On the persistence of unemployment

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1. Introduction

One puzzle concerning the recent unemployment experience of the OECD countries is that it has been so diverse, as is clear from Figure 1. In many European countries (Belgium, Denmark, France, Germany, Italy, Ireland, the Netherlands, Spain, and the UK) unemployment rose in the mid-seventies, then shot up in the early 1980s, to increase by more than 4 percentage points (only 2.5 in Italy) with little tendency to fall. At the same time, Austria, the other Scandinavian countries, Japan and Switzerland escaped with a minor average rise in unemployment of less than 1 percentage point. In the US, unemployment rose sharply in the mid-seventies, fell between 1976 and 1979, rose again in the early 1980s, and has again fallen since 1982.

One important characteristic of these differences is that they do not reflect differences in economic growth (see Table 1). Countries with roughly comparable declines in average GDP growth (Sweden, the US and the UK, or, Belgium, the Netherlands, Italy and France), had quite different unemployment experiences. In fact, in some of the countries that experienced the steepest declines in average growth rates (Japan, Switzerland), the unemployment rate hardly rose. It is doubtful, therefore, whether unemployment can be explained solely in terms of the

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Summary

A comparison of unemployment across fourteen European countries, Japan and the US shows a great diversity of persistence: high in most of Europe outside the Scandinavian countries, Austria and Switzerland, low in Japan and the US.

Three reasons for unemployment persistence are examined. First, employed workers may not care about the unemployed, and only wish to protect their own jobs. The authors find little support for this view, except perhaps in the US. Second, workers may be reluctant to revise downward their wage aspirations. This seems to be the case in Europe, as opposed to the US and Japan. Third, firms may be slow in adjusting employment to its optimum level. This is the case in Europe and Japan, not in the US.

Labour market reforms might help, but have their own costs. The authors conclude that the best course of action is a demand expansion combined with incomes policies.

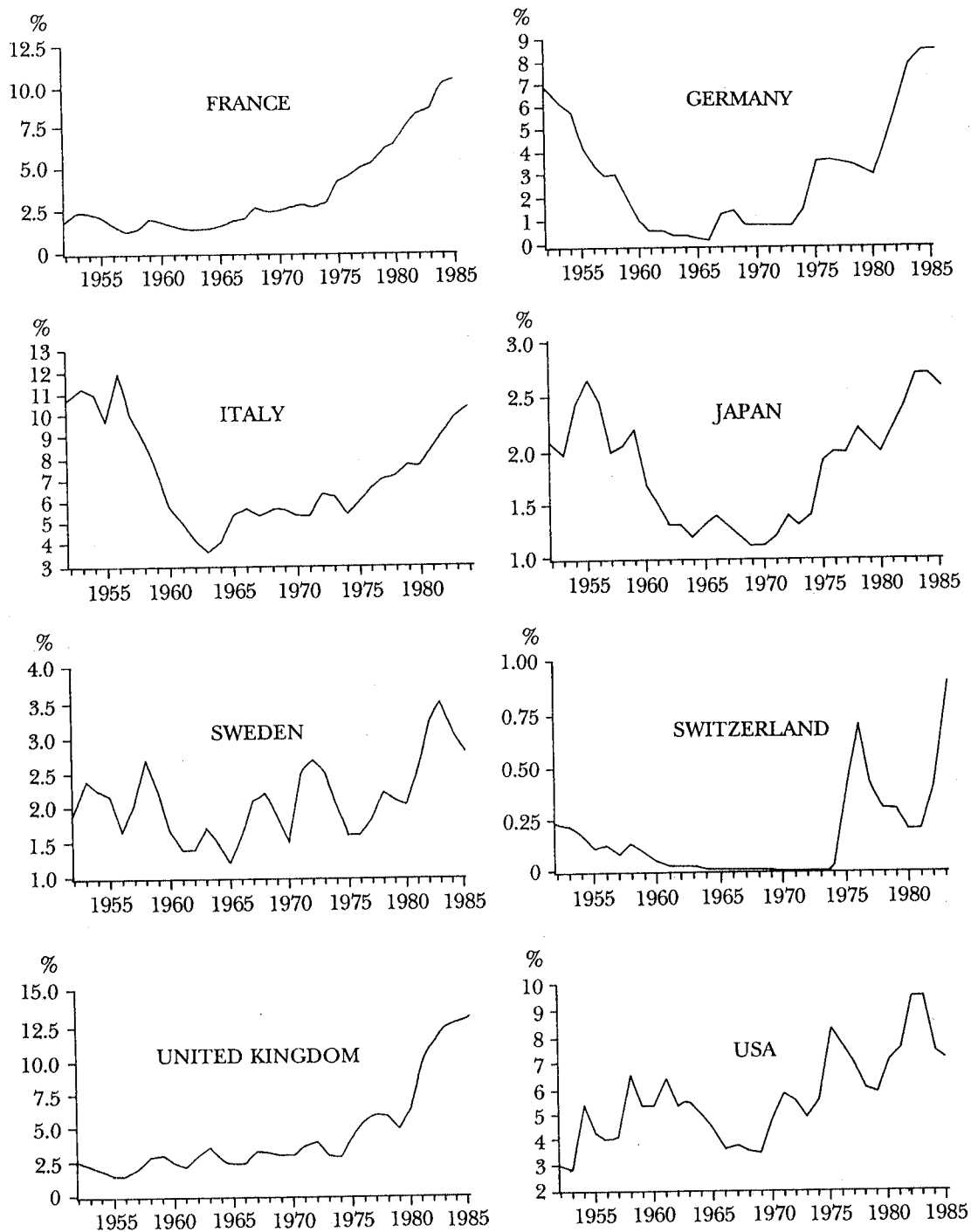**Figure 1. Standardized unemployment rates**

Source: OECD.

deceleration of aggregate economic activity. Nor is it possible to rely on a simple trade-off between unemployment and inflation. Average unemployment initially rose hand in hand with average inflation, and some of the countries with the highest increases in unemployment also experienced the highest rises in average price inflation.

Table 1. The anatomy of stagflation in Europe, Japan and the US: 1960–73 to 1974–85

	Rise in unemployment	Slowdown of GDP growth	Rise in inflation	Slowdown of real wage growth
Austria	0.7	2.6	1.7	2.9
Belgium	6.4	3.1	4.1	3.7
Denmark	6.6	2.7	3.4	3.8
Finland	2.9	2.5	4.9	2.8
France	4.4	3.4	5.5	2.0
West Germany	4.0	2.9	1.1	4.3
Ireland	4.0	1.3	7.9	3.1
Italy	2.5	3.2	10.6	3.0
Japan	0.9	6.1	0.7	5.9
Netherlands	5.9	3.4	1.4	5.1
Norway	0.3	0.3	4.0	1.7
Spain	8.4	4.8	7.9	2.2
Sweden	0.6	2.2	4.6	3.5
Switzerland	0.4	4.2	0.2	2.6
UK	5.0	1.9	6.9	1.4
US	2.6	1.9	4.3	2.0

Source: OECD.

Notes: The numbers refer to the difference in percentage points between the respective averages in 1960–73 and 1974–85. GDP is at market prices, unemployment rates are the OECD standardized ones, inflation refers to consumer prices, and wages are average earnings in manufacturing.

The rise in unemployment seems to have exerted significant downward pressure on real wage growth. Real wage growth has declined throughout, and in most countries this decline has been steeper than the decline in GDP growth. Yet the decline in real wage growth has not yet reversed the rise in unemployment in Europe. A final important fact is revealed from the graphs presented in Figure 1. For most of the European countries the average level of unemployment changes relatively infrequently. However, when it does change it changes fast, and afterwards it tends to persist. For the US, Sweden, Norway, and to a lesser extent Austria and Finland, the unemployment rate displays a lot more variability around its average level, but there are relatively minor changes in the average level itself.

There are two broad explanations for the persistence of unemployment. The first asserts that what really changed is the equilibrium (i.e. long-run) unemployment rate. This may have been due to exogenous disturbances or to the structural characteristics – technology, preferences, institutions – which determine the response of equilibrium unemployment to disturbances. The second explanation is that labour markets

adjust very slowly to equilibrium so that even temporary shocks will persist. In that case cross-country differences chiefly reflect differences in speeds of adjustment. Both explanations are plausible. Most recent studies of high unemployment have relied on the first explanation, and have attempted to identify what determines equilibrium unemployment. Many of these studies have allowed for sluggishness in the response of the economies to shocks, but the focus was firmly on medium-term equilibrium unemployment, the so-called 'natural rate'.[1] Empirical investigations focusing on the second class of explanations of unemployment persistence have started more recently. One influential study, Blanchard and Summers (1986), is based on the distinction between insiders and outsiders in the labour market. It suggests that any level of unemployment may be self-perpetuating, because insiders always set wages so as to protect their jobs, but only their own jobs. If, for some reason, unemployment is *temporarily* raised so that laid-off workers lose their insider status, the new, smaller group of insiders then sets the wage so as to maintain *permanently* the lower level of employment. In the extreme case where the unemployed lose their insider status immediately, employment and unemployment will show no tendency to return to their previous level, and the unemployment rate will display hysteresis, i.e. the current unemployment rate simply becomes the equilibrium rate. In less extreme circumstances, where the unemployed do not lose their insider status immediately, unemployment displays significant persistence and may take a long time to return to its previous equilibrium.

Although unemployment rates display very high persistence in many European countries relatively to the US, we believe that Blanchard and Summers' explanation is too special. Our scepticism is not only based on doubts about the speed at which unemployed workers become outsiders, but also because insiders are assumed to be concerned only with their employment prospects. If insiders also care about their real wages, they should balance their employment target against their wage aspirations. In such a case, a number of other possible factors can affect the persistence of unemployment: slow adjustment in firms' hiring and firing decisions, persistence of wage aspirations of insiders, the tastes of wage setters for wages relative to employment, and the

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[1] A number of comparative studies have attempted to look at wage rigidity and the determinants of the equilibrium rate of unemployment in the medium run. See among others, Branson and Rotemberg (1980), Grubb, Jackman and Layard (1983), Sachs (1983), Bruno and Sachs (1985), Layard and Nickell (1985), Newell and Symons (1985, 1987), Bean, Layard and Nickell (1986), Bruno (1986), Gordon (1987), Schultze (1987), and others. Many of these studies have also allowed for sluggishness in the response of the economy to shocks, but with few exceptions they did not particularly focus on it.

elasticity of labour demand: the membership dynamics explanation of unemployment persistence is simply a special case.

When we confront these various explanations with the data, we find no role for insider membership dynamics. On the other hand, we find that the main difference between Europe and the US is related to persistence in wage aspirations and sluggishness in labour demand. Faster reactions of wages to employment conditions, and of employment to real wages, account for the lower persistence in US unemployment. In Japan, unemployment is not less persistent than in Europe, but it seems less responsive to disturbances, a feature which we attribute to the smaller weight attached by wage setters to wage aspirations relatively to employment. We find this weight much smaller in Japan than in any other country except for Norway. This revealed preference may arise because of the lifetime employment system, and the high proportion of bonuses in Japanese labour earnings. The same revealed preference also explains differences among European economies. In Europe, it takes the form of centralization in wage setting, for example in Austria and Scandinavia. Another important finding is that 'demand-side' disturbances (those which affect the demand for labour) have large initial effects on unemployment, but then unemployment adjusts quickly. Such disturbances, when transitory, have short-lived effects. On the other hand, 'supply-side' disturbances (those which directly come via labour costs) have small initial unemployment effects, but these effects tend to persist. Our findings have two major policy implications. The first concerns labour market institutions, and the nature of possible reforms. The second implication concerns the design of macroeconomic policy.

The paper is organized as follows. In Section 2, we present our analysis of wage setting and unemployment persistence. With this in mind, the experience of the European countries, the US and Japan is examined in Section 3. In Section 4 we discuss implications for policy, and the final section summarizes our conclusions.

2. Wage setting and alternative sources of unemployment persistence

Theories of trade unions (dating back to Dunlop, 1944, and recently surveyed by Oswald, 1986) often describe unions as able to set wages unilaterally. Once wages are set, firms in turn determine employment. Because firms' demand for labour normally declines (unemployment rises) when real wages increase, as shown in Figure 2, labour unions face a trade-off: they implicitly choose between higher real wages and more jobs. If, for some reason, the firms' demand for labour shifts, say upward, trade unions face an improved trade-off. A normal reaction
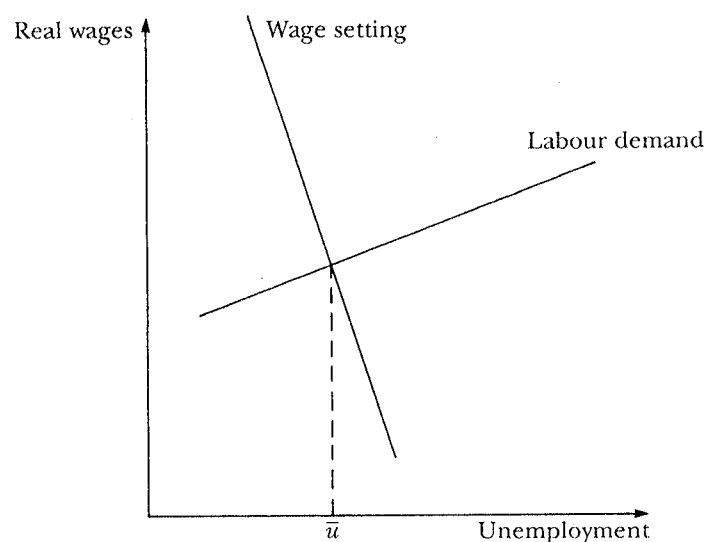
Figure 2. The determination of equilibrium unemployment

would be to ask for both higher real wages and less unemployment. This reaction is shown in Figure 2 as the wage-setting schedule. Equilibrium unemployment ($\bar{u}$) is found at the intersection of the labour demand schedule with the wage-setting reaction schedule of unions.[2] This simple framework, which is formally presented in the Appendix, can now be used to investigate the role of three sources of persistence in unemployment: membership of the group of insiders, wage aspirations, and demand for labour. Each source of persistence has a natural graphical interpretation: membership rules and wage aspirations affect, respectively, the shape and the movement of the wage-setting schedule, while movements in the labour demand schedule reflect firms' delays of reaction in adjusting employment to desired levels.

2.1. Membership dynamics and unemployment hysteresis

A first source of persistence of unemployment arises when unions are only concerned with the employment of their members (insiders). The evolution of union membership is then one of the determinants of the evolution of employment and unemployment.[3] In the simplest case, the union sets the wage as high as is consistent with the full employment

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[2] For a survey of alternative models of equilibrium unemployment see Johnson and Layard (1986). For search models see Pissarides (1985, 1988). Equilibrium and disequilibrium models, with an eye towards their econometric implementation, have also been surveyed by Nickell (1984).

[3] The recent focus on insiders versus outsiders in the labour market, owes a lot to the work of Lindbeck and Snower (1986, 1987). Blanchard and Summers (1986) first examined the empirical implications of the hypothesis, while Begg (1987), Gottfries and Horn (1987) and Lockwood and Manning (1987) have attempted to incorporate these considerations in intertemporal models.
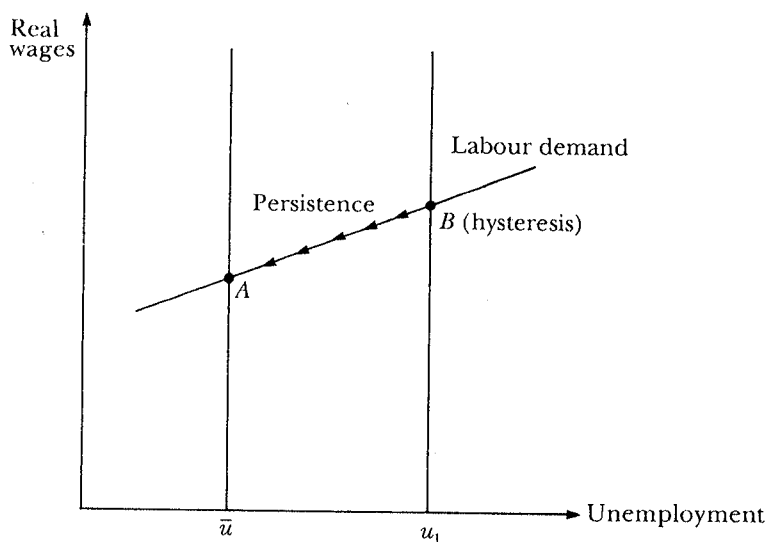
Figure 3. Blanchard–Summers model

of insiders: the wage-setting schedule is vertical and set at the unemployment level such that all insiders are employed. Starting from a situation of equilibrium unemployment (point A in Figure 3), an unanticipated deflationary shock causes unemployment to increase from $\bar{u}$ to u_1. Will unemployment return to $\bar{u}$, and if so how fast? If all the newly unemployed immediately lose their insider status, the union stops being concerned about their re-employment prospects. The wage-setting schedule shifts to the right: next time round wages will be set so as to ensure that only those who did not lose their jobs remain employed. Thus, the current equilibrium unemployment rate becomes a new equilibrium unemployment rate and we stay permanently at point B. This is a case of unemployment hysteresis. Blanchard and Summers consider this possibility as an important explanation of the current European unemployment problem:

> '... hysteresis resulting from membership dynamics plays an important role in explaining the current European depression in particular and persistent high unemployment in general. Outsiders are disenfranchized and wages are set with a view of ensuring the jobs of insiders.' (Blanchard and Summers, 1986, p. 16.).

The case of hysteresis is of course extreme. The employment targets of unions need not depend only on those currently employed. If unions also care about the unemployed, for example if their employment targets are a weighted average of the employed and the unemployed, unemployment converges back towards its initial equilibrium level (point A). The speed of adjustment depends only on the weight given

to the currently employed. In what follows, we shall denote this weight by α. The higher is α, the lower the speed of adjustment, and the higher the persistence of unemployment. Estimates of α by Blanchard and Summers (1986) suggest that α is very near to 100% for the main European economies, and less than 50% for the US. We shall provide very different estimates.

The situation just presented is rather special, even within the theory of monopoly unions. This can be seen in terms of both its assumptions and its implications. The main special assumption is that unions only care about employment (the wage-setting schedule is vertical). The implication is that the persistence of unemployment will depend only on α, the persistence in the employment targets of unions. However, if unions care about both employment and real wages, then a number of other parameters will affect the persistence of unemployment. Figure 4 exhibits the case where, because unions care about both real wages and employment, the wage-setting schedule is downward sloping. As before, we start from initial equilibrium at point A and face an adverse disturbance which displaces us to point B. This should next cause an upward shift in the wage-setting schedule, and in the absence of further shocks, unemployment will be higher than the original equilibrium (point C), but lower than unemployment immediately after the shock. This is so even if membership fully adjusts to employment ($\alpha = 100\%$), because now unions trade off real wages and employment. Unemployment will gradually converge to the equilibrium value $\bar{u}$, as the wage-setting curve gradually shifts downwards. Figure 4 shows that the long-run wage-setting schedule is flatter than the short-run one.
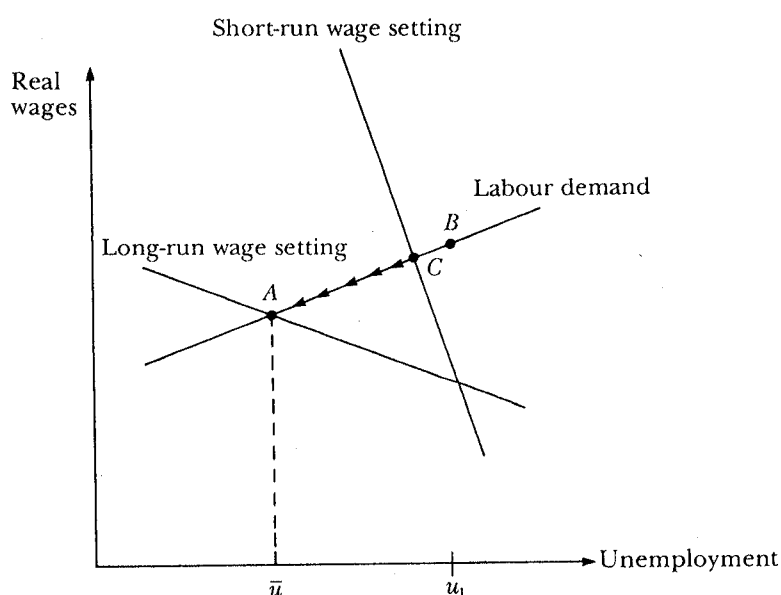

Figure 4. Dynamics of union membership

Hysteresis does not occur any more, although unemployment exhibits persistence. The return to point A will be slower the more insider membership depends on past employment (α closer to 100%), the steeper the labour demand schedule (the less elastic is labour demand), and the more unions care about real wages relatively to employment (for details see Appendix A).

2.2. Persistence of wage aspirations

A different situation emerges when, irrespective of membership of the group of insiders, wage setters and their unions develop wage aspirations which may turn out to be unjustified by the existing conditions. This may be the case when adverse productivity disturbances occur, or because past growth performance comes to an end, or else because welfare benefits raise workers' expectations and demands. Such explanations are not new and have been used in a number of recent empirical studies, such as Branson and Rotemberg (1980), Grubb, Jackman and Layard (1982, 1983), Bruno and Sachs (1985), Bean, Layard and Nickell (1986) and Newell and Symons (1987), among others.

The effect of sluggish real wage aspirations means that the wage-setting schedule is flatter in the short than in the long run: a given increase in unemployment initially has a limited effect on real wages, but this effect will grow over time. Figure 5 shows the implications of an unexpected adverse disturbance which displaces the economy from point A to point B. In the absence of further shocks, unemployment and real wages next period will be lower than immediately after the
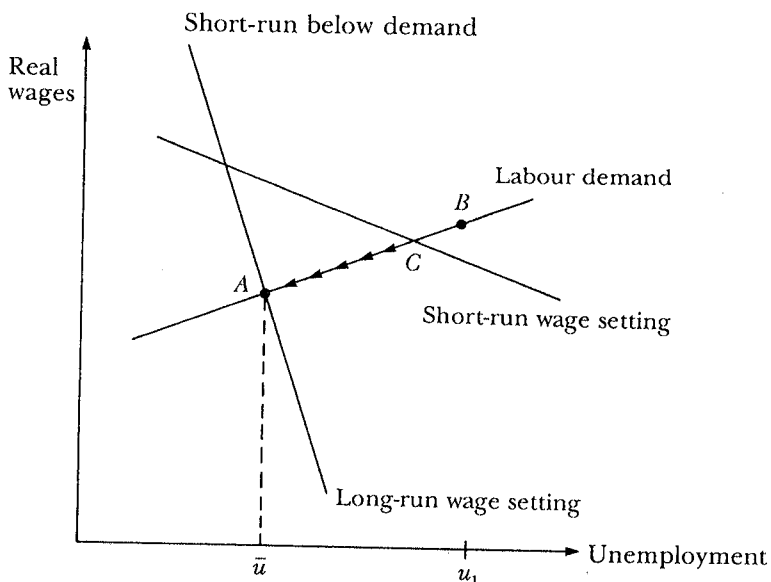

Figure 5. Dynamics of wage aspirations

shock (point *C*). They will then be adjusting downwards along the labour demand schedule, as the short-run wage-setting schedule gradually shifts towards its long-run position. We shall denote the persistence coefficient of wage aspirations by β. This coefficient measures the weight put on the lagged real wage in forming current real wage aspirations and is 'seen' as the difference between the short-run and the long-run wage-setting schedules. The persistence of unemployment will depend, of course, on the persistence of real wage aspirations. But it will also be related to other factors. Thus, persistence will be higher the steeper the labour demand schedule, as firms are less sensitive to wage changes and exert less pressure by generating less unemployment. Similarly, persistence will be higher the larger the weight put by insiders on wages relatively to employment. In general unemployment will not display hysteresis even if β is equal to 100% because, even if workers aspire to maintain the pre-disturbance real wage, the change in unemployment will make unions wish to trade off real wages for unemployment.

2.3. Persistence of labour demand

There are various reasons why employment decisions of firms depend on past employment. The simplest is costs of adjustment. If it is costly to fire and hire workers, then current employment will depend on past employment (Sargent, 1978; Nickell, 1986). Other explanations stress firm-specific skills, which depend on past employment, as well as institutional factors such as restrictions on firing. The effect of persistence in labour demand is shown graphically in Figure 6 where the labour
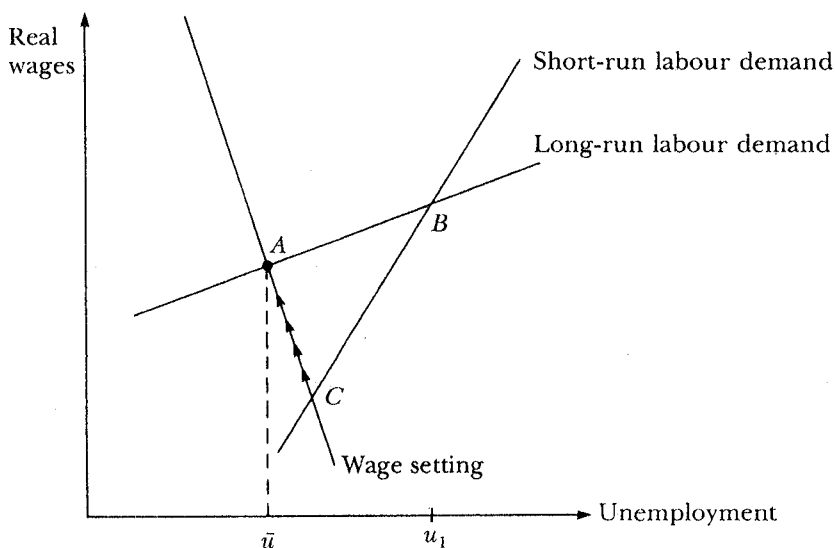

Figure 6. Dynamics of labour demand

Table 2. The framework

Wage setting schedule	
Real wages driven by:	current unemployment (elasticity: η)
	less past unemployment (persistence: α)
	past real wages (persistence: β)
Labour demand schedule	
Unemployment driven by:	real wages (elasticity: δ)
	past unemployment (persistence: γ)

demand schedule is steeper (less elastic) in the short run than in the long run. As before, the initial equilibrium at $\bar{u}$ is disturbed by an unanticipated deflationary shock, and unemployment and real wages rise. In the absence of further shocks, next period's short-run equilibrium is at the intersection of the new short-run labour demand schedule with the wage-setting schedule. Over time, the short-run labour demand curve shifts to the left, unemployment gradually falls and real wages rise towards equilibrium. The persistence of unemployment depends positively on persistence in labour demand (γ) which is shown as the difference between the short and long-run demand schedules. Persistence is also higher the steeper the short-run labour demand schedule, and the larger the weight assigned by unions to wages relatively to employment. In general, even if γ is equal to 100%, unemployment will not display hysteresis and will converge to its equilibrium rate. The reason is again that unions always wish to trade off real wages for unemployment.

2.4. A synthesis

The framework used so far is summarized in Table 2 where the three sources of persistence are indicated by the three coefficients α, β and γ. Ideally, we would like to assess precisely the contribution of each source of persistence to the overall persistence of unemployment. However, because estimating the coefficients of persistence is fraught with difficulties we shall proceed in two steps, first looking at the direct implications of the framework and then pinpointing possible values for the three coefficients of persistence.

Figures 4 to 6 have shown how each source of persistence leads to a slow adjustment of unemployment. When all three sources of persistence are present, we would want to superimpose the three figures. Doing so formally implies a particular pattern for the rate of unemployment: its current level turns out to be related to the rates observed over the previous two periods. This particular dependence is shown in Table

Table 3. Unemployment persistence

Unemployment driven by:	itself lagged once (coefficient: $\rho_1 > 0$).
	itself lagged twice (coefficient: $\rho_2 < 0$)

Particular cases:

hysteresis I:	$\rho_1 = 1.0$	$\rho_2 = 0$ when $\eta = \infty$	and $\alpha = 100\%$	
hysteresis II:	$\rho_1 + \rho_2 = 1.0$	when $\eta = 0$	and $\beta = 100\%$	
			or $\gamma = 100\%$	
		when $\alpha = 100\%$	and $\beta = 100\%$	
			or $\gamma = 100\%$	
no lagged-twice effect:	$\rho_2 = 0$	when $\beta = 0\%$		
		or $\gamma = 0\%$		
		or $\eta = \infty$		

3 and can be interpreted as follows. Lagged unemployment increases current unemployment on three counts. First because of insider membership persistence: as a result of higher past unemployment, some workers have become disenfranchized, which reduces the unions' employment target. Second because of persistence in wage aspirations: past increases in unemployment may be related to past increases in real wages, which raises aspirations and pushes up current wages and raises current unemployment. Third, directly because of persistence in labour demand. (All these channels were shown in Table 2.) As for unemployment lagged twice, it reduces current unemployment because of labour demand persistence (real wages lagged once are lower because of lower labour demand) and real wage persistence (current wage aspirations are affected by past real wages).

The advantage of the compact representation of Table 3 is that the pattern of unemployment persistence is entirely captured by the two coefficients ρ_1 and ρ_2, which can be estimated for each country. Knowledge of these coefficients can be used in two respects. First, it provides a direct measure of unemployment persistence. For example, the closer is ρ_1 to 100% and ρ_2 to 0%, the more persistence we observe (if $\rho_1 = 1.0$ and $\rho_2 = 0.0$ then current unemployment is always equal to past unemployment, up to a random factor). In fact, the overall persistence depends upon how close is $\rho_1 + \rho_2$ to 100% (if $\rho_1 + \rho_2 = 1.0$ then any temporary change in unemployment becomes permanent, the case of full persistence or hysteresis). Second, as we know how to interpret ρ_1 and ρ_2 (see previous paragraph and the Appendix), we can gain in the understanding of the role of the three sources of persistence α, β and γ. These relationships are shown in the bottom part of Table 3. For example, if we find that unemployment lagged twice has no effect on current unemployment ($\rho_2 = 0$), we know that this may occur when

wage setters do not care about real wages but only about the number of jobs ($\eta = \infty$). In that case, the coefficient of unemployment lagged once is simply equal to the coefficient of persistence of union membership ($\rho_2 = 0$, $\rho_1 = \alpha$). The special case of hysteresis considered by Blanchard and Summers occurs when $\rho_2 = 0$ and $\alpha = 100\%$. Hysteresis may occur in other cases: one case is when $\alpha = 100\%$ and either β or γ is also 100%, i.e. we need two out of three sources of full persistence when unions also care about real wages; another case is when unemployment does not affect wages ($\eta = 0$) and either β or γ is 100%.

Table 4 presents our estimates of ρ_1 and ρ_2 for 14 European countries, Japan and the US. For most countries, both lags of the unemployment rate are significant and signed as predicted by our analysis. While for most European countries the sum of ρ_1 and ρ_2 is close to one, this sum is closer to one-half for the US and the Nordic countries. This result matches the visual impression provided by Figure 1. It provides an incentive to attempt an unscrambling of the three sources of persistence which we have postulated.

3. Sources of unemployment persistence

To quantify the three sources of persistence, one would need to estimate both the wage setting and the labour demand schedules of Table 2. The wage-setting schedule provides estimates of two coefficients of persistence: insider membership (α) and real wage aspirations (β). It will also yield an estimate of the responsiveness of wages to unemployment (η), which however is not independent from the labour demand schedule, since wage-setters recognize the trade-off between real wages and employment imposed by the firms' behaviour. The incentive to accept wage cuts in the wake of an adverse disturbance is stronger for unions which know that firms are very responsive in their hiring/firing decisions to real wages (as measured by coefficient δ in Table 2). The extent of labour unions' responsiveness to unemployment (η) will also depend upon how much emphasis they put on achieving their wage aspirations as opposed to providing employment to their membership. It is shown in the Appendix that η is equal to the ratio of the firms' elasticity of demand for labour δ to the unions' preference for achieving wage aspirations θ ($\eta = \delta/\theta$). Once we know η, we need an estimate of δ to recover θ. The labour demand schedule provides estimates of both δ and the third source of persistence (γ). Actually, we shall use existing estimates of the labour demand schedule provided by Newell and Symons (1985) and, alternatively, by Bean, Layard and Nickell (1986).

Table 4. Unemployment persistence (Dependent variable: unemployment rate)

| Countries | Unemployment rate | | Sum $(\rho_1 + \rho_2)$ | R^2 | DW |
	lagged once (ρ_1)	lagged twice (ρ_2)			
Austria	1.31 (0.17)	−0.43 (0.19)	0.88	0.843	1.25
Belgium	1.47 (0.18)	−0.54 (0.18)	0.93	0.960	1.43
Denmark	1.15 (0.18)	−0.31 (0.18)	0.84	0.863	1.94
Finland	1.02 (0.15)	−0.54 (0.15)	0.48	0.853	1.49
France	0.79 (0.18)	0.25 (0.19)	1.04	0.981	2.08
West Germany	1.29 (0.17)	−0.35 (0.17)	0.94	0.936	1.73
Ireland	1.36 (0.17)	−0.38 (0.21)	0.98	0.922	1.79
Italy	1.03 (0.18)	−0.08 (0.19)	0.95	0.850	2.07
Japan	1.05 (0.18)	−0.14 (0.19)	0.91	0.818	1.79
Netherlands	1.40 (0.18)	−0.46 (0.22)	0.94	0.957	1.70
Norway	0.83 (0.17)	−0.35 (0.18)	0.48	0.436	1.86
Spain	1.04 (0.23)	−0.002 (0.26)	1.04	0.986	1.79
Sweden	0.95 (0.16)	−0.43 (0.17)	0.52	0.569	1.67
Switzerland	1.09 (0.23)	−0.31 (0.21)	0.78	0.593	1.39
UK	1.29 (0.17)	−0.38 (0.18)	0.91	0.955	1.61
US	0.68 (0.18)	−0.20 (0.17)	0.48	0.639	2.01

Notes: All equations have been estimated for 1952–85, with the exception of Italy and Netherlands (1952–84), Spain (1955–85) and Switzerland (1952–83). A time trend and a constant were also included. Asymptotic standard errors are in parentheses.

(Since the two sets of estimates of labour demand depend on different assumptions about the structure of the product market and the determination of product prices, this will allow us to check the sensitivity of our results.)

3.1. The role of anticipated inflation

We have not acknowledged so far the possibility that inflation, even when anticipated, may affect real wages. Indeed, in many countries wage setting is not synchronized and wage contracts are set for relatively long periods. For example in the US three-year nominal contracts are widespread so that real wages fall when inflation increases (Taylor, 1979). In addition wage-setting arrangements sometimes substitute for incomes policy. For example in the more corporatist of the European economies, in times of anticipated acceleration of inflation, wage setters may partly agree to limit wage increases below expected inflation as a contribution to counterinflationary policy. For this reason, we need to allow for a possible effect of the expected change in inflation in the wage-setting schedule. The corresponding coefficient will be denoted ϕ. If anticipated increases in inflation reduce real wages, ϕ will be negative. To borrow the terminology of Bruno and Sachs (1985), its value is an index of the degree of *nominal* wage responsiveness. The lower the value of ϕ, the less are nominal wages indexed to anticipated inflation, and therefore the greater the scope for an increase in inflation to reduce real wages and unemployment. A zero value for ϕ will be considered the maximum, and will be taken to characterize countries with full effective wage indexation to anticipated inflation.

3.2. A first look at the results

Estimates of the wage setting schedule for Europe, Japan and the US are presented in Table 5. The first source of persistence, insider membership (α), does not exhibit a clear pattern. A ranking would put the US at the top, with 100% persistence, followed by Sweden, the UK and France at 70–80%, while most of the other countries have estimates of the order of 50%. In addition, the unlikely combination of Belgium, Denmark, Italy, Japan, Spain and Switzerland seem to have zero persistence of insider membership. This pattern is certainly not consistent with the results of Blanchard and Summers (1986). Two further results point to a rejection of their interpretation. First, they predict that unemployment lagged twice does not affect current unemployment, which is contradicted by the estimates in Table 4. Second, they assume that unions only care for insiders' employment. This should lead to infinitely large estimates for η since η is inversely related to the weight (θ) attached by unions to real wage aspirations ($\eta = \delta/\theta$).

The second source of persistence, real wage aspirations (β), on the contrary, is quite powerful in almost all European countries and Japan,

Table 5. The wage-setting schedule (dependent variable: real wages)

	Membership persistence (α)	Real wage persistence (β)	Expected inflation (ϕ)	Unemployment (η)	R^2	DW
Austria	0.41 (0.21)	0.84 (0.09)	−0.29 (0.21)	3.69 (1.45)	0.995	1.86
Belgium	0.00	1.00	0.00	1.59 (0.31)	0.997	1.45
Denmark	0.00	1.00	−0.39 (0.19)	0.87 (0.17)	0.995	1.62
Finland	0.54 (0.11)	0.99 (0.09)	−0.16 (0.15)	4.40 (1.26)	0.976	1.75
France	0.69 (0.27)	0.90 (0.09)	0.00	1.87 (1.25)	0.992	1.61
West Germany	0.47 (0.23)	0.77 (0.11)	0.00	2.12 (0.87)	0.994	1.64
Ireland	0.56 (0.50)	0.81 (0.11)	0.00	1.11 (0.80)	0.981	1.55
Italy	0.00	0.97 (0.09)	0.00	0.67 (0.43)	0.990	1.08
Japan	0.00	1.00	0.00	14.72 (4.68)	0.986	1.70
Netherlands	0.35 (0.26)	0.64 (0.14)	−0.35 (0.31)	2.84 (1.09)	0.990	1.72
Norway	0.56 (0.19)	0.83 (0.16)	−0.27 (0.26)	7.46 (3.55)	0.969	1.23
Spain	0.00	0.64 (0.15)	0.00	0.71 (0.21)	0.992	1.76
Sweden	0.77 (0.25)	0.85 (0.09)	−0.68 (0.21)	4.62 (2.06)	0.984	1.81
Switzerland	0.00	0.96 (0.08)	0.00	4.55 (2.24)	0.990	1.28
UK	0.74 (0.26)	0.77 (0.12)	0.00	1.05 (0.54)	0.987	1.90
US	1.00	0.56 (0.12)	0.00	0.91 (0.26)	0.963	1.56

Notes: All equations have been estimated for 1952–85, with the exception of Italy and the Netherlands (1952–84), Spain (1955–85) and Switzerland (1952–83). The equation estimated is (A11) from Appendix with $\phi \Delta p_i^e$ added where p_i^e is expected inflation. Instrumental variables were used to allow for anticipated accelerations in inflation. A constant and linear trend, and a measure of the capital–labour force ratio were also included. For Belgium, Japan, Sweden and the US, a quadratic trend was significant and was included as well. Asymptotic standard errors are in parentheses. The marginal level of significance for the imposition of a zero coefficient was about 30%, so a few coefficients are retained which are not statistically significant at the conventional levels of 5% and 1%. A coefficient of unity was imposed for α and β whenever the free estimate was higher than 1, and the restriction could not be rejected at 30% (see Appendix for details and sources).

with limited differences across countries, and the lowest level is found for the US. The responsiveness of real wages to anticipated inflation acceleration is captured by the coefficient ϕ shown in the third column. For most countries this coefficient is not statistically significant, suggesting effective nominal wage indexation. Less than full adjustment of

nominal wages seems to occur only in Austria, the Netherlands and the Scandinavian countries, as expected.[4]

3.3. The responsiveness of real wages to unemployment and inflation

The responsiveness of real wages to unemployment (η) is shown in the fourth column of Table 5. The estimated values are similar to those found in other studies (Bruno and Sachs, 1985; Newell and Symons, 1985; Bean, Layard and Nickell, 1986; Bruno, 1986; Gordon, 1987). The responsiveness of real wages to current unemployment appears to be very significantly correlated with the rise in average unemployment in our sample of countries after 1974. The correlation coefficient is -0.58 if Japan is included, and -0.68 if it is excluded. (These correlations are statistically significant even at the 99% level of significance.) Figure 7 shows this relation graphically.

As indicated in Section 3.1, real wage flexibility η can be interpreted as the ratio of the short-run elasticity of firms' demand for labour (δ) to the weight (θ) given by wage setters to real wages relatively to employment. It would be interesting to know whether the differences in real wage flexibility observed among the countries in our sample are
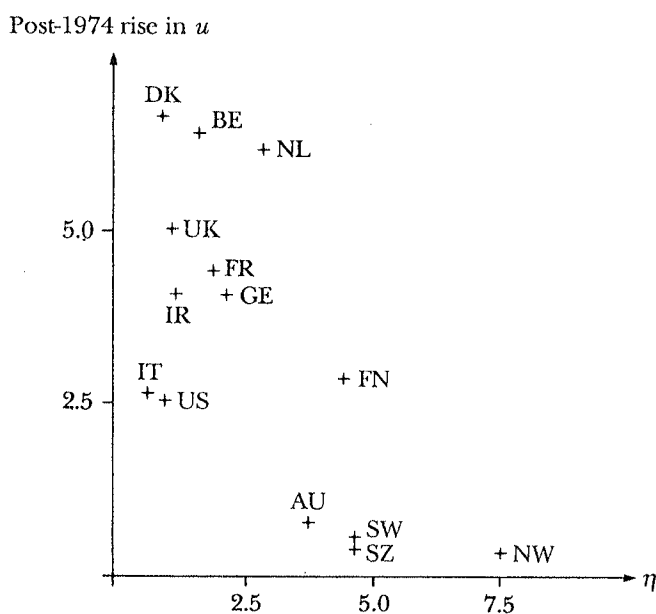
Post-1974 rise in u

Figure 7. Unemployment and real wage flexibility

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[4] The full nominal wage responsiveness to anticipated inflation in the US is surprising given the results of Branson and Rotemberg (1980) and Bruno and Sachs (1985), among others, but consistent with the recent findings of Newell and Symons (1987).

due to the 'technology' of labour demand or to wage setters' preferences. This can be found using the estimates of (short-run) labour demand elasticities (δ) found by Newell and Symons (1985) and those from Bean, Layard and Nickell (1986). Both are shown in Table 6, along with our computations of the implied values for wage setters' preferences (θ) based on the estimates of real wage flexibility ($\eta = \delta/\theta$) as reported in Table 5. Also shown is the third source of persistence, which operates through labour demand (γ).[5] The pattern of the implied differences in θ is quite similar across the two labour demand studies. The implied preference of wage setters for wages over employment is highest in the US, with Denmark and the UK next in line. Belgium, Germany, Ireland, Italy and Switzerland follow, the weights being lowest in France, the Netherlands, the rest of Scandinavia and Japan. Elasticities of labour demand δ are typically quite low. These elasticities are highest in the US, Switzerland, and then Sweden, Germany, the UK and Japan. (The estimate for the US must probably be interpreted cautiously, as Bean, Layard and Nickell, 1986, report difficulties in estimating a negatively sloped labour demand curve for this country.)

Figure 7 shows the link between $\eta = \delta/\theta$ and the increase in unemployment after 1974. Decomposing η into δ and θ, we find the following correlations with the response of real wages to unemployment: for the elasticity of demand (δ) it is 0.05 using the estimates of Bean, Layard and Nickell, and 0.11 using those by Newell and Symons; for wage-setters' preferences (θ) it is -0.54 and -0.40, respectively. These correlation coefficients suggest that differences in real wage responsiveness to unemployment have to be attributed to the preferences of wage setters for wages over employment, rather than to the labour demand constraints.

An important question is what characteristics of labour markets make for lower real and nominal wage rigidity. Recent work (Bruno and Sachs, 1985; Bean, Layard and Nickell, 1986; Newell and Symons, 1987) has focused on the notion of corporatism. Calmfors and Driffill (1988), criticizing the vagueness of the concept of corporatism, have argued that the degree of centralization in wage setting is a key element and provide an interpretation. In Table 7 we report their rankings, both for the straight centralization measure, and their own 'hump-shaped' hypothesis which states that 'both heavy centralization and far-reaching decentralization are conducive to real wage restraint'. In their own work, Calmfors and Driffill found that this effect explains

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[5] Because both types of estimates were based on second-order dynamics in the labour demand equation, we also report the sum of the lag coefficients for employment implied by their estimates as γ, the parameter of persistence in labour demand.

Table 6. Decomposition of real wage responsiveness

	Newell and Symons				Bean, Layard and Nickell		
	Real responsiveness to unemployment (η)	wage elasticity of demand (δ)	implied preference for wages (θ)	labour demand persistence (γ)	wage elasticity of demand (δ)	implied preference for wages (θ)	labour demand persistence (γ)
Austria	3.69	0.12	0.03	0.84	0.32	0.09	0.56
Belgium	1.59	0.19	0.12	0.92	0.21	0.13	0.76
Denmark	0.87	—	—	—	0.45	0.52	0.26
Finland	4.40	0.05	0.01	0.91	0.48	0.11	0.32
France	1.87	0.05	0.03	0.90	0.17	0.09	0.72
West Germany	2.12	0.26	0.12	0.88	0.53	0.25	0.36
Ireland	1.11	0.21	0.19	0.86	0.30	0.27	0.71
Italy	0.67	0.09	0.13	0.74	0.13	0.19	0.65
Japan	14.72	0.15	0.01	0.83	0.36	0.03	0.65
Netherlands	2.84	0.07	0.02	0.91	0.11	0.04	0.90
Norway	7.46	0.08	0.01	0.00	0.18	0.02	0.07
Spain	0.71	—	—	—	—	—	—
Sweden	4.62	0.30	0.07	0.78	0.55	0.12	0.16
Switzerland	4.59	0.58	0.13	0.83	0.83	0.18	0.12
UK	1.05	0.18	0.17	0.88	0.40	0.38	0.37
US	0.91	0.63	0.70	0.10	0.61	0.67	0.00

Sources: Newell and Symons (1985); Bean, Layard and Nickell (1986); and computations by authors.

well differences in unemployment among countries. Given that we report, on the one hand, a link between unemployment changes and real wage responsiveness to unemployment η (Figure 7) and, on the other hand, a link between η and wage setters' preferences θ, it is natural to ask whether these coefficients are indeed linked to the degree of centralization.

Table 7 shows a negative correlation between η and the 'hump-shaped' ranking, confirming Calmfors and Driffill's view. An obvious explanation is that wage setters at both ends of the centralization spectrum attach a higher weight to employment relative to wages. In that case, the link between $\eta = \delta/\theta$ and centralization would reflect a positive correlation between θ, the weight on real wages, and the centralization coefficient (we would not expect the channel to be δ, the wage elasticity of demand for labour). It turns out that the two alternative estimates of θ are correlated quite strongly with the straight corporatism index, but *not* with the index corresponding to the 'hump-shaped hypothesis'. In fact, for this latter index the correlation is wrongly signed as well as insignificant. Thus the evidence in Table 7 seems to favour the hypothesis that it is mainly in the centralized economies that wage setters attach a higher weight to employment relative to wages, Japan being the exception. The results of Calmfors and Driffill (1988) which correlated their indices to the average change of unemployment directly, may be partly driven by other characteristics of the three low-centralization economies, Japan, Switzerland and the US. For example, the US appears to have very low persistence in labour demand and real wage aspirations, possibly because of the system of temporary layoffs and the less than generous unemployment insurance system, while Switzerland seems to have exported its unemployment to neighbouring countries (Danthine and Lambelet, 1987, try to refute this). In Japan, as Tachibanaki (1987) and Wadhwani (1987) note, movements in the standardized unemployment rate may not properly reflect changes in the underutilization of labour.[6] This is confirmed by the strong correlation between θ, the responsiveness of real wages to anticipated increases in inflation, and the 'straight' ranking: in highly

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[6] The explanation of the evolution of such different labour market institutions merits further investigation. In particular, one would like to know the extent to which this is due to the persistence of historical accidents, or more fundamental factors related to preferences for more stable employment and less stable living standards for those in employment. The contributions in Flanagan, Soskice and Ulman (1983) are an important starting point for such an investigation, as they address the issues through a combination of historical, institutional, theoretical and quantitative methods. See also the contributions in Boltho (1982), which contain a wealth of historical and institutional information.

Table 7. The role of the degree of centralization in wage-setting

	Degree of centralization ranking by Calmfors and Driffll		Real wage responsiveness		Wage-setters preference for wages (a)	
	Original	Revised	to unemployment (η)	to inflation (ϕ)	(θ_1)	(θ_2)
Austria	1	1.5	3.69	-0.29	0.03	0.09
Norway	2	3.5	7.46	-0.27	0.01	0.02
Sweden	3	5.5	4.62	-0.68	0.07	0.12
Denmark	4	7.5	0.87	-0.39	—	0.52
Finland	5	9.5	4.40	-0.16	0.01	0.11
West Germany	6	11.5	2.12	0.00	0.12	0.25
Netherlands	7	13.5	2.84	-0.35	0.02	0.04
Belgium	8	13.5	1.59	0.00	0.12	0.13
France	9	11.5	1.87	0.00	0.03	0.09
UK	10	9.5	1.05	0.00	0.17	0.38
Italy	11	7.5	0.57	0.00	0.13	0.19
Japan	12	5.5	14.72	0.00	0.01	0.03
Switzerland	13	3.5	4.59	0.00	0.13	0.18
US	14	1.5	0.91	0.00	0.70	0.67
Correlation with original centralization index (b)			-0.05 (0.27)	0.57 (0.27)	0.39 (0.28)	0.37 (0.27)
Correlated with revised centralization index (b)			-0.31 (0.27)	0.16 (0.27)	-0.35 (0.28)	-0.25 (0.27)

Notes: (a) θ_1 for Newell and Symons, θ_2 from Bean, Layard and Nickell (see Table 6); (b) asymptotic standard errors below correlation coefficients.

centralized countries, faced with an anticipated pick-up of inflation, labour unions may accept less than full indexation.

3.4. Differences in propagation mechanisms

We have accumulated by now a number of quantitative results about the size and effects of the three possible sources of unemployment persistence. Having found that the corresponding parameters differ across countries, the obvious next question is: what factors can systematically account for these differences?

With regard to α, persistence in insider membership, we can think of no convincing deeper explanation. In principle the degree of unionization might look a potentially useful guide to interpreting the results. But this is hardly compatible with the fact that the US exhibits the highest degree of persistence. Another factor could be the degree of centralization in wage setting. For example, focusing on the UK, France, and Germany, it might appear that centralization and persistence are inversely related (with persistence the highest in the UK and lowest in Germany). But then we find that highly centralized Sweden has a higher degree of persistence than the UK. Given that in any case the pattern of differences in α does not seem to bear any relation to the average rise in unemployment following the adverse shocks of the 1970s and 1980s, we conclude that there is very little merit to the insider membership explanation of the European unemployment problem.[7]

With regard to β, the degree of persistence in real wage aspirations, the main difference is that it is smaller in the US than in Europe. This may reflect the US system of overlapping long-term contracts, decentralized wage setting, or the small duration for which the unemployed in the US receive unemployment benefits. The maximum time for which a laid-off worker can claim benefit is six months. This is far shorter than in Europe (Burtless, 1987) and may indeed affect negatively the persistence of real wage aspirations of wage setters.

Finally, the estimates of γ, the degree of persistence in labour demand, from Newell and Symons suggest quite high persistence everywhere, apart from the US and Norway. On the other hand, Bean, Layard and Nickell obtain low estimates for Sweden and Switzerland, and to a lesser extent for Denmark, Finland, Germany, and the UK. What stands out again is the position of the US, with almost zero persistence. A natural idea would be to try to relate persistence in labour demand to adjustment

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[7] We reached a similar conclusion, doing some sensitivity analysis of Blanchard and Summers' own model, in Alogoskoufis and Manning (1988). Thus, the rejection of the insider membership explanation appears to us quite robust.

'costs. Gennard (1986) has found that the costs of adjustment are lower in Japan and the US than in the larger European economies. However, this result is not confirmed by either Newell and Symons, or Bean, Layard and Nickell for the case of Japan. It has been argued that this may reflect the lifetime employment system which favours hours adjustment and retraining instead of layoffs (Tachibanaki 1987). On the other hand, the extremely rapid adjustment of labour demand in the US has often been associated with the existence of the system of temporary lay-offs (Feldstein 1976). Alternative explanations have stressed labour market regulation in the European economies, which is far more pervasive than in the US. (These issues are examined in detail in recent papers by Metcalf, 1987, and Emerson, 1988.)

3.5. Unemployment persistence and the nature of shocks

In Section 2.4, we used the estimates of the compact representation of unemployment persistence to characterize possible values for the three basic sources of persistence. We now go along the opposite way, using the estimates of the labour demand and wage-setting schedules to reach conclusions about the persistence of unemployment. This being done, it is possible to simulate the response of unemployment to disturbances, along the lines of Figures 3 to 6.

The presumed behaviour of labour demand and wage setting, it is recalled, implies a specific relationship between the current unemployment rate and two of its lagged values (Table 3 and Appendix). We can thus calculate from Tables 5 and 6 the values for ρ_1 and ρ_2 which had been estimated directly as shown in Table 4. As we use two sets of values for the parameters of the labour demand schedule, we obtain in Table 8 two sets of values for ρ_1 and ρ_2. Total persistence of unemployment is measured by the sum of the two coefficients. Most countries display a significant degree of persistence. The main exceptions are Japan and Switzerland, mainly on account of their zero persistence in insider membership (α), and the low weight wage setters put on wages relative to employment (θ). The US has a lower degree of persistence than any of the other European countries (which confirms the findings in Table 4), despite 100% persistence in insider membership. The reason is the estimated low persistence in real wages and labour demand.

The implication of these numbers is that adjustment to equilibrium unemployment is quite slow. For example, on the basis of Newell and Symons' estimates, the length of time required for half of the adjustment to take place is approximately 3 years for the US, more than 7 years in Germany and Sweden, 19 years for the UK, and half a century

Table 8. Implied unemployment persistence: effects of past unemployment rates on the current unemployment rate

	Using estimates by Newell and Symons			Using estimates by Bean, Layard and Nickell		
	Effect of unemployment lagged once (ρ_1)	Effect of unemployment lagged twice (ρ_2)	Total ($\rho_1+\rho_2$)	Effect of unemployment lagged once (ρ_1)	Effect of unemployment lagged twice (ρ_2)	Total ($\rho_1+\rho_2$)
Austria	1.53	−0.62	0.91	0.85	−0.21	0.64
Belgium	1.53	−0.73	0.80	1.31	−0.57	0.75
Denmark	—	—	—	0.90	−0.19	0.72
Finland	1.87	−0.89	0.99	0.79	−0.10	0.68
France	1.76	−0.78	0.98	1.40	−0.49	0.90
West Germany	1.41	−0.54	0.87	0.78	−0.13	0.65
Ireland	1.51	−0.60	0.91	1.28	−0.43	0.85
Italy	1.66	−0.70	0.96	1.53	−0.59	0.93
Japan	0.91	−0.41	0.50	0.26	−0.10	0.16
Netherlands	1.46	−0.54	0.92	1.25	−0.44	0.81
Norway	0.77	0.00	0.77	0.72	−0.02	0.70
Sweden	1.25	−0.37	0.88	0.84	−0.04	0.80
Switzerland	0.60	−0.27	0.33	0.23	−0.02	0.21
UK	1.58	−0.63	0.95	1.02	−0.20	0.82
US	0.79	−0.04	0.75	0.72	0.00	0.72

Note: Calculated using the formula in the Appendix from estimates shown in Tables 5 and 6.

Table 9. Increase in unemployment following a labour demand or real wage disturbance

	10% decrease in labour demand			10% increase in wage demands		
	1st year	2nd year	5th year	1st year	2nd year	5th year
Austria	4.5	0.0	−0.4	1.5	1.2	0.2
Belgium	7.5	2.4	−3.1	1.6	2.1	0.6
Denmark	7.2	−0.7	−1.2	3.2	3.0	0.8
Finland	3.2	−0.6	−0.4	1.5	1.2	0.3
France	7.6	3.8	−0.4	1.3	1.8	1.5
West Germany	4.7	−0.6	−0.2	2.5	1.6	0.4
Ireland	7.5	3.5	−0.4	2.2	2.9	1.7
Italy	9.4	4.8	−1.2	1.0	1.8	1.7
Japan	1.6	−1.2	0.0	0.6	0.1	0.0
Netherlands	7.6	4.7	0.3	0.9	1.1	0.5
Norway	4.3	−0.4	−0.2	0.7	0.6	0.2
Sweden	2.8	0.0	−0.1	1.6	1.3	0.6
Switzerland	2.1	−1.5	0.0	1.7	0.4	0.0
UK	7.0	1.8	0.0	2.8	2.9	1.4
US	6.4	1.0	0.4	3.9	2.8	1.0

Notes: The numbers refer to percentage points of increase in the unemployment rate relative to the baseline, following a shock that causes either a 10% transitory decrease in labour demand, or a 10% transitory upward shift in the wage equation.

for France! Using the alternative estimates, we find 2.5 years for the US, about 2 for Germany, 4.5 for the UK and about 9 years for France.

To go beyond the compact representation of unemployment persistence, we can simulate the effects on the complete structure shown in Figure 2 and Table 2 of two sorts of disturbances. The first is a 'demand' disturbance (it shifts down the labour demand schedule in Figure 2). The second disturbance comes from the 'supply side' (it shifts up the wage setting schedule). Both disturbances are set to initially shift the relevant schedule by 10 percentage points. The results of both simulations (performed with the labour demand schedule estimated by Bean, Layard and Nickell) appear in Table 9. A 10% labour demand shock has large initial effects on unemployment in almost all countries. The first-year effects vary from 9.4 percentage points (Italy), down to 1.6 percentage points (Japan). The countries with small rises are those which have both a high response of real wages to unemployment, and a high short-run responsiveness of labour demand to wages. Beyond the first year, unemployment falls substantially in all countries, with few effects left at the five-year horizon. The picture is different when the disturbances originate on the wage front. On impact both real wages and unemployment rise. The first-year unemployment effects are much smaller than in the previous case

because labour demand is not very responsive to wage changes in the short run in most countries. The notable exception is the US, for which Bean, Layard and Nickell report one of the highest elasticities of labour demand. Because persistence in wage targets is very high in almost all European economies, unemployment actually continues rising into the second year, and beyond in some cases. Persistence in employment targets and labour demand sustains the rise in unemployment even when the initial rise in real wages has been reversed; as a result it typically takes quite long for unemployment to return to its baseline.

The simulations highlight an important issue. Unemployment persistence is not simply related to the types of country-specific characteristics analysed in earlier sections. It matters a lot where the disturbances originate. When the disturbance originates in labour demand, the three sources of persistence (insider membership, wage aspirations and labour demand) are not a crucial element as unemployment soon returns to its previous path. On the contrary with a 'wage' disturbance, the initial rise in unemployment is smaller but persists for longer, the more so the stronger the three sources of persistence. Firms' responsiveness to labour costs, however, works differently: if high, it is a good thing for unemployment with demand-side disturbances, and a bad thing with wage disturbances.

3.6. The verdict

The results strongly confirm that the US and Europe differ. The main difference is that the US labour market is characterized by very low persistence in real wages, and almost immediate adjustment in labour demand. On the contrary, in Europe real wage aspirations are extremely persistent, while there is moderate to high sluggishness in labour demand, depending on whose estimate to believe. We can see no role for insider membership dynamics, and if any, the US has higher membership persistence than any of the other countries. It is worth keeping in mind that aggregate demand has been a lot more variable in the US (with two major wars in our sample period, and the recent huge expansion in aggregate demand engineered by the Reagan administration). On the other hand, most European economies seem to have suffered from occasional wage shocks (see Flanagan, Soskice and Ulman, 1983).

The differences between Europe and Japan mainly concern preferences for wages relative to employment. Japanese wage setters appear to be placing a very small weight on wage targets relative to employment targets. Combined with a relatively high short-run responsiveness of labour demand to wages, this factor explains why the response of wages

to unemployment is so out of line with any of the other economies. Tachibanaki and Wadhwani have suggested that the unemployment rate is a poor proxy for the underutilization of labour in Japan. In any case, the factors that make the Japanese unemployment rate a poor proxy, such as the lifetime employment system and the bonus system that gives flexibility to real wages, are precisely those which differ most between Europe and Japan.

Finally, there exist important differences among European countries. The main differences concern preferences for wages over employment and nominal wage responsiveness. The catch seems to be centralization in wage setting. The centralized labour markets of Austria and Scandinavia are characterized by low weights on wages relative to employment targets, and by low nominal wage responsiveness to anticipated inflation. Whether this is a consequence of centralization, or whether centralization is a reflection of deeper characteristics related to workers' preferences is not known.

4. Implications for policy

4.1. Labour market reform

The issue of reform of European labour markets has been examined quite extensively recently (see Metcalf, 1987 and Emerson, 1988 among others). It is a huge and complex area. We shall only concentrate on three issues related to the results in Section 3.6.

4.1.1. Should Europe become like the US? This is a recurring question in comparative macroeconomics. Given our results, this boils down to ways of reducing persistence in real wage targets and labour demand. Persistence in real wage targets is frequently associated with the generosity of European unemployment insurance schemes. In his recent comparison of European and American unemployment benefits Burtless concluded that:

> '... jobless pay cannot be responsible for higher equilibrium unemployment in Europe compared with the US, although it can be responsible for a slower adjustment in employment and wages after the economy experiences a severe shock...' (Burtless 1987, p. 154).

Our findings concur. However, the welfare implications are not that simple. Has the generosity of the European unemployment system caused persistence in real wage aspirations? Or have European workers' preferences for stable living standards brought about, through the political system, generous unemployment insurance schemes? A move

towards an American system may reduce the persistence of unemployment, but it is not at all clear that it will increase welfare.

Persistence in labour demand could be linked to European labour market regulations and to employment protection (Metcalf, 1987; Emerson, 1988). Again, it is not clear that total deregulation is the answer. For a start, given high persistence in real wage aspirations, the effects of a reduction in persistence in labour demand on the persistence of unemployment will be minimal. (This is one implication of our analysis.) But even if one could reduce the persistence of unemployment by winding down employment protection, this could bring about undesirable microeconomic effects.

4.1.2. Should Europe become like Japan? Emerson (1988, p. 801) has suggested that 'while the US regime appears on close inspection to be less satisfactory than sometimes suggested, Japan has succeeded in reconciling considerable employment security with little unemployment'. We have already noted that the main difference between Europe and Japan is the preferences of Europeans for wages over employment. What is the institutional counterpart of this revealed preference? One possible answer is the Japanese combination of the bonus system, which makes earnings and labour costs flexible, with the lifetime employment system. In this sytem there is internal adjustment of hours, retraining within the firm, reallocation or transfer of workers to new tasks, and possibly excessive labour hoarding during recessions (Tachibanaki, 1987). A possibility is that, as a consequence, the cyclical underutilization of labour in Japan is simply mis-measured by the unemployment rate. For example, Wadhwani (1987, p. 175) concludes that:

> 'The so-called lifetime employment system, ... the existence of a large body of temporary workers who tend to bypass unemployment status, ... and the high share of agricultural workers, self employed and unpaid family workers in Japan all mean that the unemployment rate is a misleading indicator of slack.'

In any case, the Japanese system displays impressive wage flexibility. Again welfare evaluations are difficult, as the Japanese institutions may be a reflection of the preferences of workers in Japan for more stable employment and less stable living standards and working conditions. The recent attempt by the Ford motor company to introduce Japanese style working conditions in the UK, resulted in a strike with the slogan 'We are Brits, not Nips', and the company had to back down! The other way in which preferences for wages over employment could be affected, is through centralization in wage setting. This is the final issue to which we turn in this section.

4.1.3. Should the rest of Europe become like Austria or Scandinavia? Although unemployment persistence is not necessarily lower in Austria or Scandinavia than in the rest of Europe, the impact of both labour demand and wage disturbances on unemployment is certainly smaller on average. On the basis of our evidence, greater centralization of wage setting may well be desirable as it increases the responsiveness of real wages to unemployment, and thus reduces the average level, and possibly the persistence, of unemployment. If it also contributes to lower nominal wage responsiveness to inflation, it may make stabilization policy a lot less complicated. However, these possible macroeconomic advantages have to be weighted against the microeconomic inefficiencies likely to be introduced by a centralized system that does not respond to industry-specific shocks.

4.2. Implications for demand and supply policies

4.2.1. Demand management effectiveness. With the currently high level of unemployment in many European countries, it is natural to consider the option of an expansion of demand. The usual argument against such an option is that it is unlikely to work, any real effect being quickly dissipated in higher inflation. How true is this assertion? An (unanticipated) increase in aggregate demand will certainly have different effects whether prices immediately rise or not. If they do not, then demand for labour should increase, which is the exact opposite case of the simulation shown in the left panel of Table 9: in most countries there is a powerful, but short-lived beneficial effect on unemployment. If, on the contrary, the demand expansion is immediately reflected in prices, real wages fall because of the unanticipated inflation. This is akin to a negative wage disturbance, the exact opposite of the simulation in the right panel of Table 9. As real wages fall, unemployment is reduced. The first year, unemployment effects are limited by the low value of the short-run responsiveness of labour demand in most countries. However, because of high persistence in wage targets, unemployment actually continues falling into the second year, and beyond in some countries. Persistence in employment targets and labour demand sustain the fall in unemployment even when the original fall in real wages has been reversed. It typically takes quite long for unemployment to return to its baseline. In general, it is safe to expect a mixture of both effects: some direct increase in demand (which raises real wages) and some real wage reduction because of an unanticipated increase in inflation. Sources of persistence now make demand management effective, both in the short and in the medium run.

4.2.2. Supply-side policies. A typical example of supply-side policy is a reduction in taxes on income or wages, compensated to keep aggregate demand unchanged. Such a package reduces the wedge between net of taxes take-home labour income and labour costs faced by firms. In our framework, it amounts to a favourable wage disturbance of the type simulated in Table 9. Accordingly, the effects are relatively small, and slow in coming. However, even *transitory* changes have persistent effects, even if it takes large tax cuts to move unemployment significantly. *Permanent* tax cuts have larger steady-state effects, but these will take quite long to come through.

4.2.3. Incomes policies. If the wage-setting mechanism is temporarily over-ridden, an aggregate demand expansion will bring about only a limited increase in inflation, and a larger reduction in unemployment than otherwise. However, incomes policies are not a panacea, and many difficulties are associated with them (see Flanagan, Soskice and Ulman, 1983, for the European experience). First is the issue of enforcement, especially with relatively decentralized wage setting, as is the case in many of the high-unemployment European countries. If mandatory incomes policies have short-run advantages, they often lead to wage explosions later on. Second, if the persistence of high unemployment is due to the fact that the insiders do not take sufficient account of the interests of the unemployed outsiders, it is difficult to see why they would cooperate with the government. Yet, incomes policy appears to us one of the most powerful instruments in the fight against persistently high unemployment, as it directly overrides the very wage-setting mechanism that takes insufficient account of the interests of the un-employed.

4.2.4. The effectiveness of the two-handed approach. The two-handed approach to solving the problem of European unemployment consists of a combination of demand and supply policies (see, for example, Dreze and Wyplosz, 1988, for its recent restatement). With the exception of the more centralized European economies, a demand expansion works better if insiders and firms are taken by surprise. It is an opportunity that will arise infrequently, and it must be exploited as effectively as possible. Governments have only limited time during which to speed up the adjustment process. For countries with a high short-run responsiveness of labour demand, policies that operate through the wage-setting schedule (such as an incomes policy, a cut in payroll, income and indirect taxes, or an unanticipated inflation) are relatively effective. Given that most such economies have a high persistence of wage aspirations and a moderately high persistence of employment targets, the

beneficial effects will tend to persist, even if the policies themselves do not. Such countries include West Germany, Ireland and the UK. These are countries whose recent unemployment record is among the worst. This is also the case of the US, which may explain the success of income tax cuts in stimulating employment in that country. On the other hand, countries with a low responsiveness of labour demand, like France and the Netherlands, and to a lesser extent Belgium and Italy, may find it more difficult to reduce unemployment quickly, unless a demand expansion has little initial impact on prices. However, in such a case, the reduction in unemployment may not persist. Supply-side policies may be quite effective in the medium run, but these countries will need much higher tax cuts for every percentage point of desired unemployment reduction.

Our results also suggest that two-handed policies would benefit from an accompanying incomes policy for two different reasons. First, there is the risk that any demand expansion be interpreted as a softening of government's resolve to keep inflation in check. If unemployment does not respond promptly, wage setters may then expect more inflationary moves, and accordingly speed up wage increases. The slow responsiveness of firms' demand for labour makes this scenario quite likely to occur and underlines the benefits of an incomes policy which gives time for employment to respond to demand. The second argument concerns the government budget. The supply-side policies considered here start with tax reductions. If the expansion comes fast, some of the revenue losses will be offset through rising taxable incomes before the public debt seriously builds up. A fast response is again desirable but will require curtailing the insiders' ability to delay job offers to the unemployed outsiders. That too can be helped by an incomes policy.

5. Conclusions

The difference in unemployment persistence between Europe and the US arises because of higher persistence in wage aspirations in Europe, and more sluggish adjustment of employment by firms. It has nothing to do with the dynamics of employment targets of wage setters which, if anything, point in the wrong direction. However, a labour market reform in Europe that would aim at reducing the level and duration of unemployment benefit payments, as well as a sweeping deregulation of European labour markets, have shaky welfare foundations. If this is granted, we are left with macroeconomic policies. A careful consideration of the alternatives indicates that, if the reduction of unemployment is considered an important objective, a combination of aggregate demand and incomes policies may be the least dangerous approach,

both in the short and in the medium term. Incomes policy has its drawbacks, not least of which is the question of how it is implemented. Nevertheless, it may well be the most effective instrument for overriding the mechanisms that generate the externalities which perpetuate the European unemployment problem.

Discussion

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The high and persistent level of unemployment in Europe has been a recurrent theme in applied macroeconomic analysis over the past decade. The paper by Alogoskoufis and Manning is an empirical attempt to explain inter-country differences in this respect. It primarily concentrates on the role of hysteresis and real wage stickiness in generating unemployment. The effect of bargaining structures on real wage stickiness is also considered, as is the effect of sluggish labour demand adjustments. The authors develop a framework that permits an assessment of the relative importance of all these factors.

A main conclusion is that differences with respect to the sluggishness of labour demand is a major determinant of the different unemployment experiences among OECD countries. This is an important finding. Alogoskoufis and Manning, however, also find an important role for the relative weighting of real wage versus employment objectives, which in turn seems to be related (monotonically) to the extent of centralization of wage bargaining.

I shall focus on the analysis of bargaining structure. I have always been unhappy about the vague and imprecise concept of 'corporatism' and, instead, prefer the concept of 'centralization'. (See, also, Calmfors and Driffill 1988, where we extensively explained our reservations about 'corporatism'.) Therefore, although I am pleased to find that Alogoskoufis and Manning use our centralization rankings, I am also surprised that they sometimes refer to them as 'corporatism rankings'. One would, however, also like to see attempts to relate various parameters in the wage equations to other institutional variables that have been claimed to be important, such as the extent of government intervention in private-sector bargaining (tripartite bargaining), the size of the government sector, the political colour of governments, the length of contract periods, the extent of synchronization of various wage contracts, etc.

The Alogoskoufis–Manning paper does not explain why we should expect the relative preference of employment versus real wage stability (the θ-variable) to reflect differences in the extent of centralization. It

would have been nice if they had offered us a theoretical justification for this proposition. In fact, it is quite straightforward to develop a simple model within which we may show that the number of cooperating unions will affect wages in qualitatively the same way as the taste parameter θ.[8] In practice, though, we will not know whether observed country differences in the responsiveness of wages to unemployment reflect genuine differences in tastes or in bargaining structure.

I am also sceptical about some of the discussion of the role of nominal wage responsiveness. The authors do not explain why one should expect more 'corporatism' to make labour more willing to let inflation erode real wages. Is it because unions have preferences over inflation as well, and more centralized unions internalize the inflationary effects of their own actions? Or is it because (social-democratic?) governments in economies with centralized bargaining are likely to enter into social contracts involving tax concessions or expenditure increases at times of high inflation in order to moderate wage demands? The reasons need to be spelled out. I also do not understand why long contract periods in the US should, in themselves, improve *long-run* employment performance. In a period when inflation has both risen and fallen, any possible short-run effects should net out over time.

I note with some surprise that Alogoskoufis and Manning do not find any systematic relation between the degree of centralization and the persistence of employment targets in union objective functions. This contradicts the Blanchard–Summers' (1986) claim that workers are more likely to drop out of local rather than national unions when they become unemployed. Could the explanation be that decisions on wage setting are anyway taken by *employed* workers, since they are the ones making up the decision-making units of centralized unions too? Or are (individual) ties to the unemployed stronger at more disaggregated levels?

My final point concerns the value of empirical studies of this sort. It is a disturbing fact that different cross-country studies tend to come up with different explanations of inter-country employment differences. Sachs (1983) and McCallum (1986) focus on aggregate demand policies. Burda (1988) does not find a role for such variables but stresses instead

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[8] If we let $a = \beta = 0$ in the loss function (A3), and also let it refer to union i, it becomes $L_i = [l_i - \bar{n}_i]^2/2 + \theta[w_i - p - \bar{\omega}]^2/2$. Further, let p denote a price index $p = \sum_{j=1}^{\infty} p_i/k$, where $k =$ the number of sectors, and let also output $y_i = l_i$, so that the output price $p_i = w_i$. Assuming constant-elastic product demand $y_i = -\varepsilon(p_i - p) + (m - p)$, where m is the exogenously given level of nominal aggregate demand, and complete symmetry, the first-order condition for a minimum of the loss function gives $w - p = \bar{\omega} + (l - \bar{n})[\varepsilon - r/(1-r)]/\theta$, where w is the wage set by all unions, l and $\bar{n}$ refer to aggregate variables, and $r =$ the fraction of unions that cooperate with each other in larger aggregate unions. As can be seen, an increase in the extent of centralization r has qualitatively the same effect as a decrease in the taste parameter θ.

the generosity of the unemployment benefit system. Blanchard and Summers (1986) stress hysteresis effects, whereas Alogoskoufis and Manning downplay this factor. Calmfors and Driffill (1988) show how the effects of centralisation on the responses of wages to various disturbances vary enormously across different studies.

So what have we learnt from the increasing number of cross-country studies on the causes of unemployment? My answer is: not much! The main reason is that there are simply not enough cross-section observations to be able to draw any safe empirical conclusions from country comparisons.

This is not to deny that it is always better to organize the scant empirical information we have as efficiently as possible, and, to this end, the Alogoskoufis–Manning paper makes a valuable contribution. But in the end we do not know much more than we knew at the beginning, namely that different countries that differ simultaneously in a number of respects have different experiences.

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This paper is an interesting attempt at understanding why unemployment is so persistent in most European countries. Persistent unemployment could result from an increase in the equilibrium unemployment rate, or permanent shocks which keep the economy away from equilibrium, or indeed be the result of slow adjustment to past shocks. The authors restrict themselves to the last of the possibilities. Thus, cross-country differences in unemployment are fully attributed to differences in the dynamic response to transitory shocks; this is taken as a postulate and not tested against the other alternatives. In my discussion, I will play according to these rules although they raise some doubts about the interpretation of the evidence. Changes in the equilibrium unemployment rate, for example, would be erroneously attributed to differences in the wage-setting or labour demand equations.

The actual model used by the authors has workers setting the wage in the knowledge that firms will then choose employment on the labour demand curve. Obviously, workers are assumed to care about both wages and employment, with the relative weight assigned to wages denoted by θ. The recent insider–outsider models are a special case of this model, and it is interesting that, in fact, the insider–outsider distinction is seen to be irrelevant in a number of countries – namely, Denmark, Italy, Japan, Spain and Switzerland. We may also note here that the authors think that adjustment costs in employment can be important,

with their relative absence in the US being put forward as a reason for its better unemployment experience.

This formulation leads to the specification and estimation of a wage-setting equation from which one can extract the most convincing piece of evidence presented here: the six low-unemployment countries (Austria, Finland, Japan, Norway, Sweden and Switzerland) have the six highest measures of the responsiveness of wages to unemployment (parameter η, Table 4), i.e. all the low-unemployment countries (except the US, see above) have significant real wage flexibility.

The authors, however, attempt to dig deeper here by asking whether the higher responsiveness of wages to unemployment is attributable to 'tastes' (i.e. the relative weight assigned to wages versus employment), or to 'constraints' (i.e. the slope of the labour demand curve facing the workers). I am, however, quite unconvinced by this attempt. For one thing, the assumed objective function precludes a sharp interpretation of the evidence. Indeed, for wage setters, wage aspirations are defined in part by reference to the full employment equilibrium wage so that the trade-off between wage goals and employment considerations is not fully represented by the θ parameter. Thus concerns for employment could imply a low θ (Table 6) but they could also be consistent with a higher θ (meaning wage aspirations receive more weight) co-existing with a lower β, that is, greater attention is given to the full employment wage in setting wage aspirations. For example take the case of the UK and Sweden. The authors would like us to attribute a good deal of the difference in unemployment performance between these two countries to the fact that Swedish wage setters give more weight to employment considerations in setting wages as evidenced by the lower value of θ (Sweden 0.05–0.09, UK 0.17–0.38). However, this assertion is undermined by the fact that in defining wage aspirations, more weight appears to be given in the UK to the full employment wage ($\beta = 0.77$ for the UK, 0.85 for Sweden). All in all, it is not clear from this evidence that full employment considerations are given more importance when setting wages in Sweden than in the UK.

A second reason for my scepticism is the fact that the empirical evidence is rather weak. The estimates of θ are imprecisely determined. Thus it is far from clear that the sets of θ's used as data in the regressions leading to Table 6 are in fact statistically different from one another. Furthermore, in order to compute the θ's, they rely on two sets of the estimates of the wage elasticity, which are sometimes very far apart.

In conclusion, while commending Alogoskoufis and Manning for addressing squarely an issue of the utmost importance, I read this paper as essentially confirming some earlier results on the significance of the responsiveness of wages to unemployment. They do not convincingly

document the relative importance of tastes and constraints in explaining cross-country differences in wage behaviour. In particular, the support extended on the basis of this evidence to one definition of corporatism over another is weak. On the other hand, I see great promise in the systematic study of the time series properties of the unemployment rates (and a start is made in Table 4) for discriminating between competing explanations of the persistence of unemployment.

General discussion

Willem Buiter worried that the paper took the long-run equilibrium level of unemployment as exogenous. Surely, this was of some importance in explaining why unemployment was so *high* today: we would not be so concerned with the persistence of unemployment if it were not also so high, and vice versa. Georges de Menil concurred, arguing that since unemployment had stayed high for more than a decade, we should presumably be interested in explaining why its equilibrium level had risen.

Several members of the Panel expressed concern about the fact that the theoretical model was backward-looking. David Begg pointed out that the authors' interpretation of the coefficient of the lagged dependent variables in the demand equation as a measure of the size of adjustment costs would not necessarily be valid in a fully optimizing, forward-looking framework. David Currie concurred, arguing that one needed, perhaps, to model employment as resulting from a dynamic game between firms and workers.

Chris Pissarides shared Danthine's concern that the authors' use of θ as a measure of the workers' concern for employment was misleading. Surely, if workers were concerned about maintaining full employment, they would set β equal to zero. If one accepted the fact that *both* β and θ were informative about the unions' concern for employment, one would, then, expect low value of θ to be associated with low values of β. Yet the authors' estimate did not suggest this association.

Sushil Wadhwani said that one of the central results of the Alogoskoufis–Manning paper was to reconfirm the finding that low-unemployment countries tended, also, to have a high responsiveness of wages to unemployment, so wage flexibility was 'good'. However, this measure of wage flexibility was likely to be seriously flawed because unemployment was mismeasured to a different extent in different countries. If one used 'output gaps' rather than unemployment, the relative ranking of wage flexibility changed significantly, so that low-unemployment

countries were no longer those with greater wage flexibility. Wadhwani also expressed some disquiet regarding the authors' contention that higher adjustment costs in employment were necessarily bad for unemployment. He offered the example of two economies, one with a lifetime employment system, the other with costless hiring and firing. If we started at full employment, but then had a temporary, adverse shock before reverting to full employment, the economy with lifetime employment would never experience any unemployment, while that with costless firing would have some temporary unemployment. Hence, a more sophisticated treatment of adjustment costs was required.

Appendix

A1. The wage-setting and labour demand schedules (Table 2)

We use a simple model of 'insiders' and 'outsiders' in the labour market, according to which the 'insiders' have an overriding power in setting wages to suit their objectives. Following Blanchard and Summers (1986), we assume that the composition of the group of insiders is influenced asymmetrically by those who have been recently employed:

$$l_t^I = a l_{t-1} + (1 - \alpha) \bar{n}_t \qquad (A1)$$

where l^I refers to the logarithm of the number of insiders, and $\bar{n}$ to the logarithm of the effective labour force. α measures the proportion of new entrants, as well as those involuntarily unemployed, who are considered outsiders.

Real wage aspirations are assumed to be a weighted average of past real wages and steady-state real wages:

$$\omega_t = \beta (w - p)_{t-1} + (1 - \beta) \bar{\omega}_t \qquad (A2)$$

where ω_t is the log of real wage aspirations, and $\bar{\omega}_t$ refers to the real wages consistent with full employment equilibrium. $(1 - \beta)$ is the speed of adjustment of real wage aspirations.

Wage setters choose the wage so as to minimize a one-period quadratic loss function, defined in terms of deviations of wages and employment from target:

$$L = \frac{1}{2} [l_t - l_t^I]^2 + \frac{\theta}{2} [(w - p)_t - \omega_t]^2 \qquad (A3)$$

where θ denotes the marginal cost of deviations of real wages from target relative to employment. (A3) is minimized subject to the labour demand curve:

$$l_t = \gamma l_{t-1} - \delta (w - p)_t + v_t \qquad (A4)$$

where γ is the degree of persistence in labour demand, δ is the short-run elasticity of labour demand, and v is a shift factor.

The first-order conditions for a minimum of (A3) subject to (A4) give:

$$\theta[(w-p)_t - \beta(w-p)_{t-1} - (1-\beta)\bar{\omega}_t] = \delta[l_t - \alpha l_{t-1} - (1-\alpha)\bar{n}_t] \tag{A5}$$

Solving (A5) for real wages:

$$(w-p)_t = \beta(w-p)_{t-1} + (1-\beta)\bar{\omega}_t + \frac{\delta}{\theta}[l_t - \alpha l_{t-1} - (1-\alpha)\bar{n}_t] \tag{A6}$$

When insiders set the nominal wage conditional on information available at the end of period $t-1$, then minimization of the expected cost in (A3) gives:

$$(w-p)_t = \beta(w-p)_{t-1} + (1-\beta)\bar{\omega}_t^e$$

$$+ \frac{\delta}{\theta}[l_t^e - \alpha l_{t-1} - (1-\alpha)\bar{n}_t^e] - (p_t - p_t^e) \tag{A7}$$

where the superscript e denotes rational expectations conditional on information at the end of period $t-1$. (A7) serves as the basis for our estimates.

One common criticism of the one period cost function (A3) is that it is 'myopic', in that wage setters do not take account of the effects of current actions on future costs. An intertemporal version of (A3) would be:

$$L^* = \sum_{i=0}^{\infty} \rho^i \left\{ \frac{1}{2}[l_{t+i} - \alpha l_{t+i-1} - (1-\alpha)\bar{n}_{t+i}]^2 \right.$$

$$\left. + \frac{\theta}{2}[(w-p)_{t+i} - \beta(w-p)_{t+i-1} - (1-\beta)\bar{\omega}_{t+i}]^2 \right\} \tag{A8}$$

where ρ is the discount factor. Minimization of (A8) subject to the labour demand curve gives second order Euler equations, containing future employment and real wages in addition to the variables in (A7). We have experimented with these future terms in estimation, with little success. We thus stick to variants of (A6) and (A7).

The difference between the effective labour force and the measured labour force is steady-state unemployment, i.e. the 'natural rate'. If we denote the natural rate of unemployment by $\bar{u}$, and the logarithm of the measured labour force by n, then:

$$\bar{n}_t \simeq n_t - \bar{u}(t) \tag{A9}$$

i.e. the proportional difference between the measured and the effective labour force is approximately equal to the natural rate of unemployment.

Assume that the measured labour force follows a random walk with drift, i.e. that it has a stochastic trend:

$$n_t = g + n_{t-1} + \mu_t \tag{A10}$$

where g is the mean rate of growth of the labour force and μ_t is a white noise component. One can use (A10) and (A9) to transform (A7) into:

$$(w - p)_t = c(t) + \beta(w - p)_{t-1} - \eta(u_t - \alpha u_{t-1}) \tag{A11}$$

where $\eta = \delta/\theta$ and $c(t) = (1 - \beta)\bar{\omega}_t + (\delta(1 - \alpha)/\theta)\bar{u}(t) + (\alpha\delta/\theta)(g + \mu_t)$. (A11) is the wage-setting schedule in Table 2, with $\bar{\omega}$, $\bar{u}$, g and μ_t normalized to zero.

To examine the dynamics of unemployment, one must combine (A11) with the labour demand equation (A4). Subtracting n from both sides of (A4), and using (A10) and the approximation $u_t \simeq n_t - l_t$, the labour demand equation can be re-written as:

$$u_t = \gamma u_{t-1} + \delta(w - p)_t + (1 - \gamma)n_{t-1} + g + \mu_t - v_t \tag{A12}$$

Assuming for simplicity that the labour force is constant, and normalizing all factors, apart from real wages and unemployment, to zero we get the labour demand schedule in Table 2.

A2. The compact representation of the unemployment process (Table 3)

Adding a stochastic component ε_t to (A11), and with n_t, g and μ_t normalized to zero in (A12), it is easy to obtain:

$$u_t = \rho_1 u_{t-1} + \rho_2 u_{t-2} + \delta\eta\varepsilon_t - (v_t - \beta v_{t-1}) \tag{A13}$$

with

$$\rho_1 = (\alpha\delta\eta + \beta + \gamma)/(1 + \delta\eta)$$

$$\rho_2 = -\beta\gamma/(1 + \delta\eta)$$

This is the representation shown in Table 3. The special cases are as follows:

If $\theta = 0$, then $\eta = \infty$ and $u_t = \alpha u_{t-1}$. If $\theta = \infty$, then $\eta = 0$ and $\rho_1 + \rho_2 = \beta + \gamma - \beta\gamma$. If $\alpha = 1$, then $\rho_1 + \rho_2 = (\delta\eta + \beta + \gamma - \beta\gamma)/(1 + \delta\eta)$.

A3. Data sources and estimation details

The data used in this study are as those compiled by David Grubb and described in Working Paper no. 615, Centre for Labour Economics, LSE. Thus they are comparable to the data used by Newell and Symons

(1985), Bean, Layard and Nickell (1986), Blanchard and Summers (1986), and others.

w is the log of average hourly earnings in manufacturing, 1980–81. *Sources*: OECD, *Main Economic Indicators*; ILO, *Yearbook of Labour Statistics*.

p is the log of the consumer price index, 1980–81. *Source*: IMF, *International Financial Statistics*.

u is the standardized unemployment rate. *Source*: OECD, *Labour Force Statistics*, and *Economic Outlook*.

k is the log of the capital stock, calculated from gross investment data by the perpetual inventory method, assuming a depreciation rate of 5% per annum, and no trend in the capital-output ratio between 1950 and 1974. *Source*: OECD, *National Accounts*.

n is the log of the labour force. *Source*: OECD, *Labour Force Statistics*.

g is the log of current government expenditure, 1980 prices. *Source*: OECD *National Accounts*.

y is the log of Gross Domestic Product, 1980 prices. *Source*: OECD, *National Accounts*.

r is the short term interest rate. *Source*: IMF, *International Financial Statistics*.

y^* is the log of the quantity index of exports of industrialized countries, 1980–81. *Source*: UN, *Monthly Bulletin of Statistics*.

Estimation of the wage equations (Table 5) has been by Non-Linear Two Stage Least Squares. The instrument list is: Constant, $(w-p)_{t-1}$, u_{t-1}, r_{t-1}, $(k-n)_{t-1}$, y^*_{t-1}, Δp_{t-1}, g_{t-1}, time and time squared. In estimation, the steady state real wage was approximated by the marginal product of a Cobb-Douglas production function, with a share of labour equal to 67%. Hence, the term in the capital–labour force ratio referred to in the notes to Table 5. Time trends were included to approximate the natural rate of unemployment and technical progress. All the equations were subjected to a number of mis-specification tests (Spanos, 1986), and there were no indications of statistical problems. These are not reported for economy of space, but a table with the diagnostics is available from the authors upon request.

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