# Labor market adjustment dynamics and labor mobility within the euro area

■ Moving to a single currency has reduced trading costs, enhanced price transparency and increased financial stability. However, the euro area is sometimes subject to asymmetric shocks. In order to respond to these shocks, EMU Member States can rely on appropriate national policies, or other real dynamics adjustment mechanisms, such as real competitiveness adjustments or the mobility of production factors, such as capital and labor.

■ Two papers from the 1990s showed that labor mobility was lower within the European Union than in the United States, and that most of the shocks' effects were absorbed by changes in the participation rate on labor markets rather than migrations. The following paper compares labor market adjustment mechanisms in the euro area and in the United States, taking into account recent labor market data.

■ The paper models labor market dynamics between 1973 and 2005. Results suggest that labor mobility in response to asymmetric labor demand shocks is lower in the euro area than in the United States. A decrease in relative labor demand (in other words subtracting the decrease for the euro area as a whole) by 10 workers the first year is associated with a relative increase in net out-migration of 3 workers after 15 years in the euro area, compared to 9 workers in the United States. Changes in labor participation are a stronger adjustment mechanism in the euro area.

■ Estimates based on a more recent period (1990-2005), however, indicate that the reactions of European labor markets to asymmetric shocks have become closer to those observed in the United State. The contribution of labor participation to the adjustment process appears to have diminished, and relative movements of labor forces between Member States seem to have become a more efficient adjustment mechanism.

Change in the number of workers following a decline by 10 people in the relative labour demand in a country of the euro area
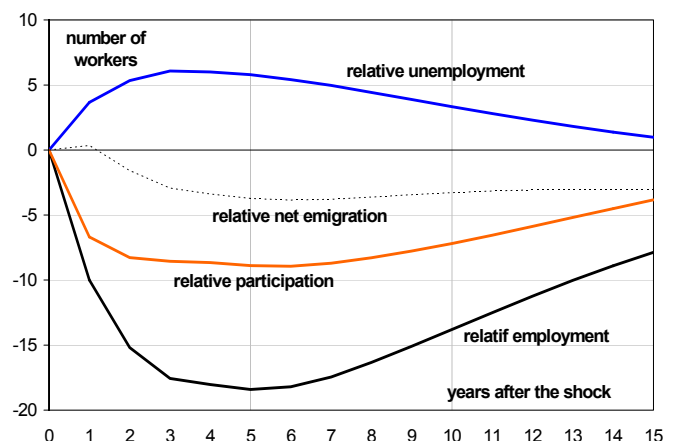
Source: Feri and DGTPE

A risk weight of 100% corresponds to the Cooke ratio. This is the foundation internal ratings-based (IRB) approach.

1. The mobility of production factors can be an adjustment mechanism in response to an asymmetric shock to a monetary union

1.1 Asymmetric shocks to the euro area

The euro area is subject to shocks, which can have diverging consequences for individual Member States in terms of growth or inflation. In this context, losing the direct control of monetary or exchange rate policy may represent a loss in terms of flexibility. For the euro area to be considered an "optimal currency area", as economic theory puts it, flexibility should increase in other domains in order to compensate for this loss.

National policies, budgetary in particular, can be used to respond to the shocks that affect each Member State. In this respect, it is useful to coordinate national budget policies. However, these policies may not allow sufficiently fine tuning in response to asymmetric shocks. In order to increase the resilience of the euro area, other real dynamic adjustment mechanisms are crucial, for example relative competitiveness adjustments or the mobility of production factors, such as capital and labor.

Financial integration and capital mobility are relatively strong in the euro area. On the contrary, two major contributions from the 1990s found that labor mobility was lower in Europe, in response to asymmetric shocks, compared to the United States.

1.2 Labor mobility is stronger in the United States

Due to the limited, and often unreliable data availability for working-age population migrations between States or even between countries, Blanchard and Kats[1] suggested an simple accounting framework in order to analyse the effects of an asymmetric shock on the labor market of an "average" State in the United States between 1978 and 1990: a given person between 15 and 64 years of age is either employed, unemployed, out of the labor force or out of the country. Based upon this framework, labor force movements, to or from a given State, in response to asymmetric shocks, correspond to the adjustments to employment developments unexplained by changes in unemployment or participation. These movements correspond to "net out-migrations" in response to shocks, which can represent both stronger out-migrations and weaker in-migrations.

Decressin and Fatás[2] applied a similar method to the 51 EU15 regions between 1975 and 1987. Whereas in the United States, migrations represented an efficient adjustment mechanism, in Europe, most of the asymmetric shocks' effects were on the contrary absorbed by changes in the participation rates on labor markets (in other words, by persons leaving the labor market in response to a negative shock to labor demand).

However, with pursuit of the European integration process, dynamic adjustment mechanisms may have improved. It is therefore interesting to test whether Decressin's and Fatás's results are still relevant for the euro area Member States. The paper compares the labor market dynamics in the 12 euro area Member States on the one hand and in the 51 United States on the other over the 1973-2005 period. It analysis, in an "average" State in each zone, the contribution of employment, unemployment, participation and net migration to the adjustment process, in the short and medium term, in response to an asymmetric shock to the labor demand addressed to a particular State.

1.3 Modelising labour market dynamics

This paper only examines labor mobility in an average State in response to asymmetric shocks. More precisely, it considers national dynamics that diverge from average euro area dynamics. The corresponding migrations can include migrations between euro area Member States as well as migration flows between a particular Member State and the outside of the euro area, when the latter correspond to asymmetric responses to asymmetric shocks[3]. More generally, this paper considers "relative" variables[4], defined as the difference between the national variable and the euro area variable.

Before running estimations on the developments observed for the past 30 years, the next section presents some stylized facts on labor market dynamics observed in the euro area over this period, in order to compare them with the situation observed in the United States[5].

The next section presents the econometric analysis, using a VAR (Vector autoregressive) model, of the joint behavior of employment, unemployment and participation in response to an asymmetric shock to labor demand in the euro area

---

(1) Blanchard, O. and Katz, L. (1992) : «Regional Evolutions», *Brookings Papers on Economic Activity, N° 1 pp 1-75*.

(2) Decressin, J. and Fatás, A. (1995) : «Regional Labor Market Dynamics in Europe», *European Economic Review, Vol 39 December, pp 1627-55*.

(3) We consider that in response to asymmetric shocks, changes in the size of national working-age populations, relatively to the euro area average, are mostly due to migrations, and are not correlated with the exits to the working-age population due to population ageing for example.

(4) Employment growth rate, unemployment rate, participation rate.

and in the United States between 1973 and 2005. Since results may depend on the theoretical framework and the VAR specification chosen, it is useful to analyse them not only in absolute terms (that is for each zone considered separately) but also by comparing the results obtained over the same period in each zone.

Finally, in order to understand how labor market adjustment dynamics in the euro area have evolved since the creation of the common currency, it is interesting to repeat the simulations over a shorter, more recent period (between 1990 and 2005).

Box 1: **A theoretical labor market model**

Blanchard and Katz's model allows us to explain basic stylised facts about regional evolutions in employment, unemployment and wages, and provides a simple framework for the econometric analysis.

Each Member State i specializes in the production of a particular product. Both labor and firms are mobile across States. The model can be represented by five equations[a].:

$$\begin{cases} w_{i,t} = -d\,n_{i,t} + z_{i,t} & (1) \\ z_{i,t+1} - z_{i,t} = -a\,w_{i,t} + x_i^d + \varepsilon_{i,t+1}^d & (2) \\ n_{i,t+1}^s - n_{i,t}^s = b\,w_{i,t} - g\,u_{i,t} + x_i^s + \varepsilon_{i,t+1}^s & (3) \\ u_{i,t} = n_{i,t}^s - n_{i,t} & (4) \\ w_{i,t} = -c\,u_{i,t} & (5) \end{cases}$$

Equation (1) gives the impact of relative demand (relatively to the average for the entire zone), for each product, $n_{i,t}$, and of relative wages, $w_{i,t}$, on relative labor demand $z_{i,t}$. Equation (2) represents variations in relative labor demand as a function of an exogenous country-specific factor[b], x_i^d and of relative wages. Equation (3) reflects movements in relative labor supply $n_{i,t}^s$. Ceteris paribus, immigrating workers are attracted by higher relative wages and lower relative unemployment $u_{i,t}$. Other national factors are captured by the exogenous term. Equation (4) defines unemployment as the difference between labor supply and demand. Equation (5) is a simplified version of the Phillips curve. Finally $\varepsilon_{i,t}^d$ and $\varepsilon_{i,t}^s$ are white noises representing shocks respectively to labor demand and to labor supply.

In the long run, employment growth rates are different in each State. The effects of innovations to labor supply and demand have a permanent effect of the level of employment. When workers and firms are mobile, the long-term equilibrium is given by:

$$\begin{cases} u_i = -\dfrac{w_i}{c} = \dfrac{d\,x_i^s - x_i^d}{c\,a + d\,(c\,b + g)} \\ \Delta n_i = \Delta n_i^s = \dfrac{c\,a\,x_i^s + (c\,b + g)\,x_i^d}{c\,a + d\,(c\,b + g)} \end{cases}$$

Relative employment grows at a rate determined by the exogenous factors x_i^s and x_i^d. In countries attractive to workers (x_i^s >0), the steady flow of workers leads to lower wages and higher unemployment, which triggers a steady flow of new jobs and sustains growth. In countries attractive to firms (x_i^d >0), the steady flow of firms leads to higher wages and lower unemployment, encouraging immigration and sustaining growth. If $dx_i^s > x_i^d$, country i is more attractive to workers than to firms and unemployment is therefore stronger than the euro area average.

The model moreover predicts that the effects on relative unemployment and participation rates of a shock to labor demand are temporary: labor and firm mobility acts as a dynamic adjustment mechanism.

a. a, b, c, d and g are positive parameters.
b. The exogenous factor captures national characteristics, other than wages, that can affect firms' decisions to create or locate their business in a particular country.

(5) See forthecoming working paper for a more detailed analysis of the stochastic developments of employment, labor force, working-age population, unemployment rate and participation rate within the euro area. Data come from the OECD for the euro area and the Bureau of Labor Statistics for the United States.

DGTPE

2. Simple stylized facts on European labor market dynamics

2.1 Labor market dynamics have been very different from one country to the next

In each Member State, the movements of employment, unemployment and participation are of course closely linked. Appendix 1 gives the cumulative growth rates, since 1973, of "relative" employment, labor force and working-age population (relatively to the corresponding euro area averages), as well as relative employment rates, for six euro area Member States.

Whereas, for instance, the dynamics observed in France and Germany[6] have been relatively similar, since 1973, to that of the euro area as a whole, differences appear in other countries.In Spain and Ireland for example, since the beginning of the 1990s, there has been a joint increase - stronger than for the euro area on average - in working-age population, labor force and employment. This may be explained by strong net migration flows.

In the Netherlands, on the other hand, relatively to the euro area on average, employment and labor force appear to have increased much more over the past fifteen years than relative working-age population. This could be explained by the strong increase in labor participation observed in Netherlands since the beginning of the 1990s, relatively to the euro area average[7].

In Finland, after the severe economic crisis at the beginning of the 1990s, the sharp decrease in employment was matched by a strong increase in the unemployment rate, whereas labor force and working-age dynamics were much smoother.

National labor market dynamics therefore appear to have been complex within the euro area since 1973. A more systematic analysis of past dynamics of employment, unemployment and participation using statistic methods seems necessary to understand the reactions of national labor markets to asymmetric shocks.

2.2 Employment developments in the euro area Member States and within the United States have been relatively homogenous for the past 30 years

The euro area's average annual employment growth rate was 0.7% over the 1973-2005 period, ranging from 1.8% on average in Ireland to 0.3% on average in Belgium. In the United States, the annual employment growth rate averaged 1.6% over the 1976-2005 period, ranging from 4.7% on average in Nevada to −0.3% on average in the District of Columbia.

In order to determine the degree of asymmetric of labor market shocks in the euro area over this period, a simple econometric regression is run, to relate national employment developments to employment developments for the entire zone considered. Box 2 of the following page gives the corresponding equation, for which results are given in table 1. The adjusted coefficients of determination (R^2) give an indication of the asymmetric nature of shocks to employment in the euro area. A low value indicates a poor fit of the equation and suggests that the share of asymmetric shocks is strong. On the contrary, a large value, close to 1, suggests that employment in the country considered was relatively correlated to the euro area average, and therefore that the country has not been subject to many asymmetric shocks.

The average adjusted R^2 is worth 0.41, which is lower that the 0.51 value found for the United States[8] over the 1976-2005 period. The changes in employment therefore appear to be slightly more asymmetric in the euro area than in the United States. The adjusted coefficients of determinations also indicate that some countries' employment developments seem to be more correlated to those of the euro area as a whole (Germany, France, Luxembourg, Belgium, Italy, Spain), whereas others' (Greece, Portugal, Finland, Ireland) appear to relatively different.

Table 1: National employment growth rates, related to euro area employment growth rates (1973-2005)

Member State	Coefficient β		R² ajusté
	Valeur	Écart-type	
Austria	0,57	0,10	0,48
Belgium	0,87	0,10	0,68
Finland	1,44	0,42	0,25
France	0,81	0,09	0,71
Germany	0,98	0,17	0,49
Greece	−0,15	0,26	−0,02
Ireland	1,35	0,38	0,27
Italy	0,81	0,15	0,48
Luxembourg	0,80	0,12	0,57
Netherlands	0,84	0,20	0,34
Portugal	0,57	0,33	0,06
Spain	2,34	0,33	0,61
Simple average			**0,41**

---

(6) Germany's situation must be analyzed with caution. Before and including 1991, the growth rates of the labor market variables considered correspond to those of West Germany. Starting in 1992, they correspond to those of unified Germany.

(7) The participation rate increased by 10.4 percentage points between 1990 and 2004 in the Netherlands, from whereas it only increased by 6.0 percentage points on average in the euro area over the same period.

(8) Comparisons with the United States must be interpreted with caution, since the sizes of the Member States, relatively to the size of the monetary union, are quite different. The asymmetric nature of shocks to the United States could therefore be biased upwards. This does not, however, change the interpretation of the results.

2.3 The differences between the two zones are more pronounced for unemployment and participation

The developments in European and American labor markets seem to be more difference when unemployment dynamics on the one hand and the participation of working-age adults to labor markets on the other hand are considered.

The dynamics of each of these variables are analysed with respect to the euro area average, in response to an asymmetric shock (see Box 2).

Figures 1 and 2 give the response of unemployment rate in an "average" Member State to an asymmetric shock, both in the euro area over the 1973-2005 period and in the United States over the 1976-2005 period.

Relative unemployment rates, contrary to relative employment, return to their initial value after an asymmetric shock. However, the return to the long-run equilibrium is slower than in the United States, when the estimation for the 1973-2005 period is considered. Whereas in the United States, the effect of a shock is essentially equal to zero within 7-8 years, the effect of the same shock, in the euro area, still represents around 30% of the initial shock after ten years and only disappears after 15-20 years. However, unemployment dynamics in response to asymmetric shocks in the euro area appear to have moved closer to those observe in the United States since 1990.

The responses of euro area Member States' participation rates to an asymmetric shock are relatively similar to that of unemployment rates. Participation rates return to their long-term equilibrium level after an asymmetric shock more slowly than in the United States.

The effect of an asymmetric shock in the euro area represents 40% of the initial shock after 15 years, whereas the effect has disappeared after 15-20 years in the United States. The difference between the United States and the euro area also appears to have diminished since 1990.

Box 2: **The econometric equations**

The asymmetric nature of shocks to employment in the euro area

Given N_{it} the logarithm of employment in country i at date t, N_t the logarithm of total employment in the euro area at date t, α_i and β_i constants for each country and θ_{it} a white noise, the following equation is estimated, over the 1973-2005 period: $\Delta N_{it} = \alpha_i + \beta_i \Delta N_t + \theta_{it}$

Unemployment developments in response to an asymmetric shock, in an "average" Member State of the zone

We analyze the dynamic behavior of unemployment in a representative country of the zone, relatively to the average unemployment rate of the zone, defined by $u_{it} = U_{it} - U_t$, with U_{it} the unemployment rate in country i at date t and U_t the unemployment rate in the area as a whole at date t. We estimate the following model: $u_{it} = \beta_1 + \beta_2(L)u_{i,t-1} + K_{it}$

Since the estimation is based on the panel of all of the countries of the area, the model gives the average behavior of a country with respect to the entire area. The model is an univariate autoregressive AR(4) model with 4 lags.

Joints dynamics of employment, unemployment and participation in response to asymmetric shocks

A VAR is estimated for the 1973-2005 [a] period. The model is given by:

$$\begin{cases} \Delta n_{it} = \lambda_{i,0} + \lambda_1(L)\Delta n_{i,t-1} + \lambda_2(L)le_{i,t-1} + \lambda_3(L)lp_{i,t-1} + \varepsilon_{i\lambda t} \\ le_{it} = \mu_{i,0} + \mu_1(L)\Delta n_{i,t} + \mu_2(L)le_{i,t-1} + \mu_3(L)lp_{i,t-1} + \varepsilon_{i\mu t} \\ lp_{it} = \nu_{i,0} + \nu_1(L)\Delta n_{i,t} + \nu_2(L)le_{i,t-1} + \nu_3(L)lp_{i,t-1} + \varepsilon_{i\nu t} \end{cases}$$

n_{it} is the logarithm of employment in country i at date t minus the logarithm of employment in the euro area at date t (logarithm of relative employment), le_{it} the logarithm of the relative employment rate and lp_{it} the logarithm of the relative participation rate[b].

As is Blanchard and Katz, but contrary to Decressin and Fatás, we do not only consider the effects of asymmetric shocks on national labor markets, but also the asymmetric effects of common shocks. For example, for the growth rate of relative employment, we consider the following variable:

$$\Delta n_{it} = \Delta N_{it} - \Delta N_t = \underbrace{\Delta N_{it} - \beta_i \Delta N_t}_{chocs\,asymétriques} + \underbrace{(\beta_i - 1)\Delta N_t}_{effets\,asymétriques\,des\,chocs\,communs}$$

---

a. We allow for four lags for each variable, as well as country fixed effects. The system is estimated by ordinary least squares
b. We suppose that these three variables are stationary, consistently with the theoretical model. The unit root tests confirm this hypothesis for the growth rate of employment and the unemployment rate. The result is less clear cut for the participation rate.

Chart 1: response of the unemployment rate (US)

impact of the shock (% points)

years after the shock
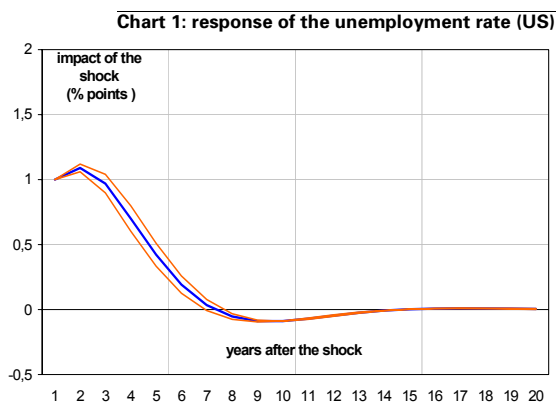
Red lines stand for standard deviations. Estimation period is 1973-2005.

Source: DGTPE calculations

Chart 2: response of the unemployment rate (euro area)

impact of the shock (% points)

years after the shock
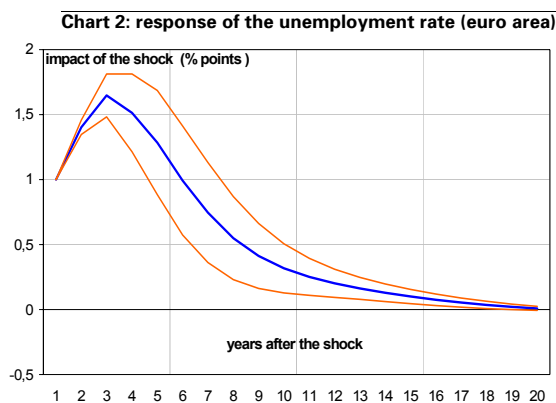
Red lines stand for standard deviations. Estimation period is 1976-2005.

Source: DGTPE calculations

3. Joint analysis of the movements of employment, unemployment and participation in response to asymmetric shocks

3.1 Labor market adjustments through migrations after a shock are estimated indirectly

Both in the United States and in the euro area, deviations of unemployment and participation from their long-term means are not permanent. This suggests that national employment shocks, that on the contrary appear to be persistent, are not entirely absorbed by changes in unemployment and participation. Migrations could therefore be an important adjustment mechanism, which could explain the persistent of shocks to national employment. In order to estimate their size, the paper analyzes the joint evolutions of all of these variables within a VAR (Vector autoregressive) model, for the 1973-2005 period (see box 2).

We analyze the effects of an innovation to relative labor demand on national labor markets. We identify shocks to relative labor demand as the annual variations in relative employment not predicted by the model. We therefore assume that current changes in relative employment can affect unemployment and participation rates but not vice-versa.

Results are particularly interesting when the United States and the euro area are compared. Figures 3 and 4 give the responses of the three variables, in an "average" Member State, to a 1% negative asymmetric shock to labor demand ($\varepsilon_{i\lambda t}$), for the euro area and the United States between 1973 and 2005.

These figures suggest that the short-term responses of unemployment and participation to an asymmetric shock to labor demand are stronger in the euro area than in the United States[9]. Moreover, the persistence of the shock's effect on the unemployment and participation rates in the medium run appear to be stronger in the euro area than in the United States. Whereas the unemployment and partici-

pation rates return to their equilibrium level after 5-10 years in the United States, they do not return to their equilibrium level before 15-20 years in the euro area.

Chart 3: changes in the US following a 1% negative shock on employment

% change

relative unemployment rate

relative participation rate

relative

years after the shock
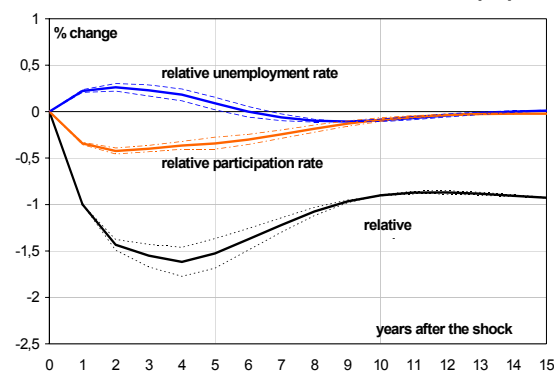
Estimation period is 1976-2005.
Note:dotted lines stand for standard deviations.

Chart 4: changes in the euro area following a 1% negative shock on employment

% change

relative unemployment rate

relative participation rate

relative employment

years after the shock
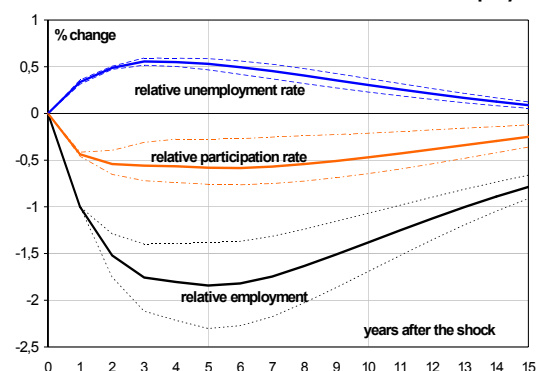
Estimation speriod is 1973-2005.
Note:dotted lines stand for standard deviations.

---

(9)   A decrease in labor demand by 1 percent the first year is reflected in an increase in unemployment rate by 0.33 percentage points in the euro area, against 0.22 in the United States, and in a decrease in the participation rate by 0.44 percentage points in the euro area, against 0.34 in the United States.

Recall that within the simple accounting framework chosen, a person between 15 and 64 years of age is either employed, unemployment, out of the labor force or out of the country. From these estimations, we can conclude that in the short and medium term, migrations are, without surprise, weaker in the euro area than in the United States, where they play a stronger adjustment role after a shock.

In order to compare the results obtained in the two zones, it is useful to express them in terms of variations in the number of workers. Figures 5 and 6 give the corresponding variations in the number of workers following a decrease in relative labor demand equivalent to 10 workers the first year.

Chart 5: changes in the US following a 10 people asymetric shock on unemployment

Estimation period is 1976-2005
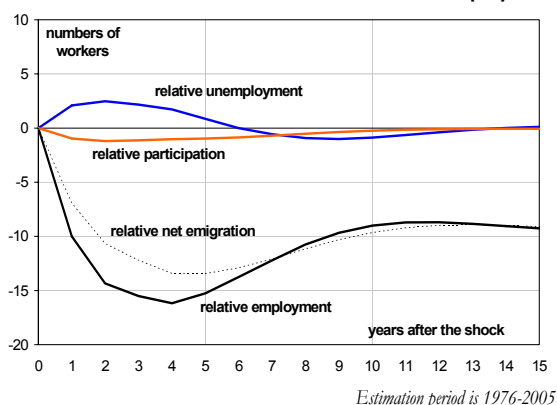
Chart 6: changes in the euro area following a 10 people asymetric shock on unemployment

Estimation periode is 1973-2005
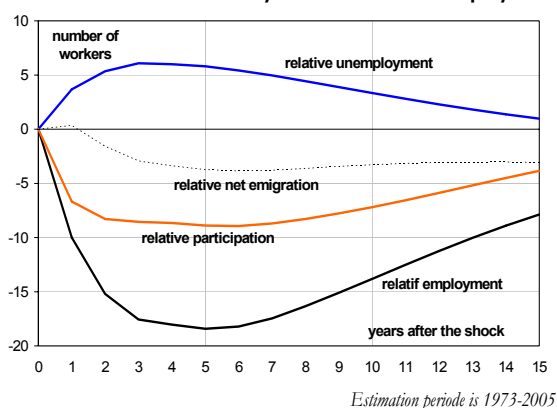
In the United States, a decrease of relative labor demand by 10 workers the first year is associated with an increase in relative unemployment of 2 persons, a decrease in relative participation of 1 person and, as a consequence, a "net relative out-migration" of 7 persons (that is either a stronger out-migration or a weaker in-migration).

After three years, the lagged effect of the shock to employment is reflected in a decrease in employment of 15

workers. The effect of labor mobility also increases to reach 12 persons after 3 years and 9 persons after 15 years, when the negative effect of the shock to employment begins to dampen, in particular thanks to job creations due to the increase in unemployment.

In the euro area, the same shock is associated, the first year, with a stronger increase in unemployment ($+3$ persons) and a stronger decrease in participation (-7 persons), without any significant impact on migrations. The relative movements of labor forces in response to the shock only appear late, and are not as strong as in the United States ($+3$ persons after 3 years and 15 years). Robustness tests do not point to any significant change in results when one of the 12 euro area Member States is excluded from the estimation, proof that results do not reflect massive labor movements in individual countries.

All in all, labor mobility appears to contribute to a lesser degree to adjustment dynamics following asymmetric shocks to labor markets in the euro area than in the United States. The adjustment appears to be stronger through labor market participation in the euro area than in the United States [10]: thus, when a negative shock affects labor demand in a particular European country, a fraction of adjustment consists in the exit of a certain number of working-age persons out of the labor market in that country. Conversely, a positive shock creates a "magnet effect", and some inactive persons return to the labor market.

3.2 Over the more recent period, the gap between the United States and Europe has narrowed

The estimations above concerned the 1973-2005 period. Since the creation of the euro area, real adjustment mechanisms may have improved. We therefore run the same estimations over the 1990-2005 period. Figures 7 and 8 give the corresponding impulse response functions.

Relative unemployment and participation return more rapidly in the euro area, to their equilibrium level after the shock (after about 10 years), therefore moving closer to the dynamics observed in the United States.

The contribution of labor mobility to the dynamic adjustment in an "average" euro area Member State after an asymmetric labor demand shock thus seems to have increased, over the recent period. More precisely, over the 1990-2005 period, a decrease in relative labor demand by 10 workers the first year is still reflected, the first year, in an increase in relative employment of 1 person an a decrease of relative participation of 7 persons, without any significant impact on labor mobility. The medium-term response of labor mobility to the shock however appears to

---

(10) The framework chosen allows us to compare the responses of unemployment, participation and migrations to an identical asymmetric shock to labor demand. Results are independent of the effects that other type of adjustment mechanisms, such as wages or hours worked, could have. The latter can change the size of the response of employment to a labor demand shock, but since this response is normalized the first years, results in terms of labor migrations are unchanged.

be stronger than over the 1973-2005 period. Implied relative out-migration reached 5 persons after 10 years and 6 after 15 years. Over the same period, the adjustment mechanisms observed in the United States did not change significantly.

Chart 7: changes in the US following a 10 people asymetric shock on unemployment
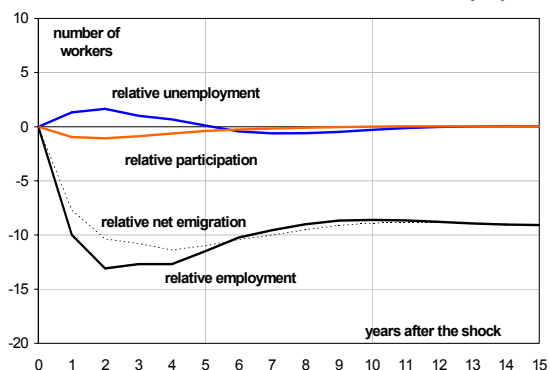
Estimation period is1990-2005.

Chart 8: changes in the euro area following a 10 people asymetric shock on unemployment
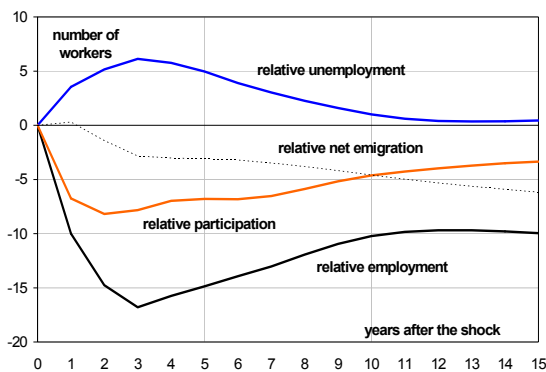
Estimation period is 1990-2005.

In conclusion, labor mobility in response to an asymmetric shock is still lower in the euro area than in the United States. It however significantly increased since 1990, bringing the dynamics observed on European labor markets closer to those observed in the United States.

Clothilde L'ANGEVIN

Recent Issues in English

DGTPE