"REGIONAL LABOR MARKET DYNAMICS IN EUROPE"

by

J. DECRESSIN*
and
A. FATÁS**

94/61/EPS

* Harvard University.

** Assistant Professor of Economics at INSEAD, Boulevard de Constance, 77305 Fontainebleau Cedex, France.

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Regional Labor Market Dynamics in Europe

Jörg Decressin *
Antonio Fatás *

Abstract: The paper investigates regional labor markets dynamics in Europe and compares the results to those obtained for the US. It analyzes to what extent regional employment dynamics are common to all regions in Europe and to all states in the US. It finds that a larger proportion of movements in employment growth is common to all US states than to all EEC regions. Next, the paper studies the adjustment mechanisms that a typical region-specific shock triggers. It shows that for Europe, in the first three years, most of the shock is absorbed by changes in the participation rate while, in the US, it is immediately reflected in migration. Surprisingly, in both cases, the unemployment rate plays a small role suggesting the presence of natural unemployment rates at the regional level.

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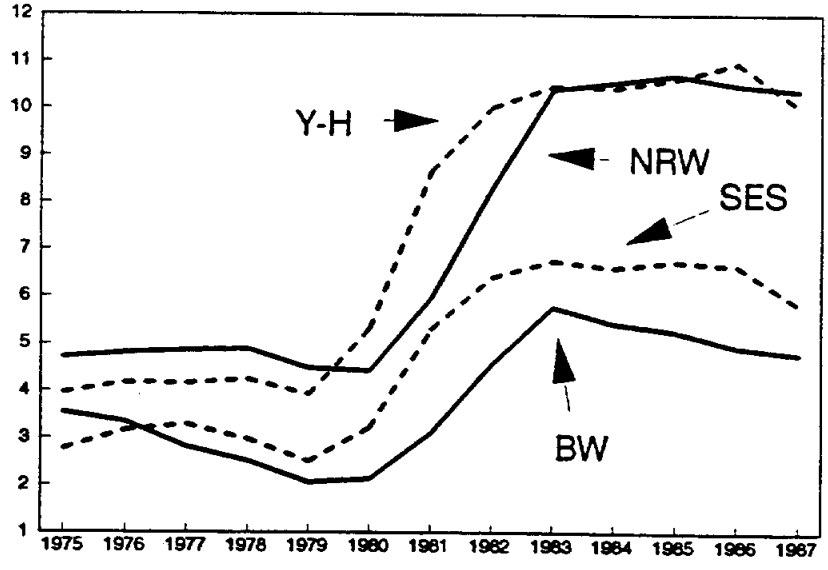
INTRODUCTION

The paper analyzes developments on regional labor markets in Europe in the last 25 years. In particular it investigates the extent to which labor market shocks are shared by all regions and how regional employment, unemployment and labor force participation adjust to labor demand shocks which are region-specific.[1]

There are several reasons for us to focus on regions rather than countries. First, if there is more specialization in the production of goods and services at the regional rather than the national level, the national labor market dynamics will be, from an economic point of view, a fairly arbitrary aggregation of many heterogeneous regional dynamics. As a result, analyzing regional dynamics is likely to provide more interesting results. Figure 1 illustrates this argument very well: it shows that the two southern regions in the UK and Germany (the South-East (SES) and Baden-Württemberg (BW)) or the two northern ones (Yorkshire-Humberside (Y-H) and Northrhine-Westphalia (NRW)) react more similarly to the employment shocks of the early 1980's than the northern and southern regions in each country.

FIGURE 1
REGIONAL UNEMPLOYMENT RATES



Second, region-specific shocks may trigger different adjustment mechanisms than national shocks: one would, for instance, expect substantially more migration between regions within countries or neighboring regions of different countries in re-

[1] A regional shock in our case is defined as a shock to a variable which equals the logarithm of regional employment minus the logarithm of aggregate EEC employment or which equals the regional unemployment rate minus the unemployment rate prevailing in the entire EEC.

sponse to region-specific shocks, than between nations in response to nation-specific shocks.

Third, with the adoption of the European Single Act and the Maastricht treaty, European countries move closer to full economic integration, and consequently region-specific shocks will become more prominent. There are a variety of reasons for this: as transaction costs continue to fall, regional specialization in production increases; concurrently macroeconomic policies converge further, increasingly shifting attention of policymakers from harmonizing national evolutions to addressing regional imbalances. In that context, a careful analysis of the sizes and repercussions of region-specific shocks should provide interesting insights for the further development and coordination of regional policies within an integrated Europe.

Throughout the paper we compare the results we obtain for Europe to those obtained from a similar analysis of region-specific (state-specific) evolutions in the US. More specifically, we would like to use our results to explore whether labor market disturbances are distributed less symmetrically across the regions in Europe and whether they trigger less interregional migration than in the US. If this turns out to be the case, then, based on the Mundell (1961) criteria for optimal currency areas, the regions in Europe would form a less suitable single currency area than the states of the US.[2]

Blanchard and Katz (1992) have accumulated an impressive amount of evidence regarding regional evolutions in the US. Whenever we compare how a typical region in Europe and a typical state of the US adjust to a region-specific labor demand shock we adapt the findings of Blanchard and Katz (1992) to make them comparable to our results for Europe.

The first section of the paper briefly discusses the regional decomposition we choose for Europe. The second section investigates to what extent year to year changes in employment have been common to all regions in Europe and how similar the response of regions to such common changes has been. We find that there is an equal or greater difference in response to common changes across regions in Europe than across states in the US. Further, in Europe, unlike in the US, the proportion of yearly changes in employment which tends to be common across regions is considerably smaller than the proportion of region-specific changes.

In Section 3 we investigate the sizes and repercussions of region-specific labor

[2] See Eichengreen (1990a and 1990b), Feldstein (1992) and Krugman (1993) for an analysis of the costs and benefits of a single currency for Europe.

market disturbances. The main difference between Europe and the US is that region-specific shocks to employment, although similar in initial size, have much stronger long-run effects in the US.

In Section 4 we identify region-specific labor demand shocks and analyze the joint behavior of employment, unemployment and labor force participation in Europe and the US in response to these shocks. Note that to the extent a region-specific shock in the demand for labor is not reflected in a change of the unemployment or labor force participation rate, it must have been absorbed by migration. For Europe we observe that in the first three years most of the labor demand shock is actually reflected in changes in regional participation rates; while unemployment rates react to a small extent, migration plays a substantial role in the adjustment process only from the third year onwards. The US differs in that labor force participation reacts to a much smaller and migration to a much larger extent than in Europe. However, both in Europe and the US, the unemployment rate moves to a small extent and transitorily, suggesting the presence of region-specific natural rates of unemployment.

We briefly check whether we observe less migration in Europe because people are reluctant to move across countries or whether they are reluctant to migrate even within countries; we do this for Germany, the UK and Italy and, within any of these nations, find little interregional migration in response to region-specific shocks within the first three years.

The last section explores some implications of our findings for EMU and concludes.

1. THE LEVEL OF REGIONAL DISAGGREGATION

The level of regional disaggregation we have chosen is a compromise between the problem of data availability and the goal of analyzing interesting regional dynamics caused by idiosyncratic shocks.[3] Our sample contains regions and countries: we have a total of 51 regions: 8 for France, 8 for Germany, 11 for Italy, 7 for Spain, 11 for the UK. Belgium, Denmark, Greece, Ireland, the Netherlands and Portugal are treated as single regions. These countries have a population of comparable size to that of the other regions we consider.[4]

[3] Data descriptions and sources are available in the Data Appendix.

[4] Even the Netherlands which is the largest country being treated as a single region in our sample is comparable in size to other regions. It actually has a considerably smaller population than the South-East in the UK and Northrhine-Westphalia in Germany which are the two largest regions in the sample.

The average population size of a region in 1987 is 6.260 million which is approximately 30% larger than that of the average US state which in the same year was 4.773 million.[5] However, the variation in population size is much smaller across our European regions: the standard deviation equals 3.601 million and the coefficient of variation amounts to 0.58 whereas the respective values for the US are 5.158 million and 1.08 respectively. The two largest regions in this regional subdivision for Europe have populations which are comparable to those of Texas and New York. Other large regions such as Belgium, Portugal, Greece, the Bassin Parisien, Ile de France, Bavaria and Baden-Wrttemberg have populations comparable to those of Pennsylvania, Ohio, Illinois and Florida and which are less than half the size of the population of California.

In terms of region size, this subdivision not only leaves us with a fairly homogeneous sample but it also maximizes the availability of data and should ensure that the results we obtain are comparable to those for the US.[6]

2. COMMON LABOR MARKET DISTURBANCES

The main purpose of this section is to evaluate the extent to which labor market disturbances in Europe are distributed symmetrically across regions and compare the results to those for the US. Moreover, it also serves to purge regional variables of movements which are common across regions, with a view to isolating the region-specific evolutions which we will subsequently examine in more detail.

To determine the extent to which yearly changes in employment are common to all regions in the EEC we fit for each region i:

$$\Delta\, log(N_{it}) = \alpha_i + \beta_i\, \Delta log(N_{et}) + \eta_{it} \tag{1}$$

where N_i stands for employment in region (state) i and N_e for employment in Europe (the US).[7]

Table 1A in Appendix A summarizes the results.[8] For Europe and the US we could reject the null hypothesis that the elasticity of regional employment changes

[5] Employment in the average European region, however, is only 12% higher than in the average US state.

[6] Regional data for all the countries being treated as single regions in our sample is either unavailable or very incomplete.

[7] Here the appropriately weighted average of the β_i's should equal one. We do not impose this restriction.

[8] Concerning unemployment and labor force participation rates, we ran the same regressions as under (1), using unemployment rates and the logarithm of regional participation rates instead of first differences of the logarithm of employment. While the results of those regressions in Table 1A later

with respect to EEC/US wide employment changes equals unity for only 10 EEC regions and 13 states of the US, although in the case of Europe this was mostly due to higher standard errors. Indeed, the average $\overline{R}^2$ for the employment regressions equals 0.20 in Europe whereas it equals 0.60 in the US.[9] Hence, on average only 20% of the year to year changes in regional employment are shared by all regions in Europe, whereas in the US 60% of the changes are common to all the states.[10] Also, the weighted standard deviation of the estimates of the β_i's, where the weights are the regional employment shares, is considerably higher in Europe than in the US: the respective values are 0.72 and 0.30. Consequently not only are the year to year changes in employment much less correlated across all EEC regions than they are across states of the US, but the amplitudes of these changes exhibit much greater differences as well. Hence, labor market disturbances seem considerably more asymmetrically distributed in the EEC than in the US.

The question that inevitably arises is: to what extent is this finding due to different countries practicing different macroeconomic policies in Europe? We briefly checked whether country-specific dynamics are indeed responsible for the observed lack of correlation in Europe by introducing country-specific time dummies.[11] The econometric model we fit for each country which is subdivided into regions is set out below:

$$\Delta\, log(N_{it}^c) = \alpha_i + \beta_{1i}\, \Delta log(N_{et}) + \beta_{2T}^c T_t + \eta_{it} \tag{2}$$

where N_{it}^c stands for employment in region i which is part of country c, N_{et} for employment in Europe at time t and T_t for a time dummy for period t. We hence restrict our parameter estimate for a particular time period dummy to be the same for all regions within a country but allow for different estimates between countries. Those countries which are not subdivided into regions in our sample cannot be considered.

Table 2A in Appendix A shows the results. Note that the F-statistics for the

serve in the construction of region-specific variables, we will not discuss them in more detail here. The results for the US are available upon request.

[9] The low $\overline{R}^2$ for Europe is not an artificat of our use of employment in first differences. For instance, upon using detrended levels, the average $\overline{R}^2$ is 0.26, and even without removing the trends it is only 0.38, which is still considerably lower than the average $\overline{R}^2$ we observe for the US.

[10] Note that the $\overline{R}^2$ tends to be smaller in the southern European regions than in the northern ones. This may indicate that the southern regions on average are less integrated with the rest of Europe.

[11] The resulting model is similar to the one of Stockman (1988). The basic idea is that if monetary and fiscal policies differ across countries then to the extent they are important causes of business cycles, the resulting nation-specific components of employment growth which are common to all regions within a nation should be captured in the dummies.

exclusion of all time dummies (F) are all significant at 1% levels. However, while country-specific dynamics potentially explain a significant part of what we call region-specific evolutions, the $\overline{R}_T^2$ values suggest that up to one half of the total variance in regional employment growth rates remains unexplained by both national as well as European factors; moreover, the average $\overline{R}^2$ for Europe is still lower than for the US, suggesting more heterogeneity among the regions of the former than the states of the latter.[12]

3. REGION-SPECIFIC LABOR MARKET DISTURBANCES

3.1. Obtaining Region-specific Variables

The region-specific variables which remain to be investigated are given by the residuals of the regressions of Table 1A, i.e.:

- for regional relative to EEC wide employment we use

$$n_{it} = log(N_{it}) - \hat{\beta}_i \, log(N_{et}) \tag{3}$$

- for regional relative to EEC wide employment rates we use

$$e_{it} = log(E_{it}) - \hat{\delta}_i \, log(E_{et}) \tag{4}$$

where E_i stands for the regional employment rate (employment divided by the labor force) and E_c for the European employment rate. or equivalently, since $log(E_{it}) \approx -U_{it}$ we use

$$u_{it} = U_{it} - \hat{\delta}_i \, U_{et} \tag{5}$$

where U_i denotes the regional unemployment rate and U_e the European unemployment rate.

- and for regional relative to EEC wide labor force participation rates we use:

$$p_{it} = log(P_{it}) - \hat{\xi}_i \, log(P_{et}) \tag{6}$$

where P_i stands for the regional labor force participation rate (labor force divided by the working-age (15-64) population) and P_e for the European labor force participation rate.

[12] Clearly the time dummies capture all common movements within a group of regions, irrespective of whether that group actually corresponds to a nation. An interesting experiment would be to check whether there are other groupings of regions such that the corresponding time dummies have similar or greater explanatory power than in the above grouping on the basis of national origin. Of course the dummies would then not capture common changes in employment due to nation-specific macroeconomic policies but common changes due to a similar specialization in production among the regions within a group.

Hence we allow for different cyclical sensitivities of the regional variables to changes in the aggregates i.e. we allow different regions to respond differently to common shocks.

Since policymakers may have successfully smoothed the differentiated impact of real country specific shocks, throughout the paper we check whether our results still hold once an allowance is made for country-specific dynamics by including appropriate time-dummies in the regression. In addition, whenever there is sufficient data available, we verify whether our results concerning the effects of region-specific shocks to employment, are similar once the behavior of regional relative to national employment is investigated.

3.2. Basic Framework

This section outlines the basic framework underlying the empirical analysis of regional shocks. A more rigorous presentation of this framework can be found in Blanchard and Katz (1992).

In Section 2 we observed that a substantial portion of the variance in regional employment changes cannot be accounted for by EEC wide macroeconomic shocks. Clearly, with substantial specialization of production on a regional level, the dynamics of employment, unemployment and labor force participation at a regional level will differ from those we observe at a macroeconomic level. Hence in the following empirical analysis we focus on the evolutions of region-specific variables as defined in the previous subsection.

Presumably the evolution of employment in any region is intimately linked to the trend in demand for the goods produced in that region. In addition to following some kind of trend, employment may be subjected to shocks resulting from changes in demand. The effect of such changes on employment can be more or less permanent, depending on the degree of regional specialization in production and the relative propensities of firms and workers to migrate between regions.

To be more concrete, think about a region which experiences a favorable shock for the goods in which it specializes.[13] Initially one would expect the unemployment rate to fall, the labor force participation rate to rise and, to the extent real wages are flexible on a regional level, a rise in the real wage. The higher wage and lower unemployment rates may set off a wave of immigration which would bring wages,

[13] This shock could be a sudden change in the demand for the goods in which the region specializes or an improvement in the technology used in the production for those same goods.

unemployment and labor force participation rates back to their equilibrium levels, while leaving relative employment in the region permanently higher. Concomitantly, part of the initial positive shock to employment might be reversed by a rising wage level, a lack of qualified personnel, increasing congestion and lower investment subsidies which would induce firms to leave the booming region.

In the following sections we will examine the effects of regional labor market shocks. Here it is important to note that the emphasis lies on shocks, not on regional trends or means. For example, a region may have seen its employment share growing over the entire period covered by our sample. This would be a case of persistence in the mean growth rate of relative employment which we will not try to explain. Rather, in focusing on a variable's reaction to shocks, we talk about persistence in the response whenever speed of adjustment of a variable towards its trend or mean is low. This distinction is particularly important when we analyze regional unemployment. Indeed some regions may exhibit persistently higher than average unemployment due, for example, to structural reasons. Although we check whether this is actually the case in both Europe and the US, what we are really interested in is how quickly the unemployment rate in a region returns to its mean once the region has experienced a shock.

3.3. Trends and Shocks to Regional Labor Markets

3.3.1. Basic Trends in Regional Employment Growth Rates.

Figure 1A shows average annual employment growth for the regions and countries in the EEC over the periods from 1968 to 1977 and 1978 to 1987. If one excludes the outlier G8 (West Berlin) from the regression one obtains a line with a slope of 0.55 and an R^2 of 0.16. Hence it seems as if there is fairly strong persistence in regional employment growth: those regions that were growing faster in the first half of the sample continued to do so in the second half.

How does this compare to the US? On performing the same regression for the states of the US, one obtains a picture such as in Figure 1B, a regression line with a slope of 0.25 and an R^2 equal to 0.10. Consequently at first sight it seems as if there is more long-term persistence of employment growth in Europe than in the US.

3.3.2. Univariate Response, Persistence and Size of Shocks to Employment.

Given the type of shocks we are interested in and which we described in Section 3.2., our null hypothesis is that there is a unit root in relative employment; we test

for this hypothesis by running the following regression over the period from 1968 to 1987:[14]

$$\Delta n_{it} = \alpha_{1i} + \alpha_{2i} n_{it-1} + \alpha_{3i}\, time + \eta_{it} \tag{7}$$

Here n_{it} is defined as explained in Section 3.1. Although 50 out of 51 coefficients have a negative sign, applying the appropriate Dickey-Fuller tests, we could reject the null for only two out of the 51 regions at 5% significance.[15] Also we found no substantial evidence for the presence of time trends in employment growth. From this, we conclude that shocks to regional employment have permanent effects and we use regional relative employment differences rather than levels for the rest of our analysis.

Next we estimate the univariate process followed by regional relative employment growth in Europe and the US. Over the period 1968-87, allowing for two lags, we run:

$$\Delta n_{it} = \alpha_{1i} + \alpha_2(L)\, \Delta n_{it-1} + \eta_{it} \tag{8}$$

This regression pools the entire sample and allows for region-specific fixed effects. Again n_i stands for the logarithm of employment in region i minus the β-adjusted logarithm of employment in Europe (or the US). Table 1 shows the estimates and Figure 2 the impulse response function of employment to a one standard deviation shock.[16] Thus one can compare the actual sizes of typical shocks.

Table 1
Regional Relative Employment Growth

Δn_{it}	Δn_{it-1}	Δn_{it-2}
EEC (51 regions)	-0.0017	0.0466
	(0.0371)	(0.0372)
US (51 regions)	0.6481	-0.0845
	(0.0333)	(0.0354)

Standard errors in parentheses.
Sample: 1966-1987

[14] Note that for the regions of France and Spain we can only run these regressions over the periods from 1976-87 and 1979-87 respectively because no more yearly data is available.

[15] Note that all the standard error estimates are biased downwards since the values of the β_i's we use are actually estimates with standard errors attached to them. With consistent standard errors we would reject the unit root hypothesis in even fewer cases. See Murphy and Topel (1985) for a way to obtain consistent standard errors.

[16] For Europe we also estimated the univariate system in levels rather than first differences. We obtained parameter estimates equal to 0.9830 (0.0366) and -0.0536 (0.0367) respectively which confirms our hypothesis of a unit root in relative employment.

Note that while the sizes of the initial shocks in Europe and in the US are similar (1.7 and 1.5 percentage points respectively), they have substantially weaker long-run effects in the former than in the latter.[17]

To complete our investigation of regional employment dynamics, we ran the univariate regression for Italy, France, the UK and Germany separately with n_{it}'s equal to the logarithm of regional employment minus the logarithm of national employment. The purpose was to check whether, for reasons outlined in Section 3.1., country-specific dynamics have an important bearing on our results. We found no evidence for this. Moreover, with the exception of France, the average shocks are close in size to the one displayed in Figure 2.

Overall the evidence gathered in this section clearly shows that shocks to regional employment, albeit being similar in size initially, have much stronger effects in the US than in Europe. Perhaps this is caused by a stronger response of interregional migrational flows to labor demand shocks in the US. This will be investigated further in Section 4. At the root of this finding could also be a higher degree of regional specialization of production in the US than in Europe: low demand for one product in which a particular region is specialized is less likely to be offset by high demand for another. Hence there is a greater incentive for people to leave a region in the US once it has suffered an adverse labor demand shock.

3.3.3. Basic Trends in Relative Unemployment Rates

Figure 3A shows regional unemployment rates minus the EEC wide unemployment rate in 1968 and 1987. The regression line has a slope of 1.09 (with a standard deviation of 0.28) and the R^2 equals 0.23.[18] This may now be compared to Figure 3B which shows the same for the US. The slope of the regression line is 0.67 and the

[17] If one allows for country-specific time dummies in Europe, the initial shock has a size of roughly 1.3 percentage points and again regional employment stabilizes at that level. We also investigated the extent to which our panel is structurally stable, by running the univariate regression for France, Germany, Italy and Britain separately. The resulting impulse response functions were broadly similar to those obtained on the basis of the entire panel. Indeed, the shape of the response functions was almost identical for all four countries. Only the size of the initial shock varied across the countries: the typical shock in France was approximately half as big as in any of the other countries were in all cases it amounted to roughly 1.7 percentage points. This may be an artifact of the much shorter time period over which data for France is available.

[18] An important problem with the regression for Europe may be that unemployment is measured differently across countries in Europe (see Data Appendix). We demeaned regional minus EEC unemployment rates using the average difference between national and EEC unemployment rates over the period from 1968 to 1987. We found an R^2 of 0.01 and a slope of 0.20. However, this result was almost entirely driven by the Spanish regional unemployment data, and upon excluding them the slope rose to 1.18 (with a standard error of 0.26) and the R^2 equaled 0.32. Figure 3C shows the results.

R^2 equals 0.38, although here it should be noted that upon discarding the outliers Alaska, West Virginia, Louisiana and New Hampshire (2, 49, 19, 30) little of a systematic relationship remains. Indeed the R^2 drops to 0.17 and the slope coefficient now equals 0.17.

We conclude that differences in relative unemployment rates between regions seem to be more persistent in Europe than in the US.

3.3.4. Univariate Response, Persistence and Size of Shocks to Unemployment.

In investigating relative unemployment rates our prior is that they do not contain a unit root.[19] Hence we proceed by estimating the univariate process followed by relative unemployment using levels rather than first differences. Allowing for two lags we run for Europe and the US:

$$u_{it} = \alpha_{1i} + \alpha_2(L)\, u_{1t-1} + \nu it \tag{9}$$

Notice that given we observed some persistence in regional relative unemployment rates we also allow for region-specific fixed effects. Table 2 shows the results while the impulse responses caused by a one-standard-deviation innovation in relative unemployment are shown in Figure 4. The sizes of the shocks are fairly similar, 0.72 percentage points in Europe and 0.84 in the US, but have less persistent effects in Europe than in the US.

Table 2
Regional Relative Unemployment

u_{it}	u_{it-1}	u_{it-2}
EEC (51 regions)	0.9787	-0.4858
	(0.0337)	(0.0331)
US (51 regions)	0.8770	-0.1630
	(0.0322)	(0.0320)

Standard errors in parentheses.
Sample: Europe 1966-1987, US. 1970-90

[19] Actually, we investigated the process followed by regional relative unemployment rates by running over the period from 1968 to 1987:

$$\Delta u_{it} = \alpha_{1i} + \alpha_{2i}\, u_{1t-1} + \nu it$$

As explained in Section 3.1., here u_i stands for the regional unemployment rate minus δ_i times the EEC unemployment rate. We find that for all the 51 regions the estimate of the lagged level is negative and large in absolute value: for 26 regions it is larger than 0.4. However, when we actually test for unit roots, a unit root could only be rejected in six cases. Given the low power of unit root tests and the large values for the parameter estimates we do not reject our prior.

Hence, we conclude that regional relative unemployment rates in Europe return to their means fairly quickly.[20] This may be due to people migrating out of regions that experienced an increase in regional relative unemployment in response to a shock. In Section 4 this will be investigated in more detail.

We again checked the robustness of this result by performing the same regression for France, Germany, Italy and the UK separately. In all cases regional relative unemployment returns to its mean by period 4. With the exception of Italy the same was also true for each country once regional minus δ_i national unemployment was the object of analysis.[21]

These results may seem somewhat surprising in light of the rigidities which are present in European labor markets and they support the existence of natural rates of relative unemployment at the regional level. To further investigate this issue we run the same regression for absolute regional unemployment i.e. we do not subtract δ_i times the EEC unemployment rate from the regional one. Indeed, we then observe the type of persistence in unemployment rates that one would expect for Europe. Table 3 shows the results and Figure 5 the corresponding impulse response functions:

Table 3
Regional Unemployment

u_{it}	u_{it-1}	u_{it-2}
EEC (51 regions)	1.305	-0.374
	(0.034)	(0.034)
US (51 regions)	0.922	-0.263
	(0.032)	(0.032)

Standard errors in parentheses.
Sample: Europe 1966-1987, US. 1970-90

As can be seen from the impulse response functions, in period 7 the effect of an innovation has disappeared completely in the US whereas 90% of the initial effect is still left in Europe. Since these innovations really capture both common as well as region-specific shocks to unemployment rates, our analysis suggests that it is the common shocks which have the permanent effects in Europe.[22]

[20] If one allows for country-specific time dummies in Europe the results are almost identical, however, it takes one more period before the effects of the initial shock have disappeared.

[21] In that case, estimates for the δ_i's were obtained by regressing the regional on the national unemployment rate. For Italy the initial shock was more than three times as large as for the other countries. Further, by period 5 only half of the initial shock had disappeared. This result confirms Eichengreen's (1992) finding that shocks to regional relative unemployment have more persistent effects in Italy than in Britain or the US.

[22] Cohen and Wyplosz (1989) analyzed the effects of symmetric and asymmetric shocks to real

3.3.5. Univariate Response of Labor Force Participation

We briefly investigate the response of labor force participation to shocks. Our prior is that regional relative labor force participation rates follow a stationary process; allowing for two lags we run:

$$p_{it} = \alpha_{1i} + \alpha_2(L)p_{it-1} + \eta_{it} \tag{10}$$

Table 4 shows the results. As can be seen from the estimates, there is very little persistence in regional relative labor force participation rates both in Europe and in the US.[23] This confirms our prior although, given the short sample period, it is clear that we are likely to underestimate the true degree of persistence.

Table 4
Regional Relative Participation

p_{it}	p_{it-1}	p_{it-2}
EEC (51 regions)	0.476	-0.015
	(0.054)	(0.047)
US (51 regions)	0.665	-0.197
	(0.040)	(0.040)

Standard errors in parentheses.
Sample: Europe 1975-1987, US. 1976-90

4. ADJUSTMENT TO REGIONAL LABOR DEMAND SHOCKS

In Section 3 we showed that deviations of regional relative unemployment rates from their long-term means are not persistent both in Europe and in the US. This evidence suggests that regional employment shocks may not be absorbed by changes in regional unemployment rates. For the US, Blanchard and Katz (1992) find that the rapid return to the long-term means occurs because labor force participants migrate into states which have benefitted from a favorable demand shock. For Europe, Eichengreen (1992) observes that although persistence in regional relative to national unemployment rates in Britain and Italy does not seem to be higher than in the US, the responsiveness of migration to regional labor market disequilibria is greater in the US than in either of the other two countries. He then conjectures

GDP, the real wage and the price levels of France and Germany. They also find that symmetric (common) shocks have permanent impacts whereas asymmetric (nation specific) shocks have transitory effects.

[23] The degree of persistence was even lower if allowance for country-specific time dummies in Europe was made.

that in Europe, "other mechanisms, perhaps including relative wage adjustments, labor-leisure choice, interregional capital mobility and government policy, substitute adequately for Europe's limited labor mobility in order to bring them (regional unemployment rates) back into line."

The purpose of this section is to investigate formally how shocks to regional labor demand in Europe are absorbed. We analyze the joint behavior of regional relative employment, relative unemployment rates and relative participation rates in response to labor demand shocks and compare the results to those for the US. To the extent regional labor demand shocks are not reflected in unemployment or labor force participation rates they must be absorbed by interregional migration. The system we estimate for both Europe and the US is set out below.

$$\Delta n_{it} = \lambda_{i10} + \lambda_{11}(L)\,\Delta n_{it-1} + \lambda_{12}(L)\,e_{it-1} + \lambda_{13}(L)\,p_{it-1} + \epsilon_{i\rho t} \tag{11}$$

$$e_{it} = \lambda_{i20} + \lambda_{21}(L)\,\Delta n_{it} + \lambda_{22}(L)\,e_{it-1} + \lambda_{23}(L)\,p_{it-1} + \epsilon_{i\sigma t} \tag{12}$$

$$p_{it} = \lambda_{i30} + \lambda_{31}(L)\,\Delta n_{it} + \lambda_{32}(L)\,e_{it-1} + \lambda_{33}(L)\,p_{it-1} + \epsilon_{irt} \tag{13}$$

where n_{it}, eit, and p_{it} are defined as in (3), (4) and (6).

Since data on regional working age population is available from 1975 onwards for Europe and 1976 onwards for the US, our estimation periods for Europe and the US are from 1975-87 and 1976-90 respectively. We consider no more than two lags and initially pool the data while allowing for region-specific fixed effects. For the β_i's, δ_i's and ξ_i's for Europe and the US we again use the estimates obtained in Section 2.

Because we are interested in analyzing the effects of regional labor demand shocks we need to identify them in some way. Following Blanchard and Katz (1992) we associate unexpected changes in regional relative employment within the year with changes in labor demand, which is a plausible assumption as long as the largest fraction of these unexpected changes is not due to exogenous changes in labor supply or migration. Consequently we allow current changes in relative employment to affect unemployment and participation rates but not vice-versa. It then suffices to trace the effects of an innovation in relative employment (the effect of $\epsilon_{i\rho}$) to understand the dynamic effects of an innovation in labor demand on relative employment, employment rates and participation rates.

Figures 6 and 7 show the impulse responses of employment, employment rates and labor force participation rates to a one standard deviation innovation in relative

employment. Essentially, in Europe a one-standard-deviation innovation in regional employment raises relative employment by 1.61 percentage points, the relative participation rate by 1.20, and the relative employment rate by 0.35 points. In the US the respective figures are 1.44 for relative employment, 0.26 for relative participation, and 0.43 for relative employment rates. Hence the size of a typical labor demand shock is quite similar in the US and Europe.

In Europe, it takes roughly 3 years for the effect on the labor force participation rate and 4 years for the effect on the unemployment rate to disappear.[24] Note that in the first year virtually 100% of the increase in employment in response to the initial shock is reflected in an increase of the participation and employment rates, in the second year 73% is, in the third 55%, and in the fourth 20%.[25] Hence only after the third year does net immigration account for a substantial portion of the adjustment to the shock.

The point that seems to be common to both the US and Europe is that the rise in the employment rate accounts for a small portion of the gain in employment in response to a positive regional labor demand shock. The main difference arises from the roles played by labor force participation and migration. In the US from the first year onwards net immigration accounts for 52% of the increase in regional employment whereas in Europe it is only after the third year that immigration accounts for a similar proportion of the rise in employment. The reverse holds for regional labor force participation: in Europe its increase accounts for 78% of the rise in employment in the first year and 50% in the second whereas the respective figures for the US are 18% and 17%.[26]

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[24] We also estimated the bivariate system in regional relative employment differences and employment rates over the period 1966-87. The result concerning the behavior of relative employment rates was confirmed: in period 1 they rise by 0.2 percentage points and in period four they return to the initial level. However, shocks to relative employment levels seem more persistent: the plateau at which employment settles is 0.9 percentage points higher.

[25] Allowing for country-specific time dummies the results are very similar. The only difference is that regional employment settles at a lower plateau: after an initial rise of 1.43 percentage points it finally settles at a level were it is 0.42 points higher whereas without time dummies it settles at a plateau at which it is 0.92 percentage points higher.

[26] Note that for the US everywhere establishment data on employment has been used. We also estimated the system for the US using household data on employment which is available from 1976 onwards. This data is actually more comparable to our employment data for Europe (only the UK data on employment is establishment data). Again net immigration accounts for the largest portion of the adjustment to a favorable labor demand shock: it explains 43% of the initial increase in employment. Interestingly, with the CPS data labor force participation changes now account for a larger portion of the rise in employment in the first year than increases in employment rates: the figures are 38% for participation and 19% for unemployment. Further, the effects on employment rates and participation disappear more quickly, namely after three and four years respectively rather than five and six years. Employment also settles at a lower plateau due to a larger feedback of labor

We check whether we observe little migration in response to shocks because people are reluctant to migrate across countries in Europe or whether they are reluctant to migrate even within their countries in response to labor demand shocks. To do so we shift our focus from EEC-wide to national employment and labor force participation and run the trivariate system for Germany, Italy and the UK separately, defining relative variables as regional relative to national totals.[27] Figures 8A, 8B, and 8C show the results for Germany, Italy and the UK respectively.[28] They confirm that in the short run participation is the main adjustment mechanism, while, except for Italy, the role played by the employment rate over both the short and long run is negligible. Moreover, migration again does not react much in the first three years except in Germany. Hence our findings in Figure 6 are basically confirmed on the national level.

Here it is important to note that our results do not imply that within countries labor does not move in response to interregional economic disparities. Note that in our trivariate system we have allowed for region-specific fixed effects. Consequently we are not explaining steady migrational flows between regions (e.g. a steady flow of migrants from Ireland to the UK or from southern Italy to the northern Italy). Such steady flows are driven by structural disparities between regions rather than by labor demand shocks.[29]

Our results thus indicate that changes in labor demand are to a large extent met by people moving in and out of the labor force. They confirm evidence by Burda and Wyplosz (1990) who find that in Germany over the period from 1970 to 1988 the gross flows from out of the labor force to employment often were considerably larger than the gross flows from unemployment to employment. There are several mechanisms that can explain the empirical relevance of these flows. Moreover, some of them are more likely to operate on the regional rather than the aggregate level.

First, employers in Europe rely considerably on early retirement to adjust the size of the workforce in their firms. In Germany for instance, when a firm reduces

force participation on employment. These results are closer to those obtained for Europe.

[27] This was not done for Spain because data on regional participation was available only from 1981 onwards and for France because data on participation was missing for the years 1979, 1980 and 1981. Estimates for the β_i's, $_i$'s and ξ_i's, which are needed to construct region-specific variables, are obtained by regressing the logarithms of regional employment growth, employment rates and participation rates on their respective national counterparts.

[28] It turns out that West Berlin behaves quite differently from the other regions in its panel. The impulse responses presented in Figure 8A are those one obtains upon excluding West Berlin from its panel. Also, in the case of the UK sensible results could only be obtained once employment levels rather than differences were used.

[29] See De Grauwe and Vanhaverbeke (1991) for an analysis of these flows.

the size of its workforce, employers and union representatives usually work out a restructuring scheme the main ingredient of which is early retirement of older workers. This is also true for France where around 50% of the 55-64 year old are either unemployed or have left the labor force.[30] Further, in the 1980's an increasing number of employees qualified for disability pensions: Emerson (1988) notes that during the 1970's and 1980's the number of people on disability pensions in Europe rose enormously and traces this to changes in eligibility criteria. These criteria have become more heavily weighted by social and economic factors rather than strictly medical ones.[31]

A second reason for labor force participation to change considerably in response to labor demand shocks is that the women bear a disproportionate burden of adjustments to shocks. Women on average are employed in lower skill positions than men and therefore severance costs are lower. Abraham and Houseman (1990) observe that in response to adverse regional labor demand shocks women are more likely to drop out of the labor force than men. Further, they find that women in Germany have a stronger tendency to do so than women in the US.

Lastly, the household survey data on employment for Europe also includes all the part-time employed. For example, in the UK and in Germany the ratio of part-time to full-time employed women in the early 1980's amounted to roughly 40% and 30% respectively. The movements in and out of the labor force may be part-time employees who are hired in booms and fired in recessions.

5. CONCLUSIONS AND IMPLICATIONS FOR EMU

In the paper we analyzed and compared the incidence and repercussions of shocks to regional labor markets in Europe and the US. We first investigated the extent to which labor market dynamics are idiosyncratic rather than common to all regions in Europe and all states in the US. While in the US only 40% of the dynamics in employment growth are state-specific, the number for Europe's regions is 80%. Even upon controlling for country-specific dynamics in Europe, about 50% of all innovations in employment growth are still region-specific. The importance of

[30] Source: The Economist, July 25th-31st 1992, p57.

[31] The number of people on disability pensions in Germany rose from 1.746 million in 1975 to 2.332 million in 1983 which amounts to 10% of the employed. For the UK the numbers are 450 000 and 737 000, for the Netherlands they are 344 000 and 673 000 (12% of the employed). Apparently in the Mezzogiorno in Italy two and a half times as many people were on disability insurance than on regular pensions in the early 1980's (see Emerson, 1988). In the US the number of people on disability insurance actually declined from 4.129 million in 1975 to 3.865 million in 1983.

region-specific shocks in Europe led us to investigate the adjustment mechanisms they trigger in more detail.

We identified region-specific changes in the demand for labor and then investigated their effects on regional employment levels, unemployment rates and labor force participation rates. In both Europe and the US, a region-specific increase in the demand for labor permanently raises the employment share of a region, indicating that in the long run workers migrate into regions with booming labor markets to look for employment. However, with respect to both the magnitude of the long-run effects of these shocks and the short-run adjustment mechanisms they trigger, the evidence for Europe and the US differs noticeably. First, the long-run effects of the shocks on a regions's share in total employment are much larger in the US. Second, in Europe, during the first three years a region-specific increase in labor demand is mainly met by higher labor force participation, whereas in the US immigration plays the most important role in the adjustment from the first year onwards. Strikingly, however, in both Europe and the US regional unemployment drops only to a small extent and transitorily, suggesting the presence of natural relative unemployment rates at the regional level. The low persistence in the response of regional unemployment to region-specific shocks in Europe stands in marked contrast to the high persistence of changes in unemployment in response to aggregate shocks.

Our results can be interpreted within the framework provided by the literature on optimal currency areas to assess how appropriate a single currency area for Europe would be. Based solely on the Mundell (1961) criteria for optimal currency areas, our results would imply that the regions in Europe form a less suitable single currency area than the states in the US. Indeed, in Europe shocks are distributed less symmetrically across regions and people apparently migrate less rapidly in response to them. However, it also appears that a large proportion of employment shocks are region- and not country-specific in nature in Europe. In addition, the results of our country-by-country analysis of region-specific dynamics indicate that, in the short run, interregional migration even within countries in response to shocks is not substantial. These latter findings suggest that, from the Mundell perspective, the present currency areas in Europe may not represent a substantially superior arrangement to that provided by a single currency.

Data Appendix

The source for the regional data on employment and unemployment is:

OECD, Regional Employment and Unemployment, 1960-87

The data span the following periods (sources of the data are in parentheses):

France: 1954, 1962, 1968, 1974-87 (INSEE; Labor Force Survey)

Germany: 1960-87 (Stat. Bundesamt; Employment: Microzensus, Unemployment: Registered Unemployed)

Italy: 1960-87 (ISTA; Labor Force Survey)

Spain: 1977-87 (INE; Labor Force Survey)

UK: 1965-87 (Employment: Establishment Survey, Unemployment: Registered Unemployed)

In this data set, the regional unemployment data for Italy has a considerable statistical break in 1976-77. Before 1977, the national total was considerably larger. We adjusted pre-1977 figures by multiplying them with the ratio of national unemployment to total regional unemployment.

The source for all national data on employment, unemployment and working-age population which is used for Belgium, Denmark, Greece, Ireland, Netherlands and Portugal is:

OECD, Labor Force Survey, 1966-89

The 1968 data on regional unemployment in Spain was provided to us by Samuel Bentolila and is published by Banco de Bilbao, *Renta Nacional de España y su Distribución Provincial.* Again the sum of regional unemployment differed substantially from the country total as published by the OECD in its *Labor Force Survey* and hence we adjusted it for usage in Figure 3A by multiplying regional unemployment by the ratio of the national total (as published by the OECD) and total regional unemployment.

The source for regional data on working-age population (15-64 years old) is:

EUROSTAT, Regional Databank: REGIO, 1991 (Section: DEMO)

This data is based on census data which is adjusted for the natural increase in population and net immigration. Figures for the natural changes are very accurate whereas those for migration are less so. The resulting error tends to increase as the date of the most recent census becomes remote; every time a new census is carried out the figures are revised. Periods covered by our data are shown below:

France: 1975-1978, 1982-87 (last census: March 1982)

Germany: 1975-87 (last census: 1970)

Italy: 1975-87 (last census: October 1981)

UK: 1975-87 (last census: April 1981)

Spain: 1981-87 (last census: March 1981)

Participation rates are obtained by dividing the labor force in each region (obtained with the OECD data on employment and unemployment) by the working-age population computed from the demographic data described above.

We thank Larry Katz for providing us with the regional data for the US. The 51 regions for which data are available include the 50 states and the District of Columbia. Employment data comes from establishment surveys and comprises nonagricultural employment only. For the trivariate system the unemployment and population data come from the CPS (last census: 1980). To obtain regional labor force data CPS unemployment is added to establishment employment which is normalized so that it is equal to the CPS number in 1976. Working age population data also comes from the CPS. For a more precise description of the data sources see the Data Appendix of Blanchard and Katz (1992).

Appendix A

TABLE 1A

Regression of Regional Employment Growth, Unemployment Rate and the Logarithm of the Participation Rate on the same variable for all of Europe. Annual Data, Employment (N) and Unemployment Rate (U) 1966-87 (France 1974-87, Spain 1977-87), Participation Rate (P) 1975-87 (Spain 1981-87).

$$\Delta\, log(N_{it}) = \alpha_{1i} + \beta_i\, \Delta\, log(N_{et}) + \mu_{1it}$$

$$U_{it} = \alpha_{2i} + \delta_i\, U_{et} + \mu_{2it}$$

$$log(P_{it}) = \alpha_{3i} + \xi_i\, log(P_{et}) + \mu_{3it}$$

Region	β_i	$\overline{R}^2$	δ_i	$\overline{R}^2$	ξ_i	$\overline{R}^2$
France						
Ile de France	0.41*	0.37	0.55*	0.90	2.71	0.45
Bassin Parisien	0.42*	0.16	1.04	0.95	2.52	0.44
Nord-Pas-de-Calais	0.24*	0.00	1.24*	0.93	2.52	0.59
Est	0.50*	0.27	0.93	0.98	2.57	0.43
Ouest	0.22	-0.02	1.04	0.96	1.93	0.34
Sud-Ouest	0.42*	0.22	0.80*	0.96	1.71*	0.72
Centre-Est	0.34*	0.14	0.79*	0.96	2.50	0.48
Mediterrane	0.62	0.32	0.98	0.95	0.97	0.51
Germany						
S.Holst. and Hamburg	1.01	0.09	1.14*	0.95	-1.33*	0.08
Nieders.and Bremen	1.46	0.22	1.18*	0.96	0.98	0.20
Nord.-Westfalen	1.72	0.44	1.11*	0.96	-0.25	-0.07
Hessen	1.28	0.33	0.68*	0.88	-0.42	-0.07
R.Pfalz Saarl.	1.51	0.19	0.89*	0.93	-0.93	-0.02
B.-Wrttemberg	1.74	0.31	0.55*	0.88	0.34	-0.06
Bayern	1.40	0.28	0.65*	0.85	-0.77	-0.02
Berlin(West)	2.33	0.20	1.05	0.98	-0.91	-0.07
Italy						
Nord-Ovest	0.40	0.00	0.61*	0.95	2.23	0.40
Lombardia	0.56	0.06	0.49*	0.92	1.87	0.17
Nord-Est	0.93	0.17	0.52*	0.93	1.29	0.00
Emilia-Romagna	0.92	0.14	0.35*	0.86	0.98	0.06
Centro	0.25	-0.04	0.49*	0.92	0.73	-0.06
Lazio	0.14	-0.05	0.30*	0.60	-3.70*	0.37
Campania	-0.63	-0.02	1.00	0.65	-1.54	-0.02
Abruzzi-Molise	1.13	0.08	0.36*	0.72	1.37	0.00
Sud	-0.25*	-0.04	0.76*	0.75	1.14	0.36
Sicilia	0.27	-0.03	1.11	0.91	-0.86	-0.05
Sardegna	1.65	0.26	1.51*	0.93	0.26	-0.09

* Significantly different from 1 at 5%

Region	β_i	$\overline{R}^2$	δ_i	$\overline{R}^2$	ξ_i	$\overline{R}^2$
Spain						
Noroeste	-0.48*	0.05	1.86*	0.91	3.09	0.03
Noreste	1.66	0.28	2.36*	0.96	5.34*	0.71
Madrid	1.41	-0.03	1.86*	0.86	3.70	0.53
Centro	0.87	0.00	2.07*	0.95	4.82*	0.66
Este	2.75	0.54	2.70*	0.97	5.66*	0.94
Sur	2.51	0.37	3.27*	0.97	5.96*	0.94
Canarias	2.17	0.25	3.01*	0.92	5.66*	0.72
United Kingdom						
North	1.93	0.31	1.15*	0.94	4.91	0.34
York.and Humb.	1.89*	0.53	1.01	0.95	4.21*	0.47
East Midlands	1.61	0.26	0.80*	0.95	2.38	0.27
East Anglia	1.91	0.39	0.58*	0.90	0.17	-0.09
South-East	0.99	0.29	0.61*	0.96	0.73	0.14
South-West	1.43	0.44	0.63*	0.93	2.61	0.48
West Midlands	2.21	0.51	1.13	0.93	3.92*	0.42
North-West	1.60	0.35	1.13*	0.96	4.77*	0.39
Wales	1.49	0.20	1.11*	0.97	4.99*	0.35
Scotland	1.33	0.32	0.89	0.93	3.27*	0.43
Northern Ireland	1.21	0.01	1.17*	0.92	0.35	-0.09
Belgium	0.97	0.58	1.30*	0.96	0.75	0.37
Denmark	0.87	0.08	0.83	0.55	-1.31*	0.04
Greece	-0.08*	-0.05	0.51*	0.48	-3.55*	0.46
Ireland	1.01	0.23	1.39*	0.92	0.77	0.26
Netherlands	1.43	0.14	1.19*	0.95	-1.29	-0.04
Portugal	0.90	0.01	0.68*	0.68	0.22	-0.08

* Significantly different from 1 at 5%

TABLE 2A

Regression of Regional Employment Growth on European Employment Growth allowing for Country Specific Time Dummies. Estimation period: 1966-87 (France 1974-87, Spain 1977-87); $\overline{R}_T^2$ stands for the $\overline{R}^2$ value of the estimation with time dummies; F stands for the F-statistic for the exclusion of all time dummies.

Region	β_{1i}
France $\overline{R}_T^2 = 0.76$ $\overline{R}^2 = 0.31$ $F = 15.80$	
Ile de France	0.92
Bassin Parisien	0.93
Nord-Pas-de-Calais	0.75
Est	1.01
Ouest	0.73
Sud-Ouest	0.92
Centre-Est	0.85
Mediterrane	1.13

Region	β_{1i}
Germany $\overline{R}_T^2 = 0.52$ $\overline{R}^2 = 0.25$ $F = 3.11$	
S.Holst. and Hamburg	2.72
Nieders.and Bremen	3.17
Nord.-Westfalen	3.41
Hessen	2.98
R.Pfalz+Saarland	3.21
B.-Wrttemberg	3.44
Bayern	3.10
Berlin(West)	4.03
Italy $\overline{R}_T^2 = 0.41$ $\overline{R}^2 = .04$ $F = 7.67$	
Nord-Ovest	1.57
Lombardia	1.73
Nord-Est	2.09
Emilia-Romagna	2.08
Centro	1.42
Lazio	1.30
Campania	0.53
Abruzzi-Molise	2.30
Sud	0.92
Sicilia	1.44
Sardegna	2.82
Spain $\overline{R}_T^2 = 0.60$ $\overline{R}^2 = 0.20$ $F = 5.46$	
Noroeste	-9.56
Noreste	-7.41
Madrid	-7.67
Centro	-8.20
Este	-6.33
Sur	-6.56
Canarias	-6.90
United Kingdom $\overline{R}_T^2 = 0.52$ $\overline{R}^2 = 0.30$ $F = 6.00$	
North	3.30
York. and Humb.	3.25
East Midlands	2.97
East Anglia	3.27
South-East	2.35
South-West	2.79
West Midlands	3.58
North-West	2.96
Wales	2.85
Scotland	2.69
Northern Ireland	2.57

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FIGURE 1A

REGIONAL EMPLOYMENT GROWTH RATES: EUROPE

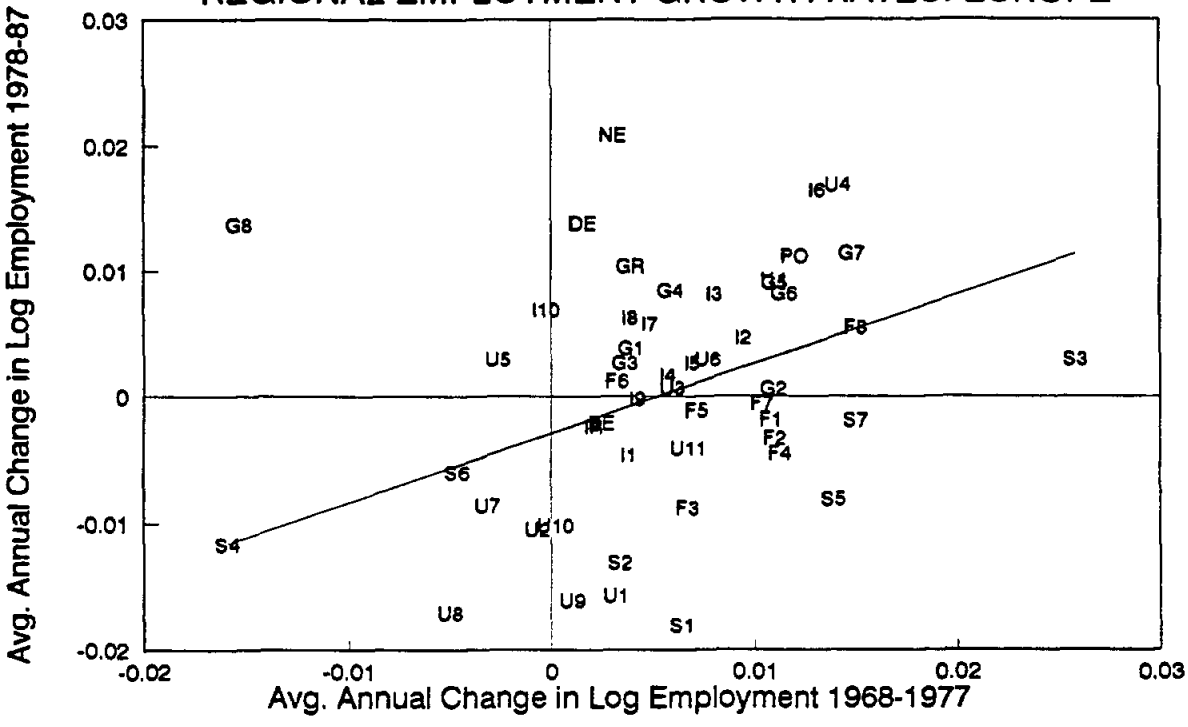

FIGURE 1B

REGIONAL EMPLOYMENT GROWTH RATES: US

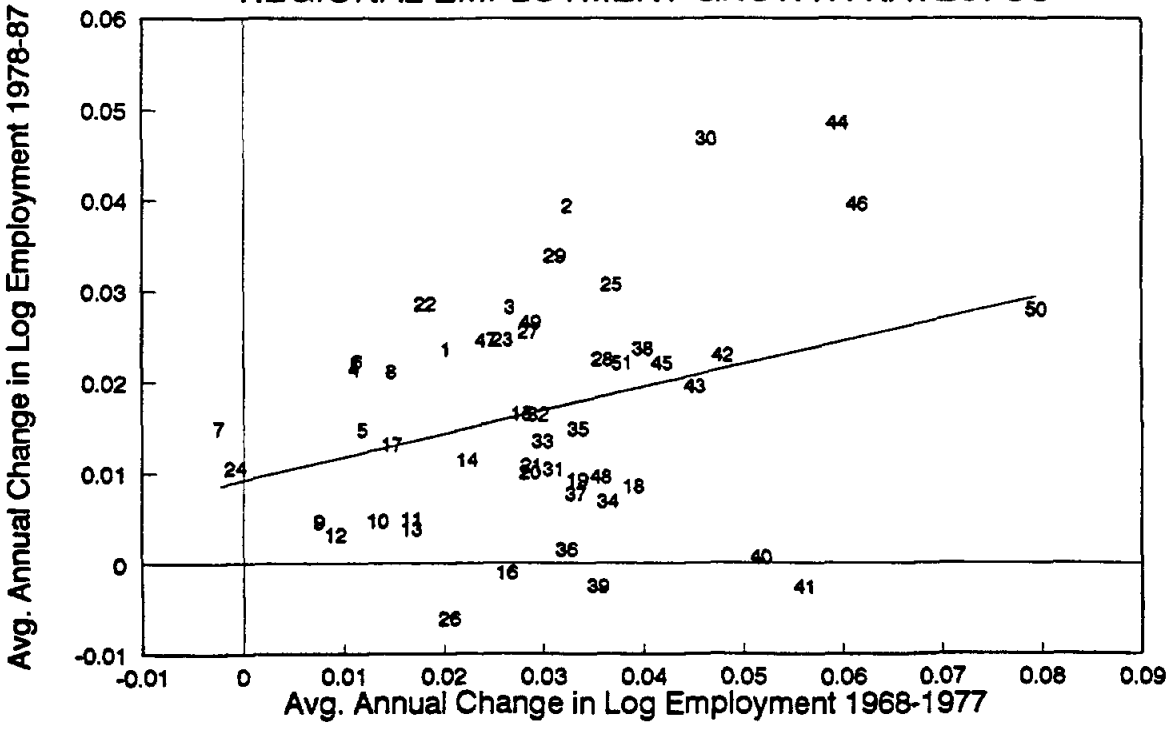

FIGURE 2
RESPONSE OF RELATIVE EMPLOYMENT: EUROPE AND US
One Std. Dev. Innovation

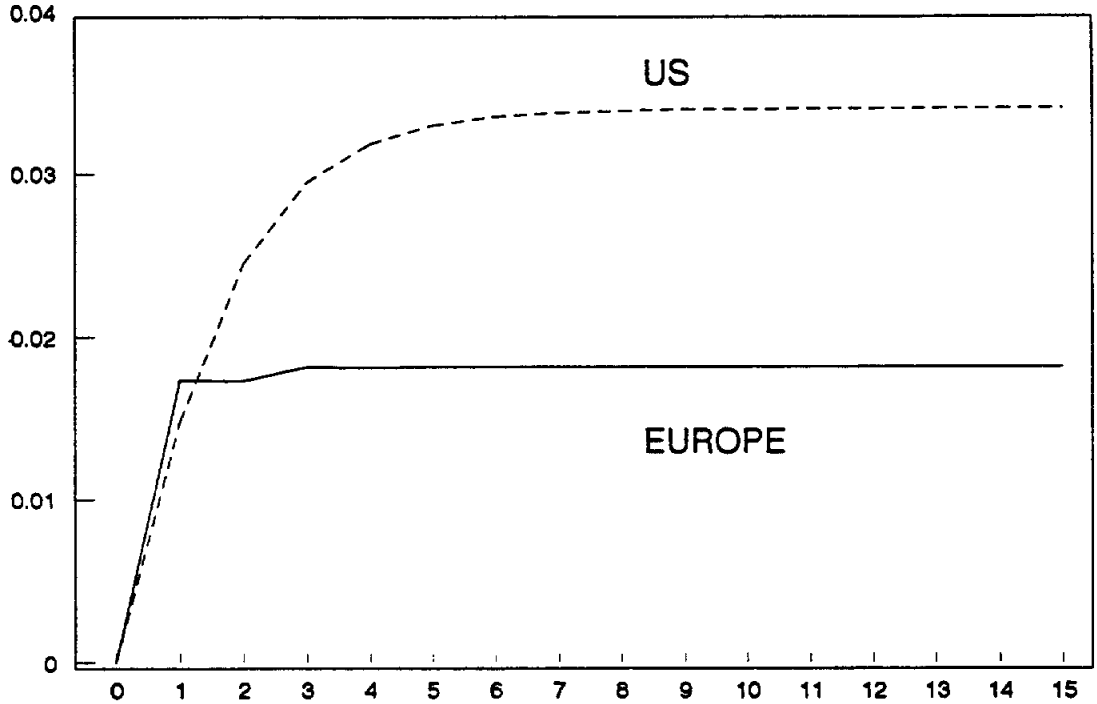

FIGURE 3A
RELATIVE UNEMPLOYMENT RATES: EUROPE

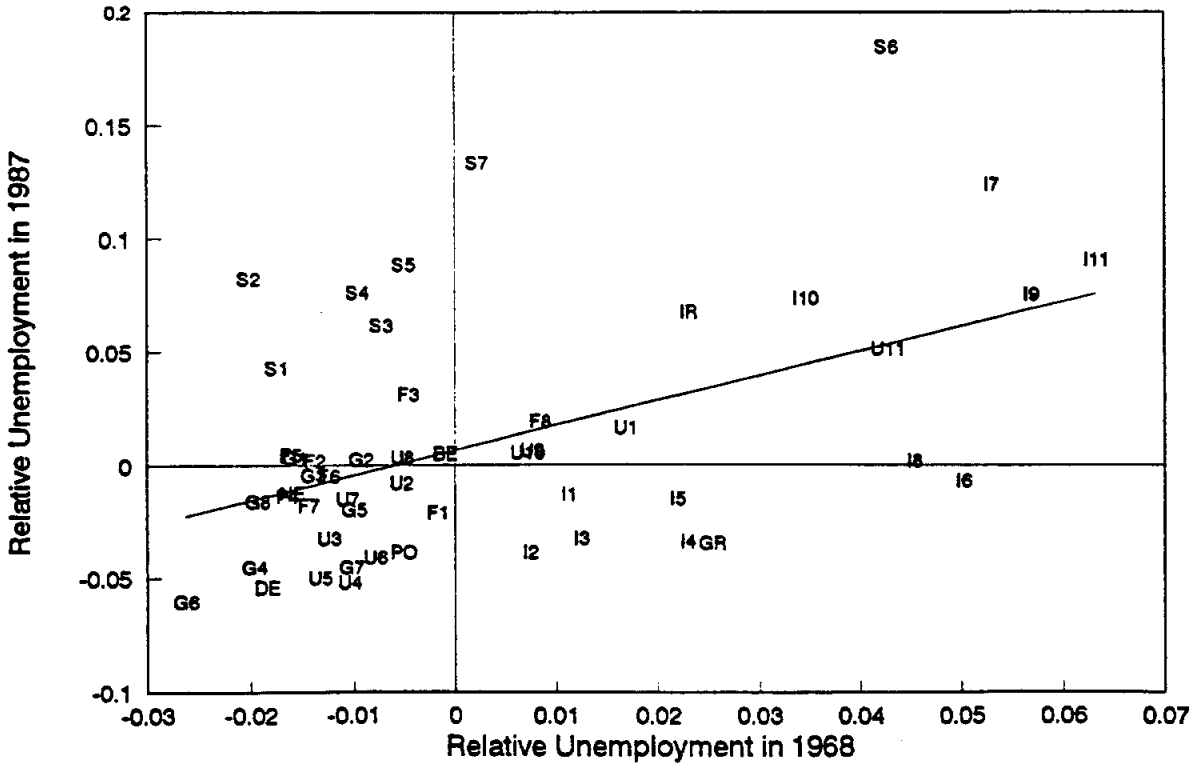

FIGURE 3B

RELATIVE UNEMPLOYMENT RATES: US

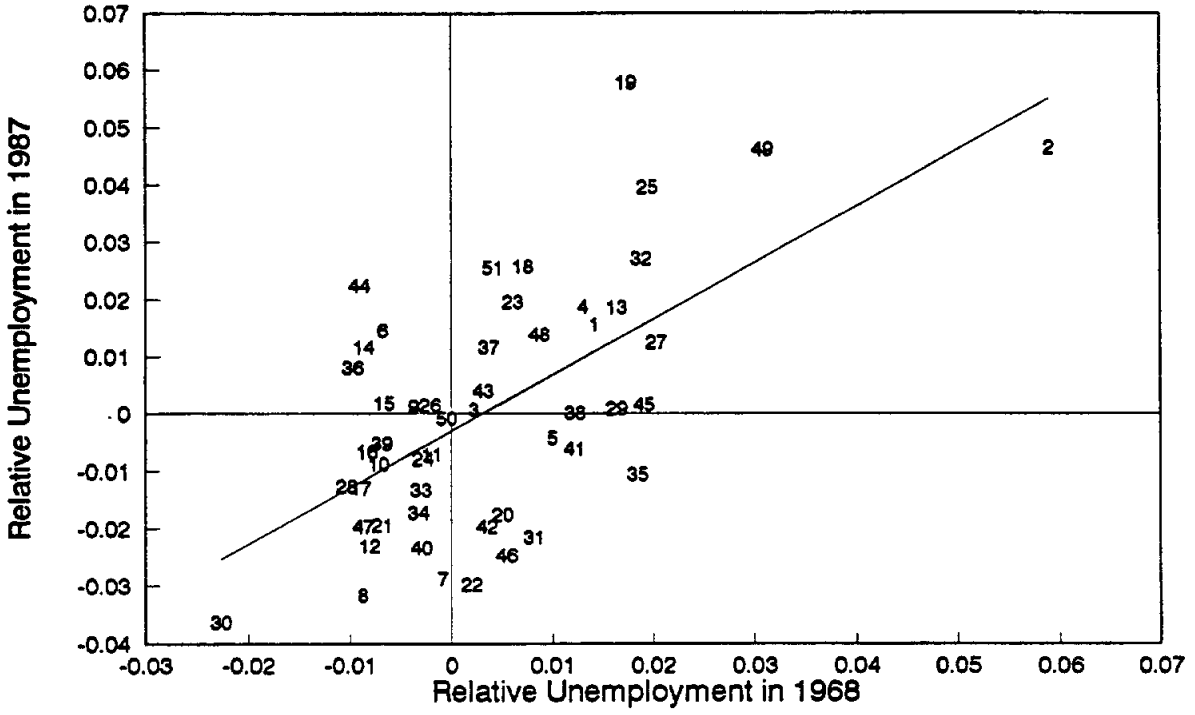

FIGURE 3C

DEMEANED (NATIONAL MEANS) RELATIVE UNEMPLOYMENT RATES: EUROPE

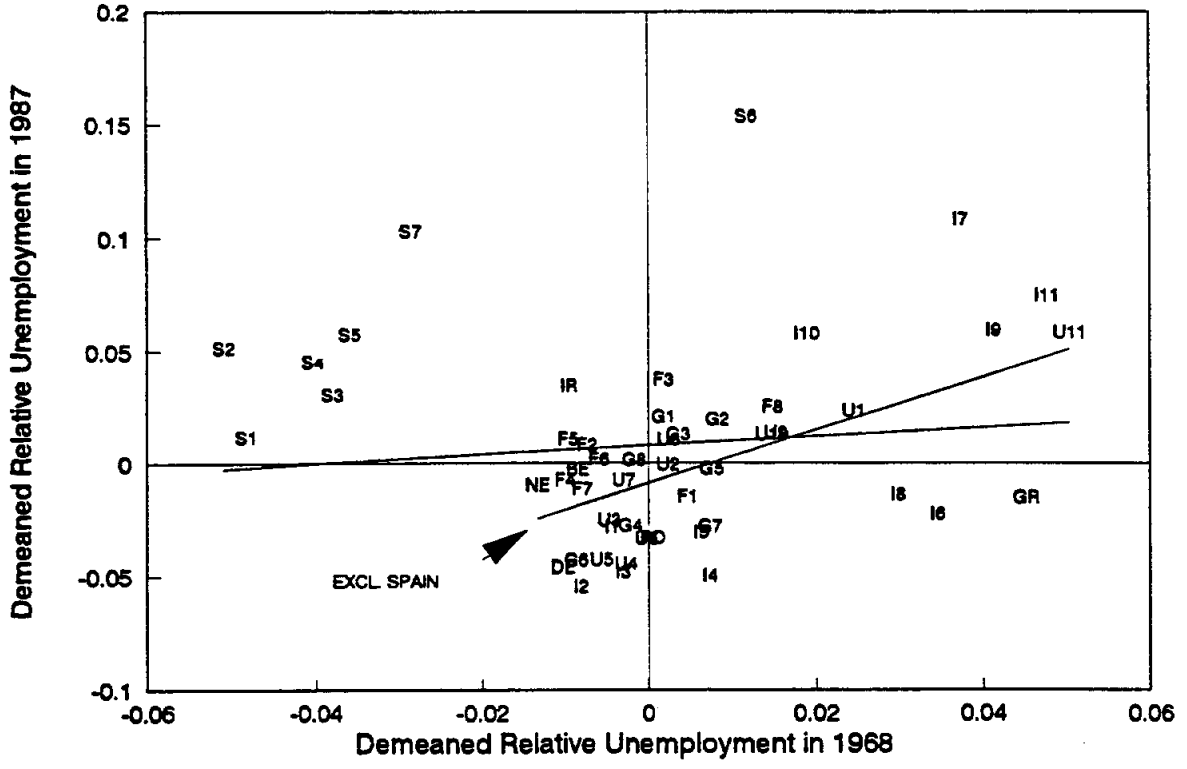

FIGURE 4
RESPONSE OF RELATIVE UNEMPLOYMENT: EUROPE AND US
One Std. Dev. Innovation

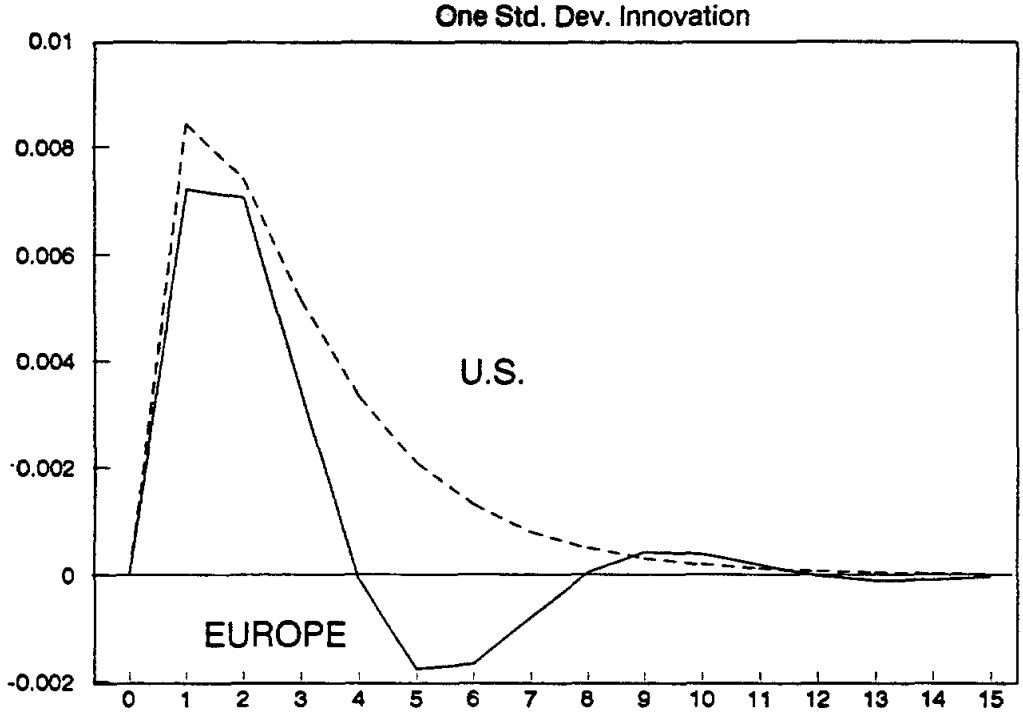

FIGURE 5
RESPONSE OF ABSOLUTE UNEMPLOYMENT: EUROPE AND US
One Std. Dev. Innovation

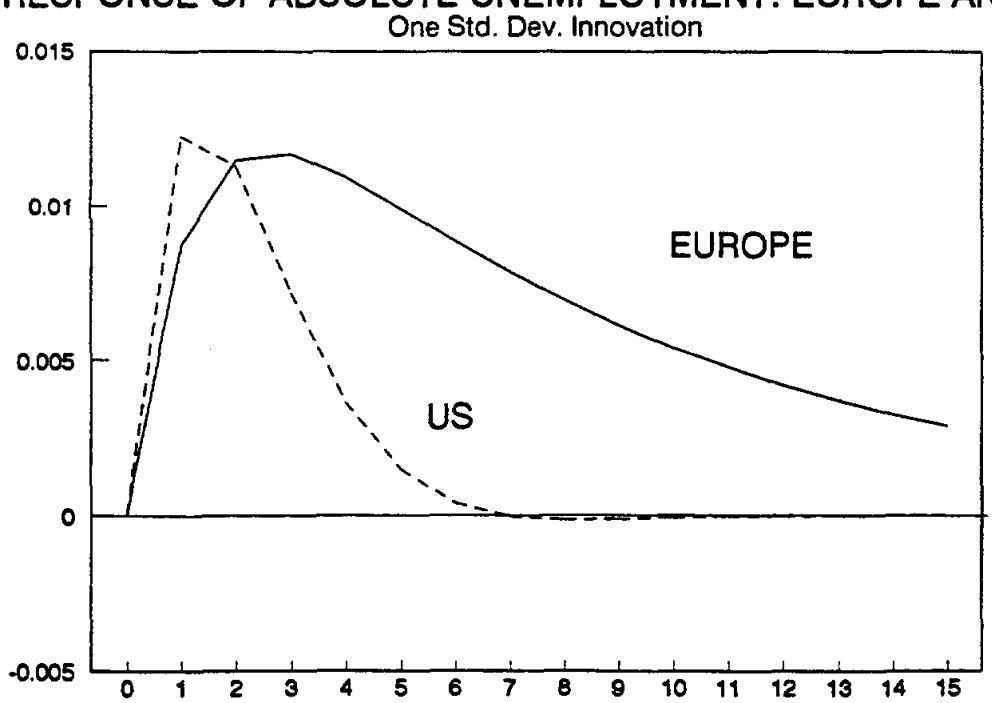

FIGURE 6
RESPONSES TO LABOR DEMAND SHOCKS: EUROPE
One Std. Dev. Innovation

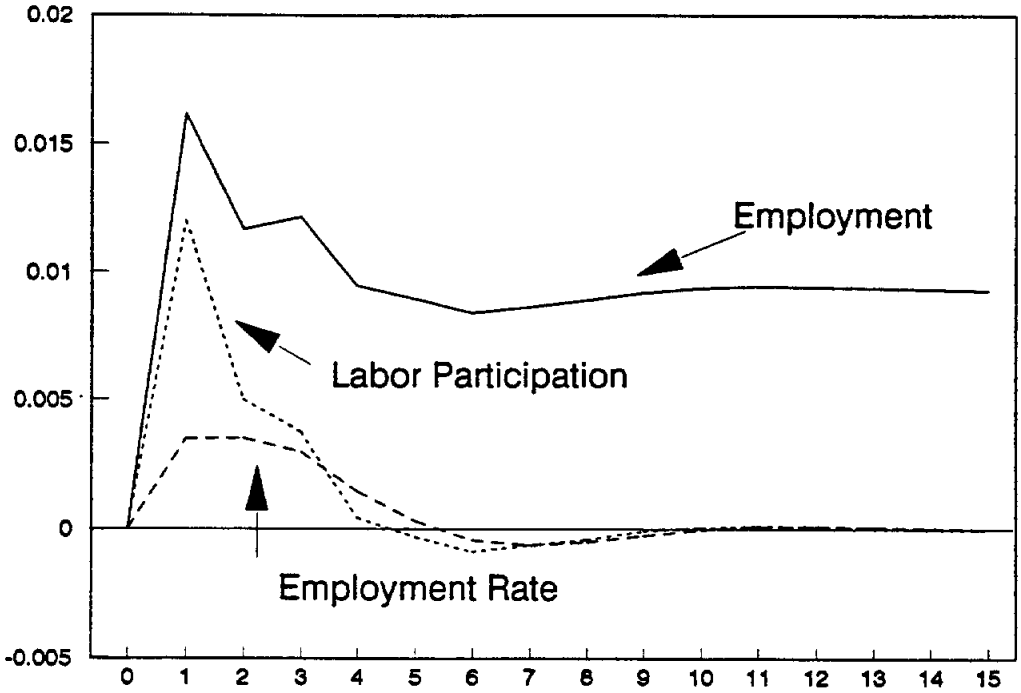

FIGURE 7
RESPONSES TO LABOR DEMAND SHOCKS: US
One Std. Dev. Innovation

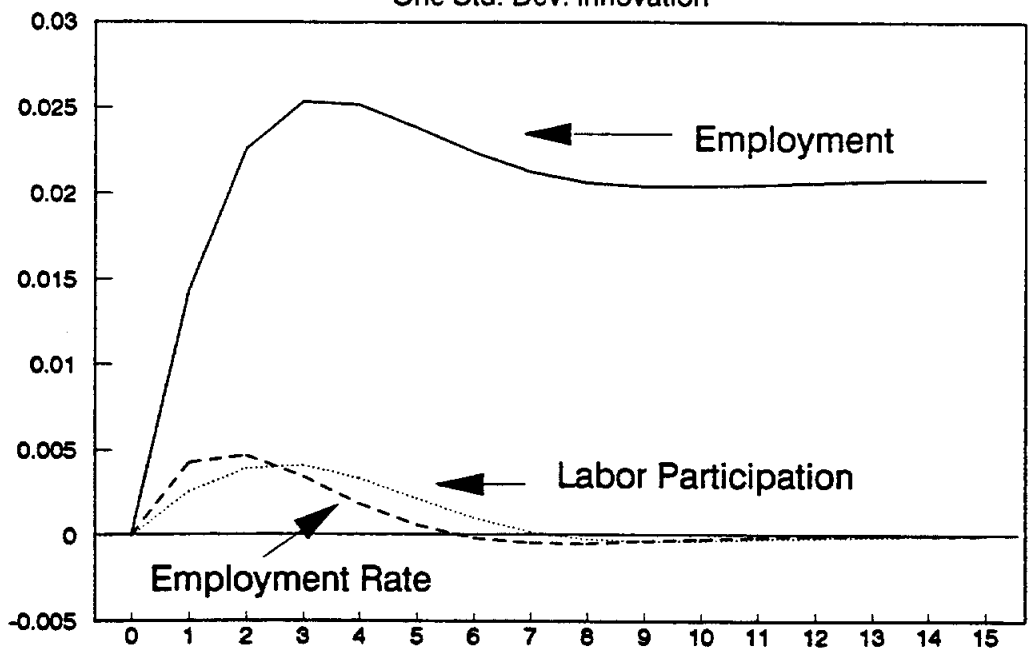

FIGURE 8A
RESPONSES TO LABOR DEMAND SHOCKS: GERMANY
One Std. Dev. Innovation

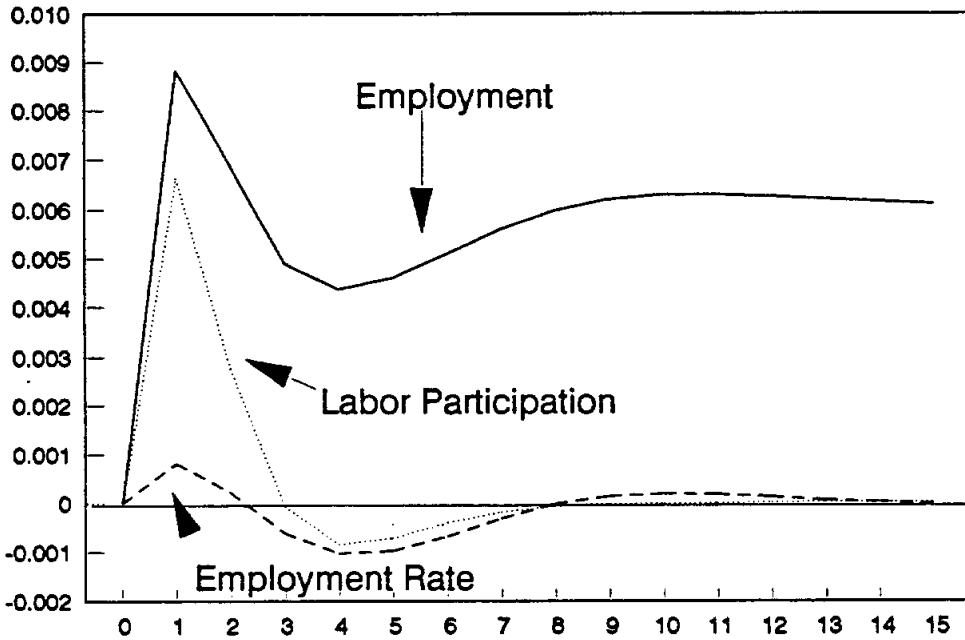

FIGURE 8B
RESPONSES TO LABOR DEMAND SHOCKS: ITALY
One Std. Dev. Innovation

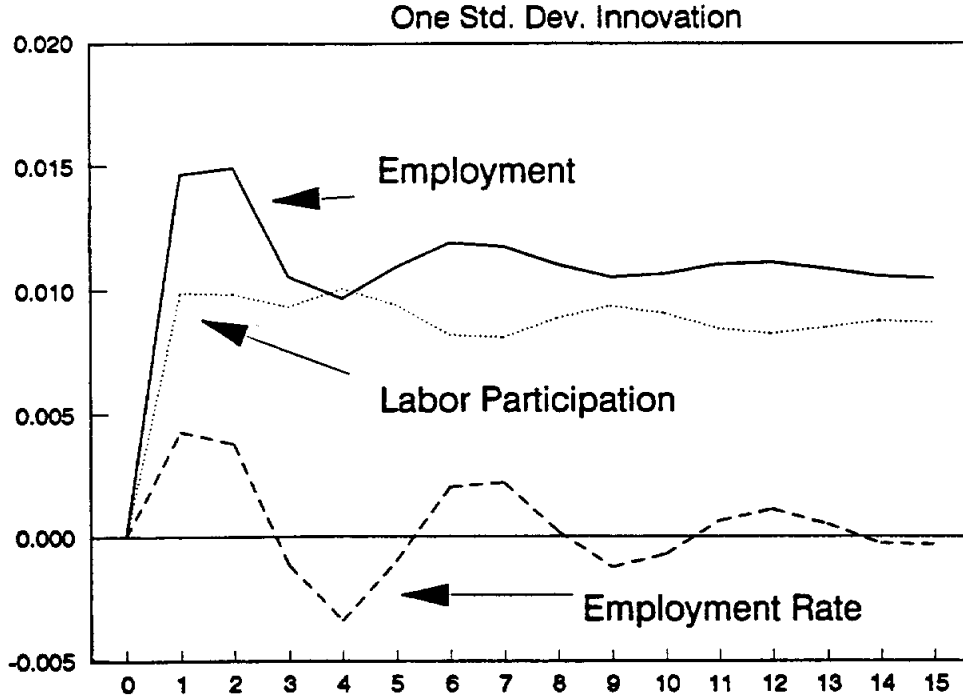

FIGURE 8C
RESPONSES TO LABOR DEMAND SHOCKS: U.K.
One Std. Dev. Innovation