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HYSTERESIS AND THE EUROPEAN UNEMPLOYMENT PROBLEM

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Hysteresis and the European Unemployment Problem

ABSTRACT

European unemployment has been steadily increasing for the last 15 years and is expected to remain very high for many years to come. In this paper, we argue that this fact implies that shocks have much more persistent effects on unemployment than standard theories can possibly explain. We develop a theory which can explain such persistence, and which is based on the distinction between insiders and outsiders in wage bargaining. We argue that if wages are largely set by bargaining between insiders and firms, shocks which affect actual unemployment tend also to affect equilibrium unemployment. We then confront the theory to both the detailed facts of the European situation as well as to earlier periods of high persistent unemployment, such as the Great Depression in the US.

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After 20 years of negligible unemployment, most of Western Europe has suffered since the early 70's a protracted period of high and rising unemployment. In the United Kingdom unemployment peaked at 3.3 percent over the 1945-1970 period, but has risen almost continuously since 1970, and now stands at over 12 percent. For the Common Market nations as a whole, the unemployment rate more than doubled between 1970 and 1980 and has again doubled since then. Few forecasts call for a significant decline in unemployment over the next several years, and none call for its return to levels close to those that prevailed in the 1950's and 1960's.

These events are not easily accounted for by conventional classical or Keynesian macroeconomic theories. Rigidities associated with fixed length contracts, or the costs of adjusting prices or quantities are unlikely to be large enough to account for rising unemployment over periods of a decade or more. And intertemporal substitution in labor supply is surely not an important aspect of such a protracted downturn. The sustained upturn in European unemployment challenges the premise of most macroeconomic theories that there exists some "natural" or "non-accelerating inflation" rate of unemployment towards which the economy tends to gravitate and at which the level of inflation remains constant. The European experience compels consideration of alternative theories of "hysteresis" which contemplate the possibility that increases in unemployment have a direct impact on the "natural" rate of unemployment.

This paper explores theoretically and empirically the idea of macroeconomic hysteresis--the substantial persistence of unemployment and the protracted effects of shocks on unemployment. Our particular motivation is the current European situation. We seek explanations for the pattern of high and rising unemployment that has prevailed in Europe for the past decade and for the very different performance of the

labor market in the United States and Europe, and reach some tentative conclusions about the extent to which European unemployment problems can be solved by expansionary demand policies. The central hypothesis we put forward is that hysteresis resulting from membership considerations plays an important role in explaining the current European depression in particular and persistent high unemployment in general. The essential point is that there is a fundamental assymetry in the wage setting process between insiders who are employed and outsiders who are want jobs. Outsiders are disenfranchised and wages are set with a view to insuring the jobs of insiders. Shocks which lead to reduced employment change the number of insiders and thereby change the subsequent equilibrium wage rate, giving rise to hysteresis. Membership considerations can therefore explain the general tendency of the equilibrium unemployment rate to follow the actual unemployment rate. A number of types of empirical evidence consistent with our hypothesis are adduced. The paper is organized as follows:

Section 1 documents the dimensions of the current European depression. It documents, by looking at the movements in unemployment in the United States and United Kingdom over the past century, that high unemployment is in fact often quite persistent. It reviews standard explanations of the current European situation and finds them lacking. It then considers a number of mechanisms through which high persistence of unemployment could be generated.

Section 2 explores what we find the most promising of the possible mechanisms for generating hysteresis. It presents a formal model illustrating how temporary shocks can have a permanent effect on the level of employment in contexts where wages are set by employers who bargain with insiders. Persistence results in this setting because shocks change employment and membership in the group of insiders, thus influencing its subsequent bargaining strategy. We then discuss the role of unions and whether such effects can arise in non union settings.

Section 3 examines the behavior of post war Europe in light of our theory of hysteresis. It presents direct evidence on the role of unions, on the behavior of wages and employment and on the composition of unemployment. We find the European experience quite consistent with our model. Europe appears to have high hysteresis, much more so than the US. High unemployment in Europe and low unemployment in the US are well explained both by different sequences of shocks, especially in the 1980's, and by different propagation mechanisms, with Europe exhibiting more persistence than the US.

Section 4 returns to an issue which is of fundamental importance for policy. Granting that Europe has more hysteresis than the US, is it really due to unions or is hysteresis itself endogenous, being triggered by bad times ? In an attempt to answer this question, the section compares Europe now to Europe earlier when unemployment was low, and compares the current European depression to the US Great depression. This last comparison is especially important, given the ability of the US to drastically decrease unemployment in 1939 and 1940, mostly through aggregate demand.

The conclusion summarizes our beliefs and doubts, and draws the implications of our analysis for policy.

1. The Record of Persistent Unemployment

We start this section by documenting the dimensions of the current European depression. We then demonstrate that persistently high unemployment like that experienced in Europe at present is not historically unusual. Data for the past century suggest a surprisingly high degree of persistence in unemployment in both the United States and United Kingdom. We argue that such persistence is not easily explained by standard natural rate theories and conclude that theories which allow for hysteresis, by which we mean a very high dependence of current unemployment on past unemployment[1], are required to explain such persistence.

1.1 The European Depression

Table 1 presents some information on the evolution of unemployment in three major European countries as well as the US over the past 25 years. While European unemployment rates in the 1960's were substantially lower than those in the United States, unemployment rates in Europe today are substantially greater than current US unemployment rates. The unemployment rate in the United States has fluctuated considerably, rising from 4.8 to 8.3 percent in the 1973-1975 recession then declining to 5.8 percent in 1979, then rising to 9.7 percent in 1982 before declining to around 7.0 percent today. In contrast, unemployment in Europe has risen seemingly inexorably since 1973. In France, the unemployment rate has increased in every single year since 1973, while it has declined only twice in Germany and the United Kingdom. The differences between the European countries and the United States are most pronounced after 1980. While the US unemployment rate is at roughly its 1980

Table 1

European and U.S. Unemployment

1961-1986

	United States	United Kingdom	France	West Germany
1961-1970	4.7	1.9	.9	.8
1971-1975	6.1	2.8	2.6	1.8
1976-1980	6.7	5.2	5.3	3.7
1980	7.1	6.0	6.4	3.4
1981	7.6	9.2	7.7	4.8
1982	9.7	10.6	8.7	6.9
1983	9.6	11.6	8.8	8.4
1984	7.5	11.8	9.9	8.4
1985	7.3	12.0	10.7	8.4
1986*	7.2	11.7	10.9	8.0

Source. Annual Economic Review, Commission of the European Communities, 1986.
*Forecast.

level, the unemployment rate has approximately doubled in the three European countries. The rapid decline in US unemployment after 1982 contrasts sharply with the continuing increase in unemployment in Europe. The last line of the table gives forecasts of unemployment by the European Commission for 1986 ; they show little expected change. Longer run forecasts are very similar ; baseline projections by the European Commission put unemployment for the EEC as a whole at 10.4% in 1990, compared to 10.8% in 1985.

Differences in unemployment rates actually understate the differences in the performance of American and European labor markets over the past decade. Europe has suffered the concomitants of high unemployment--reduced labor force participation and involuntarily reductions in hours-- to a much greater extent than has the United States. Between 1975 and 1983, the labor force participation rate of men in the United States remained constant, while the corresponding rate in OECD Europe declined by six percent. Average annual hours worked declined by 2.7 percent in the United States between 1975 and 1982 compared with declines of 7.5 percent in France and 8.1 percent in England. Perhaps the most striking contrast of the labor market performances of Europe and the United States is the observation that between 1975 and 1985 employment increased by 25 percent, or about 25 million jobs in the United States while declining in absolute terms in Europe.

1.2. Unemployment Rates in the UK and the US over the last 100 years

European unemployment has steadily increased and, pending an unexpected change in policy, is expected to remain at this new higher level for the foreseable future. How unusual is such high and persistent unemployment? To answer this question, we now examine the behavior of unemployment over the last 100 years in both the UK and the US.

Figures 1 and 2 plot unemployment for each of the two countries, for the period 1890-1985 for the UK, and 1892-1985 for the US.[2]

Estimation of an AR(1) process for the whole sample for each country gives :

UK : $u = .93\ u(-1) + e$; $\sigma_e = 2.1$ %

(.04)

US : $u = .90\ u(-1) + e$; $\sigma_e = 2.0$ %

(.04)

In both cases, the degree of first order serial correlation is high. Unemployment is indeed surprisingly persistent. It exhibits at best a weak tendency to return to its mean.

Examination of the two figures --as well as statistical work--suggests that the evolution of the unemployment rate over the past 100 years is however not well captured by any simple linear autoregressive representation. The degree of persistence as captured by the degree of first order serial correlation reported above arises in large part from relatively infrequent changes in the level around which unemployment fluctuates. In the UK, when unemployment goes up from 1920 to 1940, it shows little tendency during that period to return to its pre 1920 level ; it then returns to a low level during WWII, to stay there until the 1960's. The current episode, both past and forecast, is a second instance in which unemployment, after having sharply increased, stabilizes at a new, high level. The US experienced a sustained increase in unemployment from 1929 to 1939, only to see unemployment drop sharply during and after the war to a new, much lower, level. When the degree of persistence in unemployment is estimated separately for periods of high and low average unemployment, there is some weak evidence of greater persistence within periods of high average unemployment.

FIGURE 1

UKUR

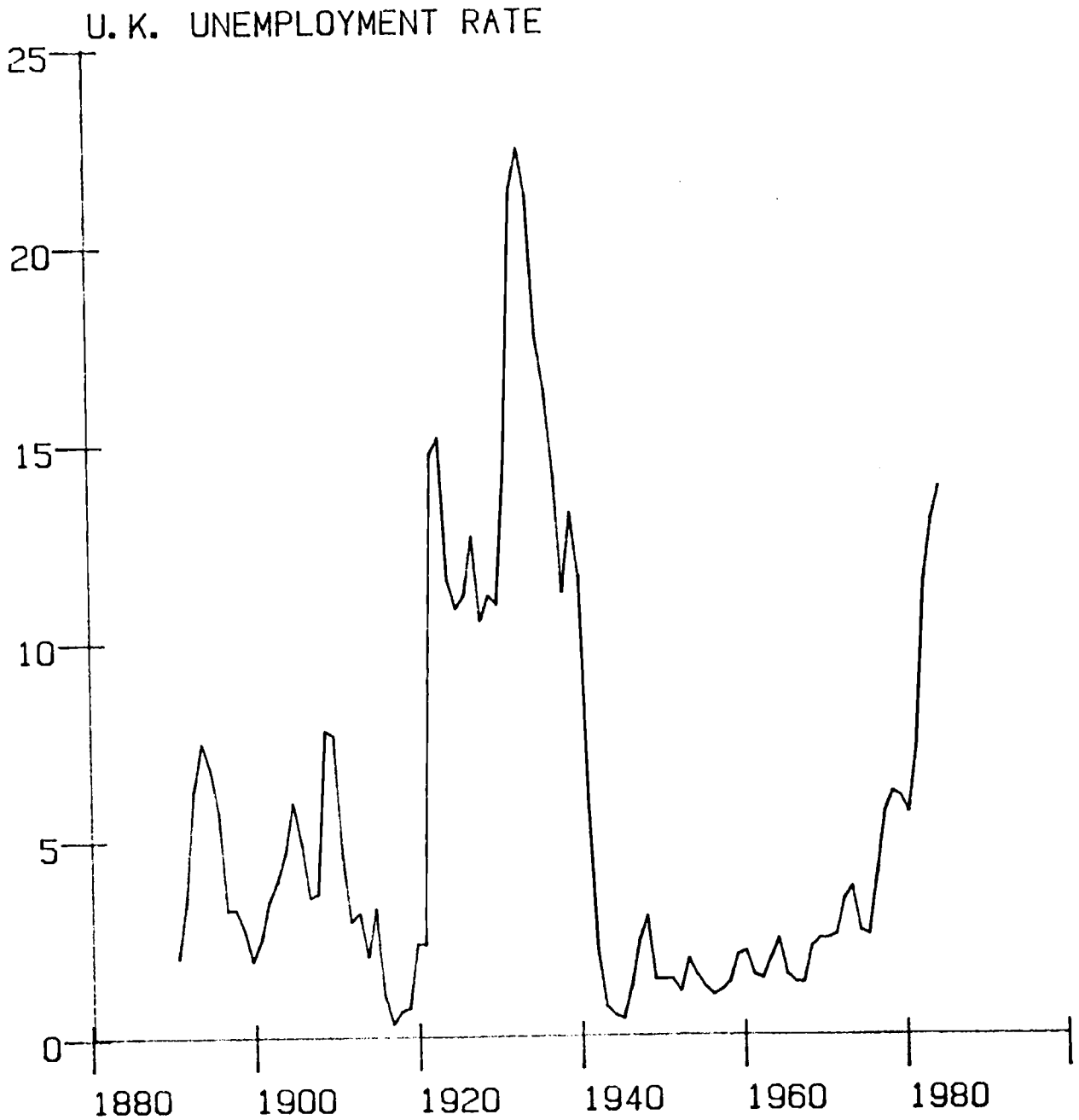
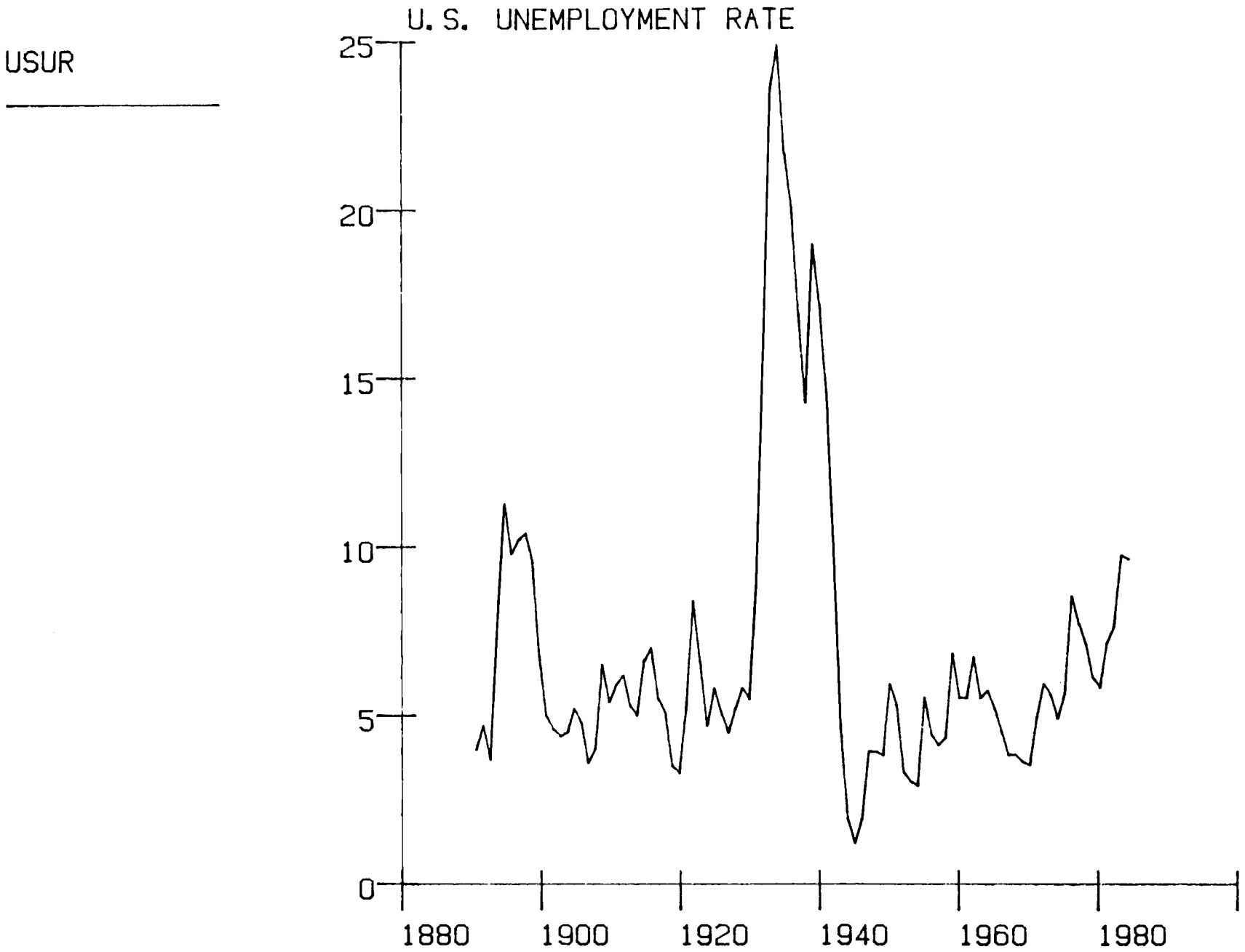


FIGURE 2


U. S. UNEMPLOYMENT RATE
USUR
25
20
15
10
5
0
1880
1900
1920
1940
1960
1980

The time series studied in isolation give little indication as to the cause of the changes in the mean level, which account for much of the persistence in unemployment. They could be exogenous or instead be triggered by unemployment itself, with a few years of high unemployment triggering an increase in the mean level of unemployment, a few years of low unemployment triggering in turn a decrease in that level. In the absence of a tight specification of how this triggering occurs we do not believe that the data can easily distinguish between these two possibilities and we shall not attempt to do so at this stage.

Our finding that unemployment exhibits a very high degree of persistence over the past century parallels the findings of Nelson and Plosser [1982], Campbell and Mankiw [1986] and others that a variety of economic variables follow random walks or other non-stationary processes. In many cases such findings can be easily rationalized by recognizing that the level of technology is likely to be non-stationary and that other variables like the level of output depend on productivity. But the failure of unemployment to display more of a mean reverting tendency is troubling. It is unlikely that non stationarity in productivity can account for the persistence of unemployment since the secular increase in productivity has not been associated with any trend or upwards drift in unemployment.

1.3. Diagnosing Unemployment Problems

What sort of theories can account for persistent high unemployment in general and the current European experience in particular? We highlight the general difficulties one encounters in explaining persistent unemployment by focusing on the problem of explaining the current European situation. The central puzzle it poses is its persistence. While it is easy to point to substantial, adverse supply and demand

shocks over the last 15 years, we argue that our standard theories do not easily explain how they have had such enduring effects on the level of unemployment [3].

Aggregate demand

There is little question that Europe has been affected by large adverse demand shocks, especially since 1980 (see for example Dornbusch et al. 1983). In the 1980's, Europe has to a large extent matched tight US monetary policy while at the same time engaging in a major and prolonged fiscal contraction (see Blanchard and Summers 1984 for the UK, Germany and France ; see Buiter 1985 for a more detailed study of the UK fiscal policy).

But to the extent that aggregate demand shocks do not affect the equilibrium or natural rate of unemployment, one would expect sustained high unemployment to be associated with rapid declines in the rate of inflation. More generally, standard models of the effects of aggregate demand shocks would not predict that previous estimates of the relationship between inflation and unemployment would break down. There is substantial evidence however that this relation has broken down and that there has been a much smaller decline in inflation than would have been predicted by past relationships. Below we examine the relation between wage inflation and unemployment in detail. But the basic point that previous relations have broken down is evidenced in Table 2 which gives the rates of inflation and unemployment in 1984 and 1985 for the United Kingdom, France and Germany. Despite the high rates of unemployment, there is no sign of disinflation, with the United Kingdom and Germany experiencing a small increase in inflation and France a small decrease. Econometric estimates of the rate of unemployment consistent with stable inflation show rapid increases over the past decade. Layard et al (1984), using crude time trends in a

Table 2

Inflation and Unemployment in the U.K., France and Germany

1984-1985

	United Kingdom		France		Germany	
	π	U	π	U	π	U
1984	4.4	11.8	7.0	9.9	1.9	8.4
1985	5.5	12.0	5.7	10.7	2.1	8.4

π = Rate of change of GDP deflator.

μ = Unemployment

Source. Annual Economic Review, Commission of the European Communities, 1986.

Phillips curve relation, find the unemployment rate consistent with steady inflation to have risen from 2.4 in 1967-70 to 9.2 in 1981-1983 in Britain, from 1.3 to 6.2 in Germany and from 2.2 to 6.9 in France. Coe and Gagliardi (1985), also within the framework of the Phillips curve but using instead of a time trend a battery of potential determinants of equilibrium unemployment as right hand side variables, obtain roughly similar results. Aggregate demand shocks have clearly played a role in explaining the increase in European unemployment ; but they cannot be the whole story given the increase in the rate of unemployment consistent with steady inflation.

Aggregate supply

Aggregate supply explanations appear more promising if the goal is to explain an increase in equilibrium unemployment. This is indeed the approach followed by much of the recent research. Sachs [1979,1983] and Bruno and Sachs [1985] have argued that unemployment in Europe is in large part the result of a combination of adverse supply shocks and real wage rigidity. The argument is that real wages do not adjust to clear the labor market so that adverse supply shocks which reduce the demand for labor at a given real wage create unemployment. This argument has two parts, real wage rigidity and the occurence of adverse supply shocks. We start by reviewing the evidence on the second.

Table 3 presents some information on the behavior of various supply factors with a potential bearing on unemployment in the UK since 1960[4].

Table 3

Supply Factors and U.K. Unemployment

Year	Unemployment Rate (%)	Replacement Rate (%)	Mismatch Index (%)	Productivity Growth (%)	Change in Tax Wedge (%)
1960	2.3	42	-	1.9	.0
1965	2.3	48	41	2.8	1.0
1970	3.1	51	38	3.2	1.0
1975	4.7	49	43	2.7	.8
1976	6.0	50	38	1.5	2.8
1977	6.4	51	35	1.7	1.9
1978	6.1	50	35	1.4	-.9
1979	5.6	46	35	2.1	1.3
1980	6.9	45	37	1.5	1.3
1981	10.6	50	41	1.4	2.6
1982	12.8	54	37	1.1	1.0
1983	13.1	54	-	.5	-1.8

Notes.

a) Standardized unemployment rate; source OECD.
b) Weighted average of replacement rates relevant to families of different sizes. Source: Layard and Nickell (1985).
c) Index constructed as $\Sigma \mid u_i - v_i \mid$ where u_i and v_i are the proportions of unemployment and vacancies in occupation i respectively. Source: Layard, Nickell and Jackman (1984).
d) Rate of change of total factor productivity growth, derived by assuming labor augmenting technical change. The first four numbers refer to the change in the rate (at annual rate) over the previous five years. Source: Layard and Nickell (1985).
e) The tax wedge is the sum of the employment tax rate levied on employers and of direct and indirect tax rates levied on employees. The first four numbers refer to the change in the rate (at annual rates) over the previous five years. Source: Layard and Nickell (1985).

A first candidate is unemployment benefits. Unemployment insurance may raise unemployment if it causes workers to search longer or less intensively for jobs, reducing the pressure that unemployment puts on wages. The second column of table 3 gives the average replacement ratio, that is the average ratio of after tax unemployment benefits to earnings for different categories of workers ; it shows no clear movement over time. This is not necessarily conclusive evidence against a role for unemployment benefits : one can easily envision mechanisms through which increases in unemployment benefits lead to higher real wages, higher unemployment but little or no change in the replacement ratio. Indeed, another way of reading the column is that it shows an increase in real unemployment benefits of roughly 30% since 1970. Furthermore, it has been argued that the principle changes in unemployment insurance have occurred through changes in eligibility rules rather than benefit levels. Attempts to estimate the effect of unemployment benefits on unemployment have not been very successful (see Minford (1982) and Nickell (1984) for further discussion) and one is led to conclude that the increase in unemployment benefits probably does not account for a large portion of the increase in unemployment.

A second candidate explanation is structural change. The argument is that the need for large scale reallocation of labor associated with structural change tends to increase unemployment. Often it is suggested that the energy shocks of the 1970's increased the rate of structural change and so led to higher unemployment. The adjustment to structural changes may be complicated by real wage rigidity. The fourth column of Table 3 presents the index of "mismatch" developed by Layard, Nickell and Jackman [1984]. The index tries to represent the degree of structural change in the economy by examining the extent to which unemployment and vacancies occur in the same sectors. The results in the table look at occupational mismatch,

but results are largely similar when industrial and regional measures are used[5]. There is little evidence of an increase in the rate of structural change since the 1960's when the unemployment rate was consistently low.

Perhaps the most common supply based explanations for persistent high unemployment involve factors which reduce labor productivity and or drive a wedge between the cost of labor to firms and the wage workers receive. The fourth and fifth columns of the table give time series for total factor productivity growth and the change in the tax wedge[6]. It is clear from the table that there has been a substantial reduction in the rate of total factor productivity growth in the wake of the oil shocks. Over the years the total tax wedge has also risen substantially, by 30% since 1960, by 10% since 1970. While it is still true that the real after-tax wage consistent with full employment has risen fairly steadily, it has increased more slowly than it had in the first half of the post war period.

The problem with aggregate supply explanations

We have now documented the presence of adverse supply developments relative to what might have been expected in the early 1970's. But for these shocks to have a long lasting effect on unemployment, there must be long lasting real wage rigidity. If and when labor supply becomes inelastic, supply shocks are then reflected in real wages, not in unemployment. Individual labor supply is surely largely inelastic in the long run. As with aggregate demand explanations, we face the problem of explaining the mechanism that causes shocks to have long lived effects.

Recent models of union behavior (notably McDonald Solow 1981) have addressed this problem by showing that if wages are the result of bargaining between unions and firms, the result may be real wage rigidity, with shocks affecting employment only. There is however a fundamental difficulty with this line of argument. To take the

model developed by McDonald and Solow, if real wages were truly rigid at a rate determined by the interaction of union preferences and firms' production technology, employment would steadily increase and unemployment steadily decrease through time. Annual productivity improvements due to technical change are equivalent to favorable supply shocks. As long as productivity increments and capital accuulation led to the demand curve for labor shifting outwards faster than the population grew, unemployment would decline. This appears counterfactual[7]. Even over the last decade, the cumulative impact of productivity growth has almost certainly more than counterbalanced the adverse supply shocks that occurred.

To rescue this line of thought, it must be argued that real wages are rigid along some "norm", which may increase over time. But this has two implications. The first is that the dynamic effects of supply shocks on employment then depend on the way the norm adjusts to actual productivity and this is left unexplained. The second and more important one here is that adverse supply shocks have an effect only as long as the norm has not adjusted to actual productivity. Thus, unless the norm never catches up with actual productivity, adverse supply shocks cannot affect unemployment permanently. It seems implausible that the current persistence of high unemployment can all be attributed to lags in learning about productivity. Both the United Kingdom and the United States have experienced enormous productivity gains without evident reduction in unemployment over the last century. High unemployment therefore cannot be blamed simply on poor productivity performance. It can only be attributed to <u>surprises</u> in productivity performance. But then it is hard to see how to explain protracted unemployment from lower productivity growth.

Where does this leave us ? We have argued that there is plenty of evidence of adverse shocks, be it lower than expected productivity growth, increases in the price of oil or in the tax wedge in the 1970's or contractionary aggregate demand policies in the 1980's. But we have also argued that standard theories do not provide us with convincing explanations of how these shocks can have such a sustained effect on unemployment. Put differently, it is difficult to account for the apparent increase in the equilibrium rate of unemployment --or equivalently in the unemployment rate consistent with stable inflation-- by pointing to these shocks. Borrowing from the business cycle terminology, it is not difficult to find evidence of negative impulses ; the difficulty is in explaining the propagation mechanism. This leads us to look for mechanisms that can explain the propagation of adverse supply or demand shocks over long periods of time. These include the possibility that current unemployment depends directly and strongly on past unemployment[8]. We now consider various channels through which this may happen.

1.4.Theories of Hysteresis

Three types of explanation which loosely speaking might be referred to as the "physical capital", "human capital",and "insider-outsider' stories can be adduced to explain why shocks which cause unemployment in a single period might have long term effects.

The physical capital story simply holds that reductions in the capital stock associated with the reduced employment that accompanies adverse shocks reduce the subsequent demand for labor and so cause protracted unemployment. This argument is frequently made in the current European context where it is emphasized that, despite the very substantial increase in the unemployment rate that has occurred, capacity

utilization is at fairly normal levels. For the EEC as a whole, capacity utilization has shown no trend over the last decade. It currently stands at 81 percent compared with 76 percent in 1975, 83 percent in 1979, and 76 percent in 1983. It is then argued that the existing capital stock is simply inadequate to employ the current labor force.

We are somewhat skeptical of the argument that capital accumulation effects can account for high unemployment for two reasons. First, as long as there are some possibilities for substitution of labor for capital ex-post, reductions in the capital stock affect the demand for labor just like adverse supply shocks. As noted above, it is unlikely that an anticipated supply shock would have an important effect on the unemployment rate. Second, as we discuss in Section 4 below, substantial disinvestment during the 1930's did not preclude the rapid recovery of employment associated with rearmarment in a number of other countries. Nor did the very substantial reduction in the size of the civilian capital stock that occurred during the War prevent the attainment of full employment after the War in many countries[9]. The argument that reduced capital accumulation has an important effect on the level of unemployment is difficult to support with historical examples.

A second and perhaps more important mechanism works through "human capital" broadly defined. Persuasive statements of the potentially important effects of unemployment on human capital accumulation and subsequent labor supply may be found in Phelps [1972] and Hargraves-Heap [1980][10]. Some suggestive empirical evidence may be found in Clark and Summers [1982]. Essentially, the human capital argument holds that workers who are unemployed lose the opportunity to maintain and update their skills by working. Particularly for the long term unemployed, the atrophy of skills may combine with disaffection from the labor force associated with the inability to find a job, to reduce the effective supply of labor. Early retirement may for

example be a semi-irreversible decision. More generally, if for incentive or human capital reasons employers prefer workers with long horizons, it may be very difficult for middle aged workers to find new jobs. A final point is that in a high unemployment environment, it will be difficult for reliable and able workers to signal their quality by holding jobs and being promoted. The resulting inefficiencies in sorting workers may reduce the overall demand for labor.

Beyond the adverse effects on labor supply generated by high unemployment, the benefits of a high pressure economy are foregone. Clark and Summers [1982] demonstrate that in the United States at least World War II had a long lasting effect in raising female labor force participation. Despite the baby boom, in 1950 the labor force participation of all female cohorts that were old enough to have worked during the War was significantly greater than would have been predicted on the basis of pre-War trends. The causal role of participation during the War is evidenced by the fact that the participation of very young women who could not have worked during the War was actually lower than would have been predicted on the basis of earlier trends. Similarly, research by Ellwood [1981] suggests that teenage unemployment may leave some "permanent scars" on subsequent labor market performance. One channel through which this may occur is family composition. The superior labor market performance of married men with children has been noted many times. The effect of the Great Depression on fertility rates, both in the US and in Europe, has often been noted.

Gauging the quantitative importance of human capital mechanisms generating hysteresis is very difficult. Some of the arguments, early retirement for example, suggest that labor force participation should decline rather than that unemployment should increase in the aftermath of adverse shocks. Perhaps a more fundamental problem is that to the extent that there is some irreversibility associated with

unemployment shocks, it becomes more difficult to explain why temporary shocks have such large short run effects. If early retirement is forever, why should it be taken in response to a temporary downturn ? Overall, while it seems likely that human capital mechanisms can explain some of the protracted response to shocks, it is doubtful that they are sufficient to account completely for the observed degree of persistence.

A third mechanism that can generate persistence and that we regard as the most promising relies on the distinction between "insider" and "outsider" workers, developed in a series of contributions by Lindbeck (see Lindbeck and Snower [1985] for example) and used in an important paper by Gregory [1985] to explain the behavior of the Australian economy. To take an extreme case, suppose that all wages are set by bargaining between employed workers--the "insiders"--and firms, with outsiders playing no role in the bargaining process. Insiders are concerned with maintaining their jobs, not insuring the employment of outsiders. This has two implications. First, in the absence of shocks, any level of employment of insiders is self-sustaining; insiders just set the wage so as to remain employed. Second and more importantly: in the presence of shocks, employment follows a process akin to a random walk; after an adverse shock for example, which reduces employment, some workers lose their insider status and the new smaller group of insiders sets the wage so as to maintain this new lower level of employment. Employment and unemployment show no tendency to return to their pre shock value, but are instead determined by the history of shocks. This example is extreme but nevertheless suggestive. It suggests that, if wage bargaining is a prevalent feature of the labor market, the dynamic interactions between employment and the size of the group of insiders may generate substantial employment and unemployment persistence. This is the argument we explore in detail in the next section.

2. A Theory of Unemployment Persistence

This section develops a theory of unemployment persistence based on the distinction between insiders and outsiders. As the example sketched at the end of the previous section makes clear, the key assumption of such a theory is that of the relation between employment status and insider status. We can think of this key assumption as an assumption about membership rules, the rules which govern the relation between employment status and membership in the group of insiders. The possibility of persistent fluctuations in employment arises because changes in employment may change the group's membership and thereby alter its objective function[11].

In the first part of this section, we develop a partial equilibrium model of bargaining between a group of insiders and a representative firm and characterize employment dynamics under alternative membership rules (We use the term "group" rather than the more natural "union" to avoid prejudging the issue of whether the membership considerations we stress are important only in settings where formal unions are present). The second part of the section extends the analysis to a general equilibrium setting and shows how both nominal and real shocks can have permanent effects on unemployment. In the remaining part of the section, we consider mainly two issues ; the first is that of the endogeneity of membership rules. The second is that of whether our analysis is indeed relevant only or mostly in explicit union setttings.

2.1. A Model of Membership Rules and Employment Dynamics.

To focus on the dynamic effects of membership rules on the decision of the group of insiders, the "group" for short, we formalize the firm as entirely passive, as presenting a labor demand on which the group chooses its preferred outcome[18]. We start by characterizing employment and wages in a one period model. In a one period model, initial membership is given and membership rules are obviously irrelevant. But it is a useful intermediate step, which will allow us to contrast our later results with traditional ones which treat membership as exogenous. Throughout, we make no attempt at generality and use convenient functional forms and some approximations to retain analytical simplicity.

The One Period Model

The group has initial membership n_o (in logarithms, as are all variables in what follows, unless otherwise mentioned). It faces a labor demand function given by:

(2.1) $n = - cw + e$

where n is employment, w is the real wage and e is a random technological shock, with mean Ee, uniformly distributed between [Ee-a, Ee+a]. The coefficient a captures the degree of uncertainty associated with labor demand. The group must decide on a wage w before it knows the realisation of e. Given w and the realisation of e, the firm then chooses labor according to the labor demand function. If n exceeds n_o, $n-n_o$ outsiders are hired. If n is less than n_o, n_o-n insiders are laid off. The probability of being laid off is the same for all insiders.

Before specifying the objective function of the group, we can derive, for given w and n_o, the probability of being employed. The probability of being employed for an insider is equal to one if $n>n_o$. For $n<n_o$, we approximate the probability (which is

not in logarithm) of being employed for an insider by $1-n_o+n$. This approximation will be good as long as n is not too much smaller than n_o. Under these assumptions, the probability p of being employed is given by (all derivations are in the appendix) :

$$(2.2) \quad p = 1 - (1/4a)(n_o + cw - Ee + a)^2 \quad \text{for } n_o + cw \geq Ee - a$$
$$= 1 \quad \text{for } n_o + cw \leq Ee - a$$

If even under the worst outcome--which is $e=Ee-a$ and thus $n=-cw+Ee-a$ -- n is larger than n_o, then the probability of employment is clearly equal to one. Otherwise, the probability is an increasing function of expected productivity Ee, a decreasing function of initial membership n_o, and of the wage w. It is also a decreasing function of the degree of uncertainty a ; the larger a, the lower the probability of being employed in bad times, while the probability remains equal to one in good times.

The second step is to derive the choice of w. This requires specifying the utility function of the group. The group maximises the utility function of the representative group member, which we specify as :

$$U = p + bw$$

Utility is linear in the probability of employment and the wage. This specification is not the most natural but it is however attractive, for two reasons. The first reason is that, as will be seen below, it implies, together with the specification of probabilities given above, that the group exhibits the stochastic equivalent of inelastic labor supply : an increase in Ee is entirely reflected in an increase in real wages and leaves the probability of employment unchanged. We have argued in the previous section that this is a desirable feature of any model of wage determination given the absence of major trends in unemployment rates over long

periods of time[13]. Note however that our assumption of stochastically inelastic labor supply is the opposite of that used by McDonald and Solow. Where they postulate a rigid real wage so that the labor supply curve is perfectly elastic, we postulate perfectly inelastic labor supply. The second reason is that it is analytically convenient.

Replacing p by its value from (2.2) and solving for the optimal wage w gives:

$w^* = (1/c)(-n_o + Ee + a(2(b/c)-1))$

Replacing in labor demand gives

$n = n_o - a(2(b/c)-1) + (e-Ee)$

Replacing w^* in equation (2.2) and rearranging gives the optimal probability :

$p^* = 1-a(b/c)^2$

Thus the wage depends negatively on initial membership. As by definition $E(e-Ee) = 0$, whether expected employment exceeds membership depends on the sign of $a(2(b/c)-1)$ thus on whether b/c is less than 1/2 or not. The lower b, the more importance workers attach to employment protection as opposed to the wage; the higher c, the smaller the wage reduction required to increase expected employment. If b/c is less than 1/2, workers set a wage low enough to imply expected net hirings of outsiders by the firm. Note, as mentioned above that the optimal probability of being employed depends neither on the initial membership nor on expected productivity[14].

Until now, the analysis has been rather conventional: Given the initial membership, insiders choose a wage. This wage and the realisation of a disturbance determine employment. But when we go from this one period model to a dynamic one, there may well be a relation between employment this period and next period's membership. This relation will depend on the form of membership rules. We now examine how this affects employment dynamics.

We first define membership rules. We can think of various membership rules as being indexed by m. Those workers who have been working in the firm for the last m periods belong to the group, are insiders. Workers who have been laid off for more than m periods lose membership[15], become outsiders. There are two extreme cases: the first is the case where m is equal to infinity, so that the initial membership never changes. The second is the case where m=1 so that membership always coincides with current employment. The extreme cases highlight the effects of alternative membership rules so we consider them before turning to the more difficult intermediate case.

The case of a constant membership (m=infinity)

Let us denote by $\underline{n}_i$ beginning of period i membership, and by n_i realised employment in period i. In the present case, membership is equal to $\underline{n}_o$ forever. So, each period, if n_i exceeds $\underline{n}_o$, all members work ; if n_i is less than $\underline{n}_o$, the probability of being employed is given for each member by (approximately) $1-\underline{n}_o+n_i$. We assume that the one period utility function of a worker is given, as above, by $(p_i + bw_i)$ and that the workers' discount factor is equal to θ. Thus the utility of a member as of time zero is given by:

$$U_o = E_o \sum_{i=0}^{\infty} \theta^i [p_i + bw_i] \text{ where } \theta \text{ is less than one}$$

Assume for the moment that the shocks affecting labor demand are uncorrelated over time, or more precisely that e_i is iid, uniform on $[-a,+a]$. (We shall return below to the case of serially correlated shocks). Then by the analysis of the previous section, the probability of being employed in period i, conditional on w_i is given by (using the fact that $Ee_i = 0$) :

$$p_t = 1 \qquad \text{for } \underline{n}_o + cw_t \geq -a$$

$$= 1 - (1/4a)(\underline{n}_o + c\, w_t + a)^2 \qquad \text{for } \underline{n}_o + cw_t \leq -a$$

Given that employment outcomes do not affect future membership, and given the assumption that shocks are white noise, the problem faced by members is the same every period, and thus its solution is the same as that derived above:

$$(2.3) \quad w^*_t = (1/c)(-\underline{n}_o + a(2(b/c)-1)) \text{ and}$$

$$n_t = \underline{n}_o - a(2(b/c)-1) + e_t$$

In response to white noise shocks, employment will also be white noise. Whether employment is on average larger or smaller than membership depends on whether (b/c) is smaller or larger than 1/2. If the insiders want strong employment protection, they will choose a wage so that, on average, employment exceeds membership and the firm has a cushion of outsiders who are laid off first in case of adverse shocks.

It is easy to see that the result that employment is white noise will continue to hold regardless of the stochastic process followed by e. As shown above, our assumptions insure that labor supply is stochastically inelastic. Changes in the expected value of e affect real wages but do not affect the level of employment. Only the deviation of e from its expected value affects the level of employment. By the properties of rational expectations, the unexpected component of e must be serially uncorrelated.

<u>The case where membership equals employment (m=1)</u>

We now go to the opposite extreme, in which membership comes and goes with employment. In this case membership at time i is simply given by employment at time i-1 : $\underline{n}_i = n_{i-1}$. If the group kept the same decision rule as in equation (2.3) but applied it to $\underline{n}_i$ rather than to $\underline{n}_o$, equation (2.3) would become :

$$(2.3') \quad n_i = n_{i-1} - a(2(b/c)-1) + e_i$$

Thus, employment would follow a random walk, with drift. Optimal wage behavior under the assumption that membership equals beginning of period employment is however not given by (2.3'). Unlike the behavior implied by (2.3') current members should recognize their inability to commit future memberships to wage policies. The subsequent policies of the group will depend on its then current membership. This changes fundamentally the character of the maximization problem. The group membership, when taking wage decisions today, knows that wage decisions will be taken next period by a membership which will in general be different from that of today. This implies in particular that if an insider is laid off, he becomes an outsider and thus considerably decreases his chances of keeping employment with the firm ; this presumably leads him to choose a lower wage than in the previous case, where being laid off did not affect his future chances of being hired[16].

The formal solution to this problem is treated in the appendix. Even with the simplifying assumptions we have made so far, the problem is intractable unless we further simplify by linearizing the group's intertemporal objective function. Let w' be the wage around which the objective function is linearized and let the shocks to labor demand be white noise. The solution to the maximization problem is then :

$$w^*_i = (1/c)(- \underline{n}_{i-1} + a(2(b/c)(1/(1+b\theta w'))-1))$$

$$(2.4) \quad n_i = n_{i-1} - a(2(b/c)(1/(1+b\theta w'))-1) + e$$

The probability of employment for a member is a constant and is given by :

$$p^*_i = 1 - a[(b/c)(1/(1+b\theta w'))]^2$$

Thus, under this membership rule, employment follows a random walk with drift. For a given labor force, there is unemployment hysteresis. Uncorrelated shocks to labor demand affect current employment, and through employment, membership and future expected employment. The drift is positive if (b/c) is less than (1+bθw')/2, if workers care sufficiently about the probability of employment as compared to the wage. In such a case, although they do not care about the unemployed, they will set the wage each period so as to have the firm hire on average new employees. For a given membership, the wage is always set lower than in the m=infinity case and thus the probability of employment is set higher; this is because being laid off implies a loss of membership and imposes a much larger cost than before.

This analysis can again easily be extended to the case where labor demand shocks are serially correlated. The results remain the same; employment continues to follow a random walk. This is a consequence of our maintained assumption that expected changes in labor demand have no effect on the level of employment.

The Intermediate Case (m between 1 and infinity)

The intermediate case where workers remain insiders for some time after losing their jobs and where newly hired workers eventually but not immediately become insiders raises an additional conceptual problem. There will no longer be unanimity among insiders. Those who have already experienced some unemployment, or those who have been working in the firm for a short period of time, for example will favor more cautious wage setting policies than those who have not. A theory of behavior in the face of conflict between members is beyond our grasp[6]. A plausible conjecture is

that allowing for values of m between 1 and ∞ leads to wage setting policies that are less cautious than in the m=∞ case but more cautious than in the m=1 case.

More importantly, rules corresponding to m between one and infinity are likely to generate unemployment behavior such that shown in figures 1 and 2, namely infrequent but sustained changes in the level of unemployment. Short sequences of unexpected shocks of the same sign have little effect on membership and thus on mean employment. In the case of adverse shocks, insiders are not laid off long enough to lose insider status ; in the case of favorable shocks, outsiders do not stay long enough to acquire membership. But long --and infrequent-- sequences of shocks of the same sign have large effect on membership and may lead to large effects on the mean level of employment. The length of the shock necessary to cause a permanent change in employment depends on the membership rules. In general there is no reason why these rules have to be symmetric. The length of time after which an unemployed worker becomes an outsider need not equal the length of time until a new worker becomes an insider. Hence favorable and unfavorable shocks may persist to differing extents.

The results of this section have been derived under very specific assumptions, from fixed membership rules to the assumption that the firm was passive and that outsiders played no role, direct or indirect, in the negotiation process. We must return to these assumptions. Before we do so however, we first show how the model of this section can be used to generate permanent effects on aggregate employment of both nominal and real shocks.

2.2 Persistent Effects of Nominal and Real Disturbances on Unemployment.

We now assume that there are many firms in the economy, each dealing with its own group of insider workers. We further assume that wages are set in nominal terms, so that nominal disturbances can affect employment. We then characterize the effects of nominal and real disturbances on employment and real wages.

The derived demand for labor facing each group

The economy is composed of many firms indexed by j, each selling a product which is an imperfect substitute for all others, but being otherwise identical. The demand facing firm j is given by :

$$y_j = -k(p_j-p) + (m-p), \quad k>1$$

All variables are in logarithms and all constants are ignored for notational simplicity. The variables y_j and p_j denote the output and the nominal price charged by firm j respectively, m and p denote nominal money and the price level. Demand for the firm's output depends on the relative price as well as on aggregate real money balances. The restriction on k is needed to obtain an interior maximum for profit maximisation.

Each firm operates under constant returns to scale ; the relation between output and employment is given by $y_j = n_j$. If w_j is the wage that firm j pays its workers, constant returns and constant elasticity of the demand for goods imply that prices are given by $p_j = w_j - e$, where e is a random technological shock, which is assumed common to all firms[18].

Each firm j faces a group of insiders with the same objective function as above, which chooses a nominal wage and lets the firm determine employment. Given the relation between p_j and w_j, we can think of each group j as choosing w_j subject to the demand function:

(2.5) $n_j = k(w_j-e-p) + (m-p)$

The choice of the wage and employment

We now characterize the decisions of each group j at time zero (and for the moment we do not introduce the time index explicitly). We assume each group to operate under the membership rule m=1, so that at time zero, membership in group j is given by $n_j(-1)$. The group now chooses a nominal rather than a real wage, based on its expectations of the price level, Ep, nominal money, Em, and the expected value of the technological shock, Ee, which all enter the derived demand for labor. As we have shown earlier, given such a demand function and its objective function, it chooses a wage so that the expected level of employment is equal to its membership plus a constant term. Ignoring again the constant, this implies :

(2.6) $k(w_j-Ee-Ep) + (Em - Ep) = n_j(-1)$

which defines implicitly w_j as a function of $n_j(-1)$, Em, Ep and Ee.

To solve for w_j, we must solve for the value of Ep. We do so under the assumption of rational expectations. As all firms and groups are the same, and are all affected by the same aggregate nominal shock, all groups have the same membership : $n_j(-1) = n(-1)$. Furthermore all nominal prices are the same and equal to the price level, so that the first term in (2.6) is equal to zero. Thus, from (2.6)

$Ep = Em - n(-1)$ and

$w_j = Ee + Em - n(-1)$

The expected price level depends on expected nominal money and negatively on membership. The nominal wage in turn depends positively on expected nominal money and the expected technological shock, and negatively on membership. Replacing w_j and Ep by their values in (2.5) and aggregating over j gives the equation characterizing the dynamic behavior of aggregate employment :

$$n = n(-1) + (m-Em) + (e-Ee)$$

or, if we reintroduce the time index i,

$$(2.7)\quad n_i = n_{i-1} + (m_i-Em_i) + (e_i-Ee_i)$$

Shocks, employment and wages.

From (2.7) only unexpected shocks affect employment. In the case of real shocks, this comes as before from the assumption of inelastic labor supply, which imply that each group sets wages so as to leave employment unaffected by anticipated real shocks. In the case of nominal shocks, the result is the same as in other nominal contract models (Fischer 1977) and the intuition is straightforward. Workers set a nominal wage which, in view of expected aggregate demand, will maintain last period's level of employment. Firms simply mark up over this nominal wage. Unexpectedly low aggregate demand leads to unexpected decreases in output and employment, with no changes in nominal wages (by assumption) and in prices (because of constant returns)[19].

These unexpected nominal and real shocks, unlike other contract models, have however permanent effects on employment. This is the result of our assumptions about membership rules. Once employment has decreased, it remains, in the absence of other

shocks, permanently at the lower level. A sequence of unexpected contractions in aggregate demand increases equilibrium unemployment permanently. If we assumed that m, the membership rule, was greater than one, we would again obtain the result that while short sequences of adverse shocks had no effect on equilibrium unemployment, a long sequence of such shocks would increase equilibrium unemployment permanently.

While the implications for employment are straightforward, the model implies that there is no simple relation between employment and real wages. Consider in particular the effects of nominal shocks. By our assumption of constant returns to scale and constant elasticity of demand, they leave the mark up of prices over wages unaffected. Equivalently, they leave the real wage unaffected. Thus, a sequence of adverse nominal disturbances will decrease employment, with no effect on the real wage. This lack of a simple relation between real wages and employment comes from our assumptions of monopolistic competition and constant returns, not from our assumptions about insiders and outsiders. As our focus is on the dynamic effects of membership rules, we do not explore the relation between real wages and employment further. But it is an important caveat to the line of research which has focused on the role of real wages in "explaining" high European unemployment. In the model constructed here, it is quite possible to have sustained high unemployment without high real wages. It is also possible for expansionary policies to raise employment without altering real wages.

2.3. The endogeneity of membership rules

In the rest of this section, we return to the original model and examine various extensions. Here, we focus on the determination of the membership rules.

We have shown that the time series evolution of employment depends critically on the nature of these rules. To the extent that insider status is closely linked with employment, substantial persistence is likely to result. If membership does not change or changes relatively little when employment changes, employment is likely to be much less persistent.

It is clear that at any point in time the currently employed would find it optimal to commit the group to maximizing their interests indefinitely, while ignoring the welfare of those currently laid off. That is, they would like to apply the rule $m=1$ this period and $m=\infty$ hereafter. But this means that if the currently employed are those who decide about membership, the only time consistent rule is $m=1$, which is always the best current period rule for the currently employed. The issue is therefore whether the group can precommit itself, or more accurately whether the currently employed can commit the group to take care of their interest in the future whether or not they are still employed by the firm.

Achieving the $m=\infty$ solution is probably not feasible. But it seems plausible that the group will be able to commit itself to at least some extent. The factor limiting the commitment will be the degree of divergence between the original membership and the group of employed workers in some subsequent period. Where the divergence is too great, current employees will wrest control of the group from those controlling it in the interests of some group of past workers. The extent to which groups can commit themselves is probably greatest where demand shocks are small so that level and composition of employment change relatively little from period to period.

This suggests that m will depend on the distribution of the shocks. If shocks have large variance, m may have to be close to one to avoid large differences between membership and the employed. Or m may instead be a function of the realization of the shocks. A sequence of large positive or negative unexpected shocks may lead to the takeover of the group by the then current employees. When a large fraction of original labor force is on layoff, the incentive for the workers still employed to ignore them and thus not take the pay cut required to get them back may be strong. This is much less likely in the face of small shocks. Changes in the value of m associated with major shocks provide another possible explanation for coincidence of persistent and high unemployment.

Our model thus suggests two alternative explanations for the empirical observation that unemployment remains at high levels for long periods of time. First, for a given fixed value of m greater than one but less than infinity, a sequence of adverse shocks will lead to a change in membership and therefore alter the level of employment permanently. Second, in bad times currently employed workers are more likely to take over and disenfranchise the unemployed, thus reducing the value of m and increasing persistence. The two differ in their implications for the process for unemployment at high levels. In the first, after the level change, the process for unemployment will have higher mean but the same degree of persistence around the new mean as it had before. In the second case, unemployment will not only be higher but exhibit more persistence.

2.4. Limitations and Extensions of the Model

In developing our analysis, we have made a number of simplifying assumptions regarding functional forms and the structure of bargaining between workers and firms. The question arises of how senstitive our results are to these assumptions. We have also carefully avoided using the term "union" to refer to the group of insiders. But it is clear that "union" would often have sounded more appropriate and the issue arises of whether our analysis is actually relevant in non union contexts. We now discuss these issues informally.

Other bargaining structures

It is well known that even in a one period model, it is in general inefficient to let the firm choose employment unilaterally given the wage (see for example Oswald (1985)). In our multi-period model, the assumption that the firm chooses employment according to its short run profit maximizing labor demand is even more questionable. Even if bargaining takes the form of the union setting a wage and allowing the firm to control the level of employment, firms will not choose to operate on their short run labor demand curves. Through its employment decision, the firm can affect future membership (unless $m=\infty$). By employing more workers this period, it can increase membership next period and thus lower the expected cost of labor. This will lead the firm to choose a level of employment higher than that implied by short run profit maximization. We suspect that taking account of this consideration would not substantially alter our analysis of employment dynamics. Rather, it would simply shift each period's labor demand curve outwards.

Another important possibility would be for the firm to introduce two tier systems, where newly hired workers get lower wages than those hired previously. Under such systems, insiders should have no reluctance to let firms hire more workers, and

employment should increase until new hirees are paid their reservation wage. The general reluctance of unions to accept such arrangements, especially in Europe, suggests that a central issue is that of what happens over time to those hired at lower wages. Unions do not encourage two tier arrangements at least in part because of the fear that second tier workers will come to control the wage setting process. Indeed the rarity of two tier arrangements is strong evidence for the relevance of the membership considerations stressed here. Without some such consideration, it is difficult to see why unions do not always favor such systems as a way of maximizing the rents that they can capture.

Going back to the setting of the wage, if we allow the wage not to be set unilaterally by the insiders but to be determined by bargaining between insiders and the firm, wages will depend both on the utility of insiders and on the value of the firm, the present discounted value of profits. Profit is a decreasing function of the wage. Thus, the larger is the weight of the firm in bargaining, the lower is the wage, and thus the higher the average level of employment. The implications for employment persistence depend on the weight of the firm in bargaining when the wage is far from the reservation level of workers. If the firm is relatively more powerful when the wage is much above the reservation wage, then the wage will tend to decrease when it is high, employment will tend to return to a higher level. Whether or not this happens depends on the structure of bargaining between insiders and the firm.

The specific utility function we have used for insiders is also important for our results. Its main implication, which we have argued is a desirable one, is that the probability of employment chosen by the group is invariant to the size of the group of insiders, or to the level of productivity. If instead an increase in membership given productivity led the group to choose both a lower wage and a lower probability of employment -which we can think as the stochastic equivalent of elastic

labor supply-, employment would depend on both the anticipated and unanticipated components of productivity and may show less persistence. Even under the rule m=1, an unanticipated increase in employment would, if the increase in productivity was tesporary, lead to the choice of a lower wage and a lower probability of employment in the following period, implying an expected return to the initial level of employment over time. The same effects would also arise if as unemployment became larger and being unemployed became more costly, the group chose a higher probability of employment, leading to an expected increase in employment over time

Groups or Unions ?

Is our analysis still relevant when workers are not formally organized in unions, when for example wages are simply set unilaterally by the firm ?

The work of Lindbeck and Snower [1985] suggests that even in the absence of formal unions current workers have some leverage vis a vis firms. And Slichter [1950] provides confirming empirical evidence suggesting that even before unions were economically important, wages tended to be high in industries with relatively inelastic labor demand

In many non-union settings, current incumbent workers and prospective workers cannot be regarded symmetrically. The requirement of cooperation among workers and the collective knowledge possessed by incumbent workers make their position very different from that of prospective new workers. This leads us to suspect that the membership considerations we have stressed are at least somewhat applicable even in non-union contexts. The potential applicability of our analysis to non-union settings may be argued informally as follows. Imagine a firm facing a collection of insider workers. The firm must choose a wage and an employment level. It cannot

credibly threaten to lay off all its workers and replace them, except at very high cost, because of the specialized expertise of its labor force. On the other hand, the firm cannot credibly threaten to replace workers individually with lower wage workers because the remainder of the labor force will not tolerate the hiring of "scabs". Under these conditions, wages and expected employment will be set in some way to divide the surplus resulting from a continued relationship between workers and firms. Workers will in general be able to extract some surplus even when they are unorganized. If firms make an "inadequate" wage offer, they can refuse to work. As long as they have some specific capital, it will be preferable for management to make another higher offer rather than lay the worker off.

If agreements are renegotiated only periodically and firms are permitted to vary employment in the interim, shocks will in general influence the level of employment. Even without a formal model of the bargaining process between workers and firms, it seems reasonable to expect that a reduction in the number of incumbent workers will lead to the setting of a higher wage and a lower level of expected employment. Thus persistence in employment, though not necessarily as much as with unions, may result even in that case. Note that this also may help explain what goes on in the non-union sector of economies with large unions.

This argument is clearly tentative. But we conclude from it that, while the effects we have described are more likely to be present when there are explicit unions, they may also arise in settings in which insider-outsider considerations are important.

The presence of a non union sector

We finally consider how our conclusions must be modified if part of the labor market is neither unionized nor subject to insider-outsider considerations.

The simplest analysis of a setting with a competitive sector would hold that there was no involuntary unemployment. Wages in the non-union sector would fall to the point where all those workers ejected from the union sector could find employment[20]. There are at least three reasons why even granting the existence of a competitive sector, this analysis is suspect. First, competitive firms may be reluctant to lower wages because of the fear of being unionized after they have alienated their current labor force. Second, unemployment benefits may be sufficiently high that the market clearing wage in the non-union sector is below some workers' reservation wage. In one sense their unemployment is voluntary since jobs are available. In another sense the unemployment is involuntary since the unemployed may envy workers with the same skill in the union sector. The general consideration is that when there are wage differentials across jobs, the concept of involuntary unemployment becomes elusive (see Bulow and Summers 1985 for an elaboration of that theme). Third, unemployment may occur even with a competitive sector if remaining unemployed is in some sense useful --or thought to be useful by workers-- in getting a union job. This may occur if substantial search effort or queuing is required or alternatively if accepting a low quality job sends a bad signal to employers. This unemployment is related to that of Harris and Todaro [1970] where workers must migrate to urban areas to have a chance at high wage urban jobs.

There is a more fundamental point regarding the inability of a non-union sector to prevent unemployment. As Weitzman [1982] persuasively argues, there are strong reasons to believe that most economic activity involves fixed costs and monopolistic competition. Imagine a monopolistically competitive economy with fixed costs of production and constant marginal costs where there is initially no involuntary

unemployment. Suppose that an adverse demand shock reduces the demand for goods in this economy but that nominal wages remain constant in all existing firms. Then employment and output will fall as will the profitability of existing firms. Will it pay new firms to enter the market and hire the unemployed at low wages? It may not because unlike incumbent firms, new firms must cover fixed as well as variable costs. Particularly in settings where labor costs do not represent a large fraction of sales, entry may not be able to insure the employment of the unemployed[24]. These considerations may enhance the power of unions because they reduce the incentive to start up new non-union firms.

3. Empirical Evidence on Hysteresis Theories

Having developed a formal theory of hysteresis, we now examine whether the model is consistent with the observed patterns of persistently increasing unemployment in Europe and whether it can illuminate the very different behavior of unemployment in Europe and the United States in the recent past. We start by giving direct, institutional evidence on the strength of unions in Europe. We then estimate wage and employment equations implied by our model, for both the Europe and the US. We finally examine patterns of labor market turnover, in the UK and the US.

3.1. The role of unions in Europe

The size of the union sector

Our model suggests that, even if hysteresis may arise in non union contexts, it is probably more likely to arise the stronger and the larger the union sector. Thus, we start by reviewing the role of unions in Europe ; we limit, as before, our investigation to the UK, France and Germany.[22]

Membership figures indicate a union density of approximately 45% for the UK, 20% in France and 38% for Germany. But these figures give very limited information as to the strength of unions. A better indicator is union coverage, that is of the proportion of workers covered by some form of collective bargaining. For the UK, coverage is of approximately 70% for manual workers, and of 55% for non manual workers. For France and Germany, the proportion of all workers exceeds 80%. But even coverage numbers are misleading. To understand why, one must be given some institutional background.

On the surface, the three countries appear to be very different. In France there are three main national unions. In Germany, there are only industry unions. In the UK, there is a maze of craft and industry unions. But the structure of bargaining is in fact quite similar and can be described as follows : in all three countries, most of the formal bargaining is done at the industry level. But, in all three countries, wages are determined much more at the company or plant level:

In the UK, industry bargaining sets rates, which are usually floors that have little effect on actual wages . Until the Employment Act of 1980, there was scope for extension, i.e. for provisions to extend the terms of the agreement to the whole sector. These provisions have been eliminated in 1980. In the last 20 years, there has been an increase in the amount of bargaining, both formal and informal, at the plant level, between shop stewards and employers. Given that plant/company bargaining is the really important level of bargaining, it is relevant to look at how many workers are covered by both industry and plant/company level bargaining. In 1978, the number of workers covered by at least a company agreement was of 33% for all industries and of 47.7% for manufacturing. Given the importance of informal bargaining, these figures understate the importance of unions in setting wages.

In France, the "Conventions collectives" which are usually but not always at the industry level form most of the formal bargaining. These agreements are signed between a "representative" union and a "representative" employer and apply even if not all unions sign it (which is frequently the case). Subject to some minor conditions, they can be extended to all firms in the industry, by decision of the Minister of Labor. As in the UK however, the importance of industry agreements with respect to wages should not be exaggerated. They usually set floors, which do not appear, either directly or indirectly, to have a large effect on actual wages. As in the UK, a growing portion of the bargaining takes place at the company level,

although often in haphazard fashion. Until 1982, wages were largely determined unilaterally by firms, or in response to complaints of union representatives in the plant, with little bargaining or even consultation ; local strikes were however a standard instrument used by unions to achieve a better deal. Since 1982, there has been a change in the law (Lois Auroux) which requires annual bargaining at the company level on pay and other matters. The result has been a drastic increase in the number of company level agreements.

In Germany, most of the formal bargaining again takes place at the industry level. Agreements can be extended -to either firms in the same industry or to non union worders in firms which sign the agreements -by the state or federal Minister of Labour if (1) half of the employees of the sector are employed by firms which have signed the agreement and (2) extension is approved by both unions and employers who have signed[23]. But, as in the other two countries, bargaining is increasingly taking place at the company level and there is general agreement that pay is very largely determined at the company level.

To conclude, it is difficult to give an exact estimate of the "union sector" in these countries. To the extent that much bargaining over wages in fact takes place at the company level, union coverage numbers, which are based on both company and industry level bargaining probably overstate the number of workers for whom the wage is determined as a result of bargaining between unions and employers. Even with this adjustment, the size of the union sector still remains high, much higher than in the US. Also, if we believe that the more disaggregated the level of bargaining the less likely it is to take into account the interests of the unemployed as a whole, then these countries are good candidates for hysteresis in the union sector.[24]

An alternative approach is to ask the question : can a firm be non union ? can a firm become non union ? In the UK, the answer is yes : a firm can be or can become non union. There is nothing in the law which prevents it. There are some well known examples of non union firms, most often subsidiaries of US companies (Kodak). There are very few examples of firms going non union[45]. In France and Germany, extension agreements put some constraints on firms in a given sector. There are non union firms in both countries. In France, these are nearly exclusively small firms. In France furthermore, various requirements are imposed on firms with more than 50 employees. In particular they must allow for the presence of "delegues du personnel" who are union representatives within the firm. All national unions have a right to be represented. Since 1978, firms must also allow for the presence of a "section syndicale d'entreprise", for the presence of the union inside the firm. Together, these facts suggest that it is difficult to be or go non union in these countries.

Finally, there is the question of how different the non union sector is from the union sector. A study by Kaufman [1984] of the competitive sector in the UK finds relatively little difference in wage behavior across the two sectors. Together with the arguments given in the previous section, this suggests that the size of the formal union sector may not be a major determinant of the extent of hysteresis. We shall return to this question in the next section.

Membership rules

Membership rules determining who the union represents at each point in time, play an important role in our analysis. The empirical evidence on actual membership rules is fairly clear : workers have the right to join unions if they want to.

Workers who are laid off can remain in the union although they often lose the right to vote ; this may happen either because of formal restrictions, or because voting takes place inside the plant. But this tells us little about the question of in whose interest the union actually acts. A study of the unemployed and the unions in the UK [Barker et al 1984] gives some information. It finds that, while laid off workers are officially encouraged to remain in the union and have their union fees waived, they do not, for the most part, see reasons to stay in the union[26]. This provides support for the idea that the union cares mostly about the currently employed.

3.2. Wage and employment equations

Theory

We now derive, and then estimate later, the wage and employment equations associated with an expanded version of the model of the previous section. There are two extensions. First we allow for a dynamic specification of labor demand ; the reason for introducing it will be clear below. Second, we specify explicitly an alternative hypothesis to that of hysteresis.

We thus specify labor demand as [27] ;

(3.1) $n = s\, n_{-1} - (1-s)b(w-p) + e$

Following the analysis of the previous section, we assume that the union acts to set expected employment according to the relation:

(3.2) $En = (1-a)n^* + an_{-1}$

The case where a=1 corresponds to the case where m=1 in the preceding section and there is hysteresis ;the case where a=0 corresponds to the case where the union's policy is independent of history and so there is no hysteresis. Clearly, intermediate outcomes are also possible[22].

Finally, let the wage which satisfies (3.1) and (3.2) be denoted by w*. We assume the actual wage to be given by :

$$w = w^* + u,$$

where the disturbance term u is assumed to be white, uncorrelated with w* and reflects factors outside the model. Combining this assumption with equations (3.1) and (3.2) yields a wage and an employment equation:

$$(3.3)\quad w = Ep + (1/b(1-s))[-(1-a)n^* + (s-a)n_{-1} + Ee] + u$$

$$(3.4)\quad n = (1-a)n^* + a\, n_{-1} + [e-Ee +(1-s)b(p-Ep-u)]$$

The wage equation holds that the wage of the union is a decreasing function of n*. When the union is larger, it is more cautious in setting wages. The impact of n_{-1} is ambiguous. A larger value of n_{-1} raises the size of the group in whose interest the union is maximizing but it also increases labor demand.

The employment equation on the other hand implies that employment follows a first order process. The degree of persistence depends only on a, not at all on s. Unexpected movements in employment are due to price and productivity surprises, and deviations of wages from target. Equation (3.4) can be estimated by OLS. This is however not the case for equation (3.3) : expected productivity is likely to be correlated with past productivity and thus with past employment. Therefore we now derive the reduced form wage equation. To do so requires an assumption about the process followed by e : we assume that e follows a random walk[23]. Lagging (3.1) and substituting it in (3.4) yields :

$$(3.5)\quad w-w_{-1} = k + (Ep-p_{-1}) + (1/b(1-s))[(1+s-a)n_{-1} - s\, n_{-2}] + u$$

where $k \equiv -(1/b(1-s))(1-a)n_*$.

This equation can be estimated by OLS. It gives the rate of wage inflation as a function of expected price inflation, and employment lagged once and twice. It is worth examining it further.

Consider first the case where there are no costs of adjustment in labor demand. In this case the relation gives a relation between expected real wage growth and lagged employment only. If a=1, then expected wage growth does not depend on employment but if a<1, it does : after an unexpected decline in productivity, which leads to lower employment, the remaining workers accept a cut in real wages only to the extent that they care about the workers who have been laid off.

If there are costs of adjustment to employment, then expected real wage growth depends on employment lagged both once and twice. If a=0, then the ratio of employment lagged twice to employment lagged once cannot exceed 1/2 (in absolute value). But as a increases, the ratio tends to one. If a = 1, the ratio equals unity : expected real wage growth depends on the change rather than on the level of employment.

Note that we cannot identify a and s separately from estimation of the wage equation. But a must be positive if we find the ratio described above to be larger than 1/2. Furthermore, a can be directly obtained from the employment equation.

While we have derived the wage equation (3.5) from a rather specific theory of union behavior, it can be motivated in other ways. Following the logic of the monopolistic competitive model in the preceding section just as we have followed the logic of the competitive model gives rise to an equation for wage inflation parallelling (3.5). Much more generally, equation (3.5) is very close to a standard Phillips curve which allows for a rate of change effect, a la Lipsey. The only real difference is the presence of employment rather than unemployment on the right hand side. We now turn to estimation of the wage and employment equations.

Results

The results of estimation of the wage equations for the UK, France, Germany and the US, for the period 1953 to 1984 are reported in tables 4 and 5.

In table 4, four alternative specifications of the wage equation are estimated for each country. Because the appropriate timing is unclear with annual data, we estimate the equations using alternatively contemporaneous and once lagged employment, and once and twice lagged employment[30]. We also estimate each equation with and without a time trend ; many researchers have captured the shift of the Phillips curve by a time trend, that is by an increase over time unrelated to the history of unemployment and it is interesting to see what happens to our specification when a time trend is allowed. This gives us the four alternative specifications. Finally, we use for expected inflation the forecast of inflation obtained from estimation of an AR(1) process for inflation over the sample period and constrain the coefficient on expected inflation (which is therefore equal to a constant plus a scalar times lagged inflation) to equal unity.

Table 4

Wage Equations

1953-1984

Country	π_{t-1}	logEt	logEt-1	logEt-2	Time x100	θ	DW	R^2
Germany								
(1)	.6*	-	.92	-.80		.07	1.99	.54
			(4.0)	(-4.2)		(.3)		
(2)	.6*	-	.71	-.57	-.12	.04	2.03	.59
			(2.4)	(-2.2)	(1.5)	(.2)		
(3)	.6*	1.12	-.89			-.10	2.00	.74
		(9.6)	(-8.9)			(-.5)		
(4)	.6*	(.96)	-.74		-.07	-.13	2.01	.76
		(6.2)	(-5.1)		(-1.5)	(-.7)		
United Kingdom								
(5)	.75*	-	.67	-.76	-	.25	2.01	.23
			(2.6)	(-2.5)		(1.5)		
(6)	.75*	-	.86	-.84	.19	.09	1.97	.31
			(3.2)	(-2.8)	(1.9)	(.5)		
(7)	.75*	.13	-.08	-	-	.21	1.83	.07
		(.4)	(-.2)			(1.0)		
(8)	.75*	.34	-.19	-	.20	.16	1.84	.15
		(1.0)	(-.5)		(1.5)	(.7)		
France								
(9)	.8*	-	.58	-.39	-	-	2.03	.12
			(1.5)	(-.9)				
(10)	.8*	-	.61	-.42	.00	-.05	1.92	.13
			(1.2)	(-.7)	(.0)	(-.2)		
(11)	.8*	.97	-.74	-	-	-	2.04	.29
		(2.9)	(-2.1)					
(12)	.8*	1.28	-1.16	-	.12	-	2.09	.33
		(3.1	(-2.1)		(1.2)			

Table 4

Wage Equations

1953-1984
(cont'd.)

Country	π_{t-1}	logEt	logEt-1	logEt-2	Time x100	θ	DW	R^2
United States								
(13)	.7*	-	-.07	.00		.54	2.03	.26
			(-.8)	(.0)		(2.2)		
(14)	.7*	-	-.07	.00	.00	.54	2.02	.26
			(-.8)	(.0)	(.0)	(2.2)		
(15)	.7*	.24	-.25	-	-	.48	1.98	.49
		(4.6)	(-4.8)			(2.5)		
(16)	.7*	.28	-.16	-	-.13	.34	1.99	.63
		(5.9)	(-3.3)		(-3.9)	(1.7)		

Notes.

$\dot{w}$: rate of change of average hourly earnings in manufacturing.

π : rate of change of the consumer price index.

E : manufacturing employment.

t-statistics in parentheses.
All equations for Europe are run with a first order autocorrelation correction.
All equations for the U.S. are run with a first order moving average correction.
*Coefficient from a regression of π on $\pi(-1)$ for each country for the sample period.

Source. OECD data bank, extended back to 1950 by D. Grubb. See Grubb (1984).

Table 5

Wage Change Equations

1953-1984

Country	π_{t-1}	U_t	U_{t-1}	U_{t-2}	Time x100	ρ	DW	R^2
Germany								
(1)	.6*	-	-2.86	2.62	-	.30	1.97	.57
			(-4.3)	(3.8)		(1.6)		
(2)	.6*	-	-2.41	2.12	-.08	.27	1.94	.59
			(-3.0)	(2.6)	(-1.1)	(1.4)		
(3)	.6*	-2.39	1.68	-	-	.06	1.99	.50
		(-4.0)	(2.6)			(.3)		
(4)	.6*	-1.60	.95	-	-.10	.08	2.00	.54
		(-2.1)	(1.2)		(-1.5)	(.4)		
United Kingdom								
(5)	.75*	-	-2.31	2.58	-	.04	2.02	.33
			(-3.6)	(3.4)		(.2)		
(6)	.75*	-	-2.57	2.46	.14	(-.03)	2.02	.37
			(-4.0)	(3.3)	(1.4)	-.2		
(7)	.75*	-.96	.78	-	-	.22	1.83	.12
		(-1.0)	(.7)			(1.0)		
(8)	.75*	-1.43	.62	-	.28	.13	1.85	.25
		(-2.0)	(.8)		(2.4)	(.6)		
France								
(9)	.8*	-	-1.42	1.35	-	.07	1.93	.03
			(-.7)	(.6)		(.4)		
(10)	.8*	-	-3.01	2.10	.25	-.10	1.86	.15
			(-1.3)	(.9)	(2.1)	(-.5)		
(11)	.8*	-3.57	3.78	-	-	.13	1.99	.14
		(-1.97)	(1.8)			(.7)		
(12)	.8*	-4.97	4.12	-	.33	-.10	1.91	.33
		(-2.9)	(2.2)		(3.0)	(.5)		

In table 5, we perform the same set of estimations, but using unemployment rather than employment as a right hand side variable. We do this because unemployment is the variable used in standard Phillips curve specifications. Some theories of hysteresis such as the idea that the long term unemployed exert less pressure on wages than those recently laid off also suggest that unemployment is more appropriate than employment in the Phillips curve.

Tables 6 and 7 give the results of estimation of the employment and unemployment processes for each country for the period 1953 to 1984. Here again, while our theory has implications only for employment, we think it is useful to also report results for unemployment as well.

The results are fairly clear cut and indicate that there are substantial differences between the European countries and the United States. Starting with the wage equations, one can draw the following conclusions :

(1) Virtually all specifications for Germany, France and the United Kingdom in tables 4 and 5 suggest a substantial degree of hysteresis.

Let us denote by R the absolute value of the ratio of the coefficient on lagged employment -unemployment- to the coefficient on contemporaneous employment - unemployment- (or of the coefficient on employment -unemployment- lagged twice to the coefficient on employment lagged once as the case may be). As we have seen, under strict hysteresis (a=1) this ratio should be equal to unity. R is indeed close to unity for nearly all specifications ; it is not affected by the inclusion of a time trend, or by the use of employment versus unemployment. There is little difference across countries : R is higher in the UK, sometimes exceeding unity. It is closer on average to .85 for Germany and France[39].

Table 4b

Wage Equation Residuals

1953-1984

Year	Germany	United Kingdom	France	United States
1980	-1.91	1.7	1.6	-1.2
1981	- .32	-4.1	1.4	- .8
1982	- .75	3.9	- .0	- .1
1983	.57	-2.7	.1	- .9
1984	- .44	1.1	-1.5	.3
	σ=1.87	σ=3.2	σ=3.9	σ=1.5

Residuals from equations 3, 5, 11 and 15 in table 4.

Table 5

Wage Change Equations

1953-1984
(cont'd.)

Country	π_{t-1}	U_t	U_{t-1}	U_{t-2}	Time x100	ρ	DW	R^2
United States								
(13)	.7*	-	-.07	-.06	-	.40		
			(-.2)	(-.1)		(1.3)		
(14)	.7*	-	.11	.07	-.07	.47	2.01	.24
			(.3)	(.2)	(-1.7)	(1.6)		
(15)	.7*	-1.02	.47	-	-	.41	1.99	.62
		(-6.0)	(2.9)			(2.2)		
(16)	.7*	-1.05	.43	-	-	.42	1.99	.63
		(-5.8)	(2.4)		.02	(2.2)		
					(.6)			

Notes. See Table 4.

U : standardized unemployment rate.

Source. OECD and Grubb (1984).

Table 6

Employment Processes

1953-1984

Country	ρ	Θ	α x100	R^2
Germany				
	.76	1.00	-	.96
	(22.3)	(5.3)	-	
	.86	.78	-1.9×10^{-2}	.97
	(26.7)	(3.9)	(.0)	
United Kingdom				
	1.07	.54	-	.96
	(23.3)	(2.6)	-	
	.95	.41	-.20	.94
	(16.3)	(2.0)	(-3.8)	
France				
	.94	.81	-	.94
	(19.5)	(3.0)	-	
	1.08	.48	-.13	.94
	(19.5)	(2.5)	(-4.0)	
United States				
	.82	.07	-	.72
	(7.5)	(.3)	-	
	.34	.46	.40	.77
	(1.5)	(1.6)	(2.5)	

Note. Results of estimation of :

$\log E = \rho \log E(-1) + \alpha(TIME) + \varepsilon + \varepsilon\Theta(-1)$

E : manufacturing employment.

Table 7

Unemployment Processes

1953-1984

Country	ρ	θ	α x100	R^2
Germany				
	.92	.65	-	.91
	(14.8)	(3.4)	-	
	.94	.39	.06	.93
	(17.5)	(1.9)	(5.0)	
United Kingdom				
	1.02	.77	-	.95
	(20.9)	(3.9)	-	
	.81	.82	.09	.96
	(9.9)	(3.9)	(3.5)	
France				
	1.12	-.06	-	.97
	(32.7)	(-.3)	-	
	1.04	-.22	.02	.97
	(18.2)	(-1.1)	(1.4)	
United States				
	.72	.06	-	.58
	(4.5)	(.2)	-	
	.36	.31	.07	.63
	(1.4)	(.9)	(1.9)	

Note. Results of estimation of :

$$U = \rho U(-1) + \alpha(TIME) + \varepsilon + \theta\varepsilon(-1)$$

U : standardized unemployment

The time trend itself contributes little. If the increase in unemployment was due to an autonomous increase in the natural rate over time, the coefficient on the time trend should be positive. Only in the UK when employment is used, and in the UK and France when unemployment is used is the time trend positive and either significant or marginally significant. Even then, its quantitative contribution is small. In the case in which it is largest and most significant (equation 12 for France in table 5), it only explains a 1.5% increase in the unemployment rate consistent with a given level of expected real wage growth over the sample period. Further evidence that the apparent increase in the natural rate through time is a consequence of rising unemployment and not autonomous comes from the absence of substantial serial correlation in our estimated Phillips curves. An upwards drift in the constant term would manifest itself in the form of serial correlation.

A final piece of evidence is given in table 4b which reports the residuals associated with the best fitting equations from table 4, not including a time trend, for each country, for 1980 to 1984. There is little evidence of significant prediction errors in recent years. This is in sharp contrast to the performance of wage equations which do not allow lagged employment to enter.

(2) In contrast to the results for Europe, the results for the United States provide evidence of much less hysteresis. There is evidence of a significant effect of either lagged employment or lagged unemployment. But, with the exception of one specification using employment, the value of R for the US is smaller than for Europe, being in most cases around .5. There is also no evidence in favor of a time trend in the wage equation

(3) A comparison of the results of estimation in tables 4 and 5 does not give a clear answer as to whether employment or unemployment belongs in the wage equation. Using R^2's gives a draw, with employment doing better for France, unemployment doing

better for the UK. We have also run regressions including current and lagged values of both unemployment and employment -or equivalently, employment and the labor force-. They give the same ambiguous answer, with the labor force being significant in the UK, but not in France or Germany. We see the UK results however as presenting a problem for our model.

The employment and unemployment equations reported in table 6 and 7 confirm to a large extent the conclusions from the wage equations. Both unemployment and employment are more persistent in Europe than in the US. In particular, the process generating unemployment appears non stationary in all three European countries, whether or not a time trend is included in the regressions. The US process is instead stationary. The data however strongly suggest that an ARMA(1,1), rather than the AR(1) process implied by our theory, is needed to fit the employment and unemployment processes of all four countries. This may reflect a difference between the length of a period in the model and annual frequency of observation used in the estimation.

3.3 Patterns of Labor Market Turnover

A central element in our theory of hysteresis is the lack of concern of employed workers for the unemployed. It is the fear of job loss for current workers and not the outstanding labor market pool that restrains wage demands. Indeed the formal model explains why firms hire at all only by assuming that wages which are set low enough to insure the jobs of current workers will sometimes make it profitable for firms to hire new workers. While this is clearly an oversimplification, the point remains that insider-outsider or union models of the type we have considered are

really theories of why the unemployed are not hired, not theories of why layoffs take place. This suggests the utility of looking at data on labor market turnover. A finding of high turnover with many workers having short spells of unemployment and then being rehired would tend to cast doubt on the relevance of insider-outsider formulations, while a finding that the rate of flow into and out of employment was relatively low but that the unemployed remained out of work for a very long time would tend to support these theories.

Table 8 presents some evidence on the rate of flow into unemployment in the United States and United Kingdom over the past decade. The flow is measured as the number of persons becoming unemployed over a three month period. For the United States, this is estimated as the number of unemployed reporting durations of less than 14 weeks. For Britain it is the number of unemployment registants over a three month period.

Two conclusions emerge clearly from the table. First, despite the much higher rate of unemployment in the United Kingdom than in the United States, the rate of flow into unemployment is actually lower there. The implication is that the unemployment problem is not one of an excessive rate of job loss but of an insufficient rate of hiring of the unemployed. The second striking feature of the data is that the rate of flow into unemployment in Britain has increased surprisingly little as unemployment has soared. Between 1970 and 1984 when the rate of unemployment in Britain rose more than 300 percent, the rate of flow into unemployment has risen by only about 75 percent. This pattern of rising unemployment with only a modest increase in the rate of inflow appears more pronounced in British than American labor markets. In the United States, the inflow rate has accounted for a significant part of the increase in unemployment during recession periods. For example, between 1979 and 1982, unemployment increased by 67 percent and the inflow rate rose by 44 percent.

Table 8

Patterns of Inflow to Unemployment

Year	United States		Great Britain
	Number Unemployed less than 14 weeks as a % of Employment	$\frac{14 \times \text{Unemployed}}{\text{Employment} \times \text{Average Duration (weeks)}} \times 100$	Quarterly Inflow as a % of Employment*
1970	4.4	8.4	3.3
1971	4.8	7.8	3.6
1972	4.5	6.9	3.6
1973	4.2	7.2	2.9
1974	4.8	8.5	3.2
1975	6.3	9.2	4.2
1976	5.7	7.4	4.9
1977	5.5	7.5	4.7
1978	5.0	7.6	4.5
1979	5.0	8.0	4.2
1980	5.8	9.0	4.9
1981	6.0	8.4	5.2
1982	7.2	9.6	5.5
1983	6.5	7.4	5.6
1984	5.5	6.2	

*Average of quarterly values.

The OECD (1985) summarizes the fragmentary information available on labor market turnover for other European nations. The data in general parallel our findings for Britain--suggesting relatively modest increases in the rate of flow into unemployment starting from a very low base. They do suggest however that the composition of the newly unemployed has changed over time as the unemployment rate has increased. Layoff rates have increased while quit rates have declined.

Given the magnitude of the increases in European unemployment rates and the relatively small increases in flow rates, it is inevitable that unemployment durations have increased substantially. Table 9 presents some information on the increasing importance of long term unemployment in Europe. Along with information on the average duration of unemployment, it presents estimates of the fraction of all unemployment due to persons whose complete spells will exceed various threshold lengths[31]. The table demonstrates that at the same level of unemployment, long term unemployment is much more important in Europe. In 1980, when the American unemployment rate was 7.2 percent, only an estimated 15 percent of all unemployment was due to persons out of work for more than a year. The corresponding percentages were 74 percent, 59 percent and 75 percent in the United Kingdom, Germany and France even though the unemployment rates were lower. The table also demonstrates that long term unemployment has increased in importance as overall unemployment rates have risen in Europe. Indeed, the increase in duration of unemployment is almost proportional to the increase in unemployment.

Summary

Table 9

The Importance of Long Term Unemployment

	United States		FR of Germany		France	
	1980	1984	1980	1984	1980	1984
unemployment rate	7.2	7.5	3.4	8.1	6.6	10.0
average duration of unemployment for adult men currently unemployed	3.6	5.8	8.6	12.6	12.6	14.4
percent contribution to adult male unemployment of those unemployed at least -						
6 months	50	72	85	92	92	93
12 months	15	39	59	75	75	80
18 months	4	18	38	58	58	64
24 months	1	8	23	43	43	56

Table 9

The Importance of Long Term Unemployment

	United States		United Kingdom		FR of Germany		France	
	1980	1984	1980	1984	1980	1984	1980	1984
unemployment rate	7.2	7.5	6.5	12.7	3.4	8.1	6.6	10.0
average duration of unemployment for adult men currently unemployed	3.6	5.8	12.2	19.4	8.6	12.6	12.6	14.4
percent contribution to adult male unemployment of those unemployed at least -								
6 months	50	72	91	96	85	92	92	93
12 months	15	39	74	87	59	75	75	80
18 months	4	18	57	76	38	58	58	64
24 months	1	8	41	65	23	43	43	56

Source. Based on authors calculation.

In this section, we have shown that unions play an important role in Europe and that the behavior of European unemployment is consistent with our hypothesis about hysteresis. It is obviously tempting to conclude that unions are at the root of the European problem. But the temptation must be strongly resisted. First, even if unions create hysteresis, they just create a channel for persistence, which implies that both favorable and adverse shocks will both have long lasting effects. The sequence of unfavorable shocks at least some of which are the consequence of policy may equally well be said to be the cause of persistent high unemployment. Second, it is as yet unclear whether the cause of hysteresis in Europe is unions or the sequence of of adverse shocks which has caused high unemployment. We consider this issue in the next section.

4. Is Eurosclerosis Really the Problem?

The previous section has shown that our model of persistent unemployment may explain important aspects of the current European depression and the very different behavior of European and American labor markets. The evidence presented so far leaves open a crucial question however. Is the presence of hysteresis in European unemployment a consequence of the heavily regulated and unionized character of European labor markets? Alternatively, is hysteresis the result of a sequence of adverse shocks to employment? The case that major structural reforms are needed if full employment in Europe is to be restored depends on an affirmative answer to the first question, while the case for expansionary macroeconomic policies is more compelling if the second question can be given a positive answer.

Resolving whether the source of hysteresis lies ultimately in European institutions or in the sequence of adverse shocks that have buffetted European economies requires comparisons of the current situation with situations where only one of these elements is present. Comparison with the United States at present cannot resolve the issue because the American economy lacks institutions like those in Europe and has not suffered a sequence of contractionary aggregate demand shocks like those experienced by Europe in the 1980's. But we are able to make two comparisons which can shed some light on the sources of hysteresis. The first is a comparison of the behavior of European labor markets in the recent period with their behavior over the 1953-1968 period. Broadly speaking, labor market institutions were similar in the two periods but the pattern of shocks was very different[33]. The second comparison is between the current European depression and the US depression of the 1930's. At the time of the US depression, unions were weak, social programs and labor market regulations were a small factor, and there were few if any important

adverse supply shocks. The US Depression may also shed light on the role of expansionary policies in alleviating persistent high unemployment. We consider these comparisons in turn.

4.1 European labor markets before the current depression

The previous section has examined the persistence of unemployment and the behavior of wages in Europe over the past 35 years. This long interval contains the current depression period and the period of unparallelled prosperity of the 1950's and 1960's. We examine the extent to which hysteresis is a product of bad times by considering labor market behavior separately over each of the two periods. Table 10 presents estimates of the stochastic process followed by unemployment separately for the 1952-1968 and 1969-1984 periods[34]. The degree of persistence in unemployment in Europe is much higher in the latter period when unemployment was high. Similar but somewhat less dramatic results are obtained using employment rather than unemployment. For the earlier sample period, unemployment appears to be more persistent in the United States than in the United Kingdom or France. These results tend to suggest that hysteresis is a feature of bad times rather than a consequence of the structure of European labor markets.

Table 11 presents estimates of wage change equations paralleling those reported in Table 5, but now for the 1953-1967 period. Taken together the results suggest somewhat less hysteresis in the 1953-1967 period than is present over the whole sample period, with the difference being pronounced in the United Kingdom where the ratio R, which was close to one for the full sample is now close to .5. However, the results for the 1953-1967 period like those for the entire period suggest a greater degree of hysteresis in Europe than in the United States. The fact that persistence

Table 10

The Persistence of Unemployment in Good and Bad Times

Country	ρ	Θ	SE Regression
France			
1952-1968	.41	.81	.3
	(1.1)	(1.8)	
1968-1984	1.11	-.48	.4
	(5.0)	(1.4)	
Germany			
1952-1968	.86	.22	.5
	(12.3)	(.9)	
1968-1984	1.07	.51	.8
	(5.1)	(1.4)	
United Kingdom			
1952-1968	.01	.97	.5
	(.0)	(2.5)	
1968-1984	1.0	.99	.9
	(27.6)	(3.8)	
United States			
1952-1968	.75	-.37	1.0
	(1.6)	(-.7)	
1968-1984	.59	.50	1.1
	(1.7)	(1.1)	

Note. The results represent estimates of ARMA (1,1) process for the unemployment rate.

Table 11

1953-1967

Country	π_{t-1}	U_{t-1}	U_{t-2}	Time x100	ρ	DW	R^2
Germany							
(1)	.6*	-6.48	5.86	-	-.14	1.91	.55
		(-3.7)	(3.7)		(-.4)		
(2)	.6*	-6.25	4.53	-.60	-.14	2.07	.60
		(-3.6)	(2.2)	(-1.1)	(-.4)		
United Kingdom							
(3)	.75*	-2.91	1.89	-	-.00	1.71	.50
		(-3.2)	(2.0)		(.0)		
(4)	.75*	-3.49	1.74	.16	-.17	1.71	.57
		(-3.8)	(1.9)	(1.4)	(-.5)		
France							
(5)	.9*	-6.11	4.53	-	-.47	2.18	.61
		(-3.8)	(2.8)		(-1.8)		
(6)	.9*	-6.25)	4.12	-.06	-.50	2.19	.62
		(-3.8)	(2.3)	(-.5)	(-1.9)		
United States							
(7)	.7*	-1.23	.37	-	.73	2.05	.66
		(-5.2)	(1.7)				
(8)	.7*	-1.25	.57	-.17	-.04	1.90	.86
		(-7.0)	(3.2)	(-4.2)	(-.1)		

is present in the early period in Europe to a greater degree than in the United States but that it becomes increasingly important as the unemployment rate increases makes it difficult to draw any firm conclusion about its causes.

On balance, evidence on the changing behavior of European labor markets suggests that bad times as well as unions account for findings of hysteresis. But this evidence is not sufficiently powerful to permit a judgement about their relative importance.

4.2 A Tale of Two Depressions

Salient features of many discussions of the current European depression include pessimistic forecasts that unemployment will never return to earlier levels, concern that reduced investment and lower capital stocks have made it impossible to employ the entire labor force, and fears that expansionary policies will lead directly into inflation with little or no favorable impact on output or employment. These pessimistic views are premised on the conviction that structural problems are central to high unemployment in Europe, and that the causes of persistent high unemployment go beyond a sequence of adverse shocks. Yet the American depression of the 1930's was ended by the expansion in aggregate demand associated with rearmarment. Unemployment recovered to pre-Depression levels. Recovery was not inhibited by an insufficient capital stock or by the overly rapid adjustment of wages and prices. Are this experience and the current European experience sufficiently comparable to permit the inference that hysteresis arises from a sequence of adverse shocks rather than from structural problems in the labor market? Or do major differences in the character of the American and European depressions render the American experience irrelevant for thinking about current European problems?

We begin by briefly reviewing the record of the American economy over the 1925-1945 period. A number of basic economic statistics are presented in Table 12. The outstanding feature of the period is of course the dramatic upsurge in unemployment that began in 1929. Unemployment rose from levels comparable to those experienced in Europe in the late 1960's and early 1970's to 25 percent in 1933 and remained above 14 percent until 1940. As in Europe today employment actually declined over a 10 year period despite a rapidly increasing population. Beginning in late 1939 with the declaration of War in Europe, unemployment began to decline rapidly as rearmarment stimulated the economy. The benefits of increased defense spending spilled over widely into the rest of the economy. While there were only 822 thousand men in the Army in November of 1940 and 2.1 million a year later, non-agricultural employment increased by 16 percent or 6 million persons between 1939 and 1941. Production of a variety of non-defense goods increased rapidly. Mitchell (1947) reports that between 1939 and 1941 automobile sales rose by 35 percent, refrigerators by 69 percent and washing machines by 63 percent. Overall industrial production rose by 20 percent.

These rapid improvements in economic performance were unexpected. Indeed in the wake of the 1937 recession many observers had despaired of any eventual return to full employment. Paul Samuelson noted in 1944 that "in the years just prior to 1939 there were noticeable signs of dwindling interest in the problem of unemployment which took the form of ostrich-like attempts to think away the very fact of unemployment by recourse to bad arithmetic and doubtful statistical techniques. And even among economists there was increased emphasis on the recovery of production and income to 1929 levels." Such pessimism was pervasive even among those charged with alleviating the situation. Harry Hopkins a liberal confidante of Roosevelt wrote in 1937 that "it is reasonable to expect a probable minimum of 4 to 5 million unemployed even in future prosperity periods." (Leuchtenberg (1963) p.263). Similar sentiments

Table 12

The American Economy

1925-1945

Year	U	$\dot{w}$ (all workers)	$\dot{p}$(CPI)	Index of Productivity	Non-Residential Capital (1958$)
1925	3.2	.9	4.0	92.6	211.0
1926	1.8	1.5	0.0	95.0	218.7
1927	3.3	3.2	-6.0	95.4	223.9
1928	4.2	.3	-1.0	96.1	229.3
1929	3.2	3.5	-1.0	100.0	236.6
1930	8.9	-0.6	-3.0	97.0	238.8
1931	16.3	-5.0	-8.3	98.5	233.5
1932	24.1	-8.9	-9.0	95.4	222.8
1933	25.2	-5.8	-5.0	93.2	212.2
1934	22.0	12.0	2.6	103.3	203.9
1935	20.3	2.3	2.6	106.7	198.3
1936	17.0	1.9	1.2	111.3	197.0
1937	14.3	5.9	3.7	110.4	198.4
1938	19.1	1.8	-2.4	113.5	194.5
1939	17.2	1.2	-1.2	117.6	192.2
1940	14.6	2.4	1.2	122.2	193.6
1941	9.9	9.7	4.9	124.2	198.3
1942	4.7	26.9	10.5	123.3	193.5
1943	1.9	10.6	6.3	124.6	186.5
1944	1.2	7.8	2.0	134.4	183.0
1945	1.9	9.0	1.9	142.0	185.5

Source. Baily (1983) and Historical Statistics.

were echoed by others including LaGuardia who concluded that the situation had passed from being an emergency to being the new norm.

Similar pessimism is often expressed in Europe today. The pessimism reflects the view that unlike the US depression's persistent unemployment, persistent unemployment in Europe is caused by structural problems not merely the residue of adverse shocks. H. Giersch has coined and popularized the word "eurosclerosis" to denote these structural problems. Is there some important difference between the two situations which suggests that rapid expansionary policies would fail in Europe today even where they succeeded so spectacularly in the United States in 1940? There are surprisingly many similarities between the two experiences. The failure of inflation and real wages to recede more rapidly is an often noticed aspect of the current European experience. Indeed, it is this observation that drives conclusions that problems are structural and that the equilibrium rate of unemployment has increased. In the latter half of the Depression, a similar pattern appears in the United States. Between 1936 and 1940 unemployment fluctuated around a very high mean but there was essentially no deceleration in inflation and real wages rose by about 10 percent, close to the normal rate of productivity growth. Previous to the 1930's periods of steady inflation had had much lower average unemployment rates.

Just as unemployment in Europe is highly persistent today, it appeared highly persistent during the American Depression. The autocorrelation of unemployment was .874 in the United States over the 1919-1941 period. To further examine the issue of hysteresis during the Depression, Table 13 presents some estimated wage equations for the 1920-1941 period. The War years are omitted because of the influence of controls. The results dramatically suggest hysteresis parallelling that found in Europe today. When only contemporaneous employment or unemployment is entered into the equation, it is insignificant, but the change in employment or unemployment is strongly associated

Table 13

Wage Equations and the American Depression

	U_t	U_{t-1}	$\log E_t$	$\log E_{t-1}$	π_{t-1}	R^2	DW
(1)	-.06 (.2)	-	-	-	.22 (.8)	0.0	1.71
(2)	-1.13 (2.9)	1.26 (3.2)	-	-	.50 (2.1)	.29	2.13
(3)	-	-	.67 (.50)	-	.24 (.9)	.03	1.75
(4)	-	-	2.71 (.74)	-2.72 (3.2)	.38 (1.7)	.36	1.99

Note. The dependent variable is the rate of wage inflation. Data drawn from Historical Statistics of the United States.

with changes in the rate of wage inflation[35]. These results are robust to a variety of ways of treating expected inflation. While parallelling our results for present day Europe, these results differ from our results using American data for the Post-War period. This may be taken as evidence that hysteresis is a phenomenon associated with bad times rather than with particular labor market institutions.

In considering contemporary European labor markets, we laid considerable stress on the importance of long term unemployment emphasizing that turnover rates were if anything lower in Europe than in the United States. Table 14 drawn from Woytinsky (1942) presents some of the limited evidence available on patterns of labor market turnover during the American depression. Again, the results parallel Europe today. There is little evidence of an increase in the flow rate into unemployment, though quits decline and layoffs increase. As in Europe today the duration of unemployment appears to have increased substantially. Woytinsky reports evidence from a 1937 Philadelphia survey which found that 61.7 percent of unemployed adult men had been out of work for more than a year. More generally, he concludes that the Depression era saw the emergence of a new group of hard core unemployed. Patterns in labor market turnover do not appear to provide a basis for distinguishing European labor markets and American labor markets during the Depression.

Hysteresis appears to be an important feature of American Depression. Earlier in the paper, we have suggested three possible sources of hysteresis. Of these physical capital accumulation appears an unlikely culprit. As Table 12 demonstrates, the real value of the non-residential capital stock actually declined between 1929 and 1939. This reduction did not represent an important bar to full employment during or after the War when demand for goods was strong. This makes us somewhat skeptical of claims that insufficient capital is holding up a European recovery. However, it should be noted that Mitchell (1947) claims that capacity utilization

Table 14

Labor Market Turnover and the American Depression

EXTENT OF LABOR TURNOVER FROM 1919 TO 1929
(Median monthly rates per 100 workers)

Year	Accessions	Separations			
		Total	Quits	Discharges	Layoffs
1919	10.1	7.5	5.8	1.1	0.6
1920	10.1	10.3	8.4	1.1	0.8
1921	2.7	4.4	2.2	0.4	1.8
1922	8.0	5.3	4.2	0.7	0.4
1923	9.0	7.5	6.2	1.0	0.3
1924	3.3	3.8	2.7	0.5	0.6
1925	5.2	4.0	3.1	0.5	0.4
1926	4.6	3.9	2.9	0.5	0.5
1927	3.3	3.3	2.1	0.5	0.7
1928	3.7	3.1	2.2	0.4	0.5
1929	4.4	3.8	2.7	0.5	0.6

Source: Monthly Labor Review, July 1929, pp. 64, 65; February 1931, p. 105.

EXTENT OF LABOR TURNOVER FROM 1930 TO 1940, BY YEARS
(Average monthly rates per 100 workers)

Year	Accessions	Separations			
		Total	Quits*	Discharges	Layoffs
		Median rates			
1929	4.4	3.8	2.7	0.5	0.6
1930	1.6	2.4	1.1	0.2	1.2
		Weighted average rates			
1930	3.1	5.0	1.6	0.4	3.0
1931	3.1	4.1	1.0	0.2	2.9
1932	3.4	4.3	0.7	0.2	3.4
1933	5.4	3.8	0.9	0.2	2.7
1934	4.7	4.1	0.9	0.2	3.0
1935	4.2	3.6	0.9	0.2	2.5
1936	4.3	3.4	1.1	0.2	2.1
1937	3.5	4.4	1.2	0.2	3.0
1938	3.8	4.1	0.6	0.1	3.4
1939	4.1	3.1	0.8	0.1	2.2
1940	4.4	3.35	1.0	0.15	2.2

* Including miscellaneous separations because of death, retirement on pension, etc., reported separately since January 1940.

Source: Monthly Labor Review, 1930 to 1941. For a summary of labor turnover from 1931 to 1939, see *ibid.*, September 1940, pp. 696-704.

Source. Woytinsky (1942).

rates were very low prior to the 1939 expansion. This is not true in Europe today. There is some evidence of human capital hysteresis in labor force participation. The labor force participation rate of men over 65 dropped from 54 to 42 percent between the 1930 and 1940 censuses.[36] This is considerably more rapid than its trend rate of decline. Between 1920 and 1930, it fell by only 1 percent, and it remained essentially constant between 1940 and 1950. It seems unlikely however that this could have much effect on unemployment. Indeed to the extent that marginal workers were induced to drop out of the labor force, bad times might have reduced subsequent unemployment.

This leaves our insider-outsider story of wage setting. Beyond documenting the importance of hysteresis, and confirming its implications for wage equations, it is difficult to test the story directly. But the judgement of Leuchtenberg (1963) is perhaps revealing, "By Roosevelt's second term, as it seemed the country might never wholly recover, the burden of the unemployed had become too exhausting a moral and economic weight to carry. Those who drew income from other sources could hardly help but feel that the Depression had been a judgement which divided the saved from the unsaved. Increasingly, the jobless seemed not merely worthless mendicants but a menacing Lumpenproletariat." While Leuchtenberg is referring primarily to public attitudes towards the unemployed, similar private attitudes are the driving force behind the hysteresis mechanism we have stressed.

The finding of so many parallels between the current European depression and the American depression suggests to us that hysteresis in Europe may be more the result of a long sequence of adverse shocks than the result of structural problems. Perhaps most telling is the observation that the apparent natural rate of unemployment drifted upwards following the actual unemployment rate during the American depression just as it has in Europe. Given the absence of structural

explanations for this drift, the inference that it resulted from high past unemployment seems compelling. So too, the high apparent European natural rate of unemployment may be the result of hysteresis arising in the aftermath of a sequence of adverse shocks. As we discuss below, this implies that expansionary macroeconomic policies may well work in reducing unemployment in Europe.

5. Conclusions

Periods of persistently high unemployment are not uncommon events in broad historical context. Yet standard macroeconomic theories have a difficult time accounting for them. We have argued that they can only be understood in terms of theories of hysteresis that make long run equilibrium depend on history. And we have argued that membership effects may well be important sources of hysteresis. Such effects appear to be an important source of persistence in unemployment in Europe today.

High unemployment is not however always persistent. A crucial issue is identifying the circumstances under which persistence is likely to arise. The main issue is that of whether hysteresis is the result of specific labor market structures, of the presence of unions in particular, or whether it is itself the result of adverse shocks, which by increasing unemployment, trigger the insider-outsider dynamics we have discussed in the paper. Our tentative conclusion, from the historical record, is that membership effects become important in bad times and are not crucially dependent on the presence of unions. We have not provided however a fully satisfactory theory of membership effects in non-union settings.

Our theory permits a broad brush account of the increase in unemployment in Europe over the past 15 years. In the 1970's European economies were hit with surprises in the form of rising oil prices, the productivity slowdown, and rapid increases in tax rates. With wages rigid in the short run each of these types of shocks created unemployment. Because of the membership considerations stressed here, the decrease in employment was validated by higher wage demands. As a result by the end of the 1970's the equilibrium level of unemployment had increased substantially. In the 1980's, the European economies unlike the US economy experienced a series of adverse aggregate demand shocks as European monetary policies followed US policies,

adverse aggregate demand shocks as European monetary policies follows US policies, but fiscal policies turned contractionary. This led to further unemployment which was then validated by wage demands by those who remained employed. At this point, unemployment will remain high even if there are no more adverse shocks, because of the power of insider workers to set wages.

Our argument is that Europe has experienced a sequence of adverse shocks during the past 15 years each of which had a fairly permanent effect on the level of employment. Current high unemployment can equally be blamed on a propagation mechanism which leads the adverse shocks of the past to have a lasting impact, or on the shocks themselves. Unlike simple Keynesian explanations for the European depression which stress only aggregate demand, our theory explains increases in the apparent natural rate of unemployment. Unlike some classical explanations for European unemployment which deny any role for demand management policies, our theory explains how aggregate demand can have protracted effects even in the absence of any long lasting nominal rigidities.

This view of the European unemployment problem has a number of fairly direct policy implications. First, "enfranchising" additional workers may tend to increase employment. If worksharing programs cause more workers to be employed and therefore represented in wage setting decisions, they may lead to reduced wage demands and increased employment. Profit sharing plans such as those proposed by Weitzman (1985) may also raise employment by making it possible for employers to reduce the cost of labor by increasing hiring. On the other hand they would increase unions' resistance to hiring new workers and might thereby increase membership problems. An obvious alternative policy is measures to reduce the power of unions and thereby allow outsider workers to have a larger impact on wage bargains. Our findings regarding the US depression where unions were probably not of great

importance lead us to be somewhat skeptical of the efficacy of such measures. Certainly it does not yet appear that efforts to reduce the power of unions in the United Kingdom have borne macroeconomic fruit.

Our model suggests that shocks, positive or negative, are in a sense self validating. if employment changes, wage setting practices adapt to a new level of employment. This means that positive shocks contrived through demand management policies can reduce unemployment regardless of the source of the shocks which caused it. Even if unemployment initially originated from adverse productivity shocks, expansionary policies, if they succeed in raising the level of employment will yield permanent benefits. Symmetrically, even if most of the increase in unemployment in the 1980's is due to demand, the large decrease in the price of oil may well decrease it permanently. At the same time the model suggests that only policies or shocks which are in some sense surprises will be efficacious. This means that it may be difficult to increase employment a great deal with expansionary policies. The crucial question becomes the length of time over which expansionary policies can "surprise" wage setters. To whatever extent they can, very long lasting benefits will be derived.

Do the many parallels between the American and European depressions imply that a major expansion in aggregate demand would create the same miracles in Europe as it did in the United States? Unfortunately comparison of the two depressions cannot lead to a very definite answer. While it does dispose of the idea that the apparent increase in the natural rate of unemployment means that demand expansion cannot possibly succeed, and the idea that real wage growth must be restrained if expansion is to take place, an important problem remains. The likelihood of achieving a surprise for a protracted period through inflationary policies may well have been much greater in the United States after a decade including a major deflation than it

is in Europe today after a decade of stagflation. On the other hand, the very political infeasibility of expansion in Europe suggests its possible efficacy. Certainly the protracted high unemployment caused by the deflationary policies of the recent past stands as a testament to the potent effects of macroeconomic policies.

Footnotes

1 Formally, a dynamic system is said to exhibit hysteresis if it has at least one eigenvalue equal to zero (unity, if specified in discrete time). In such a case, the steady state of the system will depend on the history of the shocks affecting the system. Thus, we should say that unemployment exhibits hysteresis when current unemployment depends on past values with coefficients summing to one. We shall instead use "hysteresis" more loosely to refer to the case where the degree of dependence on the past is very high, where the sum of coefficients is close but not necessarily equal to one.

2 For the United States we made use of the revised unemployment rates calculated by Romer (1986) for the 1890-1929 period.

3 This part relies heavily on the empirical work presented for individual European countries at the Chelwood Gate Conference on Unemployment, to be published in Economica, 1986. The reader is refered to individual country papers for further evidence.

4 We focus on the UK because detailed data are more easily available. Available data for France and Germany tell a very similar story.

5 The mismatch index by industry goes up however in 1981 and 1982 --which are the last two years for which it has been computed--.

6 Let a be the rate of growth of productivity and θ be the change in the tax wedge. Then the rate of growth of the after tax real wage consistent with a given capital labor ratio is approximately given by $a-\theta$.

7 When a time trend is added to the AR(1) specification of unemployment estimated above, its coefficient is both small and insignificant, for both countries.

8 This is also the direction of research recently followed by Sachs (1985) to explain European unemployment.

9 Unemployment remained high --around 10%--in Italy until 1960 approximately but other factors are thought to be at work in that case.

10 Drazen (1979) constructs a related model, based on learning by doing, which also generates hysteresis. Hall (1976) explores the possibility that unemployment has long lasting effects on productivity, and its implications for economic policy.

11 The issue of membership and membership rules is clearly closely related to the issue of union size and union membership in the union literature. See Farber (1984, section 6) for a survey. This literature has not however focused on the dynamic implications of membership rules.

12 Formalizing the firm as passive allows to concentrate on the effects of alternative membership rules on the decisions of the group of insiders. Allowing for wage bargaining between the firm and insiders as well as for some control of employment ex post by insiders introduces additional issues which we shall discuss later.

13 The assumption of stochastically inelastic labor supply maintained here is not realistic for a single firm. It is best to think of the firm under consideration as a representative firm, facing the same shocks as other firms.

14 Because we use a log linear approximation to define p, p^* as defined can be negative. But the approximation is only acceptable for p close to one, that is for values of $a(b/c)^2$ not too large.

15 We may also think of assymetric rules where it takes m_1 periods to acquire membership, and m_2 periods to lose it. We shall briefly return to their likely implications later.

16 There is another effect which works in the opposite direction. Choosing a high real wage leads to lower expected employment, thus lower membership and higher expected real wages in the future. This effect however turns out to be dominated by that emphasized in the text.

17 Farber (1984) reviews the research on union behavior when members have different seniority status, and thus conflicting interests.

18 Thus, we assume implicitly that the technological shock affects costs, but not the relation between output and employment. This is the case for example if output is produced with two inputs, labor and a non labor input, according to a Leontieff technology, and the the technological shock reflects changes in the relative price in the non labor input. A change in productivity growth would instead affect both the relation between output and employment, and between prices and wages. Allowing the technological shock to affect the relation betwen output and employment in the model is straightforward but introduces ambiguities in the effects of supply shocks on employment which are not central to our argument.

19 Like in other contracting models, staggering of wage decisions across unions would lead to effects of even anticipated nominal shocks. See Taylor [1979].

20 There is some evidence that this has actually occurred in Britain. Despite the legal changes which have decreased the legal power of unions in the last decade, the size of the union wage differential appears to have risen sharply in recent years.

21 Consider a simple example. Suppose restaurant wages were rigid, and a big decline in the demand for restaurant meals took place so there were unemployed chefs. Would it pay to open a new restaurant with a low paid chef? Probably not if fixed costs were high. These considerations may have something to do with why in bad times employment growth may be concentrated in small establishments.

22 Given that our paper is written for an American audience, we do not review the role of unions in the US in any detail. As will be clear from our description of Europe, unions in the US play a much more limited role than in Europe.

23 Actual extensions are rare but the threat of extension is considered to be very effective in making all firms respect the content of these agreements.

24 In future research, it would be valuable to study Japanese labor market institutions with a view to evaluating the theories of persistent unemployment put forward here. There are a number of similarities between Japaneese and European institutions including the importance of company level bargaining. There may however be important differences as well, particularly in the attitude of Japanese unions towards outsiders.

25 Two recent cases have been in the news, that of British Petroleum which has gone non unon union for some of its shipping operations, and that of Robert Murdoch who has in effect gone to a more accomodating union.

26 The reason why unions encourage the unemployed to remain in the union appears to be due in part to their desire to increase membership figures, and through these, their role in the national union movement.

27 Allowing labor demand to depend on current and expected real wages, as it should under costs of adjustment, would complicate our task here. John Kennan takes up this issue in his comments on our paper.

28 Note that a between 0 and 1 does not correspond exactly to m between 1 and infinity. As we have argued before, m between 1 and ∞ leads to a more complex, non linear, specification.

29 This is a plausible and convenient assumption. Suppose we assumed instead that productivity was the sum of a linear function of observable variables and a stationary or borderline stationary process, say an AR(1) process with coefficient ρ.

The wage equation would then differ from that in the text in two ways. The first would be the presence of lagged real wages, with coefficient ρ-1. The second would be the presence of the ρ first differences of the observable variables affecting productivity. We have explored these more general specifications empirically for the UK and found our simple wage equation not to be misleading.

30 Because our wage data refers to manufacturing wages, we use manufacturing employment as the employment variable in the results reported here. Very similar results were obtained using total employment.

31 All these findings are quite robust. The value of R is substantively the same if, following the argument of the previous footnote, the lagged real wage, current and lagged values of the capital-labor ratio, the price of oil, and a proxy for productivity growth (when available) are added to the regressions. The results are also robust to changes in the coefficient on lagged inflation, say within .2 of the values used in the table.

32 The motivation for calculations of this type is laid out in Clark and Summers (1979). In performing the calculations, we have assumed that the exit rate from unemployment is not duration dependent. If more realistically, we allowed for it to decline, the estimated concentration of unemployment in long spells would show up even more clearly.

33 Some of the institutional rigidities of European labor markets date however from social policies introduced in the 1960's and 1970's.

34 It is clear that with such short samples, and such a drastic increase in unemployment in the second subsample, estimation cannot be very precise.

35 A similar finding is emphasized by Gordon and Wilcox (1979) who also provide evidence that it holds for Europe during the Depression period. Gordon (1983) emphasizes the importance of the rate of change effect in the Phillips curve

during the Depression period in both the United States and UK but finds the level effect to be dominant outside of this interval.

36 This dropoff may reflect the effects of the introduction of Social Security to some extent. The program was sufficiently small in 1940, that this is unlikely to be the whole story. Moreover, the timing of its introduction surely had something to do with the fact of the Depression.

Appendix to Section II

1)Derivation of the probability of being employed.

For a given realisation of e, thus for a given n=- cw + e, the probability of employment is given by :

If $n \geq n_o$, or equivalently for $e \geq n_o + cw$, then $p = 1$

If $n \leq n_o$, or equivalently for $e \leq n_o + cw$, then $p = N/N_o \div 1-n_o+n$

This implies that, for an arbitrary distribution of e, with density function f(e), and support $[e^- e^+]$, the probability is given by :

$$p = \int_{e^-}^{n_o+cw} (1-n_o-cw+e)f(e)de + \int_{n_o+cw}^{e^+} 1\, f(e)de$$

If, as assumed in the text, e is uniform on [Ee-a,Ee+a], p becomes :

$$p = (1/2a)\{ [(1-n_o-cw+e/2)e]_{Ee-a}^{n_o+cw} + (Ee+a-n_o-cw)\}$$

$$= 1 \qquad \text{for } n_o+cw \leq Ee-a$$

$$= 1 - (1/4a)(n_o+cw-Ee+a)^2 \qquad \text{for } n_o+cw \geq Ee-a$$

2)Derivation of the solution in the case when m=1

We first derive the objective function maximised by the union at any point in time.

We assume that, if laid off, the probability of being rehired by the firm is equal to zero. As in the text, we assume that the utility of being unemployed is equal to zero. Let p_i be, as in the text, the probability of being employed at time i for a member of the union at time i. Then, given the membership rule that membership depends on employment in the previous period, the probability for a union member at time zero to still be a union member in period i is given by $E_o(p_o p_1 \ldots p_{i-1})$. Thus, the utility of the union member as of period 0 is given by :

$$U_o = E_o((p_o+bw_o) + \theta p_o(p_1+bw_1) + \theta^2 p_o p_1 (pU+bw_2) + \ldots)$$

or, in recursive form by :

$$U_o = p_o + bw_o + p_o E_o(\theta U_1)$$

Even under the assumption that the shocks are independently distributed through time, the random variables within the expectation operator above are not in general independent, making the maximisation problem intractable. Thus, we solve instead the problem associated with the objective function linearized around some p', w'. This linearized objective function is given by the following recursion :

$$V_o = (A + dp_o + bw_o) + \theta p' E_o V_1$$

where $A \equiv -\theta p'(p'+bw)'/(1-\theta p')$ and

$$d \equiv 1 + \theta(p'+bw')(1 + \theta p' + \theta^2 p'^2 + \ldots)$$

$$= (1 + b\theta w')/(1-\theta p')$$

The weight put on the probability of being employed, p_o, is now higher than in the previous case. This is because p_o affects not only today's outcome but the probability of union membership and employment in the future.

We now derive the solution to the maximisation using the linearized objective function. Under the assumption that shocks to labor demand are independent and uniformly distributed on [-a,+a], the solution to the linearized maximisation problem is derived as follows:

We first guess that the maximised value V_o is of the form

$$V_o = \alpha - \beta n_{-1} \qquad (a1)$$

with coefficients α and β to be determined. We then solve for optimal p_o and w_o given α and β, and finally solve for α and β.

If $V_o = \alpha - \beta n_{-1}$, then $E_o V_1 = \alpha - \beta E_o n_o = \alpha + \beta c w_o$. Replacing in the recursive form which characterizes U_o gives :

$$V_o = (A+\theta p'\alpha) + (b+\theta p'\beta c)w_o + dp_o \qquad (a2)$$

The probability p_o is given by :

$$p_o = 1-(1/4a)(\underline{n}_o+cw_o+a)^2$$

Replacing p_o in (a2) and solving for optimal w_o gives :

$$w_o = (1/c)[-\underline{n}_o - a + 2a(b+\theta p'\beta c)/dc] \qquad (a3)$$

This in turn gives :

$$p_o = 1 - a((b+\theta p'\beta c)/dc)^2. \qquad (a4)$$

This gives us w_o and p_o as functions of structural parameters and of α and β. We now solve for the values of α and β. Replacing w_o and p_o in (a2) and comparing (a2) and (a1) gives the values of α and β. The value of α is of no interest here. The value of β is given by :

$$\beta = (b/c)/(1-\theta p').$$

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