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UNCERTAINTY, WAGE SETTING AND DECISION MAKING IN A MONETARY UNION

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Abstract

The enlargement of the European Monetary Union is likely to lead to an increase in uncertainty regarding the transmission of monetary policy for the larger union. Adding new members to the central bank council will in addition imply that the policy reaction of the enlarged council will be uncertain in the initial period. The paper considers the influence of both types of uncertainty on wage-setting behavior in the larger monetary union and its effects on unemployment. In light of these effects, I also derive implications for the adequate structure of the central bank.

JEL Code: D72, E58.

Keywords: monetary policy uncertainty, wage setting, European Central Bank, Euro area, accession countries.

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1. Introduction

The European Monetary Union (EMU) will experience several important changes with its enlargement, scheduled to follow only a few years after the accession of ten new members to the European Union (EU) in May 2004.[1] First, there might be a change in the preferences of the enlarged central bank. The monetary preferences of the new members could differ because of a different structure of economic shocks (Fidrmuc and Korhonen 2001). This implies that, if monetary policy is mainly based on economic shocks, the accession countries will show different preferences for monetary policy than the majority of the present members. Another difference might be higher structural rates of inflation in the new members countries giving rise to different policy preferences (see Begg and et al. 2003, Kenen and Meade 2003). Finally, different monetary policy preferences can be due to higher unemployment, fiscal problems or problems with the banking sector. How strongly these different preferences play out in actual monetary policy decision is a function of the voting weights of the new members, and how the preferences of the new members are distributed in comparison to present members (Hefeker 2003).

Second, the result will depend on whether new members bring a distinctively national perspective to policy making. The official position is that ECB council members vote only with a European perspective. If this is indeed the case, the enlargement of the monetary union should have only a minor influence on monetary policy. In contrast to the official position, however, there is evidence that ECB council members take policy decision with a view to their own nations' needs (Berger and de Haan 2002, Meade and Sheets 2002). Whether new members will vote with a perspective on all of Europe is thus uncertain. This uncertainty is

[1] It is not clear though whether all new members would join at the same time. Poland, for instance, has declared its intention to join by 2008 while Hungary has declared to join as

compounded by the uncertainty whether they will tend to vote more or less conservative. Thus, enlargement will at least initially imply more uncertainty concerning the preferences and the reaction function of the central bank, and this uncertainty will to a large extent be a function of the voting weights of the new members.

Third, another source of uncertainty is how monetary policy translates into real variables (Issing 2003). Because of structural differences in labor markets, the structure and situation of the financial sector, and the degree of competition in goods markets, one can expect considerable differences in the transmission of monetary policy among the member states. This is in addition to the already present differences in the transmission of monetary policy in the current member states of the EMU (see Angeloni et al. 2002, Clausen 2001, and Cecchetti 2001, for surveys) and the accession countries (Ganev et al. 2002, Kiviet et al. 2003).[2] Enlargement will not only increase the degree of divergences in the larger monetary union. Given the process of structural change in the accession countries the larger monetary union is also likely to imply a higher uncertainty about how these differences translate into real variables.[3]

Surprisingly, both sources of uncertainty play no role in the discussion about ECB reform that has begun in light of the pending enlargement. The discussion is mainly concerned with the issues of efficiency of decision making and the question of diverging size of member countries. The first point is based on the fact that the current structure, with a

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soon as possible. Six countries (the Baltic States, Slovenia, Cyprus and Malta) have already joined the ERM II which is a precondition for membership in the EMU.

[2] Especially differences in the financial structure and the banking sectors are held responsible for different transmission of monetary policy (Dornbusch et al. 1998, Cecchetti 1999, Borio 1995).

[3] This uncertainty has to be strictly separated from dispersion in transmission in monetary policy, which has recently been explored in the literature (De Grauwe 2000, Gros and Hefeker 2002, Benigno 2004). De Grauwe and Senegas (2003) combine both aspects in one model but do not look at the interaction between central banks and wage setters.

board of six members and a council that comprises in addition representatives of all member states (currently 12), is already considered close to being inefficient (Baldwin et al. 2000). With enlargement, the council could easily reach a size of more than 30 members, making decision finding tedious, time consuming and inefficient.[4] The second point discussed is that every country has equal voting power, independent of its economic or population size, implying that larger members are under-represented while smaller members are over-represented (Berger and Müller 2004). It means that smaller members could implement a monetary policy that is in contrast to the interest of larger members. While the "one country, one vote" principle seems to be democratic, it is hard to justify that smaller member states overrule the interests of a majority of the population of EMU member states. This would be particularly problematic if the smaller (and new) member states have consistently different preferences than present (and larger) member states.

The present paper aims to bring together the issues of increased uncertainty and a possible revision of the ECB decision making structure. I ask how uncertainties about the behavior of the larger central bank and about the transmission of monetary policy influence the behavior of wage setters. While this is certainly not the only relevant aspect of higher uncertainty in monetary policy setting, it is particularly important given the size of the unemployment problem in Europe.

The analysis draws on different strings in the literature. First, Cukierman and Lippi (2001), among others, have analyzed the relation between monetary regimes and labor markets, pointing out a strategic externality among labor unions. The regime shift from an independent monetary authority to a common central bank will lead to more aggressive union

[4] Twelve of the EU members are currently members of the EMU. With ten new members, Romania and Bulgaria set to join the EU soon, and further candidates like Croatia and Turkey, EMU might eventually reach a size of 25 or more countries.

behavior because the unions no longer fully internalize the reaction of the central bank to their wage setting behavior. Such an externality, created through the creation of the common central bank, will play a role here too.

Second, the paper is related to the literature analyzing the influence of uncertainty on central bank behavior (see e.g. Brainard 1967, Ghosh and Masson 1994, Söderström 2000). The standard result is that central banks tend to be more cautious in their reaction to shocks if they are uncertain how policy translates into real variables. This result is confirmed in as far as economic shocks are concerned. It turns out, however, that the central bank will become more aggressive in reaction to wage developments. This is in line with other literature that has qualified the standard results by Brainard and others (see e.g. Söderström 2000).

Third, I relate to the scarce literature that looks at the interaction of wage setting behavior and uncertainty about central bank preferences (Sorensen 1991, Grüner 2002). Here it has been established that preference uncertainty will in general discipline wage setters, questioning the usual results that central bank transparency (in the sense of policy transparency) should be as high as possible (for a survey, see Geraats 2002). I find that preference uncertainty tends to have a negative influence on unemployment.

Despite the relations to the existing literature, the present paper is to my knowledge the first that combines the two sources of uncertainty with the question of wage setting. My findings are that the increased uncertainty concerning the transmission of monetary policy will tend to make the central bank react stronger to wage demands of labor unions. The reason is that higher uncertainty makes the central bank more cautious to ensure that unemployment does not increase even more. Unions expect this stronger reaction and in order to reach their desired real wage demand set higher nominal wages. The opposite result can be expected from an increase in the uncertainty of central bank behavior. This will

discipline the labor unions and lead to more moderate wage demands. Thus, the two sources of uncertainty have different influences on nominal and real developments.

Given that the importance of both uncertainties is related to the relative influence of the new members on monetary policy, I discuss next the implications of the results for the optimal structure of the common central bank. Changing the institutional structure of the ECB by too much and assigning too little decision power to the new members might prove costly for the current members.

2. Wage Setting under Monetary Autonomy

I begin by considering the case of monetary autonomy. This benchmark case is used to see how the two sources of uncertainty influence the optimal decision of policy makers and wage setters. The next section will then see how this is transformed in a monetary union where only one region is faced with uncertainty. There are two countries in the monetary union. The model is formulated in logs.

The time structure of the model is the following: (i) wage rates are set by the labor unions, (ii) stochastic shocks occur, (iii) the central bank determines monetary policy, and (iv) unemployment is realized. I assume that the labor unions are Stackelberg leaders vis-a-vis the central banks, but play Nash against each other.

The rate of unemployment u_i is given as

$$u_i = \bar{u} + \tilde{\alpha}_i(w_i - \pi_i) + \varepsilon_i \qquad i,j=1,2,\ i \neq j. \tag{1}$$

where $\bar{u}$ is the natural rate of unemployment, which is normalized to zero in what follows. Unemployment is increasing in real wages ($w_i - \pi_i$)[5] and a random shock ε_i, whose expected value is zero, $E[\varepsilon_i] = 0$. The country specific influence of monetary policy on unemployment, $\tilde{\alpha}_i$, is potentially random (denoted by ~) with $E[\tilde{\alpha}_i] = \alpha_i$ and $E[\tilde{\alpha}_i^2] = \alpha_i^2 + \sigma_{\alpha_i}^2$, where $\sigma_{\alpha_i}^2$ is the variance of the transmission of monetary policy. As argued above, this uncertainty is especially important for countries in transition where the transmission of monetary policy is highly uncertain because of structural changes in the economy. There is no influence of trade on unemployment because I assume that purchasing power parity holds before the introduction on of monetary union.

The central bank is assumed to minimize deviations of inflation from zero and unemployment from its natural rate (normalized to zero). Its reaction function can be determined from its loss function defined over unemployment u_i and inflation π_i, with b_i as the relative weight the central bank puts on avoiding unemployment:

$$EL_i = E[b_i u_i^2 + \pi_i^2]. \tag{2}$$

Given these preferences, the central bank sets its policy as

$$\pi_i = \Theta_i \cdot w_i + \frac{b_i \cdot \alpha_i \varepsilon_i}{1 + b_i(\sigma_{\alpha_i}^2 + \alpha_i^2)}, \tag{3}$$

[5] I define $\pi_i = (p_t - p_{t-1})/p_{t-1}$ and normalize $p_{t-1} = 0$.

where $\Theta_i = \frac{b_i \cdot \left(\sigma_{\alpha_i}^2 + \alpha_i^2\right)}{1 + b_i\left(\sigma_{\alpha_i}^2 + \alpha_i^2\right)}$ is its reaction parameter.

The central bank reacts to shocks to the rate of unemployment and it increases its inflation response to wages if the uncertainty concerning the transmission of monetary policy is increasing. Because it aims to avoid increases in unemployment it reacts to uncertain transmission of real wages into unemployment by becoming more active.[6] Its response to shocks, however, becomes more muted through uncertainty, confirming the standard result that uncertainty lowers the central bank's response to shocks.

The labor union in turn is assumed to have an objective function defined over deviations of real wages ($\hat{w}_i = w_i - \pi_i$) from a target real wage $\hat{w}_i^*$ (see Sorensen 1991):

$$EV_i = -E\left[\left(w_i - \pi\right) - \hat{w}_i^*\right]^2. \tag{4}$$

While the objective function might look a bit unfamiliar, it can be shown that the union's objective function leads (up to a simple transformation) to similar results as a standard utility function with real wages and unemployment as objectives (see Appendix 1).

I allow for the possibility that the union is not fully aware of the characteristics of the central bank. In particular the reaction parameter of the central bank $\tilde{\Theta}_i$ is stochastic from the perspective of the labor union. If wage setters are not aware of how decisions are actually reached in the central bank, they cannot predict how the central bank would react to a given increase of wages. The union can, however, form expectations about the reaction parameter of the central bank so that expected value and variance of this parameter can be used. I

assume that $E\left[\tilde{\Theta}_i\right] = b_i$ and $E\left[\tilde{\Theta}_i^{\,2}\right] = \Theta_i^2 + \sigma_{\Theta_i}^2$, and that the reaction parameter of the central bank and the transmission of monetary policy are independently distributed. $\sigma_{\Theta_i}^2$ is the variance of the central bank's reaction.

By taking the central bank's reaction into account, the wage rate set by the labor union follows as

$$w_i = \hat{w}_i^* \cdot \frac{1-\Theta_i}{(1-\Theta_i)^2 + \sigma_{\Theta_i}^2}. \tag{5}$$

The wage demand is increasing in the target wage of the union and in the uncertainty about the transmission of monetary policy if the variance of the central bank's reaction parameter and the variance of transmission are not too large[7], and it is decreasing in the degree of uncertainty about central bank behavior. Higher uncertainty about the transmission of monetary policy increases the reaction of the central bank to wage increases. The union expects this and sets its nominal wage demand higher in order to realize its desired real wage. Only if transmission uncertainty gets too large will unions discipline their wage demands. Higher uncertainty about the reaction of the central bank instead makes the union unambiguously more cautious in its wage demands (Sorensen 1991 and Grüner 2002).

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[6] Given that unemployment is always positive because of the real wage target of the union, the central bank only faces the risk of an increase in unemployment. Therefore its reaction becomes stronger under uncertainty.

[7] The condition for $\partial w_i / \partial \sigma_{\alpha_i}^2 > 0$ is $\left(\partial \Theta_i / \partial \sigma_{\alpha_i}^2\right)\left[(1-\Theta_i)^2 - \sigma_{\Theta_i}^2\right] > 0$ with $\left(\partial \Theta_i / \partial \sigma_{\alpha_i}^2\right) > 0$. Note that the first term in the square bracket declines in the variance of transmission. Thus, the expression will be positive for moderate variances of transmission and central bank reaction.

3. Monetary Union

3.1. Wage Setting in the Monetary Union

For the current member states I assume that the transmission of monetary policy is not stochastic, so that $\tilde{\alpha}_1 = \alpha_1$, and that the reaction of their representatives in the ECB's council are common knowledge $\tilde{b}_1 = b_1$. This is not the case for the "new" members of the EMU. The policy makers are not well known and their reaction, especially within the enlarged union is uncertain. In particular, the interaction of old and new members cannot be predicted from the private sector, so that the reaction of the larger EMU council will be uncertain for an initial period at least. Moreover, the economies in transition undergo large structural adjustments so that the effect of monetary policy is likely to remain uncertain for the near future. Thus, the transmission of monetary policy and potentially also the preferences of the council members nominated by the new member states might differ from those of the current members. I assume, nevertheless, that the expected values of transmission and central bank reaction are the same for old and new members: $E[\tilde{\alpha}_2] = \alpha_2 \equiv \alpha_1 \equiv \alpha$, implying $E[\tilde{\alpha}_2^2] = \alpha^2 + \sigma_\alpha^2$, and $E[\tilde{b}_2] = b_2 \equiv b_1 \equiv b$.

The larger central bank council has the following objective function

$$EL = E\left[(z_1 b_1 + z_2 b_2)(s_1 u_1 + s_2 u_2)^2 + (s_1 \pi_1 + s_2 \pi_2)^2\right], \tag{6}$$

where $s_1 + s_2 = 1$ and $z_1 + z_2 = 1$ are the relative economic (s_i) and political (z_i) weights of the member and accession country, respectively. For simplicity, I define $\bar{u} = s_1 u_1 + s_2 u_2$ and $\bar{b} = z_1 b_1 + z_2 b_2$. The preferences for monetary policy by the larger central bank are a

weighted average of preferences of individual members of the bank's council. This is akin to a bargaining solution among council members (Hefeker 2003).

Note that I allow for different relative weights of the new members when making decision in the ECB council and by how much new member countries are taken into account by the whole council. This reflects the possibility that all members care for the overall union and all countries. At the same time, new central bank governors may or may not have more or less relative weight than the economic weight of their country. Hence, it is possible that the governor from, say Poland, has no de facto weight in the council (z_i=0) but that developments in Poland are nevertheless taken into account to the degree of s_i>0 by other members of the board. The uncertainty about the reaction function of the common central bank is by assumption increasing in the relative voting weight of the new member countries, so that any increase in z_2 will increase the uncertainty about the reaction of the larger central bank council to wages.

The policy reaction of the central bank is

$$\pi = \theta_1 \cdot w_1 + \theta_2 \cdot w_2 + \bar{b} \cdot \frac{s_1\varepsilon_1 + s_2\varepsilon_2}{1 + \bar{b} \cdot \left(\alpha^2 + s_2^2\sigma_\alpha^2\right)}, \tag{7}$$

where $\theta_i = \theta\tau_i$ and $\theta = \frac{\bar{b}}{1 + \bar{b} \cdot \left(\alpha^2 + s_2^2\sigma_\alpha^2\right)}$, $\tau_1 \equiv s_1\alpha^2$, $\tau_2 \equiv s_2\alpha^2 + s_2^2\sigma_\alpha^2$. Again, $E\left[\tilde{\theta}\right] = \theta$ and $E\left[\tilde{\theta}^2\right] = \theta^2 + \sigma_\theta^2$.

The central bank reacts to wage setting and shocks in the individual countries according to their relative weight in the objective function. Uncertainty of transmission is only relevant for country 2 (captured by $\theta\tau_2$), while the reaction to developments in country 1 will decrease as uncertainty grows (captured by $\theta\tau_1$). This follows from the fact that the bank now has to

take into account that any reaction that might be too strong will create unnecessary variability of employment in country 1, so that the central bank has to trade off stabilizing employment in the two regions. Whether its inflation response to wages will increase or not if transmission uncertainty increases is a function of the relative wage developments in the two countries.

Acting as Stackelberg leaders, the wage reaction functions of the two unions are

$$w_i = \hat{w}_i^* \cdot \frac{(1-\theta_i)}{(1-\theta_i)^2 + \tau_i^2 \cdot \sigma_\theta^2} + w_j \tau_j \cdot \frac{\left[\theta(1-\theta_i) - \tau_i \cdot \sigma_\theta^2\right]}{(1-\theta_i)^2 + \tau_i^2 \cdot \sigma_\theta^2}. \tag{8}$$

Monetary union creates externalities between the two national labor unions. Aggressive behavior of one union makes the other union more aggressive as well because the implied higher wage demands pressure the central bank to increase inflation. A desired real wage can hence only be obtained at higher nominal wages, so that wage demands are strategic complements. At the same time, however, σ_θ^2 makes the reaction to the other union's wage w_j demand more uncertain, which disciplines the wage demand.

Using the two reaction functions, equilibrium nominal wage demands are

$$w_i = \cdot \frac{\hat{w}_i^*(1-\theta_i)\left[(1-\theta_j)^2 + \tau_j^2\sigma_\theta^2\right] + \hat{w}_j^*\tau_j(1-\theta_j)\left[\theta(1-\theta_i) - \tau_i\sigma_\theta^2\right]}{(1-\theta_i)(1-\theta_j)\left[1-\theta(\tau_i+\tau_j)\right] + \sigma_\theta^2\left[(1-\theta_i)\tau_j^2 + (1-\theta_j)\tau_i^2\right]}. \tag{9}$$

3.2. Inflation and Unemployment in the Monetary Union

More relevant than the development of nominal wages are the real wages and unemployment realized in the larger monetary union. Expectations about how they would

develop should influence decisions about the structure of the common central bank and be therefore of direct policy relevance.

The expected rate of inflation can be calculated as

$$E[\pi] = \frac{\theta(1-\theta_i)(1-\theta_j)\cdot\left[\hat{w}_i^*\tau_i + \hat{w}_j^*\tau_j\right]}{(1-\theta_i)(1-\theta_j)\left[1-\theta(\tau_i+\tau_j)\right] + \sigma_\theta^2\left[(1-\theta_i)\tau_j^2 + (1-\theta_j)\tau_i^2\right]}, \tag{10}$$

which, by using (9) and (10), leads to an expected real wage of

$$E[\hat{w}_i] = \frac{\hat{w}_i^*\cdot(1-\theta_i)(1-\theta_j)\left[1-\theta(\tau_i+\tau_j)\right] + \sigma_\theta^2\cdot\tau_j\left[\hat{w}_i^*(1-\theta_i)\tau_j - \hat{w}_j^*(1-\theta_j)\tau_i\right]}{(1-\theta_i)(1-\theta_j)\left[1-\theta(\tau_i+\tau_j)\right] + \sigma_\theta^2\left[(1-\theta_i)\tau_j^2 + (1-\theta_j)\tau_i^2\right]}. \tag{11}$$

Equation (11) shows that the higher the real wage target of the respective union, the higher the realized real wage is. By setting $\sigma_\theta^2 = 0$, the expected real wage will equal the desired real wage $E[\hat{w}_i] = \hat{w}_i^*$, independent of the size of transmission uncertainty. Unemployment will be unaffected as well (see equation (1)). We therefore have:

Result 1:

Without uncertainty over the central bank's reaction, transmission uncertainty has no influence on expected real wages and unemployment.

This result is due to the fact that the unions are aware of the central bank's changed reaction function with transmission uncertainty and internalize this completely when setting nominal wages.

In the case of uncertainty about the central bank's reaction, (11) shows that the own real wage target leads to an increase in expected real wages, while the other union's real wage

target lowers it. The higher uncertainty is, the more the own wage demand needs to increase in order to be sure to realize this aim. This increase in nominal wages translates into real wages, since the central bank will not compensate the increase fully. At the same time, higher uncertainty implies that the reaction to the other union's wage demands become more uncertain which has an influence on domestic variables as well. This spillover effect disciplines national unions and their wage demands. There are hence countervailing influences from uncertainty on wage demand.

To see whether real wages increase in the presence of uncertainties, in comparison to a situation without uncertainty, I compare real wages. The following results can be derived (see Appendix 2):

Result 2:

An increase in uncertainty about the central bank's reaction will lower real wages in both countries.

An increase of transmission uncertainty can have countervailing influences on the two countries. Union 2 will become more aggressive if the central bank's preferences for employment and the effectiveness of monetary policy are not too large. Real wages in country 1 will only increase if the real wage target of union 2 is sufficiently larger.

Like in the case of independent monetary policy, an increase in uncertainty about the central bank's reaction has a disciplinary influence on the two unions. Therefore, both unions will behave more moderately if uncertainty increases. The unions react differently, however, to the bank's reaction to an increase in transmission uncertainty. As the reaction under transmission uncertainty to wage demands in country 2 becomes stronger, both will have to increase their nominal wage demands to ensure that they are not too far off their real wage

targets. On the other hand, the bank will react less to increases in the nominal wage demand of union 1. There is thus some moderating influence from more uncertainty on the central bank's reaction. This moderating influence is increasing in the relative weight of country 1.

In country 2 the interplay of these two effects leads to an overall increase in the nominal wage demand which is not fully compensated through an increase in inflation, so that the real wage increases. If the aggressive influence from union 2 on monetary policy is large enough, union 1 will also raise its nominal wage demand to ensure its targeted real wage. In this case, real wages and unemployment in country 1 will increase as well. Otherwise, the moderating influence prevails in country 1 and unemployment decreases.

An increase in uncertainty could therefore imply for some countries that they lose employment while others gain employment. More generally, this could imply that not all would necessarily benefit from the enlargement of the union. Therefore, I next ask who would gain from an enlargement of the monetary union by comparing real wages under autonomy and monetary union (see Appendix 3):

Result 3:

The enlargement of monetary union will lead to lower real wages in both countries under monetary union than under monetary autonomy if the wage demands from union 2 are sufficiently larger than those of union 1 and if the relative weight of country 2 is large.

In both cases, the higher real wage demand of union 2 will induce the central bank to increase the rate of inflation in order to keep unemployment in country 2 from increasing too much. Inflation will be increasing in the relative weight of country 2. Union 1 will behave more disciplined than under autonomy because it is now faced with uncertainty of central bank preferences, due to the enlargement of the central bank council. This effect is present in

country 1 whenever z_2, $s_2>0$. Union 2 is as well disciplined through monetary union unless the relative weight of country 2 is very low, because the union is uncertain how the central bank reacts to wage demands in country 1 (see equation (11)).

4. Implications for the Structure of the Central Bank

4.1. Voting Weights and Unemployment

The preceding section has established that an increase of uncertainty about the central bank's behavior will lower real wages in the two countries. The policy conclusion would be to maximize uncertainty on the side of the labor unions about the behavior of the central bank if one aims to minimize union-wide unemployment. This result is somewhat in contrast to the debate that generally stresses the benefits of transparency of central banks (see Söderström 2000 and Geraats 2003 for surveys of the debate). It is, however, in line with earlier results that uncertainty can have positive labor market effects (Sorensen 1991, Grüner 2002).

Probably more interesting, however, is the question how the ECB should be dealing with transmission uncertainty, and how much weight it should assign to the new member countries. I therefore turn next to overall unemployment in the union $\bar{u} = s_1 u_1 + s_2 u_2$. From (1), it follows that $E[\bar{u}] = E[\alpha_1 s_1 \hat{w}_1] + E[\tilde{\alpha}_2 s_2 \hat{w}_2]$ or

$$E[\bar{u}] = \alpha \cdot \frac{(1-\theta_1)(1-\theta_2)[1-\theta(\tau_1+\tau_2)][s_1\hat{w}_1^* + s_2\hat{w}_2^*] + s_1 s_2^2 \sigma_\theta^2 \sigma_\alpha^2 [\hat{w}_1^*(1-\theta_1)\tau_2 - \hat{w}_2^*(1-\theta_2)\tau_1]}{(1-\theta_1)(1-\theta_2)[1-\theta(\tau_1+\tau_2)] + \sigma_\theta^2[(1-\theta_1)\tau_2^2 + (1-\theta_2)\tau_1^2]} \quad (12)$$

Total unemployment clearly shows the interaction between the two labor unions. The second term in the numerator will disappear whenever one source of uncertainty is zero or if one country's weight is zero. In those cases, unemployment would unambiguously be increasing in the real wage targets of the union, and be decreasing in preference uncertainty.

Only the interaction between the two labor unions implies that the results are potentially more complicated.

How, then, does uncertainty influence the development of overall unemployment in the union (see Appendix 4)?

Result 4:

Unemployment will decrease in preference uncertainty (see Result 2).
The effect on transmission uncertainty on unemployment is ambiguous. If the real wage target of union 2 is sufficiently larger than that of country 1 unemployment will increase.

That unemployment is decreasing in uncertainty about the central bank's reaction is established already in Result 2. Also consistent with earlier results, the influence of transmission uncertainty on wage demands and thus overall unemployment is likely to be positive if union 2 is aggressive. The union faced with the uncertainty of transmission will set higher wage demands to be sure to realize its wage target. Only if the union is very much concerned with unemployment, reflected in a low real wage target, will higher uncertainty lead to lower overall unemployment. And even though union 1 will be cautious in a situation of high transmission uncertainty, the aggressive behavior of union 2 is likely to dominate, so that the overall development in labor markets will suffer from an increase in transmission uncertainty.

The conclusion from the comparison of overall unemployment is that an increase in uncertainty about the central bank's reaction lowers unemployment, while the effect of transmission uncertainty is ambiguous. What should be concluded from this finding for the current debate about central bank reform in the EMU?

4.2. Consequences for ECB Reform

As indicated in the introduction, the institutional structure of the ECB is currently characterized by strong divergences between the economic and population size of a country and its voting power in the ECB board. This is set to increase even more through the addition of small members that are relatively weak economically. This divergence is the main focus of the current debate on central bank reform for an enlarged EMU (see Berger and Müller 2004), and it also is at the heart of official proposals. One proposal has been made by the ECB, submitted to the council of ministers and accepted by them at the European Summit in Brussels, on March 21, 2003, and an alternative one is due to the European Parliament, endorsed in a meeting on March 12, 2003.[8]

The main difference between the two official proposals is how they treat the accession countries and how smaller member states are represented. The ECB proposes that up to 22 members in the enlarged EMU should be divided in two groups; more than 22 countries should be separated in three groups, with the larger countries having more relative weights (see Table 1 for details). All heads of the national central banks would rotate according to a system based on their presence in one group. The number of actual votes should be restricted to 15 at a given time while all members of the council would have the right to offer their views and to join the discussion. There would thus hardly be any gain in efficiency in reaching a decision.

The main disadvantage of this model from the perspective of the European Parliament is that the principle of "one country, one vote" is given up. Therefore, it suggested that the principle should be retained for the time being. To account for populations sizes, there should

[8] The European Parliament requires that the final decision be taken by an Intergovernmental Conference at the end of the Convention. However, legally the head of states only need to have their decision ratified by national parliaments.

in addition be a requirement for a double majority in the sense that the size of the population must be sufficiently high for a decision to become binding. Beyond 25 members, however, decisions should be separated into operational and strategic monetary policy decisions. Strategic decision should continue to be taken by all members of the council but operational decisions should be delegated to the (possibly enlarged) board. This model would immediately solve the efficiency problem but would probably only be acceptable if member states could be sure that board members are not primarily national agents.

Table 1: Voting Weights in the Enlarged ECB

Rank	Country	Economic Weight	Voting Weight
Group 1			4 Votes
	Germany	29.33	
	France	20.46	
	Italy	15.67	
	Spain	8.67	
	Netherlands	6.04	
Group 2			8 Votes
	Belgium	3.62	
	Austria	2.91	
	Poland	2.36	
	Finland	2.09	
	Portugal	1.72	
	Greece	1.65	
	Ireland	1.51	
	Luxembourg	0.92	
	Czech Republic	0.82	
	Hungary	0.70	
	Rumania	0.52	
Group 3			3 Votes
	Slovak Republic	0.26	
	Slovenia	0.24	
	Bulgaria	0.18	
	Lithuania	0.16	
	Latvia	0.10	
	Estonia	0.07	

Source: EU-Commission. Economic Weights are based on the country's GDP (5/6) and the aggregate balance sheets of banks (1/6).

Seen from the perspective of the model, the exclusive focus on efficiency in both proposals is misleading. The model would instead suggest that uncertainty could be strategically exploited when designing a central bank structure. While transmission uncertainty in one region will tend to increase the central bank's response and potentially make unions more aggressive, the opposite is true for uncertainty about the central bank's reaction. More uncertainty concerning the reaction function of the "new" ECB could have a disciplining influence on wage setting of labor unions. While the recommendation to increase the weight of the new members in the ECB board to exploit the disciplining influence of this type of uncertainty might seem counterintuitive, it could be worth paying the price of less efficient decision making to improve the employment situation in the larger union.

5. Conclusion

The paper has explored the influence of preference uncertainty and transmission uncertainty on the wage setting behavior of labor unions, starting from the observation that uncertainty is bound to increase with the enlargement of the monetary union to new member states. The increased uncertainty will change the wage setting behavior of the national labor unions in present and new member states, and it has potential implications for the debate about the needed reform of the ECB decision making structure.

Focusing exclusively on the influence of uncertainty on wage setting, the results from an increase of uncertainty are mixed. While it could be shown that indeed both countries could gain in terms of unemployment from the monetary union, the design of the decision making process and the representation of the new members in the council of the common bank are important. While uncertainty is certainly not the only relevant aspect to be taken into account when deciding about a new structure for the ECB, the analysis suggests that it should influence the reform of the ECB and that not only country size should guide the

debate. The amount of uncertainty that a particular member adds to the EMU should be one factor when deciding about this member's importance in policy making, and strategically using the characteristics of new member states might have beneficial labor market effects.

However, since particularly the amount of transmission uncertainty is likely to change over time, and because it is hardly quantifiable in a formal sense, the best workable solution might nevertheless be a monetary policy decided by a board alone, maybe with the council in an advisory function concerning the main objectives of monetary policy. This would ensure that enough flexibility exists to gradually adjust the weights of particular countries when the structural determinants change over time. As transmission uncertainty would be reduced over time, those countries initially characterized by a high degree of transmission uncertainty could gradually receive a higher weight in the central bank's concern. Such a gradual change is probably best to manage with a small group of policy makers. At the same time, this more centralized decision making organ should not necessarily be as transparent as possible to exploit the positive effects of preference uncertainty.

Appendix 1: Comparison of Union Utility Functions

Compare the following two objective functions. (i) is the standard assumption of unions caring for unemployment and real wages (Cukierman and Lippi 2001, Grüner 2002), where u_i is determined by (1). For simplicity, I set $\alpha = 1$. (ii) is the simplified version that is used in the main text (Sorensen 1991).

i) $V_i = (w_i - \pi_i) - \frac{c_i}{2} u_i^2$ ii) $V_i = -(w_i - \pi_i - \hat{w}_i^*)^2$

Abstracting from shocks, the reaction function of the central bank is $\pi_i = b w_i$, as in the main text. Using this in the objective functions of the union yields as the respective optimal wage demand for the union

i) $w_i = \dfrac{1}{c_i(1-b)}$ ii) $w_i = \dfrac{\hat{w}_i^*}{(1-b)}$

Thus, a real wage target of $\hat{w}_i^* = 1/c_i$ yields identical results, so that the real wage target reflects the union's concern with unemployment c_i.

Appendix 2: The Influence of Uncertainty on Real Wages

The condition for real wages to decrease in preference uncertainty is unambiguously fulfilled for both countries since $\hat{w}_i\big|_{\sigma_\theta^2=0} - \hat{w}_i\big|_{\sigma_\theta^2>0} > 0$ if $\sigma_\theta^2 \cdot \tau_i(1-\theta_j)\left[\tau_i\hat{w}_i^* + \tau_j\hat{w}_j^*\right] > 0$.

The comparison of real wages and how they react to increases in the degree of transmission uncertainty is less clear. The expressions are complicated and some simplifications are useful. Recall $\tau_1 \equiv s_1\alpha^2$ and $\tau_2 \equiv s_2\alpha^2 + s_2^2\sigma_\alpha^2$. For the case of no uncertainty, we thus have $\bar{\tau}_2 \equiv s_2\alpha^2$ and $\tau_2 > \bar{\tau}_2$. We can furthermore define $a_1 \equiv (1+b\tau_1)$, $a_2 \equiv (1+b\tau_2)$ and $\bar{a}_2 \equiv (1+b\bar{\tau}_2)$, with $a_2 > \bar{a}_2$.

The condition for $\hat{w}_i\big|_{\sigma_\alpha^2=0} - \hat{w}_i\big|_{\sigma_\alpha^2>0} > 0$ in the two countries becomes, respectively, for country 1

$$\hat{w}_1^* \cdot \tau_1\left[\left(a_1 + b^2\tau_1^2\right)\left(\bar{a}_2 - a_2\right)\right]$$
$$- \hat{w}_2^* \cdot \left[a_2\tau_2\left(b^2\bar{a}_2\tau_2\bar{\tau}_2 - a_1\left(\bar{a}_2 + b^2\tau_1^2\right)\right) - \bar{a}_2\bar{\tau}_2\left(b^2a_2\tau_2\bar{\tau}_2 - a_1\left(a_2 + b^2\tau_1^2\right)\right)\right]$$

while for country 2 it is

$$\hat{w}_2^* \cdot a_1\left[a_2\tau_2^2\left(\bar{a}_2 + b^2\tau_1^2\right) - \bar{a}_2\bar{\tau}_2^2\left(a_2 + b^2\tau_1^2\right)\right]$$
$$- \hat{w}_1^* \cdot \tau_1\left[a_2\tau_2\left(b^2\bar{a}_2\tau_2\bar{\tau}_2 - a_1\left(\bar{a}_2 + b^2\tau_1^2\right)\right) - \bar{a}_2\bar{\tau}_2\left(b^2a_2\tau_2\bar{\tau}_2 - a_1\left(a_2 + b^2\tau_1^2\right)\right)\right].$$

There are different influence on the two countries from a positive and increasing degree of uncertainty in the transmission of monetary policy. For country 1, the term multiplying its own real wage target $\hat{w}_i^*$ is clearly negative, while it is positive for country 2. The expression

multiplying the other union's real wage target $\hat{w}_j^*$ is identical for both countries. Because $a_2\tau_2 > \bar{a}_2\tau_2$, the term is positive if $\left(\bar{a}_2\left(b^2\tau_2\bar{\tau}_2 - a_1\right) - a_1b^2\tau_1^2\right)$ and $\left(a_2\left(b^2\tau_2\bar{\tau}_2 - a_1\right) - a_1b^2\tau_1^2\right)$ are positive. This can be ruled out for $\left(b^2\tau_2\bar{\tau}_2 - a_1\right) = \left(b^2\tau_2\bar{\tau}_2 - (1 + b\tau_1)\right) < 0$. This is the case for $b^2\tau_2\bar{\tau}_2 < 1$ which can be expected for $\alpha^2, b^2 < 1$ and if σ_α^2 is not too large. Then, the term in the brackets is negative and the overall expression is positive. In this case, the real wage in country 2 will increase (and thus will unemployment), whereas in country 1 it is decisive which real wage target is larger. If the union in country 2 is more aggressive than union 1 (and hence $\hat{w}_2^*$ is sufficiently larger than $\hat{w}_1^*$) the real wage in country 1 increases as well.

Appendix 3: Real Wages under Monetary Autonomy and Monetary Union

The difference for real wages before and after the enlargement for country 1, $\hat{w}_1\big|_{MA} - \hat{w}_1\big|_{MU}$ (where MA and MU denote monetary autonomy and monetary union), is

$$\hat{w}_2^* \frac{1-\theta_2}{1-\theta_1}\tau_1\tau_2 - \hat{w}_1^*\left(\tau_2^2 - \tau_1^2\right),$$

which implies that unemployment in country 1 will be increasing whenever the real wage target of union 2 is sufficiently larger than that of union 1. This will force union 1 to require higher nominal wages which will translate also into higher real wages.

The real wage comparison for country 2, $\hat{w}_2\big|_{MA} - \hat{w}_2\big|_{MU}$, is more complicated. It is

$$\begin{aligned}
&\hat{w}_2^* \cdot (1-\theta_1)(1-\theta_2)(1-\theta(\tau_1+\tau_2)) \cdot \left[\Theta_2(1-\Theta_2) - \sigma_{\Theta_2}^2\right] \\
&\quad + \sigma_\theta^2 \{\ \hat{w}_2^*(1-\theta_2)\tau_2\left[\tau_2(1-\Theta_2) - \tau_1\left((1-\Theta_2)^2 + \tau_1\sigma_{\Theta_2}^2\right)\right] \\
&\quad\quad + (1-\theta_1)\left[\tau_1^2\hat{w}_2^*(1-\Theta_2) - \tau_2^2\left(\hat{w}_1^*(1-\Theta_2)^2 + \sigma_{\Theta_2}^2\right)\right]\ \}.
\end{aligned}$$

Notice the difference between θ_2 and Θ_2. The latter comprises a relative weight on country 2 of unity; i.e. this is the case of monetary autonomy. It will therefore be larger, and

the same applies for the variance, given that $z_2<1$. Thus, $\Theta_2 > \theta_2$ and $\sigma^2_{\Theta_2} > \sigma^2_\theta$. If uncertainty under monetary autonomy is high, the first term could be negative. For the expression multiplying σ^2_θ, the relative weight of the countries and the unions' real wage targets are important. If the relative weight of country 2 is large and if its real wage target is higher than that of country 1, the expression will tend to be positive. In this case, therefore, also country 2 could gain in terms of unemployment in the monetary union. If its weight is small, however, and union 2 tends to be less aggressive than union 1, it could lose from entering the monetary union.

Appendix 4: The Influence of Uncertainty on Unemployment

The condition for $E\left[\bar{u}\Big|_{\sigma^2_\alpha>0}\right] > E\left[\bar{u}\Big|_{\sigma^2_\alpha=0}\right]$ is

$$s_1\hat{w}_1^* \cdot \left[\left(a_2\tau_2^2 - \bar{a}_2\bar{\tau}_2^2\right) - s_2^2\sigma_\alpha^2 a_2\tau_2\left(a_1\bar{a}_2 + \bar{b}^2\left(\bar{a}_2\bar{\tau}_2^2 + a_1\tau_1^2\right)\right)\right]$$

$$+ s_2\hat{w}_2^* \cdot \left[\left(a_2\tau_2^2 - \bar{a}_2\bar{\tau}_2^2\right) + s_1 s_2\sigma_\alpha^2 a_1\tau_1\left(a_1\bar{a}_2 + \bar{b}^2\left(\bar{a}_2\bar{\tau}_2^2 + a_1\tau_1^2\right)\right)\right] > 0.$$

The term multiplying the real wage target of union 2 is positive, while that multiplying the target of union 1 is likely to be negative for increasing transmission uncertainty. Thus, transmission uncertainty has an ambiguous influence on the development of unemployment in the union.

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