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ABSTRACT

On the Role of Conflicting National Interests in the ECB Council*

This Paper studies the strategic interaction between Euroland's national macroeconomic players and the European Central Bank (ECB) council under two alternative assumptions on central bank behaviour: (i) all members of the ECB council are concerned about Euroland's macroeconomic aggregates and (ii) the ECB council is composed of national central bankers who are mainly concerned about domestic macroeconomic conditions. Under the former assumption monetary policy can be used to impose some discipline on national macroeconomic players at the cost of higher inflation. Under the predominance of national interests, however, this trade-off can no longer be exploited. The persistence of national perspectives in the ECB council has an adverse impact on the relationship between key macroeconomic variables such as inflation and unemployment or inflation and the level of government debt.

JEL Classification: E24, E50, E62, E63, F15, F33
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NON-TECHNICAL SUMMARY

The Paper investigates how conflicting national interests in the central bank council will affect the strategic interaction between the European Central Bank (ECB) and other major macroeconomic players in Euroland. It has recently been argued that the members of the ECB council might primarily be concerned about their domestic macroeconomic situation rather than about the macroeconomic development in Europe as a whole. This may be the case in particular in countries where reappointment procedures give national governments some control over their central bank governor's decisions. In this Paper we show that the persistence of national perspectives in the ECB council may have an adverse impact on the relationship between key macroeconomic variables such as inflation and unemployment or inflation and the level of government debt.

The main part of the Paper deals with the wage-setting side, whilst a fiscal policy model along similar lines is developed in the appendix. In the main part of the Paper, our objective is to analyse the combinations of inflation and unemployment that emerge for different degrees of inflation aversion of Europe's central bankers. Recent theoretical work has shown that EMU may adversely affect the set of combinations of inflation and unemployment that are available when national macroeconomic players internalize the consequences of their actions to a smaller extent. In this Paper we show that this problem is aggravated when national perspectives dominate in the ECB's decision process.

The Paper is closely related to a recent paper by Alex Cukierman and Francesco Lippi that shows that a trade-off between inflation and unemployment may emerge at the institutional stage when unions internalize, to a certain extent, the cost of inflation. We show that this fundamental trade-off can no longer be exploited in a monetary union where central bankers mainly care about domestic macroeconomic conditions. The intuition that underlies the trade-off in the Cukierman and Lippi model goes as follows: an inflation-averse central bank credibly secures price stability. When confronted with such a central bank, unions demand high nominal wages, leading to a high rate of unemployment. A central bank that does not care about inflation instead imposes some discipline on wage-setters. When wage-setters internalize the ensuing cost of price inflation they do not realize their desired real wage increase. Instead they raise nominal wages up to the point where the marginal utility from further real wage gains equals the marginal cost of inflation. Hence, lower real wages and higher employment can be obtained at the cost of higher inflation if a government chooses to appoint a weak central bank.

This trade-off disappears when national central bankers in the ECB council mainly care about domestic employment and not European employment. In this situation national macroeconomic players know that their actions have no impact on the ECB's decisions. This is so because individual actions do not affect the preferred policies of a majority of the ECB council members.

The analysis in this Paper provides some new insights in the possible consequences of an enlargement of Euroland. With an enlargement of Euroland the number of national central bankers in the ECB council will increase. Such an enlargement worsens the trade-off between inflation and unemployment in Europe if central bankers care for European aggregates. If central bankers care for domestic aggregates instead, the enlargement will not affect inflation or unemployment. The same holds for a reduction of the number of central bankers in the council that one might want to consider. Such a reduction has no impact unless ECB council members take a broader European perspective in their decisions.

The size of the ECB council may only play a role when council members' preferences are not perfectly observable for national players. In this case a small disciplinary effect may arise because it is no longer sure whether a particular central banker will be pivotal in the council or not. In such a setting a reduction of the number of central bankers in the council will increase the probability that a given member will be pivotal. A reduction of the size of the ECB council would then be a proper response to the enlargement of Euroland.

1 Introduction

This paper investigates how conflicting national interests in the central bank council will affect the strategic interaction between the European Central Bank (ECB) and other major macroeconomic players in Euroland. It has recently been argued that the members of the ECB council might primarily be concerned about their domestic macroeconomic situation rather than about the macroeconomic development in Europe as a whole[1] [c.f. von Hagen and Süppel, 1994 and Begg, De Grauve, Giavazzi, Uhlig, Wyplosz, 1998]. In this paper we show that the persistence of national perspectives in the ECB council may have an adverse impact on the relationship between key macroeconomic variables such as inflation and unemployment and inflation and the level of government debt.

The main part of the paper deals with the wage setting side, a fiscal policy model along similar lines is developed in the appendix. Our objective in the main part of the paper is to analyze what combinations of inflation and unemployment emerge for different degrees of inflation aversion of Europe's central bankers. The analysis is closely related to a recent paper by Cukierman and Lippi (1999) which shows that a trade-off between inflation and unemployment may emerge at the institutional stage when trade unions internalize the cost of inflation to a certain extent[2]. The intuition that underlies the trade-off in the Cukierman and Lippi model goes as follows: An inflation-averse central bank credibly secures price stability. When confronted with such a central bank, unions demand high nominal wages which leads to a high rate

[1]This may in particular be the case in countries where reappointment procedures give national governments some control over their central bank governor's decisions [c.f. Neumann, 1991].

[2]The fact that a central bank which credibly threatens to inflate away nominal wage claims may be able to reduce unemployment has first - and independently - been established by Cukierman and Lippi (1999) and Velasco and Guzzo (1998).

of unemployment. A central bank that does not care about inflation instead imposes some discipline on wage setters. When wage setters internalize the ensuing cost of price inflation they do not realize their desired real wage increase. Instead they raise nominal wages up to the point where the marginal utility from further real wage gains equals the marginal cost of inflation. Hence, lower real wages and higher employment can be obtained at the cost of higher inflation if a government chooses to appoint a weak central bank.

In this paper we show that this fundamental trade-off can no longer be exploited in a monetary union when central bankers mainly care about domestic macroeconomic conditions. In our analysis we shall assume (i) that national central bankers mainly care about domestic employment and European inflation and (ii) that decisions in the central bank council are taken by majority vote[3]. Our game has two types of equilibria; in all equilibria the disciplinary effect of inflation on union behavior vanishes for at least for half of the countries in the monetary union. The intuition for this result goes as follows: In an equilibrium at most half of the national central bank governors in the ECB council may potentially be pivotal in the decision process. Trade unions in the remaining countries know that their off-equilibrium play will leave central bank policies unaffected. In those countries unions add their real wage claims to expected inflation. The delegation of monetary policymaking to a weak central bank therefore only increases inflation but it does not raise the level of employment. When central bankers have a national perspective, the trade-off between inflation and unemployment on the institutional stage can no longer be exploited.

The paper is related to recent work by Grüner and Hefeker (1996, 1999) and Cukierman and Lippi (1998) on the effects of EMU on labor markets. Both papers

[3]This assumption has previously been made in von Hagen and Süppel (1994). Von Hagen and Süppel study how the ECB reacts to stochastic shocks in the participating countries. The present paper instead studies the strategic interaction between the ECB and other macroeconomic players.

have shown that EMU may adversely affect the set of combinations of inflation and unemployment that can be obtained. In a monetary union more trade unions are in the same currency area. Euroland's monetary authority therefore pays less attention to single wage setters than in the case of autonomous national monetary policy. Trade unions that care about inflation internalize the inflationary consequences of their actions to a smaller extent. This is why a reduction of unemployment comes at a larger cost of inflation. In this paper we show that this problem may be severely aggravated when national perspectives dominate in the ECB's decision process.

Similar forms of strategic interaction to the one between a central bank and trade unions emerge between the central bank and national governments when the latter fix their level of sovereign debt. On one hand a central bank that cares about the governments' financial position may inflate away part of the outstanding debt, on the other hand governments may internalize part of the inflationary costs that are generated by excessive deficits. In the appendix of the paper we study a simple model of this process which highlights the relevance of our results in this area.

The analysis in the body of the paper is based on a simplified version of the model in Cukierman and Lippi (1999). Section 2 introduces this model and shows how the trade-off between inflation and unemployment is affected by the introduction of a joint currency. In section 2 we shall assume that the ECB is a homogeneous body that pursues targets of Euroland's macroeconomic aggregates. This setting has previously been studied in Grüner and Hefeker (1996, 1999), and in Cukierman and Lippi (1998)[4] and we will only briefly repeat their main argument. In section 3 we show that the trade-off between inflation and unemployment can no longer be exploited when the central bank council is composed of national central bankers who take care of domestic conditions. Section 4 studies the robustness of this result. We examine the role of

[4]See also Calmfors (1998).

national differences in inflation aversion, union aggressivity, and uncertainty about central bank preferences. Section 5 relates the paper to the recent debate on the role of central bank conservatism and discusses possible consequences of an enlargement of Euroland.

2 The Trade-Off Between Inflation and Unemployment

2.1 Players and Timing of Events

Consider an economy that is composed of n sectors of identical size. The total labor force is denoted by L. Labor demand in sector i, $i = 1..n$, is given by:

$$L_i^d = (1 - \alpha\omega_i)\frac{L}{n}, \tag{1}$$

where ω_i denotes the logarithm of the real wage increase in sector i. At stage one of the game, trade unions in all sectors simultaneously and unilaterally fix sectoral nominal wage increases w_i. At stage two the central bank unilaterally fixes inflation π. If there is excess demand for labor in one sector then workers from a sector with excess supply move costlessly to that sector. Hence, total employment can be obtained as $\min\left\{L, L^d\right\}$ where

$$L^d = \sum_{i=1}^{n}(1 - \alpha\omega_i)\frac{L}{n}. \tag{2}$$

The aggregate unemployment rate is denoted by:

$$u = \max\left\{\frac{L - L^d}{L}, 0\right\} = \max\left\{\alpha\bar{\omega}, 0\right\}, \tag{3}$$

where $\bar{\omega}$ denotes the average real wage. Unemployment is zero when real wages in all sectors do not increase, i.e. for $\omega_i = 0,\ i = 1..n$.[5] All sectoral trade unions care about high sectoral real wages, high sectoral employment and low inflation. Unions are aggressive in the following sense: in absence of an inflation reaction of the central bank, each union would choose a positive real wage $\omega_i^* > 0$. Cukierman and Lippi write union utility as:

$$U_i = 2\omega_i - Au_i^2 - B\pi^2, \tag{4}$$

where u_i is defined as a rate of sectoral unemployment,

$$u_i = \max\left\{\frac{L/n - L_i^d}{L/n}, 0\right\} = \max\left\{\alpha\omega_i, 0\right\}. \tag{5}$$

This rate refers to a full employment situation where the same number of workers L/n is employed in all sectors.[6] From (4) and (5) it follows that a union's desired real wage is:

$$\omega_i^* = \frac{1}{A\alpha^2} > 0. \tag{6}$$

The corresponding unemployment rate $u_i^* = 1/A\alpha > 0$. The central bank cares about inflation and employment, not about real wages. It is characterized by its degree of formal and personal independence and by its degree of inflation aversion. The central bank maximizes a utility function:

$$C(u, \pi) = -u^2 - I\pi^2, \tag{7}$$

[5] Assuming instead that full-employment is achieved at a positive or negative real-wage increase would not affect our results but add notation.

[6] All our results can be obtained with a more general objective function in sectoral real wages and inflation. Such an objective function would be additively separable in sectoral real wages and the cost of inflation. It has to be strictly concave in the own sector's real wage with positive slope at the full employment real wage in order to yield our results.

where the parameter I measures a combination of central-bank independence and inflation-aversion. In what follows we shall simply speak of I as the central bank's inflation aversion.

2.2 The Long-Run Trade-off

Given the economy's average nominal wage $\bar{w}$, the central bank reaction is:

$$\pi = \frac{\alpha^2}{\alpha^2 + I}\bar{w} = \beta\bar{w}. \tag{8}$$

Inflation is a fraction $\beta \in [0, 1]$ of the average wage increase and β increases if the central bank is less inflation-averse. The first proposition characterizes the equilibrium and presents some comparative static results.

Proposition 1 *(i) The game has exactly one subgame perfect Nash equilibrium. It is symmetric and characterized by the following values for nominal wages, inflation and real wages:*

$$w_i = \bar{w} = \frac{n - \beta}{\Gamma}, \tag{9}$$

$$\pi = \beta\frac{n - \beta}{\Gamma}, \tag{10}$$

$$\omega = (1 - \beta)\frac{n - \beta}{\Gamma}, \tag{11}$$

with

$$\Gamma = A\alpha^2\left(n(1 - \beta) - \beta + \beta^2\right) + B\beta^2. \tag{12}$$

Moreover:

(ii) $du/dI > 0$.

(iii) $d\pi/dI < 0$ *for* B *sufficiently small.*

(iv) $dw_i/dI < 0$ *for* B *sufficiently small.*

(v) $\pi = \frac{n-1}{B}$ *for* $I = 0$.

PROOF Substitution of the central bank's reaction function (8) into union utility (4), derivation with respect to sectoral wages and solving for the symmetric equilibrium yields (9) - (12). We can exclude equilibria where there is aggregate excess demand because in a situation of excess demand all unions would raise wages. Moreover, if there was an asymmetric equilibrium then at least one union would not behave optimally. Hence, the equilibrium is unique.

(ii)

$$\frac{d\bar{\omega}}{d\beta} = B\beta\frac{\beta - n\,(2-\beta)}{\Gamma^2} < 0. \tag{13}$$

(iii)

$$\frac{d\pi}{d\beta} = \frac{A\alpha^2\,(n-\beta)^2 - nB\beta^2}{\Gamma^2}. \tag{14}$$

The numerator is positive if B is sufficiently small.

(iv)

$$\frac{d\bar{w}}{d\beta} = \frac{A\alpha^2\,(n-\beta)^2 - B\beta\,(2n-\beta)}{\Gamma^2}. \tag{15}$$

The numerator is positive if B is sufficiently small. Q.E.D.

According to Proposition 1 (ii) and (iii), a government that delegates monetary policy to a central bank faces a trade-off between inflation and unemployment when wage setting is not fully centralized ($n > 1$) and when trade unions are not too inflation-averse. The intuition for this result goes as follows. An inflation-averse central bank credibly keeps inflation low. Unions know that their wage claims do not induce inflation and realize their ideal real wage claim ω^* and a high rate of unemployment. A central bank that does not care about inflation ($\beta = 1$) establishes full employment because it inflates away the nominal wage claims. However, it cannot achieve zero inflation when wage setting is decentralized. To see this consider a situation where all wage claims are zero. In such a situation individual trade unions can raise real wages because the central bank needs less than 1 percent inflation in order to establish full employment after a 1 percent wage increase in a single sector.

In equilibrium all unions demand wages such that the marginal cost of inflation equals the marginal gain from higher real wages.

Note that, unlike the underlying short-run Phillips curve, the relation between inflation and unemployment that emerges from this model is a stable long-run relationship (see also Figure 1). A government that perceives unemployment as particularly costly may therefore choose to delegate monetary policy to a weak central bank.

2.3 EMU with Truly European Central Bankers

With a monetary union the number of sectoral trade unions inside the same currency area is increased. Consequently, the inflationary impact of a sectoral wage increase is smaller. The effect of EMU is the same as the one of increased decentralization of the wage setting process in our model. As one can see from

$$\frac{d\bar{w}}{dn} = \frac{\beta^2 B}{\Gamma^2} > 0, \tag{16}$$

decentralization raises equilibrium nominal wages, inflation, and unemployment.[7] The trade off between inflation and unemployment that arises at the institutional level is therefore adversely affected by the monetary union. Zero inflation can still be obtained at the cost of high unemployment [see Figure 1]. However, lower unemployment rates now come at the cost of higher inflation rates. This is so because higher marginal costs of inflation for trade unions are needed in equilibrium in order to prevent further wage increases.

Assuming quadratic government preferences of the form $-(u^2 + K\pi^2)$ one can show that the optimal degree of central bank inflation aversion increases when the

[7] This effect has been studied in Grüner and Hefeker, (1996, 1999), and Cukierman and Lippi (1998). Unlike Calmfors and Driffil (1988) or Cukierman and Lippi we here assumed that sectors do not compete on output markets. This is an innocent simplification when the monetary union does not affect the structure of competition on output markets.

currency area is enlarged.

Proposition 2 *Let $n \geq 3$. The optimal value of β decreases with EMU. We have:*

PROOF In equilibrium a central bank with given β generates the same ratio $\frac{\pi}{u}$ for all n. This follows from $\pi = \beta\bar{w}$ and from $u = \alpha(1-\beta)\bar{w}$. For $\frac{\pi}{u}$ constant the government's indifference curves have the same slope. If, for given β the slope of the curve $\pi(u)$ becomes steeper as n increases, the optimum must be at a lower value of β. The slope is:

$$\frac{d\pi}{du} = \frac{\frac{d\pi}{d\beta}}{\frac{du}{d\beta}} = \frac{1}{\beta B}\frac{A\alpha^2 n^2 - 2A\alpha^2 n\beta + A\alpha^2\beta^2 - nB\beta^2}{(\beta - 2n + n\beta)}, \tag{17}$$

and the derivative:

$$\frac{d\left(\frac{d\pi}{du}\,|\beta \text{ const.}\right)}{dn} = \frac{2A\alpha^2 n\beta - 2A\alpha^2 n^2 + A\alpha^2 n^2\beta - B\beta^3 - A\alpha^2\beta^3}{(\beta - 2n + n\beta)^2}. \tag{18}$$

This is negative if

$$A\alpha^2\left(2n\beta - 2n^2 + n^2\beta - \beta^3\right) - B\beta^3 \;<\; 0 \Leftrightarrow \tag{19}$$

$$A\alpha^2\left(-(2-\beta)n^2 + 2n\beta - \beta^3\right) - B\beta^3 \;<\; 0 \Leftarrow n \geq 3. \tag{20}$$

Q.E.D.

EMU worsens the trade-off between inflation and unemployment. A social planner with quadratic preferences should delegate monetary policy to a more conservative central bank than in the case of autonomous national monetary policy. However, the trade-off between inflation and unemployment can still be exploited and it may still be beneficial to delegate monetary policy to a weak central bank if unemployment is considered to be very costly.

3 National Interests in the ECB Council

So far we have assumed that the European central bank is a homogeneous body with one single objective function. In this section we turn to the case where national perspectives persist in the ECB. Each of the N countries has one representative in the council. Following Hagen and Süppel (1994) we assume that each council member has preferences over domestic employment and Euroland's inflation. The preferences of country k's central banker are represented by the loss function:

$$C_k(u_k, \pi) = -u_k^2 - I\pi^2. \tag{21}$$

where u_k is country k's rate of unemployment. We shall first assume that I takes the same value for all central bankers; the assumption will be relaxed later. Decisions in the central bank council are taken by majority rule and the inflation rate that is preferred by the median voter in the central bank council is implemented. The game has an equilibrium where all wages in all countries rise by the same amount.

Proposition 3 *The game has exactly one symmetric equilibrium if $I > 0$. The equilibrium employment level is independent of the central bank's degree of inflation aversion. Each union realizes its desired real wage ω^*. The equilibrium is characterized by a nominal wage*

$$\bar{w} = \beta\bar{w} + \omega^* \tag{22}$$

in all countries. The equilibrium inflation rate decreases with I.

PROOF Unions add the premium ω^* to the actual inflation rate. No union wants to deviate from its action because deviations would not affect the rate of inflation. There is no other symmetric equilibrium because all unions would choose $w = \pi + \omega^*$. Q.E.D.

In the symmetric equilibrium wages, inflation and unemployment are higher than in the case where all central bankers share a European perspective. The trade-off between inflation and unemployment vanishes when the monetary union is introduced (see again Figure 1). Central bankers who take a national perspective should be as conservative as possible. Central bankers who care about Euroland's aggregates should be less conservative instead.

Besides the symmetric equilibrium, there is a second class of equilibria. In those equilibria half of the countries are high-wage and half are low-wage countries (see Figure 2). All nominal wages are at least as large as in the case of autonomous national monetary policy (w^{nat}).

Proposition 4 *There exists an equilibrium where unions in* $(N+1)/2$ *countries choose a wage increase* $\hat{w}$ *that satisfies* $\beta\hat{w} + \omega^* > \hat{w} \geq w^{nat}$. *Unions in the remaining countries choose* $w = \beta\hat{w} + \omega^*$.

PROOF Downward deviations of trade unions in the low-wage group do not pay. These deviations do not change inflation but they reduce the real wage. Upward deviations in this group are pivotal and raise inflation above the national equilibrium level. This is why they do not pay for sectoral unions either. Obviously the unions in the high-wage countries behave optimally. Q.E.D.

Which of the two equilibria is the most obvious way to play the game? Two opposing arguments can be made. On one hand, one can show that all unions are better off in the asymmetric equilibrium. This is so because unions in low- and high-wage countries benefit from lower inflation in the second equilibrium. This would speak in favor of the asymmetric equilibrium. On the other hand the symmetric equilibrium does not rely on the coordination on a particular way to raise wages asymmetrically in different countries. We consider this to be a very strong argument in favor of the symmetric equilibrium as the most obvious way to play the game.

4 Robustness

Typically, voting equilibria are very sensitive with respect to symmetry assumptions about preferences and assumptions about the information structure. In this section we check for the robustness of our results with respect to various modifications of our model. We first check how a conservative executive board affects results. We then consider the case where either unions or central banks differ with respect to their preferences. Finally, we shall study the role of uncertainty about central bank preferences.

4.1 The Role of a Conservative Executive Board

So far we have focused on the role of a central bank council that is exclusively composed of national central bank governors. In addition to them there are 6 executive board members in the ECB council. How does an inflation-averse executive board member affect the outcome of our game if these agents are very inflation averse? It is straightforward to see that the symmetric equilibrium is not affected at all as long as the executive board has no majority in the central bank council. This is different in the asymmetric equilibrium. With six conservative central bankers, the asymmetric equilibrium requires that unions in only three countries behave disciplined, the unions in the other 8 countries get their desired real wage. Paradoxically, a conservative executive board does not reduce inflation but increases unemployment in a number of countries.[8]

[8]This result differs from an earlier result in Cukierman (1991). Cukierman studies the role of the executive board in a setting where central bankers react to economic shocks. He finds that a strong executive board may lower average inflation.

4.2 The Role of Asymmetric Trade Unions

We next study the case where unions in different countries differ in their degree of aggressiveness. This is captured in the assumption that $A_1 < A_2 < .. < A_N$, where N denotes the number of countries participating in EMU. In absence of an inflation reaction of the central bank all unions would pick real wages $\omega_1^* < .. < \omega_N^*$. The game has one equilibrium where there is no wage discipline except in one single country.

Proposition 5 *The game has the following equilibrium if $I > 0$. The equilibrium inflation rate satisfies $\pi = \beta w_{(N-1)/2}$. The wages in country $(N-1)/2$ and $(N+1)/2$ satisfy:*

$$w = \beta w + \omega^*_{(N-1)/2}. \tag{23}$$

Each union in countries $k \neq (N+1)/2$ realizes its desired real wage ω_i^*.

PROOF The unions in country $(N-1)/2$ and $(N+1)/2$ are both pivotal and do not want to raise nominal wages. Unions in country $(N-1)/2$ realize their ideal real wage. Unions in country $(N+1)/2$ would increase inflation in an undesired manner by raising wages. Downward deviations are not pivotal. The other unions obtain their desired real wage and their countries are not pivotal. Q.E.D.

As in the previous section, there is another type of pure strategies equilibria where half of the countries exhibit some wage discipline.

Proposition 6 *There are pure strategies equilibria where unions in $(N+1)/2$ countries demand a low wage $\hat{w} \geq 0$. Inflation is $\beta\hat{w}$. In $(N-1)/2$ countries unions pick their bliss point $w_k = \beta\hat{w} + \omega_k^*$.*

PROOF Analogue to the proof of proposition 4. Q.E.D.

Figure 3 shows how inflation and employment are determined in both equilibria. In both equilibria the inflation rate is at least as large as the median of all the inflation rates before monetary union.

4.3 The Role of Asymmetric National Central Banks

We next study the case where central banks in different countries differ in their degree of conservativeness. This is captured in the assumption $I_1 > I_2 > ... > I_N$. We define $\beta_k = \alpha^2/(\alpha^2 + I_k)$. Again both types of equilibria exist.

Proposition 7 *The no-wage-discipline equilibrium is characterized by a nominal wage*

$$w_{(N-1)/2} = \beta_{(N-1)/2} w_{(N-1)/2} + \omega^* \tag{24}$$

in country $(N-1)/2$. *The equilibrium inflation rate is* $\beta_{(N-1)/2} w_{(N-1)/2}$. *Unions in countries* $k \neq (N+1)/2$ *realize the desired real wage* ω^*. *Unions in country* $(N+1)/2$ *choose their nominal wage so that* $\beta_{(N-1)/2} w_{(N-1)/2} = \beta_{(N+1)/2} w_{(N+1)/2}$.

PROOF The central bankers from country $(N-1)/2$ and $(N+1)/2$ are both pivotal. Unions in both countries do not want to raise their wages. The former realize their ideal real wage. The latter would increase inflation. Downward deviations in both countries are not pivotal. The unions in the remaining countries obtain their desired real wage; their central bankers are not pivotal in the council. Q.E.D.

There is another sort of pure strategies equilibria that corresponds to the partially disciplined one.

Proposition 8 *There are equilibria in pure strategies where* $(N+1)/2$ *central bankers are in favor of the same (low) inflation rate. This rate is at least as large as the median of the national inflation rates. In* $(N-1)/2$ *countries unions pick their bliss point* $\beta\hat{w} + \omega^*$.

PROOF Almost analogue to the one of proposition 4. Q.E.D.

In the second equilibrium among the countries with disciplined unions those with a weak central bank are the ones with lower unemployment rates. Both types of equilibria are displayed in Figure 4.

4.4 The Role of Uncertainty

How does uncertainty about central bank preferences affects the equilibria of our game? With uncertainty about central banker's preferences there may be a small probability that the own central banker is pivotal in the decision process even if all nominal wage claims are the same. This is the case if the support of the distributions of I of the different central banks intersect. We here consider an example where all central bankers' preference parameters are identically distributed. Suppose that the parameter I is identically and independently distributed on some interval $\left[\underline{I}, \bar{I}\right]$ for all central banks. Moreover assume that all unions in all countries have identical preferences. We denote with $\vec{\beta}$ the vector of all β values. In a symmetric equilibrium the inflation reaction of the central bank is characterized by:

$$\pi = \beta_m(\vec{\beta})\bar{w} \tag{25}$$

where $\beta_m(\vec{\beta})$ is the median of all realized β values and $\bar{w}$ is Euroland's average wage. Let $\xi_k(\vec{\beta})$ be a dummy that is 1 if country k is pivotal and zero otherwise. In a symmetric equilibrium, wage claims $\bar{w}$ must satisfy:

$$\bar{w} = \arg\max_{w_{ik}} \int_{\left[\underline{I},\bar{I}\right]^N} \cdots \int \left(1 - \xi_k(\vec{\beta})\right) U_{ik}(w_{ik}, \beta^m(\vec{\beta})\bar{w}) + \tag{26}$$

$$\xi_k(\vec{\beta}) U_{ik}(w_{ik}, \beta_k \bar{w}_k)\ dI_1 ... dI_N \tag{27}$$

The first term on the right-hand-side refers to a situation where country k is not pivotal. This event occurs with probability $\frac{N-1}{N}$. With probability $\frac{1}{N}$ country k is pivotal. In this case a sectoral wage w_{ik} in country k affects $\bar{w}_k$ and inflation. Hence, under uncertainty about central banker's preferences some of the original disciplinary effect from the model where central bankers have European perspectives is at work.

5 Discussion

5.1 Populist Central Bankers

The present paper contributes to the recent debate on the role of central bank conservatism in a unionized economy that has been initiated by Cukierman and Lippi (1999) and Velasco and Guzzo (1998). Until recently, it was part of the conventional wisdom that independence and a concern for price stability are two desirable properties of a country's monetary authority. It was agreed that a central bank should credibly commit not to accommodate the behavior of macroeconomic players such as trade unions and governments who pursue overly aggressive or loose policies. Such a central bank would bring about more moderate wage claims, lower debt levels and price stability. This conventional wisdom has been challenged in both contributions. Their paradox result is that a weak monetary authority achieves a maximum degree of wage discipline *and* price stability when it credibly threatens to inflate away nominal wage increases. While this result only holds for fully centralized wage bargaining, decentralized bargaining still yields that there is a trade-off between inflation and unemployment at the institutional stage. Accordingly, one might still want to delegate monetary policy to a weak central bank when unemployment is perceived as sufficiently costly. The present paper shows that such a policy is likely to fail when conflicting national interests dominate in the ECB council's decisions.[9]

[9]Note that a more fundamental critical remark with respect to this recent debate is in order. From a politico-economic point of view, it is likely that the same forces that prevent a direct reduction of real wages will prevent any indirect reduction via the central bank constitution. However, the indirect approach may come at the cost of high inflation. Hence, a direct approach to the reduction of unemployment should dominate any indirect approach that is based on the institution of a weak or government-dependent central bank.

5.2 Enlargement of Euroland

The analysis in this paper also provides some new insights in the possible consequences of an enlargement of Euroland. With an enlargement of Euroland the number of national central bankers in the ECB council will increase. Such an enlargement worsens the trade-off between inflation and unemployment in Europe if central bankers care for European aggregates. If central bankers care for domestic aggregates instead, the enlargement will neither affect inflation nor unemployment. The same holds for a reduction of the number of central bankers in the council that one might want to consider. In the deterministic framework that we studied, such a reduction would have no impact unless ECB council members take a broader European perspective in their decisions.

The size of the ECB council may instead play a role when council member's preferences are not perfectly observable for national players. In this case a small disciplinary effect may arise because it is no longer sure whether a particular central bankers will be pivotal in the council or not. In such a setting a reduction of the number of central bankers in the council will increase the probability that a given member will be pivotal. A reduction of the size of the ECB council would then be an appropriate response to the enlargement of Euroland.

6 Appendix A Fiscal Policy Game

In this appendix we present a fiscal policy game with similar features as the wage setting model in the body of the paper. Consider the following simple game between a government and a monetary authority. At stage 1, the government fixes the size of its nominal fiscal deficit. We denote the deficit/GDP ratio by D. At stage 2 the central bank chooses the rate of inflation π. The government attempts to reach a positive value for D, $D^* > 0$. In particular the desired size of the deficit increases when expected inflation is higher because inflation reduces the real cost of interest payments. Inflation by itself is perceived as costly by the government. This is captured in the objective function:

$$G = 2D - (D - \pi)^2 - B\pi^2. \tag{28}$$

A government that takes inflation as given would choose:

$$D^* = 1 + \pi. \tag{29}$$

The central bank may be more inflation averse than the government. Its objective function is:

$$G = 2D - (D - \pi)^2 - I\pi^2, \tag{30}$$

and its reaction at stage 2 is:

$$\pi = \frac{D}{1 + I}. \tag{31}$$

The subgame perfect equilibrium of this game is characterized by the values:

$$D = \frac{1 + I}{I + B/(1 + I)},\ \pi = \frac{1}{I + B/(1 + I)}, \tag{32}$$

for debt and inflation. A weak central bank that accommodates the governments policy ($\pi = D$) generates a debt/GDP-ratio of $D = 1/B$. Hence, a government that

is somewhat concerned about inflation keeps some fiscal discipline in order to avoid high inflation. This changes when we consider a monetary union with predominant national interests in the central bank council. From our previous analysis we know that the central bank does not react to deficit levels in single countries in this setting. The equilibrium is therefore characterized simultaneously by (29) and by the reaction function (31). This leads us to:

$$D = \frac{1+I}{I};\ \pi = \frac{1}{I}. \tag{33}$$

In equilibrium the government's inflation aversion B does not affect macroeconomic outcomes. Moreover note that $\frac{dD}{dI} = -\frac{1}{I^2} < 0$. Hence, the central bank's inflation aversion unambiguously reduces debt levels and inflation in all countries.

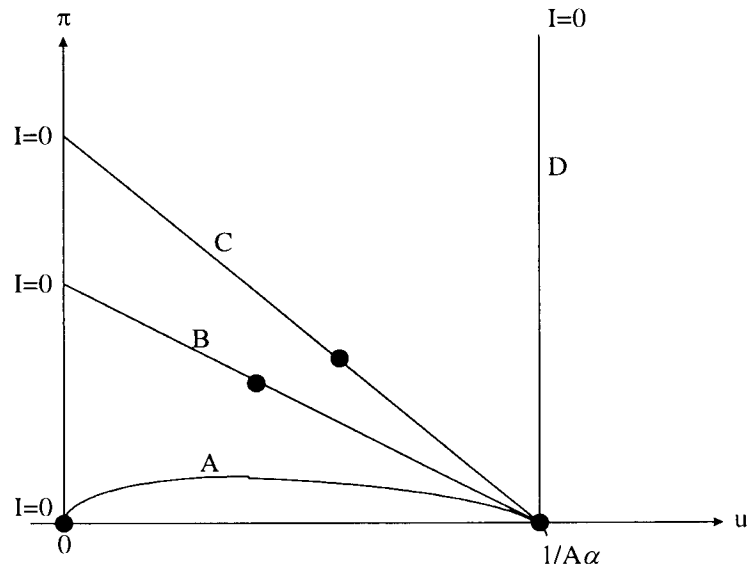

Figure 1: The trade-off between inflation and unemployment in various setups: (A) fully centralized wage bargaining, (B) decentralize wage bargaining, (C) EMU with a central bank that cares for European aggregates, and (D) EMU with national central bankers who care for national unemployment. The dots illustrate the optimal degree of the central banker's inflation-aversion in the various setups.

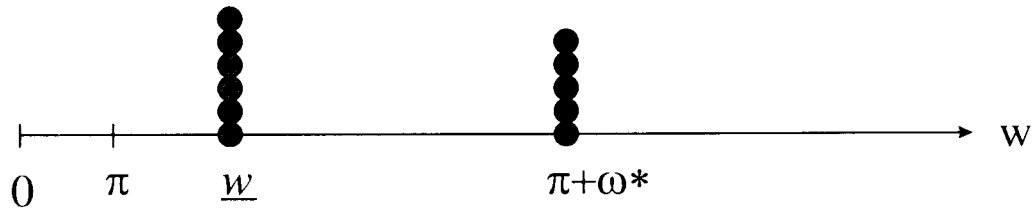

Figure 2: The asymmetric equilibrium. In six out of eleven countries union demand a low wage w. The median voter in the central bank votes in favor of $\pi = \beta w$. In the five remaining countries unions realize their desired real wage increase ω^*.

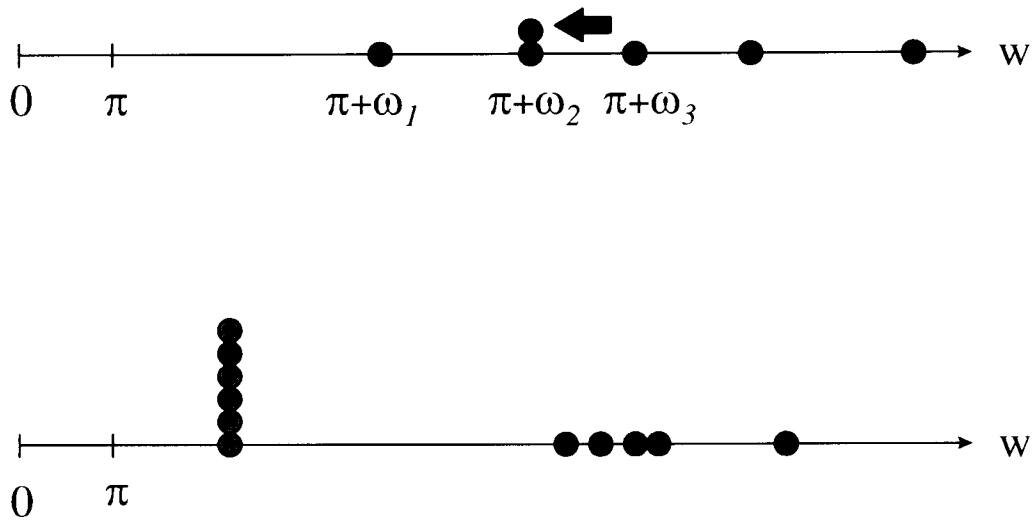

Figure 3: The two equilibria with differences in union agressiveness. The dots represent the nominal wage claims in the various countries. In the upper equilibrium there is some wage-discipline in country 3. In the lower equilibrium there is wage-discipline in half of the countries. In the remaining five countries unions realize their ideal real wage.

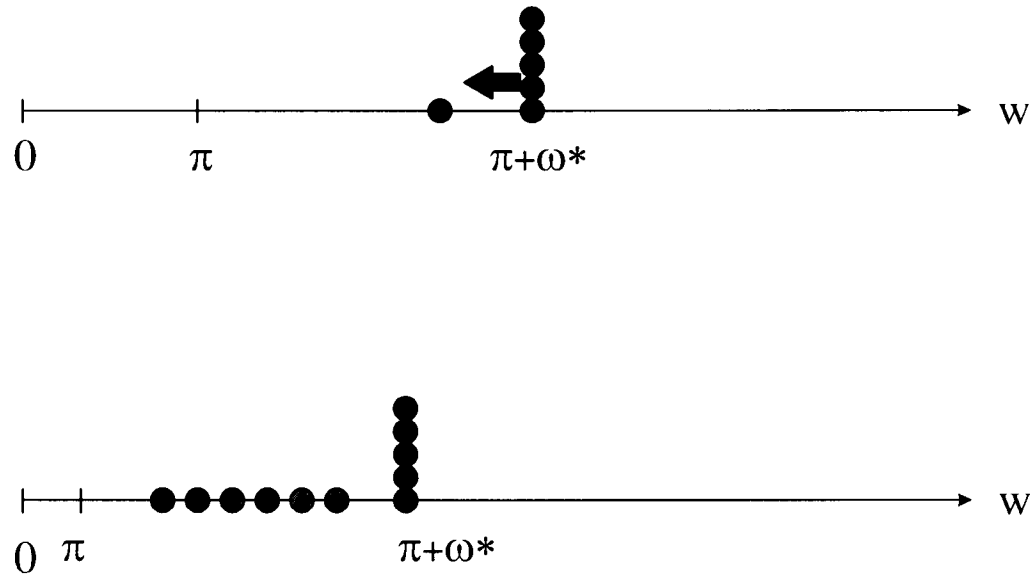

Figure 4: The two equilibria with differences in central bank conservativeness.

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