Changing Labour Market Flexibility in the European Union

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Abstract: This paper examines the effects of institutional arrangements on the wage formation process by estimating Phillips' curves for the principal European Union (EU) member states, employing a time-varying parameter methodology. Our interest is in ascertaining the causes of any differences in the underlying sacrifice ratios - *vis*. the short-run percentage increase in unemployment (or decrease in GDP) required to reduce inflation by one per cent - across member states.

Key Words: Unemployment; inflation; sacrifice ratio
JEL Classification: J33, J53.

Acknowledgements: We are grateful to Kate Morrison for excellent research assistance

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September 2000

I. Introduction

The success or otherwise of European Monetary Union (EMU) will depend critically upon the structure and conduits of constituent labour markets. A single currency will compel member states to forego two of the key instruments of macroeconomic control *vis*. exchange rate flexibility and monetary policy. The requisite co-ordination implied by EMU may therefore result in regional labour cost surges impacting far more rapidly on unemployment than hitherto, with benefits accruing to those regions best able to ensure low inflation and high productivity growth [Brown *et al*. (1996)]. This has led to mounting consternation in certain quarters that underlying social relations could be threatened, a particular concern being the impact of integration on the bargaining power of workers and firms [Rodrik (1997)].

One of the difficulties in assessing the viability of these fears is the current state of flux of most European labour markets. There has been an evident and rapid convergence in nominal wage increases following the low inflation policy adopted by most member states. It would appear that trade unions have accepted this move somewhat more swiftly than was originally anticipated, presumably aware that heightened competition within Europe has raised the costs of excessive wage claims [Fajertag (1997, 1999)]. Pressure from unions and left-wing parties for a social dimension in Europe is also sympatic of the evaporation of domestic bargaining power and the need to replace it with coordinated actions across Europe if social standards are to be protected Fajertag (1997)]

A key issue here is that although the process of integration has being going on for several decades, and in financial and capital markets is nigh well perfect, labour mobility between European countries lags well behind. [Pedersen (1996)]. Indeed, although recent evidence would suggest that wages are tending to follow each other more closely, their levels are far from uniform [Andersen *et al*. (2000)]. Moreover, wage convergence is not tantamount to structural and/or institutional convergence, and the question as to the impact on quantities (ie. employment) of levelling out prices (ie. wages) remains.

In this paper we attempt to shed some light on these issues by examining the extent of structural differentials across European labour markets. Our approach is to focus on the

correlates of member states' 'sacrifice ratios' *vis.* the amount of unemployment necessary to bring inflation down to any given extent. Our approach is to adopt a two-stage process: First we employ a time-varying parameter methodology to estimate a number of short-run Philips curves across a sample of member states. We then regress the estimated slope coefficients from these first stage regressions on a battery of labour market and institutional variables. Our presumption is that any differences in the sacrifice ratios can be explained by variables proxying the existence of differential rigidities within component labour markets.

The rest of the paper is set out as follows: Section II highlights the theoretical underpinning to our thesis. Section III sets out our empirical methodology and data. Our results are collected Section IV and our final comments in Section V.

II. Theoretical Underpinning

We adopt a simplified Jackman *et al*. (1991) type model of price and wage setting.[1] The key assumption is that the desired real wage of wage setters and the desired price level of price setters, are both inversely related to the level of unemployment within the economy. In terms of price setters, we assume that prices are set as a mark up on (wage) costs with the mark up tending to rise with the level of economic activity. Thus:

$$p = w^e + \alpha_0 - \alpha_1 u \qquad (1)$$

where p denotes the log of the price level, w^e the log of expected wages, and u the log of the unemployment rate. Equation (1) effectively sets out the 'feasible' real wage - i.e. the real wage which for a given level of productivity price setters are willing to concede.

In terms of wage setters the level of unemployment would reduce the equilibrium level of wages determined by either trade union or efficiency wage considerations. In the former situation the bargaining power of the union would be abated whilst in the latter the need to offset shirking consideration by the carrot of high wages would be alleviated. Thus we assume:

[1] A similar approach may be found in Grubb *et al*. (1983) and Grubb (1986).

$$w = p^e + \beta_0 - \beta_1 u \tag{2}$$

Equation (2) denotes the 'target' real wage as set by wage setters. If actual wages and pries are at their expected values then $p - p^e = w - w^e = 0$ such that equilibrium unemployment and real wages are defined through:

$$u^* = \frac{\alpha_0 + \beta_0}{\alpha_1 + \beta_1} \tag{3}$$

Any factor that raises wage push (β_0) or price push (α_0) will increase the equilibrium rate of unemployment. Conversely, any factor that raises real wage flexibility (β_1) or price flexibility (α_1) will reduce the equilibrium unemployment. If expectations are *not* realised then we have:

$$u = \frac{\alpha_0 + \beta_0 - (p - p^e) - (w - w^e)}{\alpha_1 + \beta_1} = u^* - \left[\frac{(p - p^e) + (w - w^e)}{\alpha_1 + \beta_1} \right] \tag{4}$$

A common simplifying assumption is that price and wage surprises are similar *vis*. $p - p^e = w - w^e$. This permits us to rewrite (4) as:

$$u = u^* - \frac{1}{\gamma_1}(p - p^e) \tag{5}$$

where $\gamma = (\alpha_1 + \beta_1)/2$ is a complex of real wage and price flexibility. Thus positive price suprises imply lower unemployment. Assuming that inflation $(\Delta p = p - p_{-1})$ has no long run trend implies:

$$\Delta p = \Delta p_{-1} + \varepsilon \tag{6}$$

where ε is white noise such that inflation is a random walk. This would imply that the rational expectation of prices is given by:

$$p^e = p_{-1} + \Delta p_{-1} \tag{7}$$

Thus the price *surprise* is given by the change in inflation:

$$\begin{aligned} p - p^e &= p - (p_{-1} + \Delta p_{-1}) \\ &= \Delta p - \Delta p_{-1} \end{aligned} \tag{8}$$

A similar story would hold for wages. We can therefore rewrite equation (5) as:

$$u = u^* - \frac{1}{\theta}(\Delta p - \Delta p_{-1}) \tag{9}$$

Which implies:

$$\Delta p - \Delta p_{-1} = -\theta (u - u^*) \tag{10}$$

This is the standard short-run Phillips curve relation. When unemployment exceeds the equilibrium rate of unemployment, inflation is rising, and vice versa. Only when unemployment its at its equilibrium or natural rate will inflation be stable.

The slope parameter, $\theta = (\alpha_1 + \beta_1)/2$, measures the slope of the short run Phillips curve and as such sets out the cost in terms of unemployment of reducing inflation. For this reason is often termed the 'sacrifice ratio'. The situation is shown graphically in Figure I below.

Erreur! Liaison incorrecte.

Figure I: The Sacrifice Ratio

Factors that might influence the size of θ are the cost of wage adjustment, which may be influenced, *inter alia*, by trade union bargaining power, the relative 'openness' of the economy, minimum wage and redundancy legislation, product market concentration and unemployment benefit [Anderson *et. al*. (2000)].

III. Empirical Methodology and Data

Our empirical methodology combines macroeconomic time series data with detailed institutional data. We proceed in two stages: First, we estimate country specific short run Phillips curves of the form:

$$\dot{p}_{it} = \theta_{it} (y_{it} - \bar{y}_i) + \varepsilon_{it} \tag{11}$$

where $i = 1, 2, \ldots, I$, and $t = 1, 2, \ldots, T$. $\dot{p}_{it}$ is the change in the log of the retail price index of country i at time t, y_{it} is the log-level of aggregate demand in country i at time t, $\bar{y}_i$ is the log of potential output in country i, and ε_{it} is a white noise error term. We then proceed to ascertain the extent to which the estimated $\hat{\theta}_{it}$'s are determined by correlates of labour and non-labour market flexibility. We therefore employ panel data techniques to estimate:

$$\hat{\theta}_{it} = \mathbf{X}_{it}\mathbf{A}_i + \mathbf{Z}_{it}\mathbf{B}_i + \eta_{it} \tag{12}$$

where $(\mathbf{X}_{it}, \mathbf{Z}_{it})$ are vectors of characteristics depicting labour and non-labour market flexibility in each state, $(\mathbf{A}_i, \mathbf{B}_i)$ are parameter vectors, and η_{it} is an error term.

Our first stage data are based on Anderson *et. al*. (2000). The annual consumer price indices for 13 EU countries – Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Sweden and the United Kingdom – were taken directly from Anderson *et. al*. (2000) and matching annual unemployment series were collected from the OECD Main Economic Indicators. As far as possible standardised rates of unemployment were used to facilitate comparison between the economies.

The second stage data is taken from three sources. The productivity data is again taken from Anderson *et. al*. (variable *Q_land*), openness was constructed from national income accounts as the ratio of imports to GDP and the labour market characteristics data taken from the New Cronos Database (see Appendix 1). The problem with this annual database is that it only begins in 1990 with 1998 as the last observation on most variables. Thus the time series aspect of the panel is rather shorter than we would wish. Moreover not all of the variables are available for countries so again limiting what variables could be included. It was, however, possible to include data on strikes, unemployment benefit, trade union membership, social protection and minimum wage legislation. The very short time series on the latter series resulted in us using a zero one dummy variable for countries and periods over which minimum wage legislation was in operation.

IV. Results

The average intercept and slope coefficients (ie. θ's) derived from our first stage regressions are set out in Table I. Except for Greece, the average slope coefficients are all negative as expected. Recall that the more negative the slope coefficient, the smaller the sacrifice ratio and the more flexible the underlying labour market. The t-ratio of θ for Greece, however, is only 1.493 and so the positive slope coefficient is insignificantly different from zero. The θ-coefficients for Spain and Sweden, although negative, are also not statistically significant.

This raises a methodological issue for the second stage results. Greece, Spain and Sweden should presumably be excluded from the sample since whatever impact the labour market characteristics have on the sacrifice ratio this is not an important parameter for inflation reduction in these countries. On the other hand, certainly as far as Sweden and Spain are concerned, the inclusion of these countries should not adversely affect the results for the other countries and indeed, given the relatively small panel will add to the efficiency of the estimates obtained. These countries are therefore maintained in the full sample, but Greece is excluded from the panel due to the positive Phillips curve parameter.

Table I
Average Constant and Slope Coefficients:

	Constant		Slope - q		
Country	**Coef.**	**Std error**	**Coef.**	**Std error**	**Log Likelihood**
Austria	9.49	0.799	-0.996	0.431	-64.635
Belgium	14.713	1.317	-0.763	0.347	-74.801
Denmark	16.076	3.718	-1.759	0.335	-60.549
Finland	19.968	0.988	-1.431	0.438	-67.941
France	11.904	1.941	-0.807	0.160	-36.796
Germany	11.653	0.968	-0.946	0.327	-62.353
Greece	4.546	2.120	1.177	0.788	-32.218
Ireland	11.702	3.252	-0.880	0.293	-68.859
Italy	17.950	1.893	-1.253	0.298	-72.639
Netherlands	5.051	1.941	-0.428	0.190	-37.600
Spain	4.933	1.295	-0.104	0.079	-31.673
Sweden	7.445	0.891	-0.353	0.247	-45.791
UK	14.429	1.199	-1.465	0.421	-71.010

In the second stage estimates are obtained using the Generalised Least Squares estimator with cross-section weights and all standard errors are the White Heteroscedasticity-Consistent Standard Errors. The results are set out in Tables II and III below.

Given the nature of our dependent variable, a positive (negative) coefficient on a particular second-stage explanatory variable implies a positive (negative) correlation between that variable and increased labour market flexibility. Table II initially shows estimates the model over the full panel of 12 countries (excluding Greece) each with eight years of time series observations, 1990-97 inclusive, giving a full panel of 96 observations. Equation (i) shows the predicted positive signs on openness and productivity and the negative signs on minimum wages and social protection, but an incorrect sign on unemployment benefits, which is expected to be negative, rather than positive. All coefficients are significantly different from zero. Because there is no data on union density or strike variables for 1997, the panel is reduced to 76 observations and the model re-estimated as Equation (ii). The results are less supportive of the theory with all coefficients showing positive signs (except the minimum wage) with both the minimum wage and unemployment benefit variables being insignificant.

Finally, Equation (iii) gives a further reduction in the size of the panel as measured minimum wage rates and early retirement agreements are only reported for three countries in the sample. This column shows that social protection is now negative and significant, as is the new early retirement variable, but other coefficients have the wrong signs (such as openness and unemployment benefits) or are insignificant (such as union density).

Table II
Second Stage Estimates:

	(i)		(ii)		(iii)	
	Coef.	**SE.**	**Coef.**	**SE.**	**Coef.**	**SE.**
Constant	-2.8157	0.0677	-2.6386	0.1935	0.2305	0.2760
Open	1.6743	0.0497	1.3433	0.1894	-1.5256	0.2736
Minimum Wage	-0.3509	0.1083	-0.0147	0.2644	-	-
Strikes	-	-	9.71_{E-05}	2.79_{E-05}	5.87_{E-05}	3.74_{E-05}
Union Density	-	-	0.0002	1.36_{E-05}	-6.52_{E-05}	5.01_{E-05}
Social Protection	-1.53_{E-05}	2.10_{E-06}	3.56_{E-06}	1.30_{E-06}	-5.77_{E-05}	2.02_{E-05}
Unemp. Benefits	0.0001	1.12_{E-05}	2.49_{E-05}	2.07_{E-05}	7.15_{E-05}	4.46_{E-05}
Productivity	0.0111	0.0005	0.0107	0.0010	0.0017	0.0027
Min Wage (measd)	-	-	-	-	0.0002	0.0002
Early Retirement	-	-	-	-	-0.0002	4.98_{E-05}
Countries used	12		12		3	
Time series obs	8		7		7	
Panel size	93		76		21	
DW *Weighted*	1.0291		1.8334		1.8361	
R^2 *Weighted*	0.5965		0.2266		0.9927	
F statistic	25.7208		2.8456		203.917	

Further investigation showed, however, that the variable pairs strikes and union density and unemployment benefit and social protection are highly correlated over the sample, with correlation coefficients of 0.913 and 0.858 respectively. It was therefore decided to include only one of each pair in the final regression, shown in Table III.

Table III shows four regression results with different combinations of the multi-collinear pairs noted above. The results are mixed with union density, unemployment benefits, social protection and strikes always having positive rather than negative signs, suggesting that these labour market characteristics add to the efficiency of the labour market giving a steeper Phillips curve. This finding is difficult to explain in the context of the proposed model, although it is consistent with the notion that social protection, union density and unemployment benefits have all been reduced in the EU during the 1990s, thus reducing the

sacrifice ratio. Furthermore, although the minimum wage dummy has its expected negative sign in two of the four cases reported in Table III, it is never significant.

Table III
Second Stage Estimates

	(i)		(ii)		(iii)		(iv)	
	Coef.	**SE.**	**Coef.**	**SE.**	**Coef.**	**SE.**	**Coef.**	**SE.**
Constant	-3.0861	0.1962	-2.3440	0.1810	-3.0658	0.1428	-2.2321	0.0984
Open	0.9239	0.1178	0.9785	0.1810	1.0453	0.0894	1.3062	0.1636
Minimum Wage	0.1044	0.1606	-0.0375	0.2097	0.0879	0.1410	-0.1235	0.2255
Strikes	0.02_{E-02}	2.00_{-05}	0.02_{E-02}	2.24_{E-05}	-	-	-	-
Union Density	-	-	-	-	0.0002	1.55_{E-05}	0.02_{E-02}	1.76_{E-05}
Social Protection	7.06_{E-06}	2.51_{E-06}	-	-	7.96_{E-06}	3.69_{E-06}	-	-
Unemp. Benefits	-	-	3.01_{E-05}	1.29_{E-05}	-	-	4.02_{E-05}	2.08_{E-05}
Productivity	0.0167	0.0012	0.0092	0.0009	0.0169	0.0009	0.0077	0.0008
Countries Used	12		12		12		12	
Time Series obs	7		7		7		7	
Panel size	78		78		76		76	
DW *Weighted*	1.586		1.656		1.442		1.677	
R^2 *Weighted*	0.328		0.528		0.321		0.325	
F statistic	7.031		16.144		6.630		6.732	

On the other hand the non-labour market characteristic variables - productivity and openness - are always correctly signed and statistically significant. The most encouraging result is that of specification (ii) where three of the five explanatory variables are correctly signed (two of which are also significant) and where the equation is able to explain over half of the variation in the dependent variable.

V. Final Comments

In this paper we investigate the extent and causes of structural differentials across European labour markets by focusing on the correlates of member states' sacrifice ratios. Our results appear to suggest that the openness of the economy and the productivity of labour are important determinants of the sacrifice ratio. To this end the continued integration of EU

product markets is likely to be an important factor in reducing the sacrifice ratios in the national EU economies. Although there is some evidence to suggest that minimum wage legislation may increase the sacrifice ratio, by making the Phillips curve flatter, this requires further analysis given that relatively few countries in the EU that report a statutory minimum wage (only Belgium, France, Greece, Netherlands and Spain). Other labour market characteristics, such as unemployment benefits, unionisation, strikes and social protection do not seem to be important factors determining the sacrifice ratio. This may be due to the fact that the sample only includes observations from the 1990s, when many of these labour market factors have become less important following on from the Single Market Act of 1986. This conclusion is of course conditioned by the limited quantity of data and further time series data may make this a premature conclusion.

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Appendix 1

Variable Definitions

Open	Imports / GDP
Minimum Wage	Statutory minimum monthly wages (annual averages)
Strikes	Number of working days lost by economic activity (ISIC) and by Member State (1000)
Union Density	Number of workers involved by economic activity (ISIC) and by Member State (1000)
Social Protection	Social protection benefits
Unemp. Benefit	Unemployment benefits (non-means tested)
Productivity	Productivity Output per hour in the manufacturing industry, units 1992=100