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WAGE SETTING AND UNEMPLOYMENT PERSISTENCE IN EUROPE, JAPAN AND THE USA

George ALOGOSKOUFIS and Alan MANNING*

Birkbeck College, London W1P 1PA, UK

1. Introduction

The persistence of high unemployment in the main European economies is one of the most puzzling economic developments of the past fifteen years. Average Japanese unemployment has risen slightly since the mid-seventies, whereas unemployment in the United States still exhibits cyclical fluctuations around a gently rising level. In marked contrast, average unemployment in France, Germany and the United Kingdom rose to a higher plateau during the latter part of the seventies, shot up again in the early eighties, and has remained persistently high.

Identification of the causes of such unemployment persistence is crucial before one makes policy recommendations. Three possible causes spring to mind: first, persistence in the determinants of equilibrium and disequilibrium unemployment; second, excessive power of insiders in wage setting combined with high correlation between employment status and insider status, and finally a high degree of state dependence (sluggishness) in labour demand. Although in general one expects all three causes to have played a role in the persistence of high European unemployment, there is still a need to identify their relative importance.

The first set of factors has been assessed empirically in recent papers by among others, Sachs (1983), Bruno and Sachs (1985), Bruno (1986), Layard and Nickell (1985), Bean, Layard and Nickell (1986), Newell and Symons (1985) and others. Many of these papers have also allowed for sluggishness in labour demand, although they did not particularly focus on it.

The second set of factors has been investigated by Blanchard and Summers (1986), who concluded that there is evidence of much higher correlation between employment status and insider status in the three largest European economies, than in the United States.

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In this paper we set out to directly distinguish between insider membership dynamics and other sources of unemployment persistence. Our findings suggest that there are not sufficient differences in insider membership dynamics between the European economies and the United States. Thus, one cannot appeal to this source to justify the difference in their unemployment experience after the mid-seventies. This is in marked contrast to the conclusion of Blanchard and Summers. We suggest that their conclusions are sensitive to the way of approximating the natural rate of unemployment. Our second conclusion concerns sluggishness in labour demand. We find evidence of significant sluggishness in the three European economies and no sluggishness in the U.S.A. and Japan. This tentatively suggests that the persistence of European unemployment after the recent demand and supply shocks may have to do with this source.

The rest of the paper is as follows: In section 2 we briefly present a version of the Blanchard and Summers model of wage and employment setting. In section 3 we modify and extend the model, and present estimates of the hysteresis coefficient, that measures the extent to which past employment determines the size of the group of insiders in wage negotiations. In section 4 we briefly investigate sluggishness in labour demand, and the conclusions are summed up in the final section.

2. Insiders, outsiders and wage setting

Consider an economy where labour demand by firms is negatively related to the real wage:

$$l_t = \gamma l_{t-1} - (1-\gamma)\lambda(w-p)_t + \varepsilon_t, \tag{1}$$

l is the logarithm of employment, w is the logarithm of the nominal wage and p the logarithm of the price level. $(1-\gamma)$ is the short-run adjustment coefficient, and λ the long-run elasticity of labour demand. Firms are assumed to determine employment, and ε_t is a factor that shifts the labour demand curve.

Following Blanchard and Summers (1986, 1987), assume a modified Gray (1976) framework, where insiders set the nominal wage in advance, so as to make expected employment equal to the size of their group.[1] The size of the group of insiders will depend on past employment, and the structure of labour market institutions, especially trade union membership rules, the existence of temporary layoffs etc.[2] Assume that the size of the insider group is a weighted average of the *effective* labour force $\bar{n}_t$, and past employment

[1]The recent focus on insiders versus outsiders owes a lot to a stream of papers by Lindbeck and Snower. See for example their 1986 and 1987 papers. See also the paper by Gottfries and Horn (1987).

[2]Blanchard and Summers (1986) provide a discussion of the role of membership rules.

l_{t-1}. If insiders act so as to make expected employment equal to that, the following condition will determine wages.[3]

$$l_t^e=(1-\alpha)\bar{n}_t^e+\alpha l_{t-1}, \qquad 0\leqq\alpha\leqq 1, \tag{2}$$

where $x_t^e=Ex_t|I_{t-1}$, for each variable x, and I_{t-1} is the information set on the basis of which insiders make their wage setting decisions. $\bar{n}_t$ is the log of the effective labour force. The coefficient α measures the proportion of new entrants as well as involuntarily unemployed who are considered outsiders. In the terminology of Blanchard and Summers (1986), it measures the degree of unemployment hysteresis. If $\alpha=1$, then all the involuntarily unemployed as well as new entrants are considered outsiders, whereas if $\alpha=0$ everybody is an insider, and we have the framework of Gray (1976) where nominal wages are set ex ante, with a view of employing the whole labour force.

From (1) and (2), nominal wages are set as

$$w_t=p_t^e+\frac{1}{(1-\gamma)\lambda}[(\gamma-\alpha)l_{t-1}-(1-\alpha)\bar{n}_t^e+\varepsilon_t^e]. \tag{3}$$

Substituting (3) in (1), employment is given by

$$l_t=(1-\alpha)\bar{n}_t^e+\alpha l_{t-1}+(\varepsilon_t-\varepsilon_t^e)+(1-\gamma)\lambda(p_t-p_t^e). \tag{4}$$

According to (4), employment will deviate from what was expected on the basis of past information, to the extent that there are unanticipated shifts of labour demand, and to the extent that unanticipated inflation reduces real wages.

3. Unemployment persistence in Europe, Japan and the U.S.A.

To convert (4) into an equation for unemployment we note that the total measured labour force consists of the effective labour force plus equilibrium unemployment.

$$N_t=\bar{N}_t+\bar{U}_t, \tag{5}$$

where upper case letters denote levels rather than logarithms or ratios, N is the total measured labour force, and $\bar{U}$ the size of equilibrium (natural) unemployment. Dividing through by N_t and approximating the proportional difference between N and $\bar{N}$ by the difference of their logarithms, we get,

$$n_t-\bar{n}_t=\bar{u}_t, \tag{6}$$

[3]Clearly this rule is a special case, even in the context of the labour demand model, where workers set the wage and firms determine employment. A more general treatment is contained in Alogoskoufis and Manning (1987).

where n is the log of the measured labour force, and $\bar{u}_t$ the natural rate of unemployment. One of the simplest assumptions one can make is that the logarithm of the measured labour force is a random walk with drift, i.e., that the measured labour force has a stochastic trend. As for the natural rate of unemployment one could model it in a number of ways. For the purposes of this particular investigation we shall approximate it by a trend polynomial with a random component. Thus, we assume,

$$n_t = q + n_{t-1} + v_t, \tag{7}$$

$$\bar{u}_t = \bar{u}(t) + \eta_t, \tag{8}$$

where q is a constant, $\bar{u}(t)$ is a trend polynomial and v_t and η_t are white-noise disturbances.[4]

From (6), (7) and (8)

$$\bar{n}_t^e = q + n_{t-1} - \bar{u}(t), \tag{9}$$

Substituting (9) in (4), and using (7), we get

$$u_t = \alpha q + (1-\alpha)\bar{u}(t) + \alpha u_{t-1} - (\varepsilon_t - \varepsilon_t^e) - (1-\gamma)\lambda(p_t - p_t^e) + v_t, \tag{10}$$

where u_t is the unemployment rate, approximated as $u_t \simeq n_t - l_t$.

Eq. (10) can easily be estimated, and the coefficient of lagged unemployment will give us an estimate of the degree of hysteresis α. In fact, OLS estimates will be consistent, as lagged unemployment is orthogonal to $(\varepsilon_t - \varepsilon_t^e)$, $(p_t - p_t^e)$, and v_t.

In table 1 we present estimates of (10), for the three major European economies, Japan and the U.S.A. We present estimates for both a linear trend polynomial $\bar{u}(t)$ [as Blanchard and Summers (1986)], and a quadratic one.[5]

With the exception of the U.S.A., the squared trend has a statistically significant coefficient at conventional significance levels. The unemployment hysteresis coefficients are of the order of 0.5 to 0.7. However, if one solely relied on the estimates with a linear time trend (as Blanchard and Summers), one would have concluded that there is almost full hysteresis in the three

[4]Approximating $\bar{u}$ by a trend polynomial is clearly an oversimplification. Ideally, one should try to explicitly model the natural rate, like Layard and Nickell (1985). Note, however, that even in that investigation, as well as in Bean, Layard and Nickell (1986), a quadratic time trend was also included to account for shifts in search intensity.

[5]Results do not differ qualitatively if one allows for an MA(1) component. The theory underlying (10) does not suggest a moving average component. However, time aggregation as well as other measurement errors could well introduce such a component, even if the theory was true.

Table 1

AR unemployment processes: 1951–86 (dependent variable: u_t).[a]

Country	Constant	u_{t-1}	t	$t^2/100$	$\bar{R}^2$	DW
France						
(1)	0.012	0.598	−0.0013	0.0061	0.986	1.808
	(0.005)	(0.131)	(0.0005)	(0.0019)		
(2)	−0.003	0.993	0.0003		0.982	1.987
	(0.001)	(0.044)	(0.0001)			
Germany						
(1)	0.027	0.625	−0.0030	0.0090	0.949	1.180
	(0.016)	(0.151)	(0.0016)	(0.0041)		
(2)	−0.007	0.946	0.0005		0.942	1.285
	(0.003)	(0.041)	(0.0001)			
United Kingdom						
(1)	0.010	0.724	−0.0011	0.0053	0.952	1.318
	(0.007)	(0.118)	(0.0007)	(0.0024)		
(2)	−0.003	0.941	0.0004		0.946	1.373
	(0.003)	(0.073)	(0.0002)			
United States						
(1)	0.017	0.518	0.0004	0.0004	0.634	1.625
	(0.009)	(0.154)	(0.0007)	(0.0019)		
(2)	0.015	0.530	0.0006		0.645	1.639
	(0.006)	(0.142)	(0.0002)			
Japan						
(1)	0.008	0.702	−0.0005	0.0015	0.858	1.730
	(0.003)	(0.111)	(0.0002)	(0.0006)		
(2)	0.0003	0.939	0.00005		0.831	1.759
	(0.001)	(0.074)	(0.00004)			

[a]Standard errors in parentheses.

European countries and Japan, and very little hysteresis in the United States. This inference is not warranted on the basis of our results, as the exclusion of squared time is rejected when tested for the European economies at conventional significance levels. It appears on the basis of these results that the natural rate of unemployment has risen in the European economies, and that at least a quadratic trend is needed to approximate this rise.

Our estimates suggest that there is very little difference in the degree of unemployment hysteresis between Europe, Japan and the United States. To formally test whether the differences are statistically significant, we estimated the equations jointly for all five countries. The likelihood ratio test for the hypothesis that all five countries have the same degree of hysteresis (α) was equal to 4.78. The critical values are $\chi^2_{0.95}(4)=9.49$ and $\chi^2_{0.99}(4)=13.3$. Thus, the hypothesis that all countries have the same degree of unemployment hysteresis, cannot be rejected at conventional significance levels. We also calculated likelihood ratio tests for a number of other hypotheses. The likelihood ratio test for the hypothesis that the U.S. and Japan have the same

degree of hysteresis as the three European countries, conditional on the latter having the *same* degree of hysteresis, yields a statistic of 4.03, where $\chi^2_{0.95}(2) = 5.99$, $\chi^2_{0.99}(2) = 9.21$. Finally, the likelihood ratio test for the hypothesis that the U.S. has the same degree of hysteresis as Europe, conditional of the three European countries having a common degree of hysteresis, yields a statistic of 3.68, the conventional critical values being $\chi^2_{0.95}(1) = 3.84$, $\chi^2_{0.99}(1) = 6.63$. This cannot be rejected at conventional significance levels either, although it could be rejected at a significance level higher than 5%. The common degree of hysteresis is estimated at 0.676, with asymptotic standard error 0.053. When Japan and the U.S.A. are allowed to differ from the three European countries, the estimates are Europe: 0.716 (ASE = 0.066), U.S.A.: 0.445 (ASE = 0.119), Japan: 0.698 (ASE = 0.091). Thus, as in Table 1, the U.S. point estimate is lower, but the difference is not statistically significant, and in any case nowhere near the differences reported by Blanchard and Summers.

There are two questions arising at this stage: One is the question of the determinants of the natural rate of unemployment in Europe, the United States and Japan. This question has been addressed by a number of recent studies, quoted in the introduction. On the basis of our results it appears that persistence in the determinants of the natural rate of unemployment might have been a more important reason for the differential unemployment experience of the major European economies than pure state dependence in unemployment. A further look at the determinants of the natural rate in the European economies might be worthwhile. The second question that arises is whether there is more sluggishness in labour demands between the European economies on the one hand and the United States and Japan on the other. In the context of the model we are using in this paper, the question boils down to obtaining estimates of γ, the coefficient of sluggishness of labour demand. This will measure the persistence of unemployment conditional on current real wages.

4. Estimates of wage setting equations

To investigate sluggishness in labour demands, we shall investigate the wage setting equation (3). This serves at least two purposes: First, it allows us to retrieve all the structural parameters of the model, and second, it makes it possible to test all the overidentifying restrictions implied by this version of insider–outsider theories. Furthermore, it allows for direct comparisons with Blanchard and Summers.

To do this we generalize their assumption about the process generating the unmodelled disturbance to labour demand ε_t, and assume it is an AR(1) process.

$$\varepsilon_t = \varepsilon_0 + \rho\varepsilon_{t-1} + e_t, \qquad 0 \leqq \rho \leqq 1, \tag{11}$$

where ε_0 is a constant, e_t is a white-noise process, and ρ is the autoregressive coefficient.

From (11)

$$\varepsilon_t^e = \varepsilon_0 + \rho\varepsilon_{t-1}. \tag{12}$$

Substituting (9) and (11) in (3) we get

$$w_t = p_t^e + \frac{1}{(1-\gamma)\lambda}[(\gamma-\alpha)l_{t-1} - (1-\alpha)n_{t-1} + \rho\varepsilon_{t-1} + \omega(t)], \tag{13}$$

where $\omega(t) = \varepsilon_0 - (1-\alpha)[q - \bar{u}(t)]$.

Lagging (1) once, solving for ε_{t-1}, substituting in (13) and using the definitions $u_t \simeq n_t - l_t$, $p_t^e - p_{t-1} = (p_t - p_{t-1}) - (p_t - p_t^e)$, we end up with

$$\begin{aligned} w_t - w_{t-1} = {} & p_t - p_{t-1} - (1-\rho)(w-p)_{t-1} \\ & + \frac{1}{(1-\gamma)\lambda}[-(\rho+\gamma-\alpha)u_{t-1} + \rho\gamma u_{t-2} - (1-\rho-\gamma)n_{t-1} \\ & - \rho\gamma n_{t-2} + \omega(t)] - (p_t - p_t^e). \end{aligned} \tag{14}$$

Eq. (14) can be estimated by non-linear least squares, to give us estimates of all the structural parameters.[6]

Non-linear least squares estimates of the structural parameters are presented in table 2, where we also present tests of the overidentifying restrictions.

On the basis of the results presented in table 2 one cannot reject the hypothesis that there is no sluggishness in labour demand in the U.S.A. and Japan. For Germany the hypothesis cannot be rejected at 5%, but γ is significantly different from zero at 10%. For France and the United Kingdom γ is significantly different from zero at 5%. This pattern of the results suggests sluggishness of labour demand in Europe, but no such sluggishness in Japan and the U.S.A.[7] The estimates also suggest a very small long-run elasticity of labour demand for Japan, compared with huge, although not well determined, elasticities for France and the United States. Finally, it is only for France and the United Kingdom that the overidentifying restrictions implied by the model cannot be rejected at conventional significance levels.[8]

[6]We have used the consumer price index for prices throughout. In our more detailed investigation [Alogoskoufis and Manning (1987)], where we examine a number of different models, we also allow for the wedge between consumer and producer prices.

[7]With the exception of Japan, this pattern of the results is not inconsistent with the findings of Layard and Nickell (1985), Newell and Symons (1985) and Bean, Layard and Nickell (1986), who also seem to find more sluggishness in labour demand for France, Germany and the United Kingdom compared to the United States.

[8]Given that these are stringent non-linear restrictions, it is hardly surprising that they are rejected. What is more significant, however, is the rather poor fit of wage change equations when estimated unrestricted by OLS, especially for France and the United Kingdom.

Table 2

Estimates of structural parameters: 1952–85.[a]

	α	γ	ρ	λ	Likelihood ratio test
France	0.536 (0.128)	0.709 (0.174)	0.959 (0.084)	2.5[b]	5.42 (3)
Germany	0.607 (0.145)	0.333 (0.247)	0.626 (0.131)	0.932 (0.411)	8.47 (2)
United Kingdom	0.712 (0.120)	0.462 (0.207)	0.309 (0.164)	0.509 (0.140)	0.80 (2)
United States	0.523 (0.158)	0.00[c]	0.561 (0.140)	2.5[b]	13.53 (4)
Japan	0.599 (0.112)	0.00[c]	1.07 (0.04)	0.06 (0.02)	10.79 (3)

[a]Asymptotic standard errors of parameters are in parentheses. The likelihood ratio tests the restricted wage equation against the unrestricted OLS estimates. The number of restrictions is in parenthesis.

[b]For France and the United States, when λ was left unrestricted the estimates did not converge. Estimates were obtained by using a grid on λ from 0.1 to 2.5 in steps of 0.1. The value of the log-likelihood was monotonically increasing as λ increased, although it was a lot flatter after λ reached 1.5. It was decided to impose 2.5 as an effective maximum.

[c]The point estimates of γ were negative for Japan and the U.S.A. The asymptotic t-ratios testing whether they were different from zero gave 0.28 (U.S.A.) and 0.53 (Japan).

5. Conclusions

Of the possible sources of persistence in unemployment, insider membership dynamics do not appear capable of explaining the recent differential experiences of the main European economies, Japan and the United States. All five economies have unemployment hysteresis coefficients of roughly the same order, and unless one is prepared to assume that labour demand shocks have been more severe and persistent in Europe than in Japan and the United States, such a finding cannot fully explain the persistence in European unemployment. On the other hand, our evidence suggests that possibly a large part of the rise in unemployment in Europe can be attributed to a rise in the natural rate, and that labour demand is sluggish in the three major European economies, in contrast to the United States and Japan. Thus, conditional on real wages, there appears to be higher persistence in European unemployment mainly through that source. Sluggish labour demand could well be a manifestation of high costs of employment adjustment in Europe. The findings seem to suggest that it might be fruitful if one tried to identify the causes of the rise in the European natural rate [see Layard and Nickell (1985) and Bean, Layard and Nickell (1986) for a first

attempt] as well as the nature of adjustment costs in labour demand. Part of the solution to the European unemployment problem may lie in these. In any case, if labour demand is sluggish, the strategy of directly reducing real wages will not yield large employment gains in the short run.

References

Alogoskoufis, G.S. and A. Manning, 1987, On the persistence of unemployment, Mimeo. (Birkbeck College).

Bean, C.R., P.R.G. Layard and S.J. Nickell, 1986, The rise in unemployment: A multi-country study, Economica Supplement 53, S1–S22.

Blanchard, O.J. and L.H. Summers, 1986, Hysteresis and the European unemployment problem, in: S. Fischer, ed., NBER Macroeconomics Annual (MIT Press, Cambridge, MA).

Blanchard, O.J. and L.H. Summers, 1987, Hysteresis in unemployment, European Economic Review, Papers and Proceedings 31, 288–295.

Bruno, M., 1986, Aggregate supply and demand factors in OECD unemployment: An update, Economica Supplement 31, S35–S52.

Bruno, M. and J. Sachs, 1985, The economics of worldwide stagflation (Basil Blackwell, Oxford).

Gottfries, N. and H. Horn, 1987, Wage formation and the persistence of unemployment, Economic Journal (forthcoming).

Gray, J.A., 1976, Wage indexation: A macroeconomic approach, Journal of Monetary Economics 2, 221–235.

Layard, P.R.G. and S.J. Nickell, 1985, Unemployment, real wages and aggregate demand in Europe, Japan and the United States, Carnegie-Rochester Conference Series on Public Policy 23, 143–202.

Lindbeck, A. and D.J. Snower, 1986, Wage setting, unemployment, and insider–outsider relations, American Economic Review, Papers and Proceedings 76, 235–239.

Lindbeck, A. and D.J. Snower, 1987, Union activity, unemployment persistence and wage–employment ratchets, European Economic Review, Papers and Proceedings 31, 157–167.

Newell, A. and J.S.V. Symons, 1985, Wages and employment in the OECD countries, Discussion paper no. 219 (Centre for Labour Economics, LSE).

Sachs, J., 1983, Real wages and unemployment in the OECD countries, Brookings Papers on Economic Activity 1, 255–289.