ASYMMETRIES ON EUROPEAN LABOUR MARKETS

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Abstract: The paper investigates adjustment mechanisms (and their evolution) to asymmetric labour market shocks. Asymmetric labour demand and labour supply shocks are identified from a structural VAR for employment, unemployment rate, participation rate and real wages. We use Blanchard and Katz (1992) methodology to decompose the effects of these shocks on the number of employed, unemployed, migrants and variations in the labour force. Our results indicate that, in spite of some common features, asymmetric shocks are an important component of short-term labour market fluctuations and that there are no common European adjustment mechanisms to labour market shocks.

JEL Classification : E24, F22, J31

Keywords*:* labour markets, asymmetries, VAR analysis.

1. Introduction

As the process towards European Monetary Union went on, many papers were devoted to the evaluation of asymmetric shocks and the way by which EMU could deal with them. Asymmetric shocks may generate output and employment imbalances across regions or countries. These imbalances may be absorbed through wages and prices adjustments. In a monetary union with stable prices and fixed wages, labour mobility is expected to play a crucial role in the adjustment process. In the absence of labour mobility, decentralised stabilisation policies may be necessary. This paper focuses on labour market asymmetries. It compares the adjustment mechanisms to a set of asymmetric labour market shocks for eleven European countries: Austria, France, Finland, Germany, Italy, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom. It also analyses the evolution of these adjustment mechanisms over time.

Blanchard and Katz (1992), Decressin and Fatas (1995) and Obstfeld and Peri (1997) (thereafter BK, DF and OP) assess the importance of intra-national labour mobility in the adjustment to an interregional asymmetric labour demand shock, for the US states and regions of some EU countries[1]. On the basis of a structural VAR, they find that most of the adjustment to labour demand shocks is undertaken by labour migration in the United States and by changes in the participation rate in Europe. Using a different methodology, Gabriel, Shack-Marquez and Wascher (1993) find that interregional migrations help to absorb a small fraction of interregional unemployment differences in the US[2].

This paper investigates the way in which national labour markets respond to a set of asymmetric shocks. We try to answer the following questions « how do European countries allocate the burden of asymmetric shocks among employment, unemployment, participation and migration? what is the role of wages in this process? and how has this allocation evolved over time? ».

We look at aggregate national effects of asymmetric shocks. At the national level, labour mobility consists in variation in participation of residents to the labour market and migrations. We do not compare regions submitted to the same economic, legal, sociological

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1 Blanchard and Katz consider US States. Decressin and Fatas consider 51 EU regions over 1975-1987 in Europe (this includes France, Germany, Italy, Spain, the United Kingdom, Belgium, Denmark, Greece, Ireland, the Netherlands, Portugal), and 51 US States over 1976-1990. Obstfeld and Peri use data from national statistical institutes for Canadian, Italian and German regions.

2 They rely on estimations of interregional migration probabilities together with data on participation and unemployment rates of migrants. Migration probabilities depend on relative wages, unemployment and

structure; rather we compare different labour market structures in order to highlight the heterogeneity of European labour markets. These may turn to be important in the discussion about common European labour market, or common EU labour legislation.

Concerning the legislation of migration flows in Europe, the main steps towards a joint migration policy are the Schengen Agreements of 1985 and 1990, whose objectives are the elimination of internal border checks. In our country panel, France, Germany, Italy, Spain, Portugal, Sweden, Finland and Austria are EMU members that have signed the Schengen Accords. Norway, the United Kingdom and Switzerland are not EMU members, and have not signed the Schengen Accords[3].

With respect to migration, European countries may be classified according to three types. First, France, Germany, United Kingdom and Switzerland received considerable labour migration from the sixties to 1974. Family and political migration dominated the period of restrained migration since 1974 with a political migration boom in 1988, especially in Germany (Zimmermann, 1995)[4]. Second, some other European countries have at past and present a small community of foreigners. This group includes southern European countries – Italy, Spain and Portugal – that sent a lot of people over Europe and the world during the last thirty years. Third, there is no migration tradition in the new EU members – Austria, Sweden, and Finland – but these countries all provide very high standards of living and therefore are attractive destinations for immigration. So, our eleven-country panel is not homogenous in terms of past and present migration. It is sometimes argued that migration is too small in EU countries to play much of a role in adjusting national differences in unemployment and wages over the cycle. We investigate this fact in analysing the effects of asymmetric labour market shocks on migration in eleven European countries.

In order to focus on asymmetric shocks, the data considered are taken in deviations from the international average, along the lines of BK and OP. Using deviations from the average captures two types of asymmetries, the ones which are due to national specific or idiosyncratic shocks and the ones which result from different responses to common shocks. If countries have the same labour market structure (institutions, bargaining level, …) they may

housing costs, education, the percentage of population that is not in the agricultural sector, and population size in the destination region.

[3] We believe that the inclusion of non Shengen countries should not harm the results because intra-EU labour mobility legislation is recent and does not cover the entire period under consideration (1966-1993). A separate analysis for Shengen and non-Shengen countries would not permit a comparison between the two groups because the cross-section average would be different so that the two analyses may capture different types of asymmetries.

[4] For example, the total number of refugees was about 7.000.000 in Europe in 1992. In particular, Germany received 1.5 million new immigrants. Hence, Germany is the key European country of migration

experience asymmetric economic fluctuations due to the occurrence of specific shocks. If, further, countries have heterogeneous labour market structures, a shock common to all countries may have a different impact on each market. The analysis highlights differences rather than similarities.

We depart from BK, DF and OP in several ways. Our focus is on national labour market rather than regional labour markets. We estimate the model for each country separately, rather than jointly. We identify two labour market shocks – a labour demand shock and a labour supply shock – rather than a labour demand shock only. We include wages directly in the model in order to evaluate their role in the adjustment mechanism. Finally, we take into account the non-stationarity of the variables.

Our results indicate that in spite of some common features, European labour markets use heterogeneous adjustment mechanisms in response to asymmetric shocks.

The rest of the paper is organised as follows. Section 2 exposes the data and the methodology. Results are presented in Section 3. Section 4 concludes.

2. Data and methodology

Data and methodology

We use quarterly OECD data on the logarithm of total employment (number of persons), unemployment rate (in %), participation rates (in %) and real wages (in PPA units) over the period 1966.1-1993.1[5].

We consider eleven European countries: Austria (Aut), Finland (Fin), France (Fra), Germany (Ger), Italy (Ita), Norway (Nor), Portugal (Por), Spain (Spa), Sweden (Swe), Switzerland (Swz) and the United Kingdom (UK). The set of countries does not cover all EU, and some non-EU countries are included in the sample. The choice of the sample is based on data homogeneity, in particular, data availability and statistical (unit root) properties.

Augmented Dickey Fuller tests with constant and deterministic trend indicate that all series (in deviation to the 11-country average) are integrated of order one[6].

The methodology builds on Blanchard and Quah (1989) for the identification of the VAR, and uses Blanchard and Katz (1992) to decompose the effects of the shocks in variations in the number of employed, unemployed, migrants and residents participating to the

[5] The sample is restricted to 1993 due to data availability.
[6] The tests are not reported here for the sake of brevity but are available on request.

labour market. BK, DF and OP estimate a VAR for the three variables system of relative employment, unemployment and participation rate. The labour demand shock is identified as the only shock that has contemporaneous effect on employment. The two other shocks are unidentified.

We depart from BK, DF and OP in several ways. First, we estimate the model for each country separately, while BK, DF and OP use panel regression analysis to evaluate the average response of migration to asymmetric labour demand shocks. Thus, we capture each country 's adjustment mechanisms, while BK, DF and OP measure the average adjustment.

Second, while BK, DF and OP focus on labour demand shocks alone leaving the other shocks unidentified, we propose a more complete description of labour markets and identify a labour demand shock and a labour supply shock.

Third, contrary to Blanchard and Katz (1992), we analyse the response of wages to shocks jointly with the other variables of the system. Further, we focus on real wages rather than on nominal hourly earnings. We believe that the former may be more relevant than the latter to understand the responses of job creation and labour supply by residents and migrants.

Fourth, while BK, DF and OP only give the adjustment mechanism for one year, we compute the BK decomposition for each year of the sample in order to analyse the evolution of adjustment mechanisms. This can be done in a very simple way: the VAR estimation provides the impulse response at every horizon k. The k-horizon BK decomposition at year t is obtained by applying the k-horizon impulse responses to the level of employment, unemployment rate and participation rate of year t. BK, DF and OP apply this to the base year; we apply it to every year of the sample. We then obtain the series of the variations in the number of employed, unemployed, residents participating to the labour market and migrants, in response to an asymmetric shock occurring at time t, after k periods[7]. Thus we can analyse the evolution of adjustment mechanisms on the basis of coefficients which are constant over the whole sample period. Appendix A describes Blanchard-Katz decomposition.

Finally, BK, DF and OP assume that all series (in deviation from the national average) are stationary. This property is not satisfied by national data. Therefore, we will consider a VAR with possibly cointegration relationships. In this framework, the shocks may have

[7] To see this, consider the following example. Suppose that the one-year response of employment to a negative labour demand shock is equal to –5%. Suppose further that total employment is equal to 1000 in 1970 and to 1200 in 1980. The variation in the number of employees one year after a shock occurring in 1970 will be –50, and after a shock occurring in 1980, –60.

permanent or transitory effects on employment, unemployment and participation rates, and wages differences[8].

The rest of this section discusses the measurement of asymmetries, and exposes the specification and identification of the VAR.

How to capture asymmetries

In order to focus on asymmetric shocks, BK and OP consider the difference of regional series to the national average. DF consider the residual of a regression of the regional series on the national average. The difference between the two approaches is that BK and OP capture idiosyncratic shocks as well as common shocks with heterogeneous effects, while DF focus on idiosyncratic shocks. To see this, assume that the regional series Y_{it} admits a static one-factor model with the national average, Y_t, as the common factor[9]:

$$(1) \qquad Y_{it} = a + b_i . Y_t + e_{it}$$

BK and OP consider $Y_{it}\text{-}Y_t = (b_i\text{-}1)Y_{it} + e_{it}$ while DF consider $Y_{it}\text{-}b_i.Y_t = e_{it}$.[10] We adopt BK and OP specification and consider the difference to the European average, i.e. Y_{it} is national series and Y_t the international average.

Our analysis focuses on the comparison of impulse responses of employment, unemployment rate, participation rate and real wages to a set of structural shocks. When one considers deviations from the average, differences in the impulse responses across countries may have three origins: differences in the correlation of each variable with the average, difference in the size (the variance) of idiosyncratic shocks across countries, differences in the covariance between the idiosyncratic shocks, and between the idiosyncratic shocks related to one variable and the average of another variable, across countries[11].

Many papers assess the importance of asymmetric shocks[12]. As an indication, we assess the degree of short-term asymmetries along the lines of Decressin and Fatas (1995),

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8 Transitory and permanent shocks are expected to be absorbed through different channels. As shown, by Topel (1986), using microeconomic data, a transitory shock has a larger impact on wages and a lower impact on migration than a permanent one.

9 The average of a set of series has frequently been used as a proxy for the common shock, implicitly as in Quah (1994), or explicitly as in Forni and Reichlin (1997), for instance.

10 See also the discussion in Obstfeld and Perri (1998).

11 See appendix B for more details.

12 See for instance, Bayoumi and Eichengreen (1992, 1996), Decressin and Fatas (1995), Forni and Reichlin (1997), Fuss (1998), for different variables, and measures of asymmetries.

Forni and Reichlin (1997) and Fuss (1998). The degree of integration is captured by the percentage of variance of national series explained by the international average, i.e. by the R^2 of the regression of equation (1). A low R^2 indicates that a high percentage of the variance of the national series is explained by idiosyncratic shocks. Further, if b_i is different from one, countries have heterogeneous responses to the common shocks.

In order to illustrate the importance of short-term asymmetries, we estimate equation (1) for each variable, in first difference of log, and each country. Results are reported in table 1 below.

Table 1. Regression of the national series on the international average

	Employment			Unemployment rate		
	R^2	β_i	$t(\beta_i=1)$	R^2	β_i	$t(\beta_i=1)$
Aut	0,09	0,27	-8,94	0,11	0,41	-5,29
Fin	0,19	1,06	0,31	0,26	0,9	-0,71
Fra	0,18	0,28	-12,9	0,27	0,26	-18,42
Ger	0,36	3,96	5,85	0,22	0,74	-1,98
Ita	0,11	0,57	-2,72	0,02	0,12	-12,3
Nor	0,02	0,33	-3,31	0,09	0,59	-2,36
Por	0,20	1,52	1,8	0,13	0,5	-3,93
Spa	0,21	0,87	-0,83	0,18	0,28	-12,62
Swe	0,29	1,09	0,55	0,12	0,5	-3,83
Swz	0,15	0,62	-2,69	0,72	6,14	13,97
UK	0,08	0,42	-4,34	0,29	0,57	-4,99
Mean	0,17	1	-2,47	0,22	1	-4,77
Std dev	0,10	1,06	5,12	0,19	1,72	8,30

Table 1. Regression of the national series on the international average

	Participation rate			Real wages		
	R^2	β_i	$t(\beta_i=1)$	R^2	β_i	$t(\beta_i=1)$
Aut	0,39	4,15	6,31	0,10	0,66	-1,77
Fin	0,23	1,05	0,30	0,24	0,86	-0,93
Fra	0,12	0,36	-6,99	0,28	0,77	-1,94
Ger	0,05	0,38	-4,11	0,19	1,28	1,11
Ita	0,17	0,97	-0,14	0,24	0,96	-0,27
Nor	0,00	-0,16	-3,84	0,20	0,80	-1,36
Por	0,26	2,58	3,84	0,44	2,43	5,48
Spa	0,07	0,44	-3,57	0,21	0,81	-1,31
Swe	0,03	0,31	-4,02	0,20	0,90	-0,61
Swz	0,04	0,76	-0,66	0,26	0,72	-2,45
UK	0,02	0,16	-7,58	0,14	0,83	-0,88
Mean	0,13	1	-1,86	0,23	1	-0,45
Std dev	0,12	1,27	4,29	0,09	0,50	2,18

The R^2 are very low on average (17% for employment, 22% for unemployment rates, 13% for participation rates, and 23% for real wages), and rarely exceed 30%. This indicates a low degree of integration; idiosyncratic shocks play a prominent role in the variations of these variables in Europe[13]. Further, the estimates show that β_i is rarely equal to unity, indicating that the other source of asymmetries - different responses to the average - may also be an important part of the story.

VAR specification

We estimate, for each country, a VAR for the four variables system of employment, unemployment rate, participation rate and real compensations. The order of the VAR is selected in order to satisfy, as much as possible, the following criteria: (1) the residuals must be serially uncorrelated, (2) the residuals should be normally distributed, (3) the number of cointegration relationships, as identified by Johanssen trace and maximum eigenvalue tests, cannot exceed three. Details and tests are given in appendix C.

[13] The low values of the R^2 may also result from misspecification of equation (1). In particular, the national series may depend on lagged values of the international average. Examining this issue is beyond the scope of this paper. Further, specification (1) copes with the transformation of the series (difference to the international average).

Identification

Blanchard and Katz (1992) estimate a VAR in employment, unemployment and participation rate. They identify the labour demand shock as the only shock that has contemporaneous effect on employment. The two other shocks are unidentified. They estimate the response of employment, unemployment and participation to a labour demand shock, and estimate the response of migration residually (see Appendix A for details).

We estimate a four variables system. This allows us to estimate jointly the response of real wages to labour demand shocks[14]. We identify two shocks: a labour demand shock and a labour supply shock. Two shocks are unidentified. Three identification restrictions focus on contemporaneous relationships, one on long-term ones[15].

The labour demand shock may have contemporaneous effects on the real wage although the other shocks have not. The labour demand shock has no long-term effect on real wages. We have in mind a theoretical model in which, in the short run, firms determine wages and capital is fixed. In the long run, the capital stock adjusts to labour demand shocks, so that labour productivity, hence real wages, returns to its initial level. Therefore, we identify the labour demand shock as the shock with no permanent effect on real wages. Further, the labour demand shock has no contemporaneous effect on the participation rate.

Labour supply shocks may have contemporaneous effects on the participation rate but not on employment. Labour supply shocks increase the labour force and may involve increase in the participation of residents as well as migrations.

3. Results

We should keep in mind that all series must be interpreted in terms of deviations from the average. In the following comments, short-term means one year after the shock; long-term

[14] Blanchard and Katz estimate two separate VARs, one with employment, unemployment and participation, the other with employment and nominal hourly earnings.

[15] We also estimate the four variable VAR system with labour demand shocks identified as employment innovations (Blanchard and Katz, 1992). This choice does not modify the results.

five years after the shock[16]. For the sake of brevity, we do not report full results in the text. These are available on request[17].

Variance decomposition

Table 2 below reports the percentage of variance of relative employment (E), unemployment rate (UR), participation rate (PR) and real wages (RW) explained by the labour demand shock (e^{ld}) and the labour supply shock (e^{ls}), at the one-year and five-year forecast horizons.

There are some regularities concerning variance decompositions. Relative employment is explained by labour demand shocks except in France, Norway and Switzerland in the long run. Note that labour market shocks explain less than 30% of relative employment fluctuations in the long run in France, Finland, Germany, Portugal, Spain and Switzerland.

Relative unemployment rate is mainly explained by labour supply shocks in the short and long runs, though to a lower extent in Finland and Germany.

Labour market shocks are not the main source of relative participation rate and relative real wages fluctuations, both in the short and long runs. Relative participation rate is not explained by labour market shocks in the short run. In the long run, labour demand shocks explain respectively 30% and 40% of relative participation rate fluctuations in France and Sweden. Labour supply shocks explain respectively 20%, 30% and 40% of relative participation rate fluctuations in Finland, Norway and the United-Kingdom.

Concerning relative real wages, the situation is a little bit different. Actually, relative real wages are explained in the short run by labour demand shocks in Germany (40%), Portugal (60%) and Switzerland (60%). In the long run, labour market shocks explain more than 50% of relative real wage fluctuations in Portugal and Switzerland. Our model tells us nothing about relative real wage fluctuations in the other European countries.

[16] We choose one year as the short term because migration and participation decisions may take time. At the five years horizon, impulse responses become stable.

[17] With the set of identifying restrictions in the short and long runs, the VAR model describing Austria is not stable in the long run. So, we do not estimate the Austrian model .

Table 2. Variance decomposition of prediction error

	Fin	Fra	Ger	Ita	Nor	Por	Spa	Swe	UK	Swz
Employment										
1-year										
e^{ld}	60%	75%	40%	80%	60%	12%	60%	40%	80%	3%
e^{ls}	5%	5%	10%	2%	30%	0%	0%	5%	5%	15%
5-years										
e^{ld}	20%	25%	12%	80%	40%	13%	10%	40%	90%	2%
e^{ls}	10%	40%	9%	0%	40%	0%	0%	5%	10%	23%
Unemployment rate										
1-year										
e^{ld}	20%	4%	0%	10%	15%	5%	2%	0%	10%	1%
e^{ls}	50%	90%	70%	90%	80%	90%	90%	80%	90%	65%
5-years										
e^{ld}	15%	0%	5%	10%	20%	10%	0%	20%	10%	5%
e^{ls}	35%	90%	42%	90%	75%	80%	80%	50%	90%	60%
Participation rate										
1-year										
e^{ld}	0%	8%	0%	2%	0%	2%	0%	10%	0%	2%
e^{ls}	10%	4%	3%	2%	20%	2%	0%	10%	0%	2%
5-years										
e^{ld}	0%	30%	0%	12%	5%	3%	0%	40%	10%	4%
e^{ls}	20%	9%	2%	15%	40%	10%	0%	8%	30%	7%
Real wages										
1-year										
e^{ld}	3%	14%	40%	0%	6%	65%	4%	4%	0%	60%
e^{ls}	17%	1%	4%	0%	6%	5%	0%	1%	0%	10%
5-years										
e^{ld}	5%	6%	10%	0%	4%	25%	3%	2%	0%	24%
e^{ls}	27%	1%	5%	0%	20%	50%	0%	2%	2%	20%

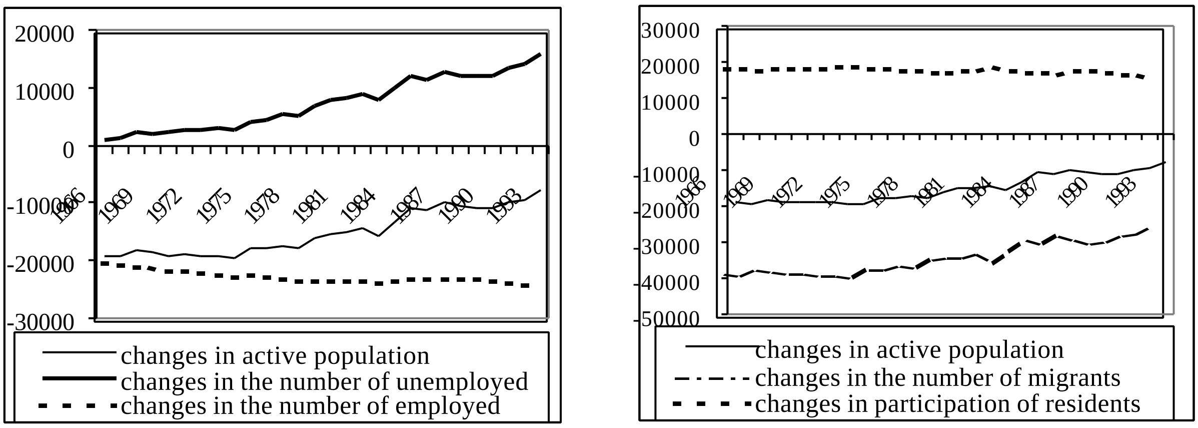
Negative labour demand shock[18]

Following a one-standard-deviation negative labour demand (LD for short) shock, employment decreases significantly in the short run, in all countries except Switzerland (actually, LD shocks have no significant effect on labour market variables in Switzerland). In the long run, the shock has a permanent and negative effect on employment in all countries except France, Germany and Spain. In the first one, it has a permanent positive effect on employment although, in the two other ones, it has only a negative transitory one. In the long and short runs, LD shocks lead to an increase in unemployment rate in Finland, Italy, Portugal and the United Kingdom. They have no effect on unemployment rate in France, Germany, Spain and Switzerland. LD shocks have also no effect on participation rate, except in France (a positive one in the long run), Italy and the United Kingdom (a negative one). In the short run, LD shocks have a negative effect on real wages in France, Finland and Germany and a positive one in Portugal.

We comment the one-year Blanchard-Katz decompositions only because, for almost every country, the decompositions at the one-year and five-year horizon exhibit the same patterns; the size of the responses may vary though. In all countries except Germany, Spain and Switzerland, the one-year-adjustment mechanism to a negative labour demand shock has the following three characteristics. First, employment diminishes and the number of unemployed increases because the labour force diminishes less than employment. Second, the reduction in the labour force results from out-migrations that are partly compensated by increased participation of residents. Third, this adjustment mechanism has evolved over time, as countries rely more and more on unemployment and less and less on migrations, while the number of job losses is relatively stable over time. While the adjustment pattern is similar across countries, the size of the adjustment differs. For instance, the variation in the number of unemployed in percentage of the number of job losses (averaged over the last five years) varies from 31% in the United Kingdom to 77% in Italy. Figure 1 below illustrates these for France.

[18] Confidence bands on the IRFs figures are computed by a Monte Carlo procedure. We perform random drawings from the distribution of the structural VAR model for each country. Confidence bands are not stable in Norway and Sweden ; therefore we do not consider these countries. IRFs figures for France and Italy are available in appendix D.

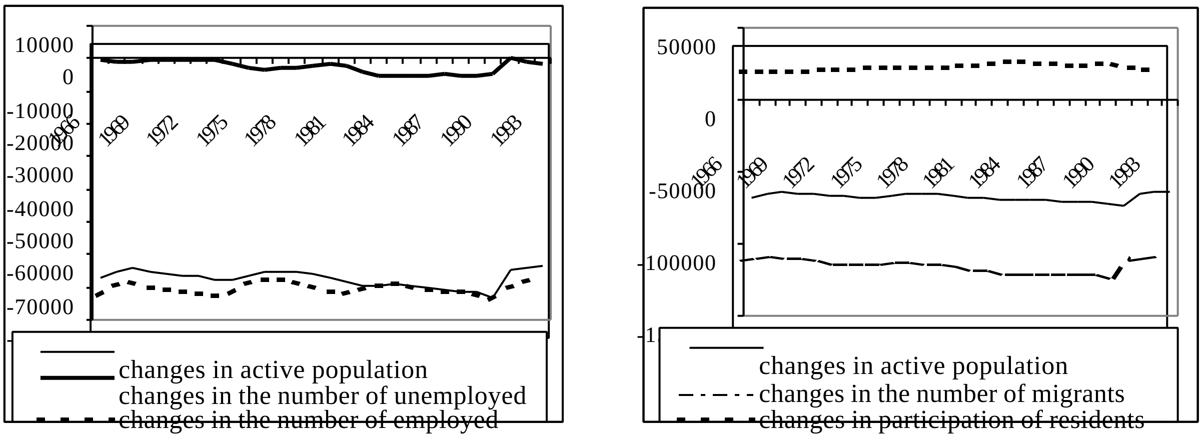
Figure 1 : One-year Blanchard-Katz decompositions for France after a negative labour demand shock



The evolution of variations in participation of residents varies from one country to the other: it is stable in France, Germany and the United Kingdom; it decreases over time in Finland and Italy; it increases in Portugal and Switzerland.

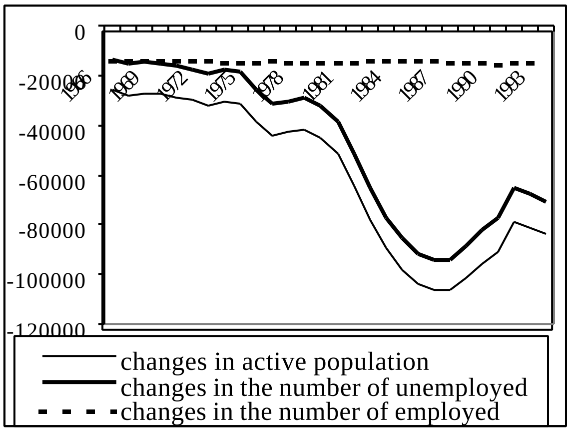
In Germany, the adjustment mechanism has remained relatively stable over time, as illustrated in Figure 2 below. Also, Germany differs from other countries in that the number of unemployed remains almost unchanged because the reduction in the labour force is close to the number of job losses.

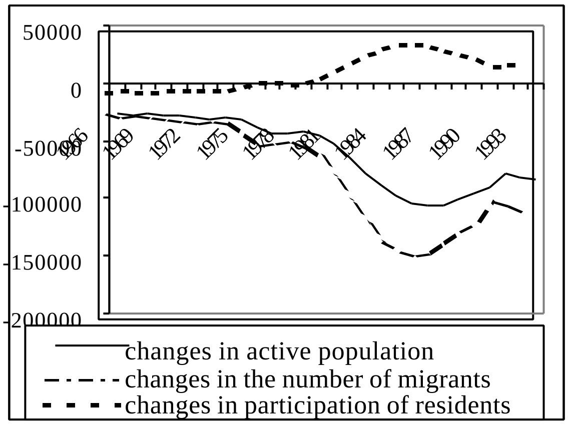
Figure 2 : One-year Blanchard-Katz decompositions for Germany after a negative labour demand shock



In Switzerland, a negative labour demand shock induces a decrease in the number of unemployed because of massive out-migrations, and despite some increased participation of residents to the labour force. The importance of this phenomenon has grown in the last twenty years.

Figure 3 : One-year Blanchard-Katz decompositions for Switzerland after a negative labour demand shock





In Spain, the response of migration and participation varies over time. In the sixties and seventies, a negative labour demand shock induces some additional unemployment because out-migrations are compensated by increased participation of residents. In the mid-eighties and in the early nineties, job losses still imply more unemployed but the labour force did not diminish enough to compensate for in-migrations.

From the variance decomposition, the impulse responses and the BK decompositions, it is not possible to evidence a typology of countries with the same adjustment mechanism. The direction and size of the adjustment vary across countries.

Positive labour supply shock[19]

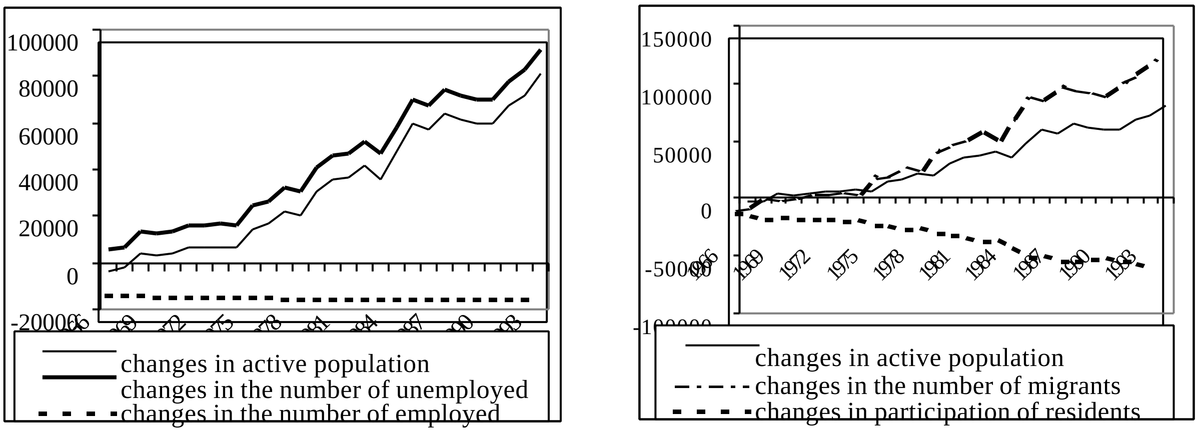
Following a positive labour supply (LS for short) shock, participation rate increases in the short run in Finland and Germany. In other countries, LS shocks have no significant short-run effect on participation rate. Nevertheless, in the long run, participation rate increases in all countries except Spain. Employment increases in Finland, Germany, Switzerland and the United Kingdom in the short and long runs. Unemployment rate increases in Italy and Spain in the short and long runs. In other countries, it decreases in the short and long runs. Real

[19] See IRFs figures D3 and D4 for France and Italy in appendix D. Confidence bands are not stable in Norway and Sweden; therefore we do not consider these countries.

wages increase in Finland in the short run and in Finland, Portugal and Switzerland in the long run. In other countries, LS shocks have no significant effect on real wages.

The adjustment mechanism in the number of employed, unemployed, migrants, etc…, in response to a positive labour supply shock is identical in all countries, although the size of the effects may differ across countries. A positive labour supply shock increases the number of unemployed because the number of jobs diminishes (except in Italy where it increases, but by a low extent). Note that the increase in the labour force corresponds to in-migrations and induces a reduction in the participation of residents to the labour market. Figure 4 below illustrates this for France. Note also that the increase in the number of unemployed does not imply an increase in the unemployment rate. In France and Germany, in the long run, the unemployment rate returns to its initial level.

Figure 4 : One-year Blanchard-Katz decompositions for France after a positive labour supply shock



Although there are common features in the adjustment mechanisms to a labour supply shock, across countries, the size of the adjustment differs. For instance, the variation in the number of residents participating to the labour market in percentage of the variation in the labour force (averaged over the last five years) varies from -29% in the United Kingdom to -162% in Spain.

As for labour demand shocks, the analysis evidences heterogeneity of labour market adjustment mechanisms to labour supply asymmetric shocks.

Conclusion

We investigate asymmetries in European national labour markets, in a structural VAR framework. We analyse the responses of employment, the unemployment rate, the participation rate and real wages to a set of asymmetric labour market shocks: a labour demand shock and a labour supply shock. We then decompose the adjustment to the shock in variation of the number of employed, the number of unemployed, the number of migrants and the variation in the participation of residents using Blanchard and Katz (1992) methodology.

Variance decompositions indicate that employment fluctuations depend on labour demand shocks, while unemployment rate fluctuations depend on labour supply shocks. Labour market shocks do not explain much of real wage and participation rate fluctuations. Actually, participation rate and real wage fluctuations are not mainly explained by labour market shocks as identified here. The sources of their fluctuations should be found outside the labour market.

Impulse responses show that, except in Switzerland, in the short run, a negative labour demand shock reduces employment. It increases unemployment - except in Switzerland, Germany, Spain and France - because the labour force diminishes less than employment, out-migrations are compensated by increased participation. The Blanchard-Katz decomposition evidences evolving adjustment mechanisms, as countries rely more and more on unemployment and less and less on migrations, while the number of job losses is relatively stable over time.

In response to a positive labour supply shock, participation rates increase significantly in the long run. Employment increases and unemployment rate decreases except in Italy and Spain. In these two countries, labour supply shocks have no significant effects on employment, while the unemployment rate increases in the short and long runs**.** Real wages augment in Switzerland, Portugal and Finland.

Our analysis may also provide information on the persistence of unemployment differentials. The labour demand shock does not explain relative unemployment rates in France, Germany, Spain and Switzerland: in these four countries, unemployment rate remains unchanged in the short and long runs following a labour demand shock, although it augments in the other countries. Following a positive labour supply shock, the unemployment rate augments in Italy and Spain, and decreases in other countries. So, the persistence of unemployment in Germany, Switzerland and France is not due to labour demand shocks. This result is important in terms of economic policy. It suggests that unemployment in these countries should be fought by policy measures concerning not only labour demand but the global functioning of the economic activity.

In spite of similarities with respect to some shocks and/or variables, the picture that emerges from the analysis is rather one of a large variety of adjustment mechanisms. The percentage of variance explained by each shock varies across variables and across countries. The effects of each type of shock - labour demand or labour supply - differ across countries. So, there is no single European labour market.

The evidence of heterogeneous adjustment mechanisms may be taken as supportive of the need for labour market harmonisation. However, the importance of idiosyncratic shocks in explaining short-term asymmetries should be considered seriously. Even if adjustment mechanisms were alike, countries would experience asymmetric specific shocks. The construction of a single labour market in Europe should be performed very carefully, taking into account all types of asymmetries - asymmetric shocks, asymmetric responses to the shocks - and considering the entire functioning of labour markets rather than one adjustment mechanism alone. A partial harmonisation may have very different implications in the various countries, because European labour markets have different structures, different adjustment mechanisms, and are subjected to different shocks.

References

Bayoumi, T. et B. Eichengreen (1992) “Shocking aspects of European monetary unification”, *CEPR discussion paper* n° 646.

Bayoumi, T. et B. Eichengreen (1996) ‘Operationalizing the theory of Optimum Currency Area”, *CEPR discussion paper* n° 1484

Blanchard, O.J. and L.F. Katz (1992) “Regional evolutions”, *Brooking Papers on Economic Activity*, 1, 1-76.

Decressin, J. and A. Fatas (1995) “Regional labour market dynamics in Europe”, *European Economic Review*, 39, 1627-1655.

Forni, M. et L. Reichlin (1997) “National policies and local economies : Europe and the United States”, *CEPR Discussion Paper,* n°1632.

Fuss (1998b) “Contributions to the empirical analysis of convergence in the European Union”, thèse de doctorat, Université Libre de Bruxelles.

Gabriel, S. A. , J. Shack-Marquez and W.L. Wascher (1993) “Does migration arbitrage regional labor market differentials ?“, *Regional Sciences and Urban Economics*, 23, 211-233.

Obtsfeld, M. and G. Peri (1998) “Regional non adjustment and fiscal policy”, *Economic Policy*, 26, 205-260.

Quah, D. (1994), “One business cycle and one trend from (many,), many disagregates”, *European Economic Review*, 38, 605-613.

Zimmerman, K. (1995), “Tackling the European migration problem”, *Journal of Economic Perspectives*, 9, 45-62.

Appendix A : Migration response in Blanchard-Katz framework

Denote by e_t employment, U_t unemployment rate, u_t the number of unemployed, p_t participation rate, *popactive*$_t$ active population, *pop*$_t$ total population, *pop15-64*$_t$ working age population

Blanchard and Katz (1992) estimate a VAR for (e_t, U_t, p_t) in logarithm, and obtain the responses of e, u p to an adverse unit labour demand shock. Since variables are in log, one obtains the responses in growth rate :

(B1) $\Delta e_t/e_t = \alpha$

(B2) $\Delta U_t/U_t = \Delta u_t/u_t - \Delta popact_t./popact_t. = \beta$

(B3) $\Delta p_t/p_t = \Delta popact_t/popact_t - \Delta pop15\text{-}64_t/pop15\text{-}64_t = \gamma$

To find the response of migration to a labour market shock, additional hypothesis are necessary. If one assumes that population does not react to a labour market shock (the fertility rate does not respond to a labour market shock), all population increase is due to migrations.

(B4) $\Delta pop_t = \Delta popmigr_t$

On the other hand, population and working age population can be decomposed into active population and inactive population :

(B5) $\Delta pop_t = \Delta popact_t + \Delta popinact_t$

(B6) $\Delta pop15\text{-}64_t = \Delta popact.15\text{-}64_t + \Delta popinact.15\text{-}64_t$

If one assumes further that all migration is in the working age population,

(B7) $\Delta popmigr_t = \Delta pop_t = \Delta pop15\text{-}64_t$

one can solve for migration on the basis of the impulses for e_t, U_t and p_t (B1), (B2) and (B3). Rewrite equations (B1) and (B2) as

(B8) $\Delta e_t = \alpha . e_t$

(B9) $\Delta u_t = \beta . u_t + \Delta popact_t . u_t / popact_t$

Equation (B4) becomes

(B10) $\Delta popact_t = \alpha . e_t + \beta . u_t + \Delta popact_t . u_t / popact_t$

$\Delta popact_t = (\alpha . e_t + \beta . u_t)/(1 - u_t / popact_t)$

$\Delta popact_t = (\alpha . e_t + \beta . u_t)/(e_t / popact_t)$

And from (B3) and (B7) one obtains

(B11) $\Delta popmigr_t = (\alpha . e_t + \beta . u_t) . \dfrac{pop15-64_t \ / \ popact_t}{e_t \ / \ popact_t} - \gamma . pop15\text{-}64_t$

This decomposition can be computed for any basis year t, and for any horizon of the impulse responses. We use the α, β , γ, which correspond to the one-year and five-year horizons. For each of these α, β, γ, we perform the decomposition for every basis year: from 1966 to 1993.

Appendix B : Asymmetric shocks

For simplicity, consider a bivariate system of Y_{it} and X_{it}, and two countries, 1 and 2. Assume that national series admit a static factor model with the international average as the common factor :

$X_{1t} = \beta_1.X_t + \varepsilon_{1t}$

$X_{2t} = \beta_2.X_t + \varepsilon_{2t}$

$Y_{1t} = \gamma_1.Y_t + \eta_{1t}$

$Y_{2t} = \gamma_2.Y_t + \eta_{2t}$

with ε_{it} independant of X_t, η_{it} independant of Y_t, We consider the difference to the international average, i.e. $x_{it}=(\beta_i-1)X_{it}+\varepsilon_{it}$ and $y_{it}=(\gamma_i-1)Y_{it}+\eta_{it}$

There are two types of asymmetries : asymmetries in the coefficient on the average : $\beta_1\neq\beta_2$ and $\gamma_1\neq\gamma_2$, and asymmetries related to idiosyncratic shocks, ε_{1t} is independent of ε_{2t} and η_{1t} is independent of η_{2t}.

For simplicity, consider a model with no dynamics between a VAR(0) in x_{it} and y_{it}:

(A1) $x_{1t} = \delta_1.y_{1t} + \xi_{1t}$

(A2) $x_{2t} = \delta_2.y_{2t} + \xi_{2t}$

If one performs an OLS regression of x_{it} on y_{it} in each country, we obtain the following estimates :

$$\hat{\delta}_1 = \frac{(\beta_1-1).(\gamma_1-1).\sigma_{xy} + \sigma_{\varepsilon_1\eta_1} + (\beta_1-1).\sigma_{x\eta_1} + (\gamma_1-1).\sigma_{y\varepsilon_1}}{\sqrt{[(\beta_1-1)^2\sigma_x^2 + \sigma_{\varepsilon_1}^2].[(\gamma_1-1)^2\sigma_y^2 + \sigma_{\eta_1}^2]}}$$

$$\hat{\delta}_1 = \frac{(\beta_1-1).(\gamma_1-1).\sigma_{xy} + \sigma_{\varepsilon_1\eta_1} + (\beta_1-1).\sigma_{x\eta_1} + (\gamma_1-1).\sigma_{y\varepsilon_1}}{\sqrt{[(\beta_1-1)^2\sigma_x^2 + \sigma_{\varepsilon_1}^2].[(\gamma_1-1)^2\sigma_y^2 + \sigma_{\eta_1}^2]}}$$

$$\hat{\delta}_2 = \frac{(\beta_2-1).(\gamma_2-1).\sigma_{xy} + \sigma_{\varepsilon_2\eta_2} + (\beta_2-1).\sigma_{x\eta_2} + (\gamma_2-1).\sigma_{y\varepsilon_2}}{\sqrt{[(\beta_2-1)^2\sigma_x^2 + \sigma_{\varepsilon_2}^2].[(\gamma_2-1)^2\sigma_y^2 + \sigma_{\eta_2}^2]}}$$

where σ_z^2 denotes the variance of z and σ_{vw}, the covariance between v and w.

$\hat{\delta}_1\neq\hat{\delta}_2$ as soon as (1) the correlation of each variable with the average differs across countries, i.e. : $\beta_1\neq\beta_2\neq1$ or $\gamma_1\neq\gamma_2\neq1$, (2) the size (the variance) of idiosyncratic shocks differs across countries, i.e. if $\sigma^2_{e1}\neq\sigma^2_{\varepsilon2}$ or $\sigma^2_{\eta1}\neq\sigma^2_{\eta2}$, (3) the covariance between the idiosyncratic shocks, and between the idiosyncratic shocks and the average, varies across countries, i.e if

$\sigma_{\varepsilon 1\eta 1} \neq \sigma_{\varepsilon 2\eta 2}$ or $\sigma_{x\eta 1} \neq \sigma_{x\eta 2}$ or $\sigma_{y\varepsilon 1} \neq \sigma_{y\varepsilon 2}$. The argument extends to more than two countries, more than two variables, and dynamic relationships between the series.

Appendix C : VAR specification

Table C1 below reports the p-value of the tests for serial correlation and normality, and the order of the VAR, p[20]. In general, residuals satisfy the criterion of no order one serial correlation at the 5% level, except in Finland and France. Normality is accepted everywhere.

Table C1. VAR(p) specification

	p	H_0: ε ~AR(1)	H_0: ε ~AR(4)	H_0: ε~N(.)
Aut				
Fin	1	0,04	0,23	0,77
Fra	2	0,01	0,68	0,40
Ger	1	0,05	0,04	0,07
Ita	1	0,05	0,21	0,38
Nor	2	0,08	0,53	0,22
Por	2	0,11	0,40	0,76
Spa	1	0,15	0,05	1,00
Swe	1	0,32	0,27	0,50
Swz	1	0,43	0,50	0,98
UK	1	0,33	0,06	0,27

ε~AR(1) gives the p-value for the test that the residuals are serially correlated of order one

ε~AR(4) gives the p-value for the test that the residuals are serially correlated of order four

ε~N() gives the p-value for the test that the residuals are normally distributed

Table C2 reports trace and maximum eigenvalue tests for this specification of the order of the VAR. We consider the 5% critical values of the model with constant and trend in the data generating process; r is the number of cointegration relationships. The number of cointegration relationships varies from one country to the other. There is a conflict between the trace and maximum eigenvalue tests for Germany. The trace test suggests that there are four cointegration relationships where the maximum eigenvalue test indicates one cointegration relationship. Since four cointegration relationships correspond to the stationary case, and since this is inconsistent with the unit root tests, we consider the case of one cointegration relationship in Germany.

[20] Tests on this hypothesis are performed using CATS in RATS.

Table C2. Cointegration tests

		λ max				Trace			
	R	r=0	r<=1	r<=2	r<=3	r=0	r<=1	r<=2	r<=3
Aut									
Fin	2	28.77	22.92	6.99	3.47	62.14	33.38	10.46	3.47
Fra	1	31.97	17.54	9.46	0.02	58.99	27.01	9.48	0.02
Ger	2	40.30	18.69	11.46	4.24	74.70	34.39	15.71	4.24
Ita	1	28.48	9.31	6.86	0.11	44.75	16.28	6.96	0.11
Nor	1	37.86	18.23	7.05	0.67	63.81	25.95	7.71	0.67
Por	2	53.58	29.82	9.76	0.01	93.17	39.59	9.77	0.01
Spa	2	43.36	29.41	9.58	1.62	83.96	40.61	11.20	1.62
Swe	1	33.61	14.61	9.22	3.88	61.32	27.71	13.10	3.88
Swz	1	58.97	9.67	5.07	2.24	75.95	16.98	7.31	2.24
UK	1	33.37	8.48	6.99	1.68	50.52	17.15	8.67	1.68
1%		31.943	25.521	17.936	6.936	53.792	35.397	19.310	6.936
5%		27.169	20.778	14.036	3.962	47.181	29.509	15.197	3.962
10%		24.712	18.697	12.099	2.816	43.964	29.791	13.338	2.816

Johanssen cointegration tests with constant and trend in the data generating process.

Critical values are given in Johanssen and Juselius (1992).

Λ max stands for the maximum eigenvalue test, trace stands for the trace test.

Appendix D : Impulse response functions (IRFs)

Figure D1: IRFs to LD shocks, France

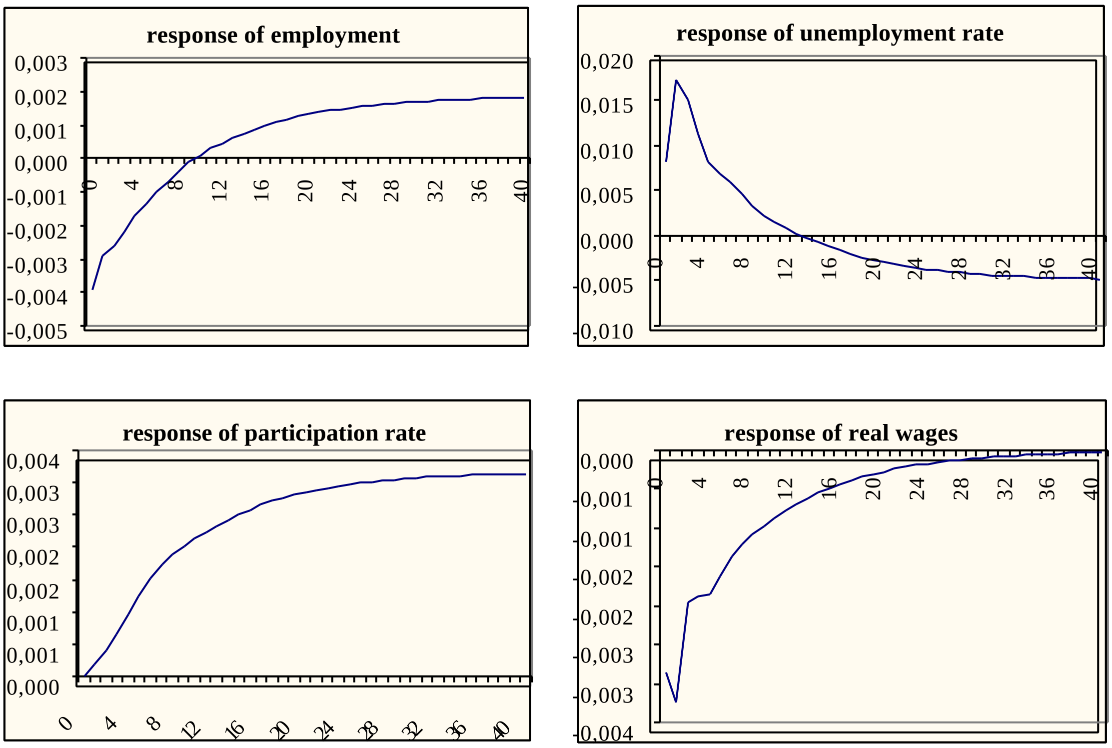


Figure D2 : IRFs to LD shocks, Italy

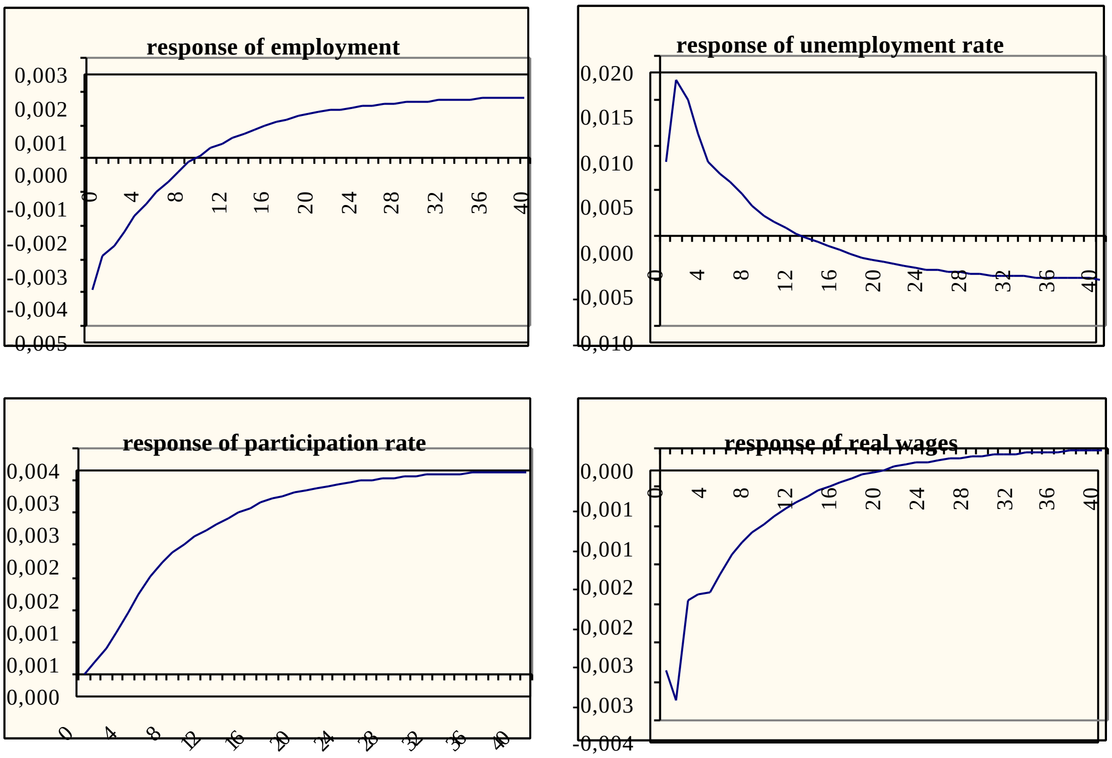


Figure D3 : IRFs to LS shocks, France

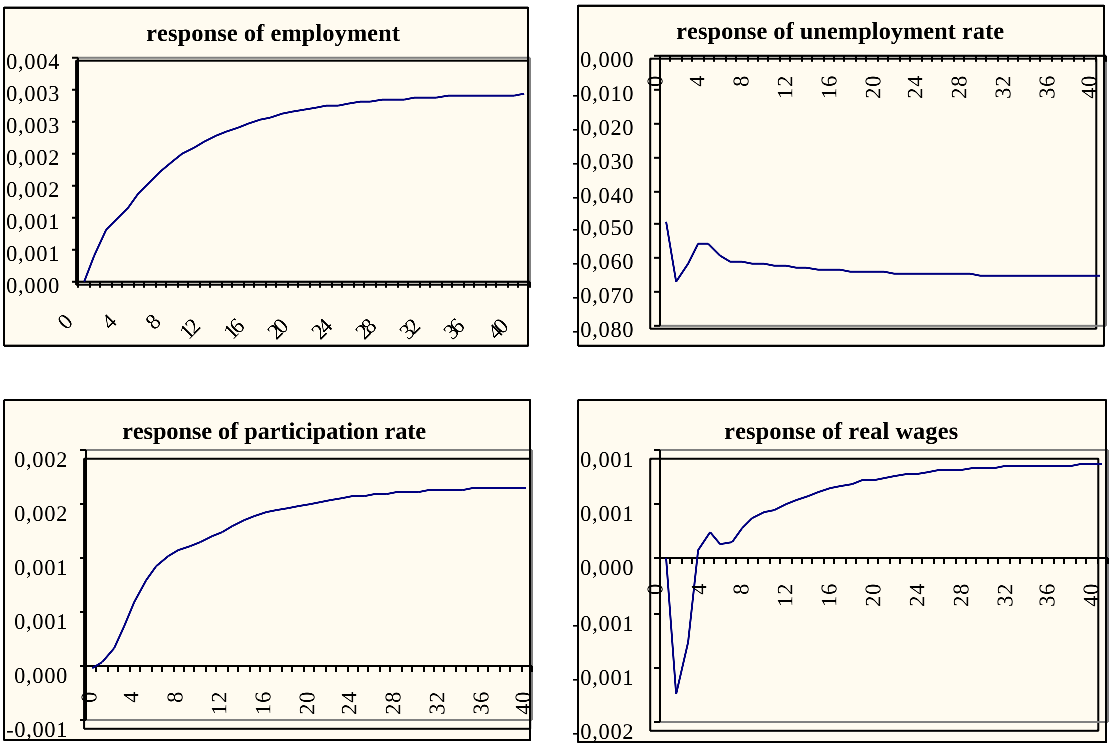


Figure D4 : IRFs to LS shocks, Italy