generous benefit system the union can achieve a higher real wage, albeit at the expense of some unemployment among its members, and this is preferred by the union to the case where the central bank is ultra-liberal. In such a situation the union cannot extract any labor market rent, because the allocation is the same as under a competitive labor market. Notice, how we from (22) directly can see that when $C \to 0$, the union's political influence is removed. In this case the political parameter, θ, vanishes from the expression.

4 Conclusion

The literature in the Barro-Gordon tradition on monetary policy delegation following Rogoff (1985) has been a major influence in the design of the statute of the European Central Bank, as we saw in the introduction of this paper. In fact, the statute almost exactly replicates the main result of that classical paper, namely that a central bank should target only price stability and be left with a considerable degree of independence in order to signal commitment to this goal. The present paper has not challenged the idea that the central bank should be made institutionally independent of government interests, but has rather focused on which goals such a central bank should pursue.

We have set up a conventional model of monetary policy with decentralized wage setting and a politically active labor union influencing the policy maker's decision on labor market policy. In this framework we have shown that the standard result is completely reversed. The socially optimal choice of central banker is one who puts all weight on unemployment and none on inflation. The reason is that such a central banker in effect removes the union's

[11] In this expression we do not take the contributions given by the union into account. As we already discussed in footnote 7, the model set up in this paper cannot decide the sharing of the bilateral surplus from the political game. Hence, we consider only the non-political terms in the union's objective function.

political power by precommiting to zero unemployment. A conservative central bank cannot do the same because precommitment to zero inflation leaves the union with an active role in the political process. This enables it to extract labor market rents and also explains our second result, which is that the union's loss is minimized when the central bank is ultra-conservative.

The results of this paper rely on some specific assumptions about the workings of both the labor market and the political decision making process. We nevertheless argue that it is unfortunate that so much policy advice has been made on the basis of a theoretical result whose robustness is apparently so weak as demonstrated here. The framework in our paper is in many ways similar to the institutional setting in many Northern European countries, and according to our result in would be in these countries' interest to let the European Central Bank precommit to fighting unemployment rather than inflation, as it is presently stated in its statute.

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