



STUDIECENTRUM VOOR ECONOMISCH EN SOCIAAL ONDERZOEK

VAKGROEP      MACRO-ECONOMIE

**WAGE FORMATION, LABOR MARKET  
CHARACTERISTICS AND THE EMS**

André Van Poeck

Report 89/235

February 1989

The first draft of this paper was started while I was visiting scholar to the Research Department of the International Monetary Fund in October 1988. I am very grateful to Jacob Frenkel, Director of the Department and to Andrew Crockett, Deputy Director, for the invitation and kind hospitality. I have benefited greatly from discussions with Flemming Larsen, Charles Adams and David Coe. Frida Deceunynck (UFSIA) and Johan Van Gompel (UFSIA) provided excellent research assistance for this paper. Financial support was in part provided by N.F.W.O. and Nationale Bank van België.

Universitaire Faculteiten St.-Ignatius  
Prinsstraat 13 - B 2000 Antwerpen  
D/1989/1169/11

ABSTRACT:

In this paper, we show that differences in wage formation between OECD countries go a long way towards explaining differences in unemployment. We also assess the role of labor market policy and labor market structure in explaining these differences in wage formation. It is shown that the tax treatment of labor, the indexation regime and the wage bargaining structure affect the parameters of the wage equation. Our analysis is especially relevant for the EMS countries, as policymakers advocate greater convergence in real variables (real growth, employment, unemployment) in these countries, in addition to the convergence in inflation and money growth that has to some extent been achieved. This also poses the problem of labor market harmonization in Europe.

## 1 Introduction

One of the most striking developments concerning macroeconomic performance in the 1980s has been the steady reduction in average inflation and in inflation dispersion in the industrial economies, coupled with a dramatic increase in unemployment and unemployment differentials.

This phenomenon stands out very clearly for the countries of the EMS<sup>1</sup>, and the reduction of inflation differentials between these countries has generally been considered as an indication of the successful progress of the system. Indeed, this inflation record has often been ascribed to the monetary developments in the system, more specifically to the anti-inflationary monetary discipline pursued by Germany and the increased convergence of monetary policy, especially after 1983<sup>2</sup>.

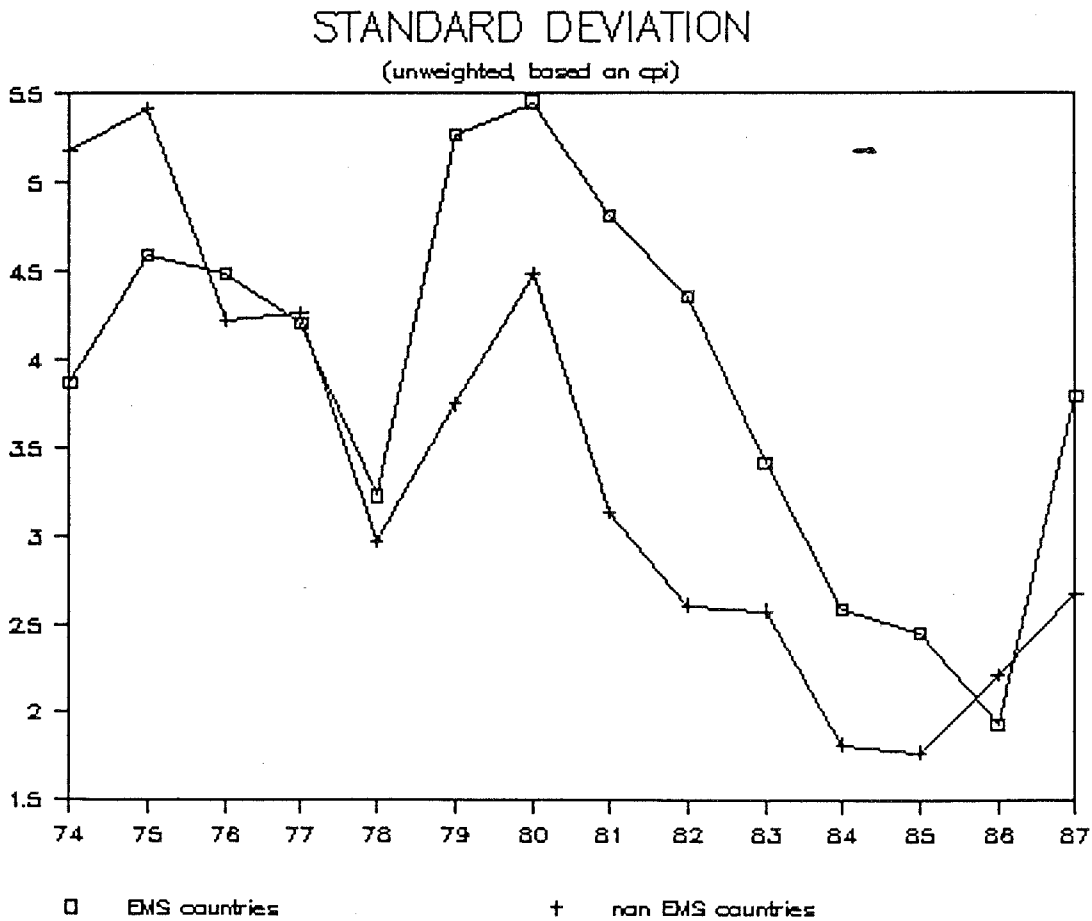
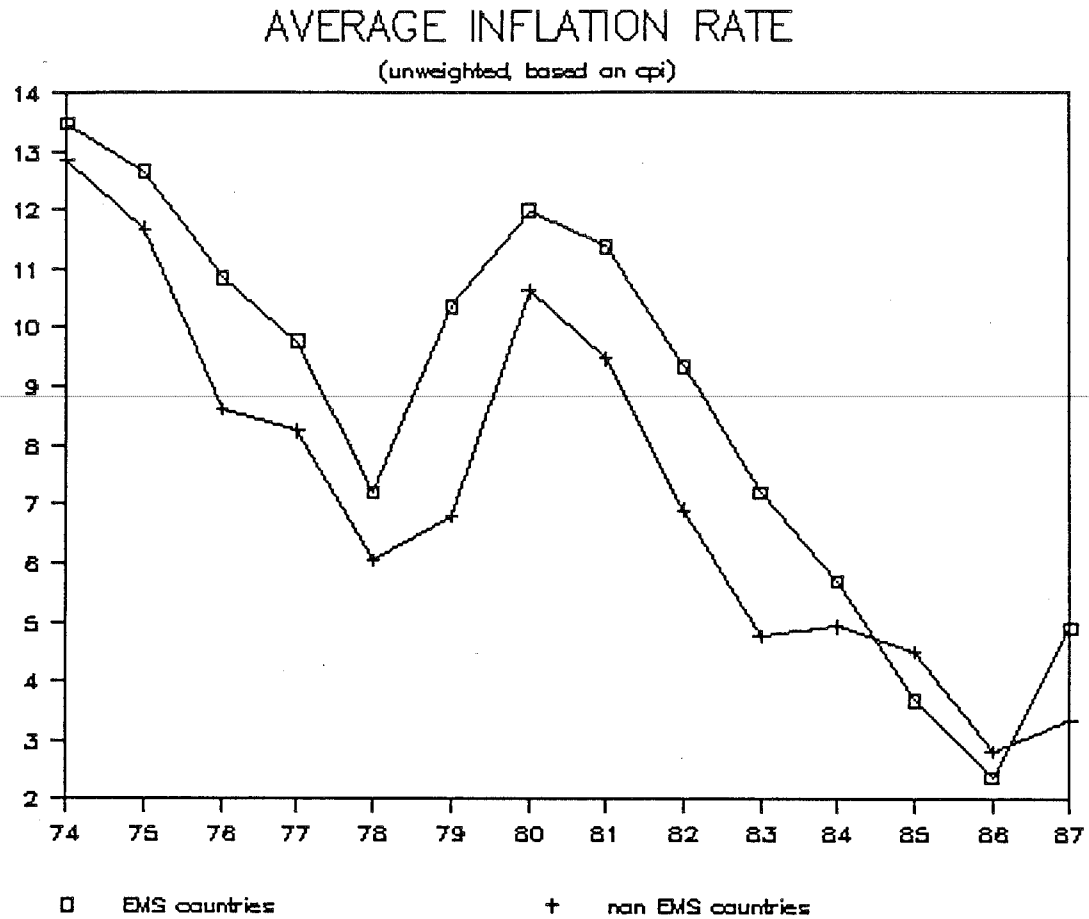
As figure 1 shows, however, the reduction in inflation and inflation differentials is anything but a single EMS development.

---

<sup>1</sup> In this paper, the appellation EMS refers to the countries participating in the exchange rate mechanism of the system (i.e. what H. Ungerer et al. (1986) call the ERM - Exchange Rate Mechanism - countries). The member countries of the exchange rate mechanism include Belgium, Denmark, France, Germany, Ireland, Italy, Luxembourg and the Netherlands. Luxembourg (which constitutes a monetary union with Belgium) is, however, not included in the sample of the EMS countries that are considered here. Furthermore, although the EMS has been in existence since 1979, for those same countries we continue to use the term EMS for the years prior to 1979.

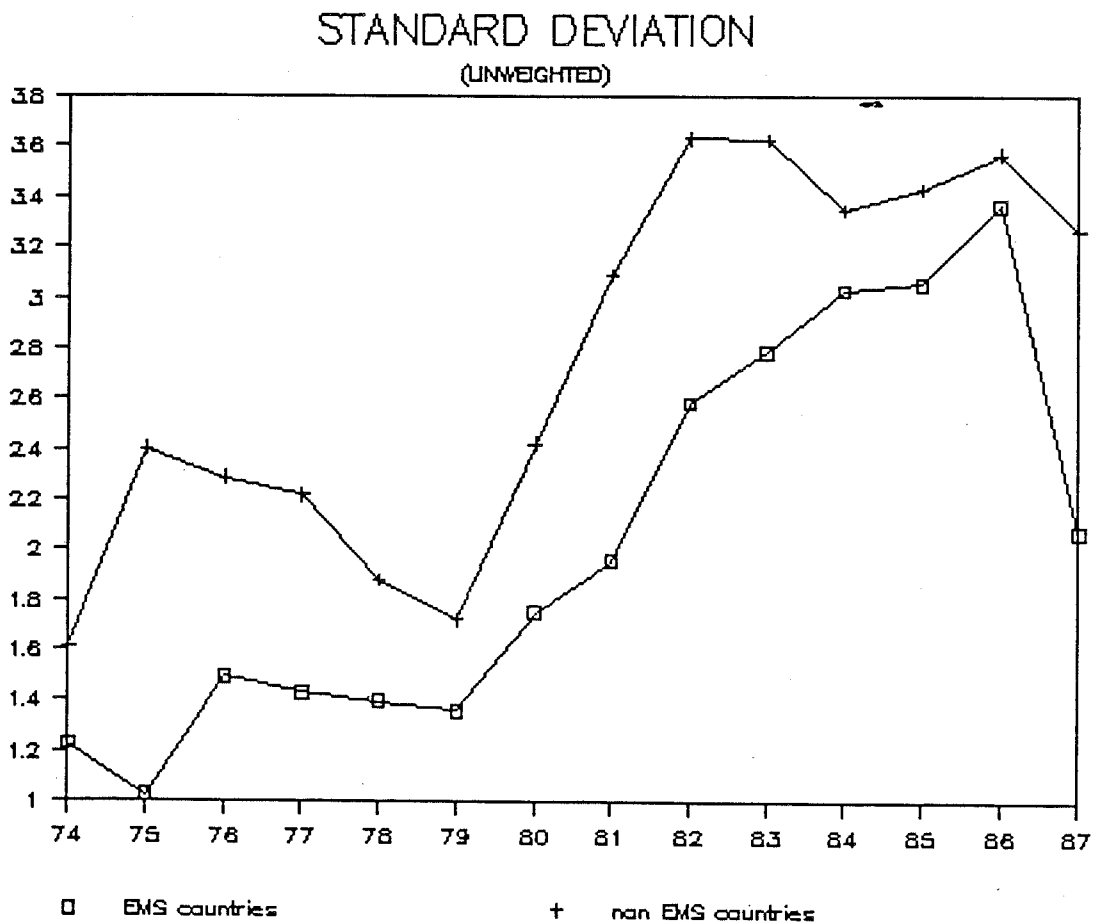
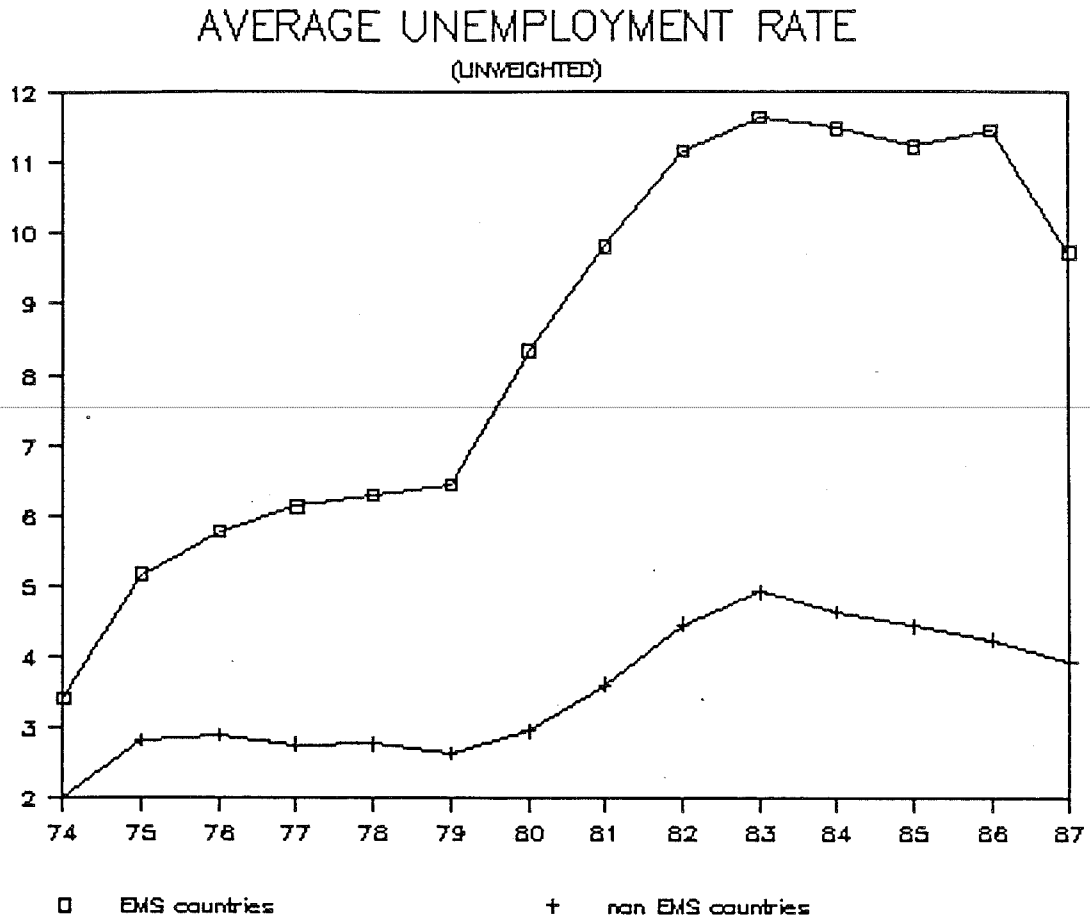
<sup>2</sup> See e.g. H. Ungerer et al. (1986) and M. Russo & G. Tullio (1988).

Figure 1: Inflation and inflation differentials in EMS - and non-EMS-countries (1), 1974 - 1987



(1) Non-EMS-countries are Austria, Japan, Norway, Sweden, Switzerland, United Kingdom, USA

Figure 2: Unemployment & employment differentials in EMS- and non-EMS countries (1) 1974-1987.



(1) see figure 1

It applies to the non-EMS countries as well<sup>3</sup>. This result is not astounding, of course, since the underlying change in monetary policy has been a worldwide phenomenon too.

However, the other side of this favorable picture has been the sharp increase in unemployment and in unemployment differentials, especially in the early part of this decade. This has also for the most part been a worldwide development, of course. Yet, as shown by figure 2, the unemployment record has been especially adverse in the group of the EMS countries.

A logical question which then arises is whether the observations with respect to inflation and unemployment in the EMS are inter-related, i.e. both caused by the underlying counter-inflationary money growth developments. In this case, it could be argued that, at least for some member countries, the cost of monetary integration is high in terms of increased unemployment.

In this paper, we find no evidence for an affirmative answer to this question. We show that the inflation record in the EMS (as well as in Europe and the OECD) is indeed strongly related to the money growth developments. Unemployment, on the contrary, is shown to be independent of money growth, at least over the medium term that is considered in this paper. Consequently, whatever the evolution of the money supply implied by adherence to the system, it can have no lasting effects on unemployment.

---

<sup>3</sup> We leave undecided whether the inflation record of the EMS is superior to the evolution of the average inflation and inflation convergence in the non-EMS world. The answer to this question depends very much on which countries are included in the group of non-EMS countries. H. Ungerer et al. (1986) suggest that it is, but their conclusion is sharply influenced by the inclusion of countries like Iceland, Greece and Portugal in the group of non-EMS countries. P. De Grauwe (1985), restricting the group of non-EMS countries to the US, UK, Japan, Austria, Canada, Norway, Sweden and Switzerland, finds that disinflation and inflation convergence have been stronger outside the EMS.

We do find some tentative indication, however, for relating differences in unemployment between EMS countries, and between industrial countries on the whole, to differences in wage formation between these countries. In our opinion, these differences in wage formation are to some extent the result of differences in the labor market policies pursued and in the institutional labor market characteristics of the countries concerned, although it is difficult to furnish strong evidence for such an assertion.

In other words, we show that policymakers of the EMS member countries are confronted with a vertical Phillips curve, and provide evidence that the national (natural) rates of unemployment are to some extent related to the characteristics of wage formation in the countries<sup>4</sup>.

Consequently, if policymakers favor convergence in both inflation and unemployment in the EMS, more convergence of labor market policies and institutional labor market characteristics will be required. It remains an open question whether such convergence should be the outcome of a voluntary process on the basis of national choices, or of obligatory harmonization on the basis of community legislation. E.g., the Padoa - Schioppa group argues that there is a strong case for national experimentation in labor policy areas in the European Community, combined with increased dissemination of information and exchange of experience. It is hoped that demonstration effects will gradually produce convergence on the best practices. However, these economists also recognize that institutional changes in voluntary organizations like e.g. trade unions will be very difficult to achieve<sup>5</sup>. Moreover, as R. Freeman (1988a, p.79) rightly puts it, there is no guarantee that labor market institutions developed in one country can, with success, be transferred to another.

---

<sup>4</sup> For a graphical exposition of the conditions for monetary integration based on the inflation-unemployment trade-off, see P. De Grauwe (undated).

<sup>5</sup> See T. Padoa - Schioppa, et al. (1987, p.87-88)

The structure of the paper is as follows. In section 2 we investigate, within a common framework, wage behavior in the EMS countries, as well as in several non-EMS countries. We estimate nominal wage equations for these countries and aim to discover symmetries and asymmetries between them, with respect to the response of nominal wages to various determinants. In section 3, we try to establish the role of money growth developments and wage formation for macroeconomic performance, measured by average inflation and unemployment in the medium term. Finally, in section 4 we turn to differences in labor market policy and in institutional labor markets characteristics as possible explanations for the observed differences in wage formation.

## 2 Determinants of wage formation

Our analysis of the wage formation mechanism continues an earlier approach (see A. Van Poeck, 1987), but includes recent data. Moreover, it is in line with well-known important studies focusing on wage behavior and wage rigidity in the OECD countries<sup>6</sup>. These studies have pointed, among other things, at the differences in wage behavior between the United States, Europe and Japan.

We follow these authors, and start with a fairly simple equation for nominal wage growth, which has the following general form:

$$(1a) \quad \dot{w} = -\alpha (u - u^*) + \beta \dot{p}_c + \tau \beta \dot{q} + (1 - \tau) \beta \dot{q}^* + (1 - \beta) \dot{w}_{-1}$$

with  $0 \leq \beta \leq 1$

where  $\dot{w}$  is the percentage change of nominal wages and  $u$  and  $u^*$  are the unemployment rate and the natural rate of unemployment, respectively. Further,  $\dot{p}_c$  stands for the growth rate of consumer prices and  $\dot{q}$  and  $\dot{q}^*$  for cyclical and trend productivity growth, respectively.

Equation (1a) follows from a standard model of the labor market, where the rate of change of nominal wages is determined by the

---

<sup>6</sup> See D. Grubb et al. (1983), D. Coe (1985) and J.H. Chan-Lee et al. (1987).



degree of labor market tightness (measured by the difference between  $u$  and  $u^*$ ), the rate of change of consumer prices and short-term and long-term productivity growth. Further, nominal wage growth, lagged one period, is added to the equation to take into account a possible adjustment of nominal wages to the various determinants considered.

The above equation for nominal wage inflation implies quite generally acceptable long run properties. E.g., setting  $u = u^*$ ,  $\dot{q} = \dot{q}^*$  and  $\dot{w} = \dot{w}_{-1}$  one obtains  $\dot{w} = \dot{p}_C + \dot{q}^*$ , which implies equal shares of labor and capital in value added over the long run, as well as absence of inflation illusion of the part of wage earners.

The simplest way then to estimate equation (1a) is to assume that the variables  $u^*$  and  $\dot{q}^*$ , which are not directly observable, remain constant over time. In this case, equation (1a) reduces to

$$(1b) \dot{w} = \delta - \alpha u + \beta \dot{p}_C + \tau \beta \dot{q} + (1-\beta) \dot{w}_{-1}$$

where the constant term  $\delta = \alpha u^* + (1-\tau) \beta \dot{q}^*$ <sup>7</sup>

Notice that in equation (1b) all variables are directly observable.

It should be admitted that equation (1b) represents a rather simple approach to wage formation. Additional country-specific variables could, for some countries perhaps, increase the explanatory power of the equation. Yet, in the context of this paper, we prefer to impose the same general framework to all countries concerned and to look for intra-country differences in the estimated regression coefficients of such a uniform wage equation<sup>8</sup>.

---

<sup>7</sup> It is also possible for  $\delta$  to remain more or less constant over time if  $u^*$  increases over time and  $\dot{q}^*$  decreases.

<sup>8</sup> The only exception to this general procedure is the use that was made, for some countries, of a dummy variable for a year (years) when nominal wage inflation was exceptionally high or low. Also, in several cases, the estimation results could be improved by using  $\dot{q}_{-1}$  instead of  $\dot{q}$ . In one case (Germany) we

Table 1. Estimation results for the nominal wage equation

$$\dot{w} = a + b.\dot{p}_c + c.u + d.\dot{q}_{-1} + e.\dot{w}_{-1}$$

(equation estimated under the restriction  $b+e=1$ )

Country	a	b	c	d	e	$\bar{R}^2$	h	SER
<u>Belgium</u> <sup>b</sup> 1963-1987	7.16 (3.77)	0.98 (5.39)	-0.62 (3.85)	0.07 (0.50)	0.02 (0.01)	0.88	-	1.51
<u>Denmark</u> 1962-1986	4.81 (3.45)	0.66 (4.36)	-0.55 (3.73)	-0.35 (1.48)	0.34 (2.23)	0.68	0.25	1.82
<u>France</u> <sup>ac</sup> 1961-1987	5.09 (2.93)	0.82 (5.15)	-0.31 (2.32)	-0.14 (0.52)	0.18 (1.10)	0.82	1.08	1.78
<u>Germany</u> <sup>bcd</sup> 1963-1987	-0.96 (0.67)	0.66 (4.60)	[-0.64] -	0.43 (2.25)	0.34 (2.38)	0.81	-	1.22
<u>Italy</u> <sup>c</sup> 1963-1987	7.08 (2.43)	0.99 (5.77)	-0.55 (2.21)	0.21 (0.79)	0.01 (0.01)	0.78	0.11	3.09
<u>Ireland</u> <sup>a</sup> 1961-1986	3.44 (1.70)	1.01 (8.04)	-0.17 (1.19)	0.32 (0.93)	-0.01 (0.01)	0.65	0.23	3.07
<u>Netherl.</u> <sup>bc</sup> 1963-1987	3.45 (2.49)	1.08 (4.89)	-0.27 (2.43)	0.32 (1.47)	-0.08 (0.36)	0.77	-	1.99

(a)  $\dot{q}$  instead of  $\dot{q}_{-1}$

(b) corrected for autocorrelation AR(1)

(c) estimated coefficients on dummy variables which are included in the equation:

France	1968 = 1 and 1969 = -1	2.19 (1.71)
Germany	1970 = 1	4.27 (3.17)
Italy	1973 = 1	4.73 (1.39)
Netherlands	1980 = 1 and 1981 = 1	-4.68 (2.65)

(d) log u instead of u  
with coefficient on log u -2.16 (2.64)

The results obtained from an estimation of equation (1b) for the EMS countries, using OLS and yearly data covering the period from the beginning of the 1960s to 1986 or 1987 are shown in table 1<sup>9</sup>. In the appendix to this paper we also show estimation results for a large sample of non-EMS countries (see table 1b). We will make use of these results too, when we investigate the role of differences in wage formation for differences in macroeconomic performance.

The estimation results are generally good in terms of standard statistical measures. The coefficients on  $\dot{p}_C$  and  $u$  have the expected sign and the coefficient on consumer price inflation lies between 0 and 1, as expected on theoretical grounds.

On the basis of these estimation results we can conclude, however, that there are substantial differences in the process of nominal wage formation between the EMS countries<sup>10</sup>. Consider e.g. the coefficient on current consumer price inflation, which can be interpreted as the implicit degree of indexation of nominal wages to consumer prices in the short term. This coefficient is not significantly different from one in Belgium, France, Italy, Ireland and the Netherlands. But for Denmark and Germany, on the contrary, we obtain a coefficient on current consumer price inflation that is significantly smaller than unity, implying in the short term a real wage decrease following an increase in consumer price inflation. The counterpart of this finding is reflected in the statistical significance of the

---

obtained a better result by using  $\log u$  instead of  $u$ , which implies a non-linear relationship between wage growth and unemployment.

<sup>9</sup> The estimation period is pointed out for each country in the table and may be somewhat different due to data availability.

<sup>10</sup> M. Artis & P. Omerod (1987) and M. Artis, C. Farnelo & P. Omerod (1986), using a somewhat different specification and working with quarterly data, come to a similar insight.

lagged endogenous variable for these countries.

The estimated coefficient on unemployment, which refers to the degree of real wage responsiveness to unemployment, also differs substantially between EMS countries. As can be seen from table 1, in Belgium, Denmark, Germany and Italy wage formation is relatively responsive to unemployment. In France and the Netherlands, on the other hand, this influence is more reduced, and Ireland in particular seems to be a country where the degree of unemployment exerts little or no influence on wage behaviour. The results further indicate that nominal wage changes in the EMS countries are in general not influenced by short term productivity growth. The only exception is Germany, where wage formation is indeed susceptible to changes in short term productivity (this is also reflected in the value of the constant in the German wage equation).

### 3 Money supply, real wage rigidity and macroeconomic performance

In this section we assess the role of money supply developments and wage formation for the macroeconomic performance of the EMS countries. Because the group of EMS countries consists of a rather restricted number of countries, we also consider the role of these variables for macroeconomic performance in Europe as a whole and in the OECD.

What we have in mind is a macroeconomic framework, where equilibrium is determined by the intersection of an aggregate demand and an aggregate supply curve. During the last decade or so, economists have increasingly focused attention on the supply side characteristics of the economy and on the structural variables that are believed to adequately reflect aggregate supply. Given the importance of wage formation and the functioning of labor markets in determining aggregate supply,

most of the variables that are considered in these paper relate to the labor market.

In the context of this paper, the functioning of the labor market refers to the aggregate wage formation mechanism, more specifically to the regression coefficients in the estimated wage equation<sup>11</sup>. The demand side can be represented by the growth rate of the money supply (monetary policy) or, alternatively, by a measure of the fiscal impulse (fiscal policy) . Given the role of monetary policy for monetary convergence in the EMS, and the actual process of monetary convergence that has taken place, the demand side is captured below by the growth rate of the money supply.

Macroeconomic performance then is defined in terms of the inflation rate and the rate of unemployment, in line with the weight that these two variables receive in policy discussions and with the observations that were made in the introduction of this paper. We have restricted the analysis to assessing the role of money supply developments and wage formation characteristics for inflation and unemployment in the medium term, defined as the average value of these variables over the three latest business cycles.

We thus estimated the following equations:

$$(2) \bar{p}_{it} = a' + b'X_i + c'\bar{M}_{it} + d'D1 + e'D2$$

$$(3) \bar{u}_{it} = a'' + b''X_i + c''\bar{m}_{it} + d''D1 + e''D2$$

---

<sup>11</sup> We do not consider microeconomic aspects of wage formation, such as relative wage flexibility between sectors of the economy or between regions. For an discussion, see F. Klau & A. Mittelstädt (1986), who also consider the role of labor mobility and flexibility in working shedules for labor market flexibility.

with  $\bar{p}$  : average inflation (measured by consumer price index);  $\bar{u}$  : average rate of unemployment;  $X$  : measure characterizing some aspect of the wage formation mechanism;  $\bar{M}$  : average nominal money supply growth;  $\bar{m}$  : average real money supply growth;  $D1$  and  $D2$  are dummy variables (see below); further the subscripts  $i$  and  $t$  refer to the country  $i$  and to the time period  $t$ , respectively.

These equations were estimated by OLS, using pooled data for the EMS countries, the European economies and the OECD countries, respectively. The values for  $\bar{p}$ ,  $\bar{u}$ ,  $\bar{M}$  and  $\bar{m}$  were all calculated as yearly averages for three subperiods, viz. 1971-1975, 1976-1981 and 1982-1987. The selection of these subperiods roughly corresponds to the three business cycles observed during the period 1971-1987<sup>12</sup>.

A few remarks are called for by equations (2) and (3). First, with respect to the money supply growth variable, economic theory indicates that nominal money supply growth is the relevant variable in the inflation equation (2), whereas the obvious money supply variable needed in the unemployment equation (3) is the real money supply. This procedure is therefore followed here. Moreover, we use three alternative measures of the money supply, viz. (1) narrow money; (2) broad money, viz. money plus quasi-money and (3) domestic credit expansion<sup>13</sup>. Next, we add two dummy variables (shift dummies) to the estimated equation :  $D1$  is a dummy variable taking the value 1 during the first period and 0 otherwise, while  $D2$  is a dummy variable with value 1 during the second period and 0 otherwise. These dummies are used to capture changes in macroeconomic performance that are not

---

<sup>12</sup> Arguably, the latest period (1982-87) does not constitute a full cycle.

<sup>13</sup> H. Ungerer (1986, p.25) argues that the spread in domestic credit expansion is perhaps a better measure of convergence in monetary policy, since it largely excludes offsetting differences in the external sector.

Table 2. Estimation results for equation (2)

$$\bar{p}_{it} = a' + b'.X_i + c'.\bar{M}_{it} + d'.D1 + e'.D2$$

	a'	b'	c'	d'	e'	$\bar{R}^2$	SER	F-stat
<b>EMS countries</b>								
X=IC	-3.80 (1.19)	3.47 (1.09)	0.67 (4.94)	2.04 (1.54)	2.76 (2.15)	0.65	2.22	8.74
X=STUC	-1.18 (0.47)	-0.74 (0.20)	0.67 (4.74)	2.04 (1.47)	2.76 (2.06)	0.61	2.32	7.76
X=LTUC	0.16 (0.08)	1.51 (0.69)	0.67 (4.76)	2.05 (1.51)	2.76 (2.10)	0.63	2.28	8.15
X=RWR	-0.64 (0.31)	-0.08 (0.14)	0.67 (4.71)	2.04 (1.48)	2.76 (2.06)	0.61	2.32	7.76
<b>Europe</b>								
X=IC	-1.79 (0.46)	0.42 (0.13)	0.95 (6.44)	-1.83 (1.17)	1.31 (0.86)	0.65	3.22	12.89
X=STUC	-2.83 (1.40)	-3.85 (1.60)	0.89 (6.79)	-1.68 (1.14)	1.35 (0.94)	0.68	3.05	15.00
X=LTUC	-1.74 (0.91)	-1.48 (1.04)	0.88 (6.00)	-1.64 (1.08)	1.36 (0.92)	0.66	3.15	13.77
X=RWR	-0.38 (0.16)	-0.37 (0.67)	0.92 (6.70)	-1.75 (1.13)	1.33 (0.88)	0.65	3.19	13.25
<b>OECD</b>								
X=IC	-1.93 (0.80)	1.44 (0.60)	0.79 (6.77)	0.28 (0.21)	2.68 (2.01)	0.55	3.40	12.50
X=STUC	-0.36 (0.21)	0.94 (0.95)	0.80 (6.85)	0.27 (0.20)	2.68 (2.03)	0.55	3.37	12.83
X=LTUC	-0.36 (0.22)	0.55 (1.34)	0.80 (6.95)	0.27 (0.20)	2.68 (2.05)	0.57	3.33	13.37
X=RWR	-0.92 (0.48)	0.02 (0.04)	0.79 (6.66)	0.29 (0.21)	2.68 (2.00)	0.54	3.41	12.28

IC : inflation coefficient; STUC : short term unemployment coefficient; LTUC : long term unemployment coefficient; RWR : measure of real wage rigidity;  $\bar{p}_{it}$  : average inflation in country i during period t;  $\bar{M}$  : average growth rate of the money supply (narrow money definition). The sample of EMS countries used for these regressions consists of Belgium, Denmark, France, Germany, Italy and the Netherlands, which implies 18 observations. Ireland was not included because the estimated unemployment coefficient in the Irish wage equation was found to be not statistically different from zero. For the same reason, not all estimates for the non-EMS European economies could be used. The European countries therefore consist of the same group of EMS countries plus Greece, Portugal and Spain (27 observations). The group of OECD countries further includes Australia, Canada, Japan and the United States (39 observations).

Table 3. Estimation results for equation (3)

$$\bar{u}_{it} = a'' + b'' \cdot X_i + c'' \bar{m}_{it} + d'' \cdot D1 + e'' \cdot D2$$

	a''	b''	c''	d''	e''	$\bar{R}^2$	SER	F-stat
<b>EMS countries</b>								
X = IC	4.49 (2.34)	6.44 (3.39)	0.07 (0.51)	-7.10 (9.36)	-3.96 (4.84)	0.86	1.28	26.65
X = STUC	12.18 (7.31)	3.31 (1.23)	-0.05 (0.33)	-7.25 (7.37)	-4.28 (4.04)	0.76	1.67	14.44
X = LTUC	12.39 (10.93)	3.44 (2.46)	0.003 (0.02)	-7.18 (8.35)	-4.12 (4.46)	0.82	1.45	19.98
X = RWR	9.08 (7.85)	0.69 (1.92)	-0.04 (0.25)	-7.23 (7.88)	-4.24 (4.30)	0.79	1.55	17.09
<b>Europe</b>								
X = IC	6.39 (3.22)	5.80 (2.59)	-0.07 (0.45)	-7.75 (6.68)	-4.72 (4.15)	0.67	2.38	14.29
X = STUC	13.40 (9.04)	4.00 (2.01)	-0.20 (1.14)	-7.51 (6.15)	-4.88 (4.08)	0.64	2.49	12.47
X = LTUC	13.41 (11.90)	2.86 (3.07)	-0.17 (1.10)	-7.57 (6.81)	-4.84 (4.45)	0.70	2.27	16.17
X = RWR	8.85 (8.39)	1.21 (3.19)	-0.15 (1.01)	-7.60 (6.93)	-4.82 (4.48)	0.71	2.24	16.69
<b>OECD</b>								
X = IC	7.40 (4.82)	4.14 (2.29)	-0.16 (1.30)	-6.45 (6.47)	-4.17 (3.97)	0.55	2.54	12.56
X = STUC	11.74 (14.06)	2.46 (3.53)	-0.12 (1.07)	-6.45 (7.04)	-4.07 (4.21)	0.62	2.34	16.44
X = LTUC	11.30 (14.64)	1.09 (3.73)	-0.09 (0.83)	-6.46 (7.15)	-4.00 (4.19)	0.63	2.30	17.19
X = RWR	8.18 (8.74)	1.31 (3.80)	-0.17 (1.58)	-6.45 (7.18)	-4.21 (4.46)	0.63	2.29	17.47

note: for the meaning of the abbreviations, see table 2.



taken into account by our method<sup>14</sup>. Finally, the wage formation mechanism is represented by four measures, which are successively used as X-variable : (1) the short term inflation coefficient in the estimated wage equation; (2) the short term unemployment coefficient; (3) the long term unemployment coefficient, which is obtained by dividing the short term coefficient by 1 minus the estimated coefficient on the lagged wage variable; (4) the (short term) degree of real wage rigidity, obtained by dividing the coefficient on consumer price inflation by the absolute value of the coefficient on unemployment<sup>15</sup>.

The estimation results for equations (2) and (3) are shown in table 2 and 3. They are based on the narrow money definition<sup>16</sup>. These results should be considered as tentative, of course, since they are not based on a fully articulated macroeconomic model. Notice also that, for each country, the variable representing wage formation (X-variable) takes only one value during the three periods considered<sup>17</sup>.

In general, the results confirm the importance of differences in money growth rates between countries as an explanation for differences in inflation. This is shown by the statistical significance of the  $c'$ -coefficient in all inflation equations (table 2). This finding contrasts sharply with the role of money

---

<sup>14</sup> We also tried slope dummies, allowing the regression coefficients of  $\bar{M}$  (or  $\bar{m}$ ) and X to change over time. However, such slope dummy variables were generally found to be insignificant.

<sup>15</sup> This measure of real wage rigidity was introduced by Grubb et al. (1983).

<sup>16</sup> In the appendix we also show the results obtained when using the broad money definition or domestic credit expansion. Similar conclusions can be drawn from these estimations.

<sup>17</sup> This procedure implies that the wage formation mechanism has not changed very much over the investigation period. We applied the Chow-test and investigate whether the wage equations display stability during the different subperiods. The hypothesis of stability was never rejected.

growth differentials in explaining differences in unemployment (cf. statistical insignificance of the  $c$ -coefficient in the unemployment equations in table 3). Indeed, the coefficient on money growth never turns out to be statistically different from zero in the unemployment equations.

This conclusion is strongly reversed for the variables that represent the wage formation process in the economy. Consider first the X-variables in the unemployment equation. The regression coefficients that are obtained for these variables are all statistically significant, implying that differences in wage formation between economies contribute significantly to explaining differences in unemployment. This applies to the inflation coefficient, as well as to the unemployment coefficient, and consequently also to the measure of real wage rigidity (which is based on them). Indeed, these results imply that countries with a high degree of short term implicit indexation of nominal wages to consumer prices, and countries with a low responsiveness of wage growth to unemployment will, *ceteris paribus*, be confronted with a higher rate of unemployment<sup>18</sup>.

The results further indicate that the parameters in the aggregate wage equations are of no importance in explaining inter-country differences in inflation. Notice, however, that the regressions are based on period averages, so that this conclusion does not exclude the possibility for wage formation to contribute to the speed at which money supply growth influences inflation. This possibility, however, is not analysed in this paper.

Finally, with respect to the period dummies these can be seen to be always very significant in the unemployment equation, implying a steady increase of unemployment over the three subperiods considered, which is not explained by estimated

---

<sup>18</sup> Notice that the unemployment coefficient was entered with the negative sign; the measure of real wage rigidity, however, has a positive sign.

Table 4. Indicators of labor market policy and labor market structure

Country	Unemployment insurance replacement ratio	Tax wedge on wages (c)	Index of nominal wage responsiveness and indexation		Centralisation and corporatism	Union membership		Labor conflicts
			average marginal	nominal wage resp.		Centr. Corpor. rank order	average change (d)	
average change (a)						rank order	average change (f)	average change (g)
Belgium	44.8 +2.1	48.1 61.7	4	2	6	6	71.5 +11	16.9 -11.1
Denmark	59.2 +3.3	53.4 71.2	6	2	3	5	83.3 +32	44.3 +19.8
France	38.5 -9.5	47.6 59.7	3	2	8	9	26.0 +6	54.0 -94.7
Germany	48.7 -23.9	36.6 57.0	4	0	4	2	40.3 +5	7.3 -0.2
Ireland	-	44.9 63.8	-	-	-	-	48.0 +7	40.2 +28.2
Italy	7.1 +2.6	48.9 62.7	4	2	10	10	45.0 +6	397.0 -23.6
Netherlands	52.9 -23.4	37.5 73.5	5	2	5	3	39.7 -2	5.7 +0.4

(a) average 1965-1984

(b) 1975-1984 versus 1965-1974

(c) estimates for 1983

(d) average for 1970, 1979 and 1984 (or 1985)

(e) 1984/85 versus 1970 (except for Belgium (1979 versus 1970))

(f) 1970-1986

(g) 1982-1986 versus 1970-1975

Source: - unemployment insurance replacement ratio: J.H. Chan-Lee, et.al. (1987)

- tax wedge on wages: M. McKee, et.al. (1986)

- nominal wage responsiveness, degree of indexation, corporatism rank order: M. Bruno & J. Sachs (1985)

- centralisation rank order: L. Calmfors & J. Driffill (1988)

- union membership: R. Freeman (1988a)

- labor conflict: ILO, Yearbook of Labour Statistics, and OECD: Main Economic Indicators

equations. This increase in unemployment has generally been associated with the frequency and intensity of supply shocks, but our analysis does not enable us to verify this hypothesis in a rigorous way. In the inflation equation, we obtain a statistically significant coefficient for the second period dummy for the sample of EMS countries and OECD countries, implying the average inflation in 1976-81 was roughly 2.7 percentage points higher than explained by money supply developments.

#### 4 Aggregate wage formation, labor market policy and labor market institutions

In the previous paragraph it was shown that differences in unemployment between economies are to some extent related to differences in the parameters characterizing aggregate wage formation. This relationship was shown to hold for the group of OECD countries, for the European countries, and for the EMS countries as well.

In this section we look for differences in labor market characteristics between EMS countries. The labor market characteristics that are considered are related to the policies pursued by the governments involved, as well as to the labor market institutions that govern national wage formation.

Table 4 should be regarded as nothing more than a crude attempt to bring together some data on labor market policy and labor market structure in the EMS countries. No strong conclusions should be drawn from such comparisons, however. First, the selection of the data is to some extent based on their availability, so other important aspects of the labor market (e.g. minimum wages) may be left out. Next, the figures reflect period averages or occasionally refer to only one single year. They consequently do not take into account more recent structural changes that have been introduced in several countries (e.g. changes in the indexation regime). Finally, both in theory and

in empirical comparative macroeconomic research, there is to this day no clear evidence on the relationship between labor market policy and labor market structure, on the one hand, and labor market performance, on the other hand<sup>19</sup>.

Table 4, however, confirms that labor market characteristics and labor market policy do differ between EMS countries. Consider first the data on the unemployment insurance replacement ratio, which are averages for 1965-84. These data refer to the conventional macroeconomic indicator, which is obtained by dividing the average amount of unemployment insurance paid by average (net) income of a wage earner in manufacturing. They therefore give only a crude indicator of the relative "generosity" of the unemployment insurance system in different countries, and should ideally be completed with microeconomic replacement ratios, calculated for certain categories of workers (see J.H. Chan-Lee et al., 1987). Moreover, these macroeconomic data do not explicitly bring out differences in the administration of the system (eligibility conditions, benefit period, etc.), although they are to some extent influenced by such differences. With these reservations, these figures point to widespread differentials between EMS countries, with Italy having a very low replacement ratio as compared to the other EMS countries. Germany and the Netherlands are noteworthy for the high decrease in the unemployment insurance replacement ratio in these countries between 1975-84 as compared to the preceding decade 1965-74.

Table 4 also contains data on the so-called wage wedge. These figures, however, refer exclusively to the year 1983. We report average as well as marginal wage wedge estimates. The average wedge is obtained by dividing the amount of labor taxes (payroll

---

<sup>19</sup> A recent study by R. Freeman (1988b) e.g. concludes that differences in real wage growth and development between countries cannot be attributed reliably to specific labor market structures.

taxes, labor income taxes, social security contributions from employers as well as employees) by the total amount of gross labor costs. The marginal wedge is calculated for an increase in gross labor costs. For each country, the calculations refer to a standard wage income (defined as the average income of a wage earner in manufacturing) and assume that the employee is married and has two dependent children. These figures confirm that the tax treatment of labor differs substantially within the group of EMS countries<sup>20</sup>.

We further show indexes of nominal wage responsiveness in general and of the degree of indexation, in particular, for the EMS countries. The degree of nominal wage responsiveness refers to labor market structures that contribute to a rapid response of nominal wages to changes in consumer prices. It depends on the average duration of wage settlements, on the degree of synchronization of wage negotiations across different sectors in the economy and on the formal terms of the indexation mechanism.

The influence of the average duration of wage settlements is straightforward: the longer the duration of wage agreements, the less possibility there is of adjusting nominal wages to increases in consumer prices in the short term and hence the lower the degree of nominal wages responsiveness. A similar line of argument holds for the degree of synchronization. If synchronization is low, aggregate nominal wage adjustment will only be partial. Hence, the lower the degree of synchronization, the lower the degree of nominal wage responsiveness. Finally, one can reasonably assume that the degree of indexation matters greatly for the degree of nominal wage responsiveness. It combines several elements of the indexation system, such as its legal status, applicability, the average length of the adjustment lag, etc.

---

<sup>20</sup> This holds also if the wage wedge is computed for the case of a single wage earner (data not shown).

By construction, the measure of nominal wage responsiveness shown in table 4 lies between 0 and 6 (for each component a score ranging from 0 to 2 is assigned and consequently a total of 0 refers to a low degree and 6 to a high degree of nominal wage responsiveness). The degree of indexation index, considered separately, lies between 0 and 2 (0 meaning absence of indexation and 2 standing for widespread use of indexation). These measures indicate that the EMS countries are generally characterized by a high degree of nominal wage responsiveness in general, and a high degree of indexation in particular. Germany, however, has no indexation of nominal wages to consumer prices at all<sup>21</sup>.

Other institutional aspects of the labor market that have received widespread attention in the economic literature are centralization and (or?) corporatism. Measures of centralization and corporatism are therefore also included in table 4. We use the Calmfors and Driffill measure of centralization, defined by them as "the extent of inter-union and inter-employer cooperation in wage bargaining with the other side (1988, p.17)". They focus on the degree to which coalitions are formed among unions and employers, respectively, more than on the level at which wage bargaining occurs. Their definition is therefore very similar to Bruno and Sachs' concept of corporatism, which these authors define as a "mode of social organization in which functional groups rather than discrete individuals wield power and transact affairs" (1985, p.222). This concept, when applied to labor markets, is then described as institutional negotiation, bargaining, collaboration and accord about wages and "income policies" (and perhaps additional economic issues)

---

<sup>21</sup> It should be noticed, however, that the five EMS countries that are characterized as having a high degree of indexation in table 4, have recently introduced changes aimed at reducing indexation. Denmark even abolished indexation. Yet, empirical investigation shows that the changes in the indexation regime (as well as other so-called microeconomic changes (modification of the system of unemployment insurance, adjustment of minimum wages, etc.) had by 1987 not significantly altered macroeconomic wage formation).

between representatives of the major economic groupings in the society (most typically labor confederations and employers' associations) and often including, in addition, representatives of the government.

The degree of corporatism is esteemed by Bruno and Sachs to be the combined outcome of several structural characteristics: (a) whether wage negotiation proceed on a national level, on the level of the plant or in between; (b) the power of national labor organizations over their constituent members; (c) the degree of organization on the employer side; (d) the existence of a formal framework for consultation at the plant level. The labor market is then considered to show signs of a high degree of corporatism, if wage negotiations are highly centralized, their outcomes do not have to be approved at the lower level, employers are well organized, and there exists local consultation aimed at reducing tensions at the plant level.

The data on centralization and corporatism in table 4 refer to the rank orders obtained for each country in comparison with a group of (the same) 13 OECD countries<sup>22</sup>. Notice that Calmfors & Driffill and Bruno & Sachs are more or less in agreement with respect to the classification of Belgium, France and Italy. Indeed, they assign an intermediate degree of centralization (or corporatism) to Belgium and a high degree of decentralization (low degree of corporatism) to France and Italy. There is less unanimity, however, with respect to the Netherlands, Denmark and Germany. Germany and the Netherlands are considered by Calmfors & Driffill as holding an intermediate position for centralization, whereas Bruno & Sachs see the labor market of these countries as

---

<sup>22</sup> The original rankings of Bruno & Sachs and Calmfors & Driffill are based on 17 OECD countries. Their ranking was adopted, after leaving out those countries that are not considered in this paper.



strongly corporatistic. The opposite holds for Denmark<sup>23</sup>.

Finally, table 4 shows data for union density and labor conflict. The data for union density refer to the percentage of the non-agricultural wage and salaried employees that are unionized. Both the average for the period 1970-1984/5 and the change between 1970 and 1984 are shown. Judged by this measure, Belgium and Denmark are found to be highly unionized as compared to France, e.g.<sup>24</sup>. These countries also experienced a sharp increase in density. The measure of labor conflict that is used here refers to the number of workers that were involved in labor conflicts (yearly average for 1970-86 and change between 1982-86 and 1970-75). To facilitate comparison across countries these data are expressed per 1000 employees. According to this measurement, Italy towers above all the other EMS countries with regard to labor disputes, whereas Germany and the Netherlands are characterized by a low and stable degree of labor conflicts. France also used to be characterized by a high degree of industrial disputes; yet, in this country social tensions decreased sharply in the 1980s.

---

<sup>23</sup> Recall that according to Calmfors and Driffill, there is a hump-shaped relationship between labor market performance and centralization, implying that macroeconomic performance (in terms of the level and the absolute change of the unemployment rate, the employment rate, the rate of unemployment plus the rate of inflation, the rate of unemployment plus the current account deficit in per cent of GDP) is worse in countries with an intermediate degree of centralisation, as compared with countries with a high or a low level of centralization). In Bruno & Sachs' view, there is a linear relationship between the degree of corporatism and macroeconomic performance which takes shape in a negative relation between their corporatism index and the change in the misery index, defined as the rise in inflation plus the slowdown in real GNP growth.

<sup>24</sup> R. Freeman (1988a) cautions that the union density data for France and Italy reflect particular weak measures of unionism for these countries.

Table 5. Wage formation, labor market policy and labor market structure  
(correlation matrix)

	IC	STUC <sup>a</sup>	LTUC <sup>a</sup>	RWR
UC	0.085 (0.283)	0.019 (0.057)	-0.008 (0.024)	0.055 (0.165)
ΔUC	-0.108 (0.326)	-0.106 (0.282)	-0.121 (0.323)	-0.319 (0.891)
AWW	0.611** (2.888)	-0.451* (1.598)	-0.580** (2.252)	0.264 (0.866)
MWW	0.648** (3.183)	-0.353 (1.193)	-0.430* (1.506)	0.455* (1.616)
NWR	0.452* (1.681)	0.104 (0.296)	0.008 (0.023)	0.113 (0.322)
Dii	0.716** (3.402)	-0.493* (1.603)	-0.570** (1.962)	0.629** (2.288)
COR <sup>b</sup>	-0.297 (1.030)	-0.436* (1.372)	-0.115 (0.328)	0.115 (0.328)
CEN1 <sup>b</sup>	-0.297 (1.030)	-0.182 (0.523)	0.091 (0.258)	-0.091 (0.258)
CEN <sub>2</sub> <sup>b</sup>	0.552** (2.193)	-0.070 (0.198)	-0.542** (1.826)	0.573** (1.976)
UNION	0.265 (0.952)	-0.096 (0.273)	-0.201 (0.580)	-0.126 (0.359)
ΔUNION	0.245 (0.875)	-0.185 (0.532)	-0.270 (0.793)	-0.105 (0.299)
UNION1 <sup>b</sup>	0.187 (0.659)	-0.206 (0.698)	0.071 (0.238)	-0.027 (0.091)
UNION2 <sup>b</sup>	0.491** (1.954)	0.008 (0.025)	-0.174 (0.585)	0.200 (0.677)
CONFL	0.149 (0.543)	-0.175 (0.533)	-0.214 (0.657)	0.031 (0.093)
ΔCONFL	0.090 (0.326)	-0.216 (0.664)	-0.219 (0.673)	-0.020 (0.060)

\* statistically significant at the 10 % level;  
 \*\* statistically significant at the 5 % level;  
 a absolute value;  
 b Spearman rank order correlation coefficient;  
 t-values between brackets.

IC, STUC, LTUC, RWR: see table 2;  
UC: unemployment insurance replacement ratio;  
 $\Delta$ UC: change of unemployment insurance replacement ratio;  
AWW: average tax wedge on wages;  
MWW: marginal tax wedge on wages;  
NWR: nominal wage responsiveness index;  
Dii: degree of indexation index;  
COR: degree of corporatism rank order;  
CEN1: degree of centralisation rank order;  
CEN2: degree of centralisation rank order, transformed (see text);  
UNION: union density;  
 $\Delta$ UNION: change of union density;  
UNION1: degree of union density rank order;  
UNION2: degree of union density rank order, transformed (see text);  
CONFL: labor conflicts;  
 $\Delta$ CONFL: change of labor conflicts.

The extent to which these indicators of labor market policy and labor market structure matter for wage formation and macroeconomic performance is, of course, difficult to ascertain and one should avoid jumping into strong conclusions. Table 5, which contains correlation coefficients between wage formation characteristics (represented by the estimated parameters of the wage equations) and indicators of labor market policy and labor market structure, based on the wider set of OECD countries<sup>25</sup>, should therefore be regarded as no more than a tentative indication.

It appears from table 5, however, that wage formation is significantly affected by the size of the wage wedge, the degree of indexation and the degree of centralization of wage bargaining. The evidence on corporatism and unionization is much weaker and there is no significant correlation with neither the level of the unemployment compensation replacement ratio and the conflict ratio, nor the absolute change in these variables.

With respect to the wage wedge, these results indicate that a high wedge corresponds with a high short term inflation coefficient in the wage equation and a low responsiveness of wage formation to unemployment. The same holds for the degree of indexation index, which is strongly correlated with the inflation coefficient in the wage equation, but also with the unemployment coefficient.

The degree of centralisation of wage bargaining is also found to be correlated with the parameters of the wage equations, in a way that is consistent with the results of Calmfors & Driffill (1988) and R. Freeman (1988a). Indeed, there is no evidence for a monotonic relationship between centralisation ranking (CEN 1) and the wage equation parameters. However, after reranking, such that both very centralized and very decentralized economies rank

---

<sup>25</sup> The indicators of labor market policy and labor market structure for non-EMS countries are shown in table 4b (appendix).

before the intermediate ones (CEN 2)<sup>26</sup>, we find a statistical significant correlation, implying that intermediate economies are characterized by a higher inflation coefficient and a lower unemployment coefficient (in absolute value), and hence a higher degree of real wage rigidity<sup>27</sup>.

The evidence on corporatism is much weaker, although there is some evidence to suggesting that wages in corporatist economies are more responsive to unemployment than in non-corporatist economies.

The influence of the degree of unionization on wage formation is tested in table 5, making use of 4 alternative measures of union density, viz. (a) the average percentage of the labor force unionized (UNION), (b) the change in the unionization rate ( $\Delta$  UNION), (c) a rank order of union density based on average union membership (UNION 1) assigning rank 1 to the country with lowest average membership, etc. and (d) a transformed ranking listing the countries with the lowest and highest average union membership first, followed by the countries with the second lowest and highest membership, etc. (UNION 2). The results indicate that there is no simple relation between unionization and wage formation. The only significant correlation is found between UNION 2 and the inflation coefficient, implying that the inflation coefficient is lower in countries where the labor force is highly unionized, as well as in countries with a very low union density.

---

<sup>26</sup> This reranking is obtained by ranking the most centralized economy and the most decentralized one first. The second most centralized and the second most decentralized economy follow next, etc.

<sup>27</sup> We also tried the alternative rearrangement of the original rankings used by Calmfors & Driffill (1988) which ranks the three most centralized economies first, followed by the three most decentralized, etc.

Finally, as mentioned before, neither the unemployment compensation replacement ratio, nor its change, seems to influence wage formation in the economies concerned. The same holds for the amount of industrial disputes, as measured by the conflict ratio and its absolute change.

---

---

APPENDIX

Table 1b. Estimation results for the nominal wage equation

$$\dot{w} = a + b.\dot{p}_c + c.u + d.\dot{q}_{-1} + e.\dot{w}_{-1}$$

(equation estimated under the restriction  $b+e=1$ )

Country	a	b	c	d	e	$\bar{R}^2$	h	SER
<u>Australia</u> <sup>cd</sup> 1968-1986	2.25 (1.79)	0.66 (3.59)	-0.40 (2.89)	0.40 (1.78)	0.34 (1.84)	0.74	-	1.88
<u>Austria</u> <sup>ad</sup> 1961-1986	1.39 (1.06)	0.62 (4.04)	-0.29 (0.74)	0.36 (2.22)	0.38 (2.43)	0.70	-0.44	1.56
<u>Canada</u> <sup>bd</sup> 1961-1986	3.94 (6.86)	0.44 (6.09)	-0.41 (5.85)	-0.06 (0.56)	0.56 (7.85)	0.94	0.56	0.81
<u>Greece</u> <sup>c</sup> 1964-1986	4.19 (3.07)	0.37 (3.50)	-0.59 (2.62)	0.08 (0.64)	0.63 (6.02)	0.75	-	3.44
<u>Japan</u> <sup>c</sup> 1963-1986	6.16 (2.69)	0.44 (4.08)	-2.36 (2.36)	-0.07 (0.54)	0.56 (5.25)	0.89	-	1.64
<u>Norway</u> <sup>c</sup> 1963-1986	3.72 (2.00)	0.75 (4.17)	-1.27 (1.29)	0.08 (0.75)	0.25 (1.38)	0.54	-	2.41
<u>Portugal</u> <sup>ac</sup> 1964-1985	4.64 (1.39)	0.73 (4.91)	-1.12 (2.23)	0.17 (0.73)	0.27 (1.82)	0.63	-	3.44
<u>Spain</u> 1964-1986	5.33 (1.64)	0.82 (4.19)	-0.24 (2.28)	0.21 (0.52)	0.18 (2.38)	0.80	0.78	2.53
<u>U.Kingdom</u> <sup>ad</sup> 1961-1987	-0.19 (0.24)	0.91 (5.65)	0.14 (1.34)	0.56 (2.49)	0.09 (0.58)	0.86	0.10	1.80
<u>Un.States</u> <sup>a</sup> 1961-1987	1.20 (1.91)	0.41 (4.56)	-0.25 (2.59)	0.42 (3.54)	0.59 (6.57)	0.89	0.55	0.79

(a)  $\dot{q}$  instead of  $\dot{q}_{-1}$

(b)  $u_{-1}$  instead of  $u$

(c) corrected for AR1

(d) dummies included in the equation:

Australia	1974 = 1	5.05	(2.43)
Austria	1971 = 1	3.85	(2.37)
Canada	1977 = 1    1978 = 1	-2.07	(3.29)
U.Kingdom	1970 = 1	3.93	(2.13)
	1974 and 1975 = 1	3.82	(3.64)
	1976 and 1977 = -1		



Table 2b. Estimation results for equation (2)

$$\bar{P}_{it} = a' + b'.X_i + c'.\bar{M}_{it} + d'.D1 + e'.D2$$

$\bar{M}_{it}$  broad money

	a'	b'	c'	d'	e'	$\bar{R}^2$	SER	F-stat
<b>EMS countries</b>								
X = IC	-1.50 (0.45)	-0.86 (0.24)	0.82 (4.33)	0.04 (0.03)	1.70 (1.19)	0.58	2.41	6.93
X = STUC	-5.34 (1.78)	-5.25 (1.38)	0.87 (4.94)	-0.20 (0.13)	1.61 (1.21)	0.63	2.26	8.38
X = LTUC	-3.81 (1.30)	-1.91 (0.78)	0.86 (4.50)	-0.15 (0.09)	1.63 (1.16)	0.60	2.36	7.37
X = RWR	-1.00 (0.50)	-0.80 (1.51)	0.86 (5.01)	-0.13 (0.09)	1.64 (1.24)	0.64	2.23	8.67
<b>Europe</b>								
X = IC	-2.16 (0.77)	0.91 (0.36)	0.85 (9.42)	-2.05 (1.73)	0.35 (0.30)	0.80	2.44	26.56
X = STUC	-1.64 (1.09)	-1.12 (0.56)	0.81 (9.24)	-1.95 (1.66)	0.42 (0.36)	0.80	2.43	26.83
X = LTUC	-1.23 (0.89)	0.23 (0.19)	0.84 (8.61)	-2.04 (1.71)	0.36 (0.31)	0.80	2.45	26.43
X = RWR	-0.64 (0.37)	-0.24 (0.58)	0.82 (9.66)	-1.97 (1.68)	0.41 (0.35)	0.80	2.43	26.85
<b>OECD</b>								
X = IC	-3.38 (1.99)	2.03 (1.18)	0.83 (11.15)	-1.17 (1.19)	0.82 (0.85)	0.77	2.41	33.11
X = STUC	-1.20 (1.06)	1.34 (1.95)	0.84 (11.60)	-1.20 (1.26)	0.80 (0.86)	0.79	2.33	35.93
X = LTUC	-1.29 (1.19)	0.69 (2.42)	0.84 (11.93)	-1.20 (1.29)	0.80 (0.89)	0.80	2.27	38.31
X = RWR	-2.27 (1.66)	0.20 (0.53)	0.83 (10.86)	-1.16 (1.16)	0.82 (0.84)	0.76	2.45	31.79

Table 2c. Estimation results for equation (2)

$$\bar{P}_{it} = a' + b'.X_i + c'.\bar{M}_{it} + d'.D1 + e'.D2$$

$\bar{M}_{it}$  domestic credit expansion

	a'	b'	c'	d'	e'	$\bar{R}^2$	SER	F-stat
<b>EMS countries</b>								
X = IC	0.14 (0.03)	0.01 (0.002)	0.59 (2.48)	-0.20 (0.08)	0.69 (0.34)	0.31	3.10	2.90
X = STUC	-0.73 (0.20)	-1.63 (0.32)	0.60 (2.64)	-0.26 (0.11)	0.65 (0.33)	0.31	3.09	2.95
X = LTUC	-0.02 (0.004)	-0.20 (0.06)	0.60 (2.50)	-0.23 (0.10)	0.67 (0.33)	0.31	3.10	2.90
X = RWR	0.89 (0.32)	-0.40 (0.57)	0.60 (2.67)	-0.26 (0.11)	0.65 (0.33)	0.33	3.07	3.05
<b>Europe</b>								
X = IC	1.70 (0.41)	-1.09 (0.29)	0.71 (5.25)	-4.22 (2.17)	-0.91 (0.50)	0.55	3.65	8.86
X = STUC	0.43 (0.20)	-0.76 (0.24)	0.71 (5.06)	-4.22 (2.15)	-0.91 (0.50)	0.55	3.65	8.84
X = LTUC	0.56 (0.88)	-0.46 (0.26)	0.71 (4.60)	-4.17 (2.09)	-0.88 (0.48)	0.55	3.65	8.84
X = RWR	1.20 (0.45)	-0.21 (0.32)	0.71 (5.40)	-4.23 (2.19)	-0.92 (0.51)	0.55	3.65	8.87
<b>OECD</b>								
X = IC	-0.89 (0.37)	1.39 (0.56)	0.68 (6.46)	-2.57 (1.67)	-0.15 (0.11)	0.52	3.49	11.42
X = STUC	0.65 (0.40)	0.96 (0.94)	0.69 (6.55)	-2.59 (1.70)	0.17 (0.12)	0.53	3.46	11.75
X = LTUC	0.62 (0.38)	0.48 (1.13)	0.68 (6.57)	-2.57 (1.70)	-0.16 (0.11)	0.54	3.44	11.98
X = RWR	-0.25 (0.13)	0.18 (0.34)	0.69 (6.38)	-2.59 (1.67)	-0.16 (0.11)	0.52	3.50	11.31

Table 3b. Estimation results for equation (3)

$$\bar{u}_{it} = a'' + b'' \cdot X_i + c'' \cdot \bar{m}_{it} + d'' \cdot D1 + e'' \cdot D2$$

$\bar{m}_{it}$  broad money

	a''	b''	c''	d''	e''	$\bar{R}^2$	SER	F-stat
<b>EMS countries</b>								
X = IC	4.77 (2.79)	6.07 (3.27)	0.08 (0.56)	-7.24 (9.71)	-4.02 (5.26)	0.86	1.28	26.78
X = STUC	11.48 (5.63)	2.86 (0.97)	0.07 (0.32)	-7.23 (7.43)	-4.04 (4.03)	0.76	1.67	14.44
X = LTUC	12.24 (8.84)	3.36 (2.31)	0.03 (0.18)	-7.21 (8.50)	-4.09 (4.70)	0.82	1.45	20.03
X = RWR	8.90 (8.41)	0.68 (1.72)	0.01 (0.04)	-7.19 (7.89)	-4.12 (4.40)	0.79	1.56	16.99
<b>Europe</b>								
X = IC	6.58 (2.96)	5.68 (2.47)	-0.07 (0.35)	-7.72 (6.30)	-4.63 (4.13)	0.67	2.38	14.22
X = STUC	13.17 (8.79)	3.30 (1.69)	-0.16 (0.79)	-7.49 (5.77)	-4.63 (3.88)	0.63	2.53	11.95
X = LTUC	13.07 (11.12)	2.64 (2.71)	-0.05 (0.25)	-7.77 (6.48)	-4.63 (4.22)	0.68	2.33	15.09
X = RWR	9.25 (7.67)	1.17 (3.09)	-0.18 (0.99)	-7.45 (6.47)	-4.64 (4.38)	0.71	2.25	16.66
<b>OECD</b>								
X = IC	8.11 (4.76)	3.82 (2.10)	-0.25 (1.51)	-6.02 (5.82)	-3.86 (3.89)	0.56	2.52	12.92
X = STUC	11.89 (12.91)	2.35 (3.23)	-0.16 (0.97)	-6.19 (6.43)	-3.82 (4.14)	0.62	2.34	16.28
X = LTUC	11.41 (13.00)	1.07 (3.43)	-0.11 (0.70)	-6.27 (6.59)	-3.80 (4.18)	0.63	2.31	17.04
X = RWR	8.71 (8.07)	1.25 (3.62)	-0.26 (1.71)	-6.01 (6.46)	-3.86 (4.31)	0.64	2.28	17.78

Table 3c. Estimation results for equation (3)

$$\bar{u}_{it} = a'' + b'' \cdot X_i + c'' \cdot \bar{m}_{it} + d'' \cdot D1 + e'' \cdot D2$$

$\bar{m}_{it}$  domestic credit expansion

	a''	b''	c''	d''	e''	$\bar{R}^2$	SER	F-stat
<b>EMS countries</b>								
X = IC	4.93 (2.90)	6.17 (3.29)	0.02 (0.17)	-7.23 (9.00)	-4.15 (5.51)	0.86	1.29	26.14
X = STUC	11.73 (7.19)	3.14 (1.15)	0.04 (0.32)	-7.31 (7.05)	-4.17 (4.30)	0.76	1.67	14.44
X = LTUC	12.31 (10.53)	3.40 (2.42)	0.02 (0.17)	-7.24 (8.02)	-4.15 (4.91)	0.82	1.45	20.03
X = RWR	8.86 (8.61)	0.68 (1.86)	0.02 (0.18)	-7.25 (7.49)	-4.16 (4.59)	0.79	1.56	17.04
<b>Europe</b>								
X = IC	6.27 (3.10)	5.83 (2.58)	-0.02 (0.13)	-7.79 (5.70)	-4.59 (3.97)	0.67	2.39	14.13
X = STUC	12.68 (9.17)	3.31 (1.67)	-0.02 (0.13)	-7.78 (5.28)	-4.59 (3.69)	0.62	2.57	11.48
X = LTUC	12.92 (11.84)	2.73 (2.83)	0.02 (0.15)	-8.01 (5.96)	-4.67 (4.13)	0.68	2.33	15.06
X = RWR	8.71 (7.74)	1.16 (3.00)	-0.02 (0.20)	-7.74 (5.90)	-4.58 (4.12)	0.69	2.29	15.75
<b>OECD</b>								
X = IC	7.17 (4.61)	4.23 (2.31)	-0.01 (0.87)	-6.01 (5.28)	-3.60 (3.52)	0.54	2.58	12.02
X = STUC	11.61 (13.73)	2.51 (3.57)	-0.06 (0.60)	-6.18 (5.90)	-3.65 (3.89)	0.61	2.36	15.88
X = LTUC	11.23 (14.36)	1.12 (3.83)	-0.06 (0.54)	-6.21 (6.05)	-3.66 (3.99)	0.63	2.31	16.90
X = RWR	7.91 (8.04)	1.29 (3.63)	-0.08 (0.77)	-6.10 (5.86)	-3.63 (3.89)	0.61	2.35	16.11

Table 4b. Indicators of labor market policy and labor market structure

Country	Unemployment insurance replacement ratio	Tax wedge on wages	Index of nominal wage responsiveness and indexation		Centralisation and corporatism	Union membership	Labor conflicts				
			average marginal	nominal wage resp.				Centr. Corpor. rank order	average change	average change (b)	
Australia	26.9	31.0	42.3	6	2	7	11	55.7	+5	346.0	-7.3
Austria	-	40.6	64.0	4	0	1	1	61.3	-3	3.5	-3.2
Canada	43.7	29.2	42.7	2	0	13	12	35.0	+5	87.2	-2.6
Greece	-	-	-	-	-	-	-	-	-	-	-
Japan	33.9	19.1	39.9	4	0	11	7	32.0	-6	20.8	-41.2
Norway	21.7	50.4	63.0	4	1	2	4	60.0	+2	9.5	+18.8
Portugal	-	37.1	44.3	-	-	-	-	-	-	-	-
Spain	31.8	35.5	46.7	-	-	-	-	-	-	137.8	+2.3
Un.Kingdom	27.2	39.0	54.5	5	2	9	8	53.7	+1	57.4	-11.2
Un.States	10.2	28.2	42.6	1	1	12	13	24.7	-13	24.3	-12.4

for explanation and source: see table 4;  
 (a) for Australia: average 1977-1984 and for Spain average: 1973-1984;  
 (b) for Un.States: 1976-1981 versus 1970-1975.

REFERENCES:

ARTIS, M., FARMELO, C. & ORMEROD, P. (1986): Asymmetries in the inflation response to shocks among western european economies (paper). University of Manchester/University of London, March.

ARTIS, M. & ORMEROD, P. (1987): Converging on the German standard: Wage-price processes in western Europe (paper). University of Manchester/University of London.

BRUNO, M. & SACHS, J. (1985): The economics of worldwide inflation. Basil Blackwell, Oxford.

CALMFORS, L. & DRIFFILL J. (1988): "Bargaining structure, corporatism and macroeconomic performance". Economic Policy. no.6, April.

CHAN-LEE, J.H., COE, D.T. & PRYWES, M. (1987): "Microeconomic changes and macroeconomic wage disinflation in the 1980s". OECD Economic Studies. no.8, Spring.

COE, D.T. (1985): "Nominal wages, the NAIRU and wage flexibility". OECD Economic Studies. no.5, Autumn.

DE GRAUWE, P. (1975): "Conditions for monetary integration: a geometric interpretation". Weltwirtschaftliches Archiv, Heft 4.

DE GRAUWE, P. (1985): The european monetary system during 1979-84: An evaluation. Centrum voor Economische Studiën KUL, Leuven,

International Economics Research Paper no.47, June.

FREEMAN, R. (1988a): "Labour market institutions and economic performance". Economic Policy: A European Forum. Cambridge University Press, Cambridge, no.6, April.

FREEMAN, R. (1988b): "Labour market institutions, constraints, and performance". The NBER Digest. National Bureau of Economic Research, December.

GRUBB, D., JACKMAN, R. & LAYARD, R. (1983): "Wage rigidity and unemployment in OECD countries". European Economic Review. North-Holland Publishing Company, no.21.

KLAU, F. & MITTELSTADT, A. (1986): "Labour market flexibility". OECD Economic Studies. no.6, Spring.

PADOA-SCHIOPPA, T. et al. (1987): Efficiency, stability and equity: A strategy for the evolution of the economic system of the european community. Oxford University Press, New York.

RUSSO, M. & TULLIO, G. (1988): "Monetary coordination within the european monetary system: Is there a rule ?". Policy Coordination in the European Monetary System. International Monetary Fund, Washington D.C., September.

UNGERER, H., EVANS, O., MAYER, TH. & YOUNG, PH. (1986): The european monetary system: Recent developments. Washington D.C., International Monetary Fund, Occasional Paper no.48, December.

VAN POECK, A. (1987): "Labour Market characteristics, stabilization

policy and real wage rigidity". Tijdschrift voor Economie en Management. no.2.

---



SOURCES OF DATA:

Nominal Wages: I.M.F., Yearbook of International Financial Statistics, 1988, line 65 (or 65 e.y., 65 c, 65 b).

Consumer Prices: idem, line 64.

GNP at constant prices: idem, line 99 a.p. or a.r., or line 99 b.p. or b.r.(GDP).

Narrow money: idem, line 34 x.

Broad money: idem, line 35 l.x.

Domestic credit: idem, line 32.

Dummies: J.H. CHAN-LEE, et al. (1987).

Unemployment: Commission of the European Communities, European Economy, 1987 (table 3: unemployment rate as a percentage of civilian labor force). Supplemented with O.E.C.D., Main Economic Indicators, data diskettes and several issues (unemployment rate as a percentage of total or civilian labour force), and O.E.C.D., Labour Force Statistics, several issues.

Employment: Commission of the European Communities, European Economy, 1987 (table 2: employment, total economy: annual percentage change). Supplemented with I.L.O., Year Book of Labour Statistics, several

issues.

Productivity: Computed by subtracting the growth rate of employment from the growth rate of GNP or GDP at constant prices.

---

Unemployment insurance replacement ratio, tax wedge on wages, nominal wage responsiveness, degree of indexation, corporatism rank order, centralisation rank order, union membership, labor conflicts: see table 4.