EUROPEAN CENTRAL BANK

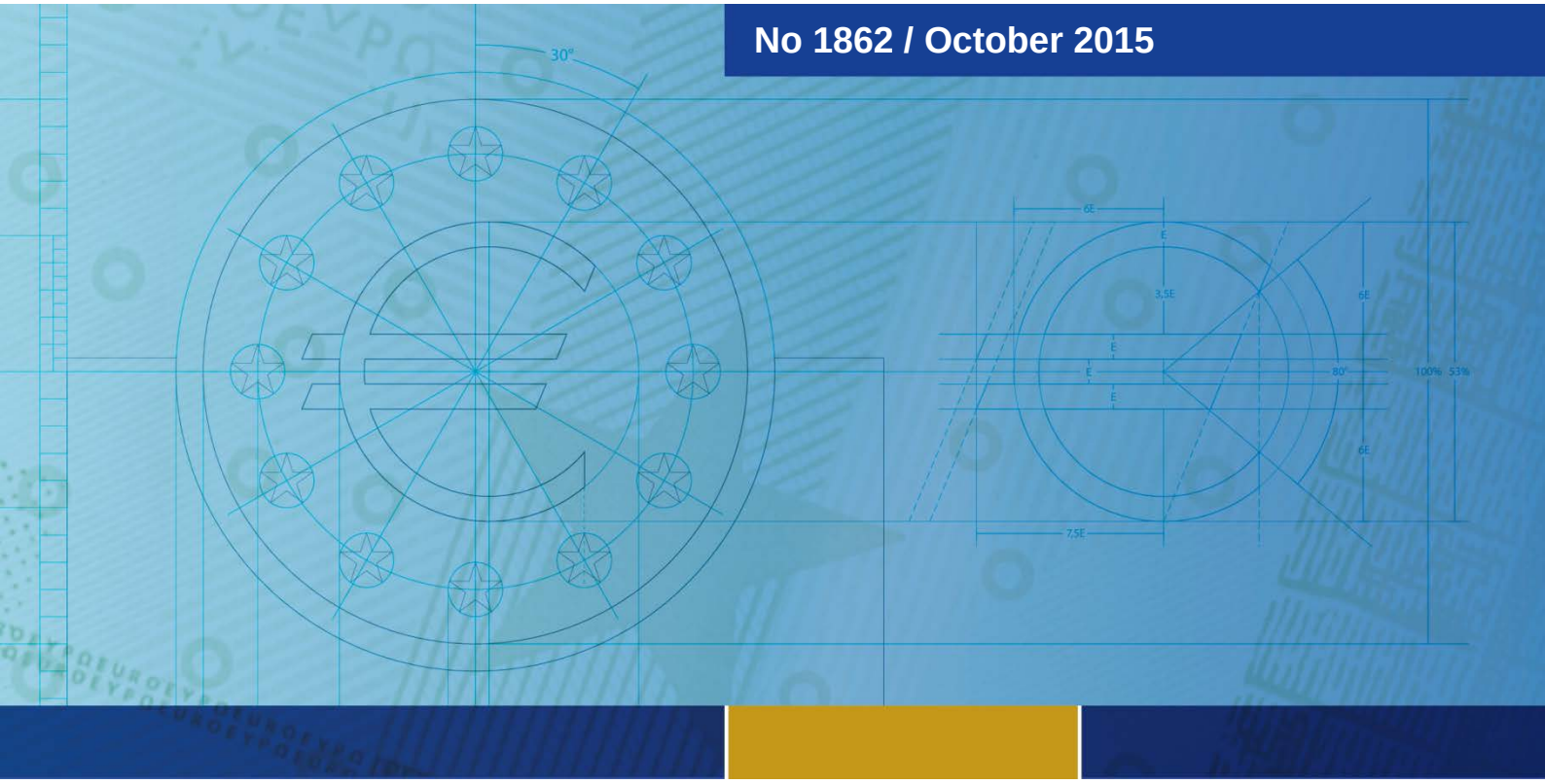
EUROSYSTEM

Working Paper Series

Jose Maria Casado, Cristina Fernandez and Juan F. Jimeno

Worker flows in the European Union during the Great Recession

No 1862 / October 2015



Abstract We measure the contribution of worker flows across employment, unemployment, and non-participation to the change in unemployment in eleven EU countries during the period 2006-2012, paying special attention to which socio-demographic groups in each of the countries were mostly affected by job creation and job destruction during the crisis. We find that age, to a larger extent than educational attainments, is the main determinant of flows from employment into unemployment, particularly in those countries where unemployment increased by most. Secondly, we highlight some institutional features of the labour market (employment protection legislation, unemployment insurance, and the incidence of active labor market policies) that help to explain the cross-country differences in flows between employment and unemployment and in their socio-demographic composition. Finally, we examine if the crisis has led to some employment reallocation across sectors, finding that, so far, there is no clear evidence in favor of cleansing effects.

Keywords: Labour Flows, Unemployment, Labour Market Institutions, Great Recession

JEL: J6, E24, C25

Non-Technical Summary

One of the most highlighted features of the Great Recession and the subsequent European crisis is their different impact on unemployment across countries. In some of them (e.g. Belgium, Austria, Germany) unemployment barely increased, and nowadays, after almost seven years since the Great Recession started, it is more or less at the same level that it was in the pre-crisis period. In others (most notably, Greece, Portugal and Spain), the unemployment rate surged to reach even higher levels than those of the high unemployment period of the early 1980s. Cross-country comparisons of the aggregate unemployment rates cannot fully provide an identification of the macroeconomic and institutional factors that determine labour market performance. In particular, the role played by institutional differences and by employment policies is better understood by looking at worker flows among employment, unemployment, and inactivity, and at their socio-demographic compositions.

This paper uses EU-Labour Force Survey (EU-LFS) data to compute worker flows between employment and unemployment, unemployment and inactivity, and employment and inactivity, and their socio-demographic compositions, distinguishing 18 population groups (defined by gender, age groups, and educational attainment levels), in 11 EU countries (Austria, Belgium, Germany, Denmark, Spain, France, Greece, Italy, Portugal, Sweden and UK) during the 2006-20012 period. It also examines the role of labour market institutions in accounting for the different impact of the crisis on the socio-demographic composition of worker flows between employment and unemployment across countries, and explores if the long recession is having some "cleansing effects" by reallocating employment towards more productive sectors.

The economic literature has extensively analyzed the role of worker flows in determining the evolution of the unemployment rate. However, most of the studies have been conducted using aggregate data,

which has the advantage of having a higher frequency and being more up-to-date than micro data, but with the drawback of not identifying the socio-demographic characteristics of the individuals that are behind those flows. By performing cross-country comparisons of workers flows during the Great Recession, paying particular attention to the socio-demographic composition of the flows, we can highlight four findings that are informative of the employment consequences of the Great Recession:

- We identify the contribution of worker flows to the changes in the unemployment rate observed during the recent crisis. We find that the increase in the probability of losing a job and becoming unemployed seems to be the main determinant of the rise in the unemployment rate, followed by the decrease in the job finding probability among the unemployed. The stark contrast across countries in this regard led us to further explore the socio-demographic composition of the flows and the institutional features of the labour market that could explain those differences.

- We document that the increase in the probability of losing a job has mainly been driven by the male workforce, regardless, in most of the countries, of activity sector; and that role of education as a protection against unemployment has been weaker, with age playing a major role in some countries in determining the flow from employment into unemployment. Besides, the comparison of the demographic characteristics of the individuals transiting between employment states in this crisis with respect to that of the early nineties shows that male and young workers have been the most affected in this recession, most noticeably in Spain.

- Notwithstanding the limitations of the EU-LFS as regards conducting a detailed analysis of inter-sectoral reallocation and although it is still too early to make a full assessment, we fail to find significant changes in the distribution of job hiring and firing during the crisis. However, sectoral reallocation has been more intensive in those countries that have experienced a sizeable increase in the unemployment rate (Spain and Greece).

- We show some statistically significant associations between the characteristics of temporary and permanent employment contracts, the initial net replacement rate of unemployment benefits and expenditure on Active Labor Market Policies, on the one hand, and flows between employment and unemployment of different population groups, on the other.

1 Introduction

One of the most highlighted features of the Great Recession and the subsequent European crisis is their different impact on unemployment across EU countries. In some of them (e.g. Belgium, Austria, Germany) unemployment barely increased, and nowadays, after eight years since the Great Recession started, it is more or less at the same level that it was in 2007. In others (most notably, Greece, Portugal and Spain), the unemployment rate surged to reach even higher levels than those of the high unemployment period of the early 1980s[1]. Understanding the reasons of these differential labour market effects is crucial for evaluating how macroeconomic policies can contribute to reduce unemployment and for designing employment policies that support employment creation and speed up the recovery.

In principle, there could be three plausible reasons for these cross-country differences in the (un)employment consequences of the Great Recession and subsequent events. First, there are cross-country differences in the type of shocks hitting the economy and, hence, in their consequences in terms of decline of economic activity. Secondly, employment policies also varied across countries in response to the shocks. Thirdly, given a similar negative shock, differences in labour market institutions affecting to hiring and firing decisions and to wage determination may also explain why in some countries the loss of employment was greater, and the subsequent employment recovery more muted than in others.

Cross-country comparisons of the aggregate unemployment rate cannot fully provide an identification of each of the three factors above. In particular, the role played by institutional differences and by employment policies is better understood by looking at worker flows and at the socio-demographic composition of these flows. For instance, the impact of employment policies targeted at reducing working hours (as those implemented in Germany) would be better observed in cross-country differences regarding the flows from employment into unemployment. Similarly, the changes in unemployment due to "discouraged worker effects" or to "added worker effects" are more apparent in the flows between unemployment and inactivity. Moreover, the socio-demographic composition of these flows is also informative about both the factors behind the change in unemployment and the impact of some institutional features of the labour market during the Great Recession.

Hence, in this paper we firstly look at worker flows with the aim of better understanding the cross-country differences in the rise of unemployment during the Great Recession.

[1]For detailed accounts of cross-country differentials in the impact of the crisis on unemployment, see ECB (2012).

Using annual data from the *EU-Labour Force Survey (EU-LFS),* compiled by Eurostat, we compute worker flows between employment and unemployment, unemployment and inactivity, and employment and inactivity, and their socio-demographic composition, distinguishing 18 population groups (defined by gender, age groups, and educational attainment levels), in 11 EU countries (Austria, Belgium, Germany, Denmark, Spain, France, Greece, Italy, Portugal, Sweden and UK) during the 2006-2012 period. Secondly, we examine the role of labour market institution in accounting for the different impact of the crisis on the socio-demographic composition of worker flows between employment and unemployment across countries. Finally, we explore if the long recession is having some "cleansing effects" by reallocating employment across sectors.

The rest of this paper is structured as follows. In Section 2 we start by describing the EU-LFS data, discussing the limitations of the information on worker flows across employment, unemployment and inactivity that can be extracted from them, and providing, in Section 3, a decomposition of aggregate unemployment rates into the contributions of each one of these flows. Section 4 examines how these flows differ across socio-demographic groups, and to what extent the current recession differs from past recessions in this regard, and presents some evidence on the extent of employment reallocation during the crisis. Section 5 focuses on the analysis of the impact of labor market institutions on worker flows. Section 6 concludes with some final remarks.

2 Data and descriptive statistics: Worker flows in the European Labour Force Survey

The EU Labour Force Survey (EU-LFS) is a large sample survey among private households which provides detailed quarterly data on the employment status of all the individuals of the household aged 15 and over. It also collects information on many dimensions regarding the socio-demographic characteristics of the individuals, as well as some characteristics of the jobs filled, and the methods used by the unemployed to find a job.

The EU-LFS interviews around 1.5 million people in the EU, European Free Trade Association (EFTA) –except Liechtenstein- and EU candidate countries. Initially, from 1983, its results covered one quarter per year only (usually in spring), but since 1998 it has undergone a transition to a continuous survey, with interviews distributed across all weeks of the year, in order to give reliable quarterly results. One advantage of the survey for our purpose is that the definition of labour status is similar across countries.[2] As

[2]Thus,persons in employment are those who during the reference week of the interview did any work for pay or profit. This definition includes employees, entrepreneurs, family workers, unpaid family workers

for socio-demographic characteristics, the *age* of the respondent refers to the difference between the date of the reference week and her date of birth. However, it is set out in 5-year age bands that we group into three categories: youngest (16-29), middle-aged (30-49) and eldest (50-64). *Educational attainment level* refers to the highest level of education or training successfully completed by the individual, considering both general and vocational education/training, (*ISCED 1997).* We group them under three different categories: low (highest completed level of education is compulsory education, ISCED 0-2), medium (general and vocational studies from compulsory education to pre-college, ISCED 3-4), and highly educated individuals (college degree of a minimum duration of two years or a similar vocational degree, ISCED 5 and 6). This classification is sufficiently broad to end up considering homogeneous groupings across countries, but there could still be some cross-country heterogeneity in this regard[3].

Our sample contains information about worker flows in 11 EU countries for which microeconomic data are available (Austria, Belgium, Germany, Denmark, Spain, France, Greece, Italy, Portugal, Sweden, and the UK). The sample period is 2006-2012[4]. We restrict our analysis to males and females between 15 and 64 years of age who reported their level of education as well as their employment status, both at the moment of the interview and one year before. Worker flows are constructed from the declared employment status of the previous year. Summary statistics are reported in Table 1. Not surprisingly, countries are roughly similar in the socio-demographic variables, with slightly older populations in Nordic countries, and less educated ones in Southern European countries. Differences in employment market status are noticeable, with the typical European pattern of lower unemployment and inactivity rates in Nordic Countries and the UK than in Continental Europe, and, higher unemployment and inactivity rates in Southern Countries.

Unemployment rates and annual worker flows between employment and unemployment during the Great Recession are reported in Figure 1[5]. In our data, the size and cross-country differences in worker flows before the crisis are consistent with the broad patterns highlighted by the empirical literature on worker flows in Europe, as documented, among others, by Burda and Wyplosz, 1994, OECD, 2010, and Elsby, Hobijn and Sahin, 2013.

and self-employed persons. Unemployed persons are those with the three following characteristics: i) lack of work during the reference week, i.e., they neither had a job nor were at work (for one hour or more) in paid employment or self-employment, ii) current availability for work, i.e. they were available for paid employment or self-employment before the end of the two weeks following the reference week, and iii) active job search, i.e., the individual took specific steps in the four week period ending with the reference week to seek paid employment or self-employment. Finally, inactive persons are those who are neither classified as employed nor as unemployed.

[3] As, for example, that arising from the fact that compulsory years of education differ across countries.

[4] The starting year, 2006, is determined by the fact that the information on the activity status in the previous year becomes systematically available from 2006 on. The exception is Sweden, where this information is available only from 2007 onwards.

[5] See Appendix A.1 for information on transitions between (un)employment and inactivity.

The impact of the recession on the flows between employment and unemployment are notoriously different across countries. Thus, in Germany, Austria and Belgium, they barely changed, while there is an increase of the flows from employment to unemployment and a decrease of the flows from unemployment to employment in the rest of the countries, most noticeably in Greece, Portugal, and Spain where, approximately, the former doubled and the latter halved.

However, since our measures of worker flows are computed from transitions among employment status from one year to the next, they are contaminated by the (well-known) *time aggregation bias* resulting from the lack of observation of changes in employment status within a given year. Since "atypical employment" (part-time, fixed-term, temporary) has been on the rise in many EU countries and its average duration is short, job creation and job destruction rates are likely to be much higher than the size of the worker flows in our sample[6]. Nevertheless, the increase in the incidence of long-term unemployment during the Great Recession (Figure 2) suggests that these annual transitions may still provide a good approximation to the rates at which workers are losing their jobs and the unemployed are finding new jobs. Still, to confirm if the time aggregation bias may render annual worker flows meaningless, we use information from the Spanish Labour Force Survey to construct the same flows from quarterly data. The comparison between both measures of transitions is presented in Figure A.3. Although it is true that annualized quarterly transitions are much higher than those obtained from annual data, the time evolution of both measures in our sample period are qualitatively similar.

3 Workers' flows and aggregate unemployment

When labour market status is defined as one of three possible states (employment, unemployment, and inactivity), the unemployment rate is a function of the six corresponding transition rates, and can be computed as follows (see Pissarides, 2000):

$$\overline{u}=\frac{h_{e??}+\frac{h_{iu}}{h_{ie}+h_{iu}}*h_{ei}}{h_{eu}+\frac{h_{iu}}{h_{ie}+h_{iu}}*h_{ei}+h_{ue}+\frac{h_{ie}}{h_{iu}+h_{ie}}*h_{ui}} \quad (1)$$

where h_{xy} stands for the probability of flowing out of x into y, for $x,y=\{e,u,i\}$, with e being employment, u being unemployment, and i being inactivity.

To compute the contribution of each of the previous six flows to the annual change in unemployment, we substitute in equation (1) the observed transition rate for a particular

[6] Elsby et al. (2012) use monthly data and quarterly observations on the duration of unemployment spells to take account of the time aggregation bias in worker flows as registered by the EU-LFS.

flow and year, holding constant the rest of the transition rates corresponding to the other five flows as observed in the previous year. Hence, each contribution represents the change in aggregate unemployment that would have been observed if only a particular flow had varied. Obviously, this computation does not yield an additive decomposition of the changes in unemployment, as there is a combined effect of changes in all the flows (that we label as "residual") that is sizeable, particularly in those countries where unemployment increased by most.

Using this approach, we obtain that in most of the countries, during the crisis, the biggest change in aggregate unemployment arose from the increase in the probability of losing a job and becoming unemployed, and, to a lesser extent, from the decrease in the probability of flowing from unemployment into employment (Figure 3).[7] Both in the countries where the increase of unemployment was moderate and in those where unemployment surged, the contributions of the flows from employment into unemployment and from unemployment into employment account for around 45% and 15%, respectively, of the increase in aggregate unemployment. This is also the case in Austria, where the increase of unemployment was negligible, but neither in Germany, where the flows from employment to unemployment decreased, nor in Belgium, where the flows from unemployment to employment increased. In Spain and Portugal, changes in these two flows account for 11 percentage point increase in the unemployment rate, where in Greece their joint contribution is above 15 percentage points.

Variations in the rest of the flows contributed much less to unemployment changes, but it is worthwhile noticing the increase in flows from unemployment into inactivity and from inactivity into employment in Austria and Germany, and the decrease of the flows from inactivity into unemployment in Germany, whose contributions to keeping unemployment low were relatively important. In contrast, in the rest of the countries, the contribution of (increased) flows from inactivity into unemployment and (decreased) flows from inactivity into employment was towards pushing the unemployment rate up, while the (decreased) flows from unemployment into inactivity contributed to increasing the unemployment rate (except in Portugal).[8] Finally, increasing flows from employment into inactivity only had

[7] Shimer (2012), using US monthly data for the period 1948-2007, argues that 75% of the fluctuations in the unemployment rate are driven by movements in the job-finding probability, this is, the "outs of unemployment". He argues that ignoring time aggregation will bias a researcher towards finding a countercyclical employment exit probability, because when the job finding probability falls, a worker who loses her job is more likely to experience a measured spell of unemployment.

[8] Increasing flows from unemployment to inactivity may be due to the so-called "discouraged worker effect", by which workers quit job searching due to the lack of vacancies available. Higher flows from inactivity to unemployment may be the consequence of the so-called "added worker effect", that is, inactive members of a household joining the labor force to compensate for employment losses of other members. In this case, a longer transition from school to jobs, as young individuals take longer to find a first job, may also explain an increase in the annual frequency of transitions from inactivity to employment.

a relatively important contribution to changes in the unemployment rate in Belgium and France.

4 The socio-demographic composition of flows

A better understanding of the changing patterns and cross-country differences of worker flows among different employment states during the Great Recession requires more detailed consideration of the characteristics of the individuals transiting between states. Thus, we now analyze the socio-demographic composition (by gender, age groups, and educational attainments) of worker flows, and compare it across countries and with previous recessions. As the most important driving forces of unemployment changes are flows between employment and unemployment, we disregard the rest of the flows.[9]

4.1 Measuring flows by socio-demographic characteristics

We measure the socio-demographic composition of flows between employment and unemployment by running the following logit regressions for each country:

$$h_{it}=\beta_1 X_1 \mathrm{D}+...+\beta_{18} X_{18} \mathrm{D}+\varepsilon_{it} \tag{2}$$

Covariates $(X_{1,}...,X_{18})$ are dummy variables that identify whether the individual belongs to any of the demographic groups that arise as a result of interacting gender (male; female), educational attainment dummies (low, medium, and high), and age (16-29; 30-49; 50-65)[10]. Each covariate is interacted with year dummies D_t (t= 2006,..., 2012), so D stands as a $Tx1$ vector of year dummies. The dependent variable h_{it} denotes one of two different outcomes in two different regressions: in the first specification –the flow from employment to unemployment $\mathrm{h}_{\mathrm{it}}^{\mathrm{EU}}$-, it takes value 1 when an employed individual becomes unemployed, and 0 when she remains employed; in the second –the flow from unemployment to employment $\mathrm{h}_{\mathrm{it}}^{\mathrm{UE}}$-, h_{it} takes value 1 when an unemployed individual

[9]Moreover, as job searching is not always a precisely observed concept in labor force surveys, there is a grey area in the definition of the boundary between inactivity and unemployment that makes the identification of flows between unemployment and inactivity a bit problematic (See Jones and Riddell, 1999, 2002, and Garrido and Toharia, 2004). Active job search in the EU-LFS is defined as the fulfillment of one of the following steps to find a job: having been in contact with a public employment office to find work, whoever took the initiative (renewing registration for administrative reasons only is not an active step), having been in contact with a private agency (temporary work agency, firm specializing in recruitment, etc.) to find work, applying to employers directly, asking among friends, relatives, unions, etc., to find work, placing or answering job advertisements, studying job advertisements, taking a recruitment test or examination or being interviewed, looking for land, premises or equipment, applying for permits, licenses or financial resources.

[10]Sample sizes corresponding to each socio-demographic group are given in Appendix A.2.

becomes employed, and 0 when she remains unemployed. Afterwards, for each socio-demographic group i in a particular country c and year t, we recover the corresponding transition probabilities from the estimated Txk matrix of coefficients $\widehat{\beta}$.

4.1.1 Flows from employment into unemployment

Figures 4a and A.4.1 show, respectively, the change in the (average) estimated transition probability from employment to unemployment between 2007-2009 and 2007-2012 by socio-demographic groups, and the contribution of each one of them to the change in the corresponding aggregate flow between these two periods.[11] In the countries where unemployment barely changed there are no signs of sizeable increasing flows from employment into unemployment for any of the considered socio-demographic groups; only in Austria and Belgium there seems to be a (statistically significant) slight increase for males without higher education in the 30-49 age cohort. On the contrary, in the countries where unemployment most increased, the rise in this flow is spread among all population groups. Admittedly, it is greater for those without higher education, but also larger for the youngest (15-29), regardless of their educational attainment, than for older workers without education. During the second half of the sample (which can be assessed by comparing the results for 2007-2009 with those for 2007-2012), the flows from employment to unemployment increased in Portugal and Greece, and, more moderately, in Italy and Spain.

Another interesting finding is that in the very high-unemployment countries, and also in the countries with a moderate increase of unemployment during the crisis, the probability of losing a job increased more for males than for females. This gender difference might be explained by the greater effect of the crisis on some specific sectors where males are overrepresented. To check this hypothesis we have interacted the gender dummy with a dummy variable that identifies employment in the construction sector –one of the hardest hit in this recession and also one with the highest incidence of male employment- (see Appendix A.5). We find some support for this hypothesis in Spain, Greece, and the United Kingdom, but not in the rest of the countries where there does not seem to be a sectoral composition effect behind the gender difference in the flow from employment into unemployment.

As stressed by the many papers in the Labor Economics literature (e.g., Nickell, 1979; Ashenfelter and Ham, 1979, and Mincer, 1991) education provides powerful protection against job loss. However, during the Great Recession in the EU countries where the

[11] *Respectively* : $\widehat{\beta}_{\mathrm{i},2007}-\widehat{\beta}_{\mathrm{i},2009}$, $\widehat{\beta}_{\mathrm{i},2007}-\widehat{\beta}_{\mathrm{i},2012}$ and $\alpha_{\mathrm{i},2007}\widehat{\beta}_{\mathrm{i},2007}-\alpha_{\mathrm{i},2009}\widehat{\beta}_{\mathrm{i},2009}$, $\alpha_{\mathrm{i},2007}\widehat{\beta}_{\mathrm{i},2007}-\alpha_{\mathrm{i},2012}\widehat{\beta}_{\mathrm{i},2012}$ $i = 1, \ldots,$ 18 where α *it* is the weight of group i in total population at time t.

increase in unemployment was highest, it seems that age, rather than education, was the main determinant of the flow from employment into unemployment, with young workers, regardless of their level of education, particularly affected by employment loss. While there are reasons to expect productivity (and the incidence of productivity shocks) to be related to some extent to age, it seems more likely that the very uneven distribution of these flows across age-groups is mostly explained by the bias of Employment Protection Legislation (EPL) in favour of older workers, especially in those countries where duality, i.e. is the existence of different layers of EPL for different jobs and workers, is especially acute.[12] We further examine this in the next Section.

Finally, it is important to weight the change in the probability of job loss for each particular socio-demographic group as a proportion of the aggregate change for the whole population. Figure A.4.1 shows that, in most countries, the most sizeable relative contribution is from middle-aged males with low/medium educational attainments, except in Sweden and the UK, where young workers contributed to a greater extent to increasing the overall flow from employment to unemployment.

4.1.2 Flows from unemployment into employment

Flows from unemployment into employment tend to decrease during recessions, especially as the pool of unemployed workers grows. In the current crisis, we observe this pattern in all the countries in our sample, but the extent of the decreases and their distribution by socio-demographic group widely differ across countries (Figure 4b).

In the low unemployment countries, most of the changes in the probability of finding a new job for the unemployed are not statistically significant, neither during the 2007-2009 period nor during the 2007-2012 period. In fact, only young unemployed women with low education in Austria and medium-aged unemployed women with low education in Germany seem to have suffered a decrease in the probability of finding a new job. On the contrary, in the high-unemployment countries, this decrease, which is most noticeable in the second half of the period, is widespread across socio-demographic groups, with the highly educated unemployed having lower transition rates into employment in Portugal (although, not statistically significant), Spain, and Greece, where young unemployed with high education are among the most affected. Finally, the decrease in the transition from unemployment to employment for the rest of the countries is more evenly distributed across socio-demographic groups, the highest impact being on young unemployed individuals with low and medium level of education attainment.

[12] Bell and Blanchflower (2011) have also stressed that during the Great Recession young workers have disproportionately suffered the rise of unemployment.

Overall, the fall in aggregate worker flows from unemployment into employment is mostly accounted for by young unemployed with low education in Portugal and Spain, unemployed youths with medium education in Greece, and young and middle-aged workers with low education attainment in France, Italy, Sweden and the UK (Figure A.4.2).

4.2 A comparison with previous recessions

To what extent these changes in the flows between employment and unemployment during the recent crisis are different from previous recessions? Given data limitations[13], we can perform this comparison only for four countries –Belgium, Spain, United Kingdom, and Portugal- regarding the recession of the period 1992-93. Figure 5a shows the probability of flowing from employment to unemployment in both periods. The blue bars represent the ratio between the probability of losing the job during the Great Recession and the pre-crisis year, while the green dots represent the same ratio during the early nineties crisis. In Portugal, Belgium and United Kingdom the increase of the flows from employment into unemployment resembles that observed during recession of the early nineties. However, in Spain, we identify two peculiarities of the recent crisis. Firstly, the probability of losing the job has increased proportionally more among males, while among females the proportional increase has been of the same magnitude in both recessionary episodes. This is, we clearly identify a differential gender component in the Great Recession, probably driven, as we stated above, by the asymmetric shock to the construction sector. Secondly, young males have experienced a higher proportional increase in the probability of losing the job than middle-aged males, while in the crisis of the early nineties both groups suffered the same proportional increase.

As for the probability of finding a job (see Figure 5b), we observe that while in Portugal and United Kingdom the magnitude of the proportional drop has been fairly similar in both crises, in the case of Spain, the options of finding a job have been cut down relatively more during the Great Recession. Additionally, in Spain the distribution of the incidence across demographic groups has not remained stable: the Great Recession has mostly undermined the chances of the younger cohorts finding a job. Therefore, while during the early nineties crises, the highest cut down was suffered by middle-aged males, during the recent crises the young males have been the hardest hit.

[13]EU-LFS provides the education breakdown only from 1992.

4.3 Employment reallocation

A central question in Economics is how business cycles affect the allocation of resources. Recessions are often seen as having "cleansing" effects, because outdated techniques and products are more likely to be squeezed out of the market at those times (Caballero and Hammour, 1994). Thus, recessions change the allocation of labor as low quality matches are destroyed and only exceptionally high quality matches are created (Mortensen and Pissarides, 1994). However, "sullying" effect of the crisis (Barlevy, 2002), arising from workers accepting any match exceeding the quality of their currently low productive match and, hence, job-to-job transitions worsening productivity, on average, are also plausible.

In this context, one of the current issues under debate is whether the Great Recession is bringing any job reallocation across sectors in the European countries. EU-LFS data, despite some limitations[14], allows us to shed some light on that debate from the point of view of worker flows, i.e., comparing the sectors where the unemployed are being hired with the sectors where workers were fired.

Looking at the correlation of the sectoral distribution of job finding across years with that of 2008 (Figure 6a), we observe that, with the exception of Spain and Greece, the sectoral distribution of job finding during the period 2009-2012 was very similar to that of 2008: the proportion of jobs created in each sector was virtually the same before and throughout the Great Recession. Another way of approaching the question is to determine whether or not hirings are taking place in the sectors that previously destroyed jobs. Figure 6b shows that in 2009, maybe due to the weakness of job finding, the correlation between hirings and firings across sectors was very low. However, this correlation increased in subsequent years. Moreover, as Figure 6c shows, the intensity of sector reallocation has been very heterogeneous across countries and seems to be higher in those countries that have experienced a sizeable increase in the unemployment rate. Overall, there seems to be little evidence supporting that cleansing effects of the current crisis are being sizeable.[15]

[14]The EU-LFS provides a broad classification of sector of activity distinguishing only between 15 categories: agriculture, mining, manufacturing, electricity, construction, wholesale and retail, transport, hotels and restaurants, financial intermediation, other business, public administration, education, health, entertainment services and household. Besides, given the NACE reclassification, categories are only fully comparable from 2008 onwards.

[15]Since in our dataset, there is no information on firm's characteristics, we cannot search for cleansing effects taking place across firms.

5 Labour market institutions and worker flows

Why transition rates between employment and unemployment varied across socio-demographic groups, and across-countries? Some studies have stressed that labor markets institutions (such as, Employment Protection Legislation, Unemployment Benefits, Active Labour Market Policies) have a significant impact, not only on employment and unemployment rates and the size of the flows between employment and unemployment, but also on their socio-demographic composition.[16]. Here we make use of our estimates of transition probabilities between employment and unemployment by age, gender, and education to further examine the impact of labor market institutions on worker flows.

We pool all the transition probabilities from employment to unemployment (heu_{ct}) and from unemployment to employment (hue_{ct}) that we have calculated above for each country c and for t=*2006-2012*. Then, for each socio-demographic group, we run the two following linear regressions:

$$heu_{ct}=\alpha_0+\alpha_c+\alpha_1 gdp_{ct}+\alpha_2 Inst_{ct}+\varepsilon_{ct} \tag{3}$$

$$hue_{ct}=\alpha_0+\alpha_c+\alpha_1 gdp_{ct}+\alpha_2 Inst_{ct}+\varepsilon_{ct} \tag{4}$$

where regressors are country fixed effects (α_c), the cycle measured by the change in GDP (gdp) and each one of the labor market institutions to be considered one at a time ($Inst$): the net replacement ratio of unemployment benefits, the strictness of employment protection legislation on permanent contracts and temporary contracts, the coverage and coordination of collective bargaining, the expenditure on active labor market policies per unemployed person, and the size of the minimum wage relative to the median wage.

Firstly, Figure 7a provides an indication of the extent to which changes in economic activity explain worker flows between employment and unemployment. By focusing in 2009, the year with the largest changes in GDP, we plot the predicted flows from regressions like (3) and (4) -after excluding the institutional co-variate- and the part of these flows explained by changes in GDP. Not surprisingly, reductions in GDP contributed overall to increase the flows from employment to unemployment and to decrease the flows from unemployment to employment; however, what is remarkable from the Figure is that those contributions were relatively small when compared to the country fixed effects.

[16] See, for instance, Bertola et al. (2007), for the impact of institutions on employment rates, and Bassanini et al. (2010), for the impact on flows.

Secondly, by focusing in the same year, we relate the cross-country fixed effects from the same regressions to changes in wages and working hours (Figure 7b). It happens that in countries with lowest wage increases and largest reductions in working hours, worker flows between employment and unemployment were lower; however, as for flows from unemployment to employment, it seems that lower wages and reductions in working hours did not contribute to increase exits from unemployment.

As for the impact of labour market institutions, results are reported in Figure 8a through Figure 8f. As regards EPL, we use the OECD indicators on the easiness of use of temporary and permanent employment contracts[17]. While the easiness of use of temporary contracts should increase the inflows from employment to unemployment, and the strictness of use of permanent contracts should decrease them, the expected magnitude of these effects across differential groups very much depend on the incidence of temporary employment and its distribution among population groups, which in turn would be determined by the extent to which temporary and permanent employment are differently regulated (precisely, the effect we aspire to capture with the interaction of the two indicators described above). Thus, we also include another indicator of EPL aimed at measuring the degree of "duality" –that is, segementation between permanent and temporary workers- which is the proportion of temporary workers among those transiting into employment in each year. Indeed, we find that less regulated temporary employment contracts are associated with a higher transition rate from employment to unemployment, especially among the young cohorts, while a more stringent permanent employment regulation is associated with lower transition rates, especially among middle-aged and older workers. As for transitions from unemployment to employment, EPL may generate noticeable substitution effects among different population groups, so that the corresponding transition rates would very much depend on the socio-demographic composition of unemployment. In our results, the more flexible temporary contracts are, the lower the transition out of unemployment of young and middle-aged workers is, while the more stringent permanent employment contracts are the higher the exit rate out of unemployment is, but only in the case of middle-aged and older workers with higher degrees of education. Finally, a larger proportion of temporary contracts in hirings produces larger flows from employment into unemployment and does not increase the flows from unemployment into employment. In fact, in the workers with low educational attainments dual EPL seems to decrease the exit rate from unemployment.

As for unemployment benefits, insofar as they increase reservation wages and lower search intensity, it is plausible that they reduce the transition from unemployment to employment. On the other hand, more generous unemployment benefits may increase the

[17]Rescaling the OECD indicator on the strictness of EPL of temporary employment.

quality of job matching, as liquidity constrained job searchers can sustain longer search periods[18]. In our data, we find that the initial net replacement ratio of unemployment benefits turns out to be negatively associated with the probability of transiting from employment to unemployment, especially for those workers with lowest educational attainments and age, while we do not observe any significant negative association with the probability of finding a job. In fact, if anything, for young workers with a low level of education, it turns out that the higher the initial replacement rate, the higher the probability of finding a job. Thus, in our sample, the moral hazard effects of unemployment benefits do not seem to work through the replacement rate.

Regarding expenditure on active labour market policies, to the extent that they lead to better matches, they should lower the transition rate from employment to unemployment and increase the flow from unemployment to employment, especially for younger, less educated workers. Our results show some support for the latter but not for the former.

6 Concluding remarks

The economic literature has extensively analyzed the role of worker flows in determining the evolution of the unemployment rate. However, most of the studies have been conducted using aggregate data, which has the advantage of having a higher frequency and being more up-to-date than micro data, but with the drawback of not identifying the socio-demographic characteristics of the individuals that are behind those flows. In this paper, we have attempted to fill this gap by performing cross-country comparisons of workers flows during the Great Recession, paying particular attention to the socio-demographic composition of the flows. We highlight four findings that are informative of the employment consequences of the Great Recession.

First, using a homogeneous micro data set, we identify the contribution of worker flows to the changes in the unemployment rate observed during the recent crisis. In line with the literature, we find that the increase in the probability of losing a job and becoming unemployed seems to be the main determinant of the rise in the unemployment rate, followed by the decrease in the job finding probability among the unemployed.The stark contrast across countries in this regard led us to further explore the socio-demographic composition of the flows and the institutional features of the labour market that could explain those differences.

[18] See Chetty (2008).

Secondly, we document that the increase in the probability of losing a job has mainly been driven by the male workforce, regardless, in most of the countries, of activity sector; and that role of education as a protection against unemployment has been weaker, with age playing a major role in some countries in determining the flow from employment into unemployment. Besides, the comparison of the demographic characteristics of the individuals transiting between employment states in this crisis with respect to that of the early nineties shows that male and young workers have been the most affected in this recession, most noticeably in Spain.

Thirdly, notwithstanding the limitations of the EU-LFS as regards conducting a detailed analysis of inter-sectoral reallocation and although it is still too early to make a full assessment, we have not yet found significant changes in the distribution of job hiring and firing during the crisis. However, sectoral reallocation has been more intensive in those countries that have experienced a sizeable increase in the unemployment rate (Spain and Greece).

Finally, we have shown some statistically significant associations between the characteristics of temporary and permanent employment contracts, the initial net replacement rate of unemployment benefits and expenditure on Active Labor Market Policies, on the one hand, and flows between employment and unemployment of different population groups, on the other.

In sum, worker flows have contributed in varying degrees across countries to the widespread increase that we have observed in the unemployment rate during the Great Recession, and the contributions of several demographic groups to the changes in each of the flows also differ substantially across countries. The identification of the groups that are driving the rise in the unemployment rate and of the labour market institutions that determined this evolution should be a first step to designing better employment policies to reduce unemployment.

References

[1] Ashenfelter, O., and J. Ham (1979): "Education, Unemployment, and Earnings ", *Journal of Political Economy*, vol. 87, pp. S99-S116, October.

[2] Barlevy, G. (2002): "The Sullying Effect of Recessions" Review of Economic Studies, 69(1), pp. 65–96.

[3] Bassanini, A., A. Garnero, P. Marianna, and S. Martin (2010): "Institutional Determinants of Worker Flows: A Cross-country/Cross-industry Approach", OECD Social, Employment and Migration, Working Paper No. 107, OECD Publishing, Paris.

[4] Bell, D.H.F. and D.G. Blanchlower (2011): "Young People and the Great Recession", IZA Discussion Paper no. 5674.

[5] Bertola, G., F.D. Blau, and L. M. Kahn (2007): "Labor Market Institutions and Demographic Employment Patterns." *Journal of Population Economics,* 20(4): 833–67.

[6] Burda, M. and C. Wyplosz (1994): "Gross worker and job flows in Europe," *European Economic Review,* vol. 38(6), pp. 1287-1315, June.

[7] Caballero, R., and M. Hammour (1994): "The cleansing effect of recessions", *American Economic Review*, 84(5), 1350-1368.

[8] Chetty, R. (2008): "Moral hazard versus liquidity and optimal unemployment insurance. *Journal of Political Economy* 116(2): 173-234.

[9] ECB (2012), *Euro area labour markets and the crisis*, Strcutural Issues Report.

[10] Elsby, M. B., Hobijn, and A. Sahin (2013): "Unemployment dynamics in the OECD", *Review of Economics and Statistics,* vol. 95(2), pp. 530-548.

[11] Garrido, L., and L. Toharia (2004): "What does it take to be (counted as) unemployed? The case of Spain", *Labour Economics* 11 507– 523

[12] Jones, S.R.G., and Riddell, W.C. (1999): "The measurement of unemployment: an empirical approach". *Econometrica*, 67-1, 147– 162.

[13] Jones, S.R.G., and Riddell, W.C., (2002): "Unemployment and Non-Employment: Heterogeneities in Labour Market States. Department of Economics Working Paper No. 2002-05. McMaster University.

[14] Mincer, J. (1991): "Education and Unemployment", NBER, working paper 3838.

[15] Mortensen, D.T., and C.A. Pissarides. 1994. “Job Creation and Job Destruction in the theory of unemployment.” Review of Economic Studies, 61(3): 397–415.

[16] Nickell, S. (1979): "Education and Lifetime Patterns of Unemployment", *Journal of Political Economy,* vol. 87(5), pp. S117-31, October.

[17] OECD (2010), *Employment Outlook*, OECD, Paris.

[18] Pissarides, C. (2000), *Equilibrium Unemployment Theory*, 2nd Edition, MIT Press.

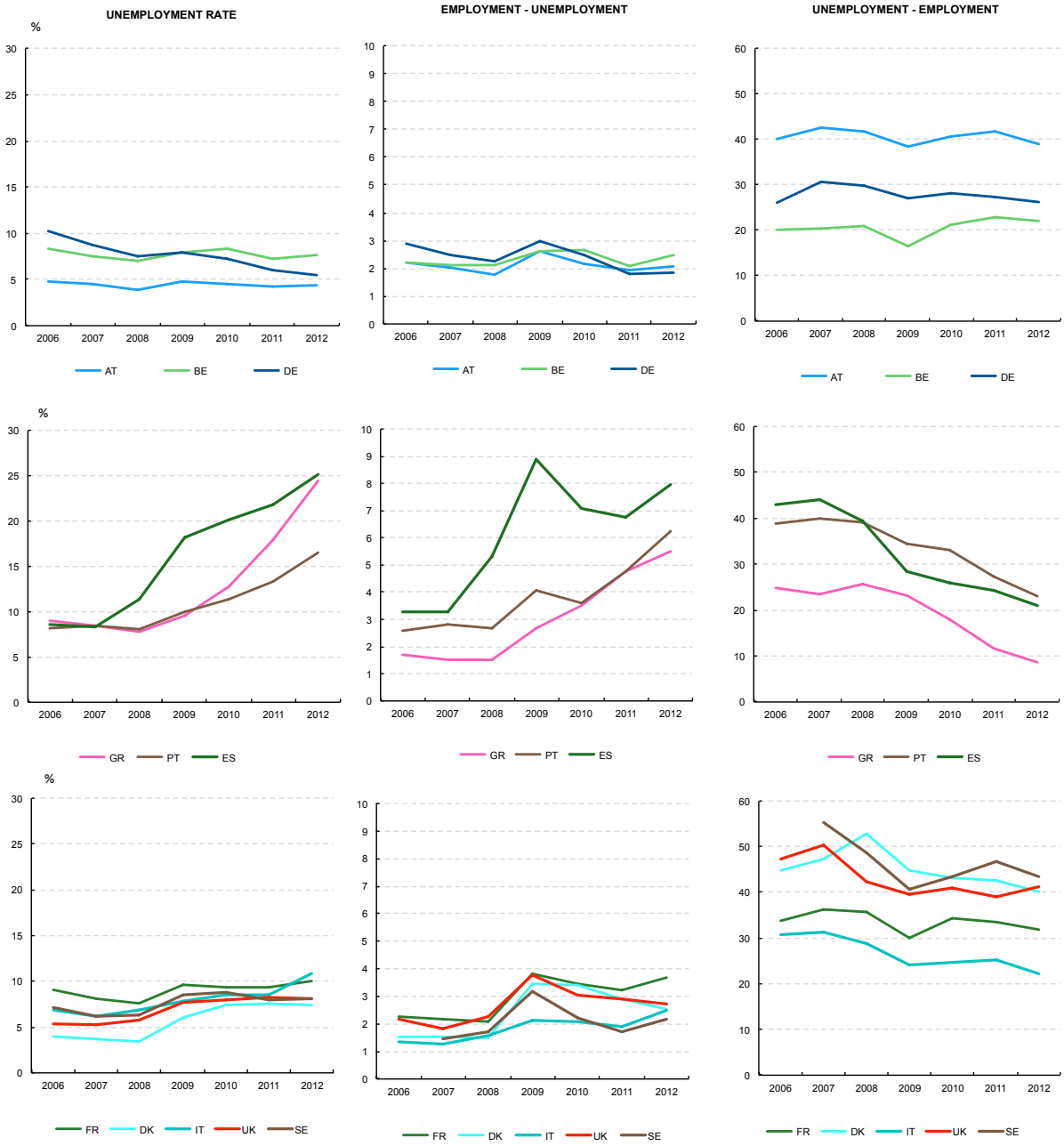
[19] Shimer, R. (2012): "Reassessing the Ins and Outs of Unemployment", *Review of Economic Dynamics*, vol. 15(2), pp. 127-148.

Table 1: SUMMARY STATISTICS

		COUNTRIES										
VARIABLES		AT	BE	DE	DK	ES	FR	GR	IT	PT	SE	UK
Age (%)	*15-29*	27.7	28.0	26.1	26.9	25.2	28.3	26.1	24.5	27.3	29.2	28.9
	30-49	45.1	43.0	44.3	42.9	48.6	42.1	45.3	46.9	45.1	41.3	43.7
	50 - 64	27.2	29.0	29.6	30.2	26.2	29.6	28.5	28.6	27.6	29.5	27.4
Education (%)	*Primary and lower secondary*	23.7	33.2	21.3	30.7	48.2	32.5	39.2	47.0	67.8	25.4	26.9
	Upper and post-secondary	60.6	37.4	56.4	41.8	23.6	41.8	40.2	40.3	18.5	46.8	42.9
	Tertiary	15.8	29.5	22.3	27.5	28.2	25.7	20.6	12.7	13.7	27.7	30.2
Gender (%)	*Male*	50.0	50.3	50.5	50.6	50.3	49.2	50.1	49.9	49.5	50.8	50.0
	Female	50.0	49.7	49.5	49.4	49.7	50.8	49.9	50.1	50.5	49.2	50.0
Unemployment rate (%)		4.4	7.7	7.6	5.6	16.3	9.0	12.9	8.0	10.8	7.6	6.9
Inactivity rate (%)		25.3	33.0	23.4	20.0	26.4	29.6	32.5	37.3	26.0	20.4	22.6

1. Sample period 2006-2012.

Figure 1: UNEMPLOYMENT RATE AND LABOUR FLOWS



Note: Figures under the employment to unemployment (unemployment to employment) column refer to the proportion of employed (unemployed) individuals that flow into unemployment (employment) in each year.)

Country legend: Austria (AT), Belgium (BE), Germany (DE), Greece (GR), Portugal (PT), Spain (ES), France (FR), Denmark (DK), Italy (IT), United Kingdom (UK) and Sweden (SE).

Figure 2: LONG-TERM UNEMPLOYMENT

Unemployment Duration (% of unemployed with duration >1 year)

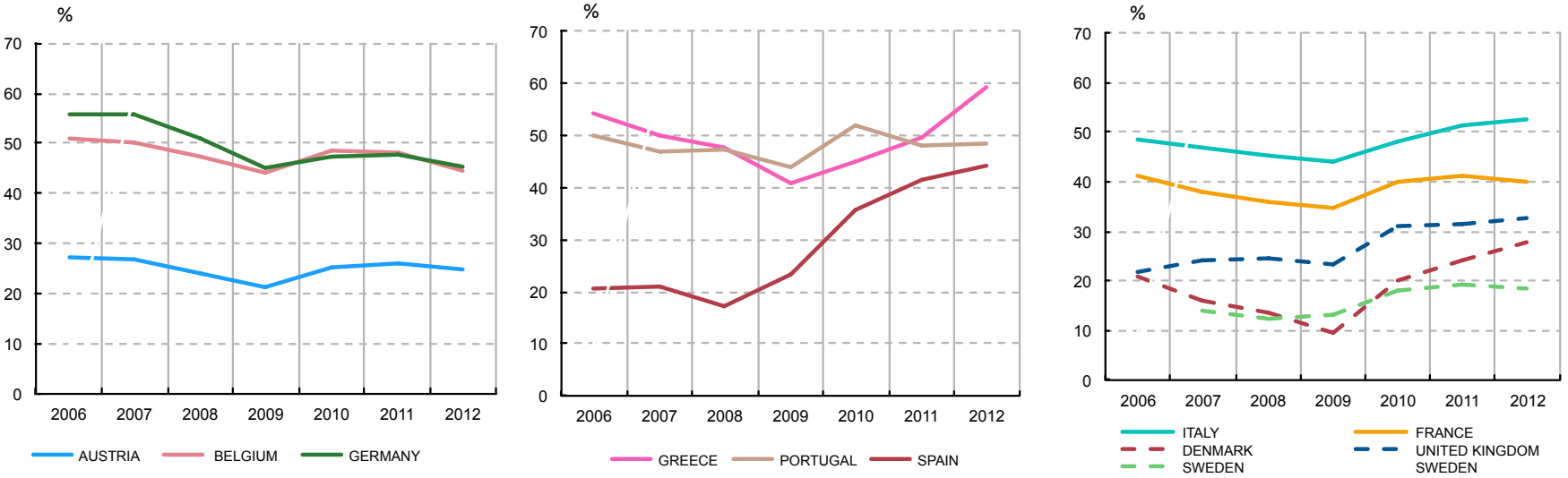
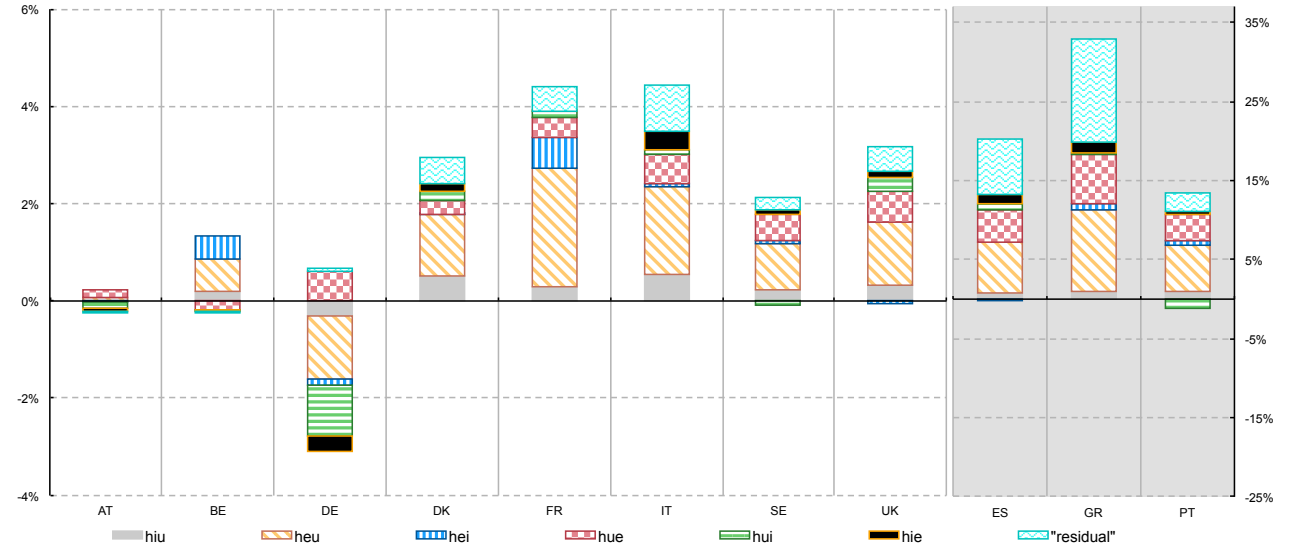
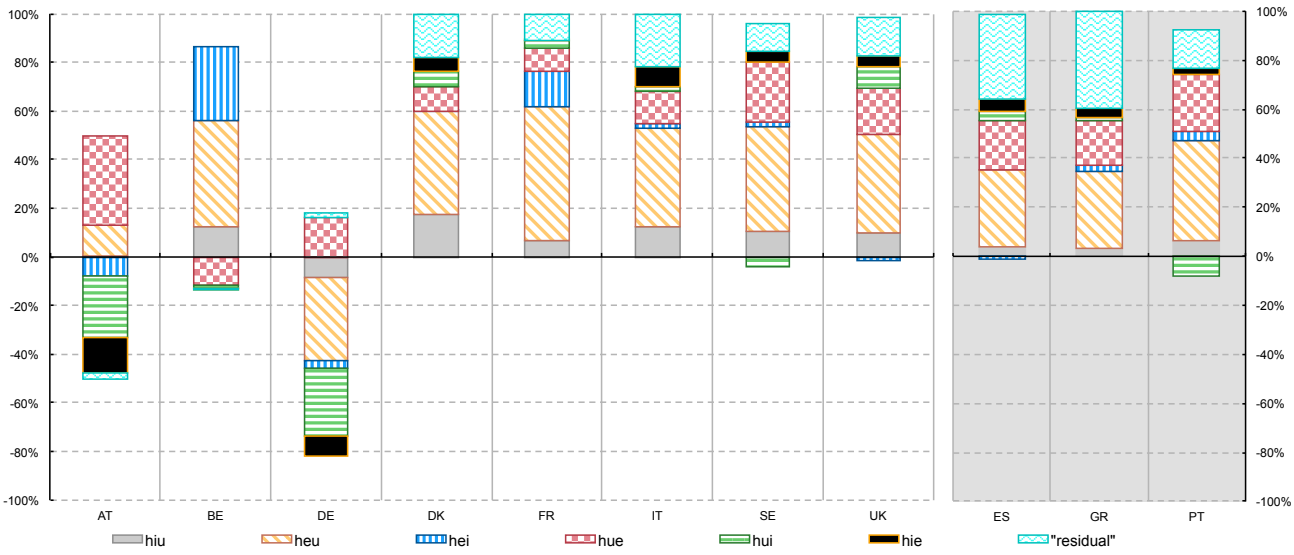


Figure 3: WORKERS' FLOWS CONTRIBUTION TO THE CHANGE IN THE UNEMPLOYMENT RATES: 2007-2012



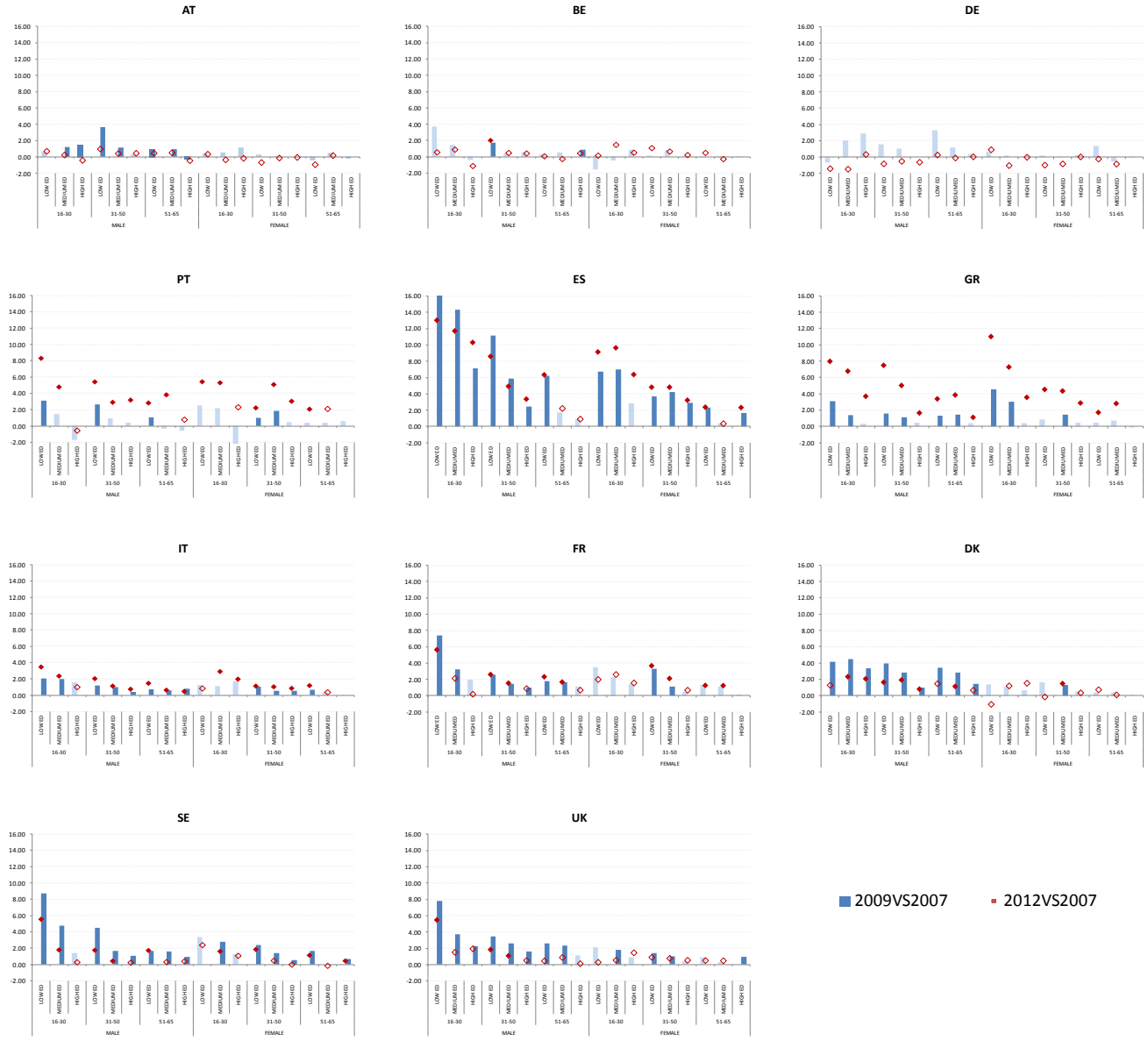


Note: Figure in the top panel shows the contribution of each flow to the change in aggregate unemployment during the period 2007-2012 that would have been observed if only that particular flow had varied. Bottom figure shows the same information with base 100.

Flow legend: Inactivity-Unemployment (hiu), Employment-Unemployment (heu), Employment-Inactivity (hei), Unemployment-Employment (hue), Unemployment-Inactivity (hui) and Inactivity-Employment (hie).

Figure 4a: SOCIO-DEMOGRAPHICAL FLOW DECOMPOSITION

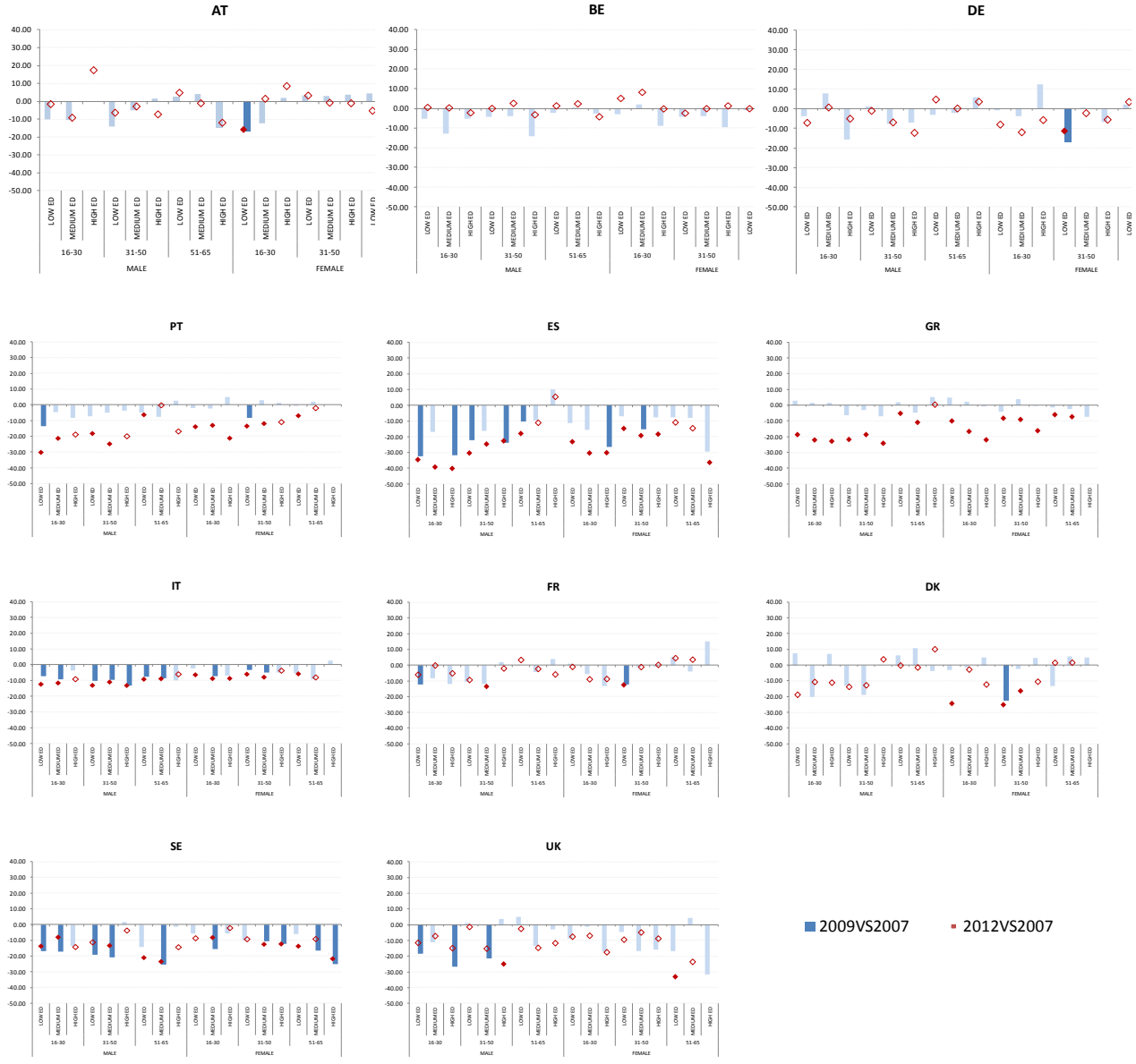
Probability growth of flowing from **employment to unemployment**



Note: Each blue bar is the difference in the probability of flowing from employment to unemployment between 2009 and 2007 for each specific group. Dark blue indicates that the difference is significant and light blue that it is not significant. Each red dot is the difference in the probability of flowing from employment to unemployment between 2012 and 2007 for each specific group. When the dot is not colored, it means that the difference is not significant.

Figure 4b: SOCIO-DEMOGRAPHICAL FLOW DECOMPOSITION

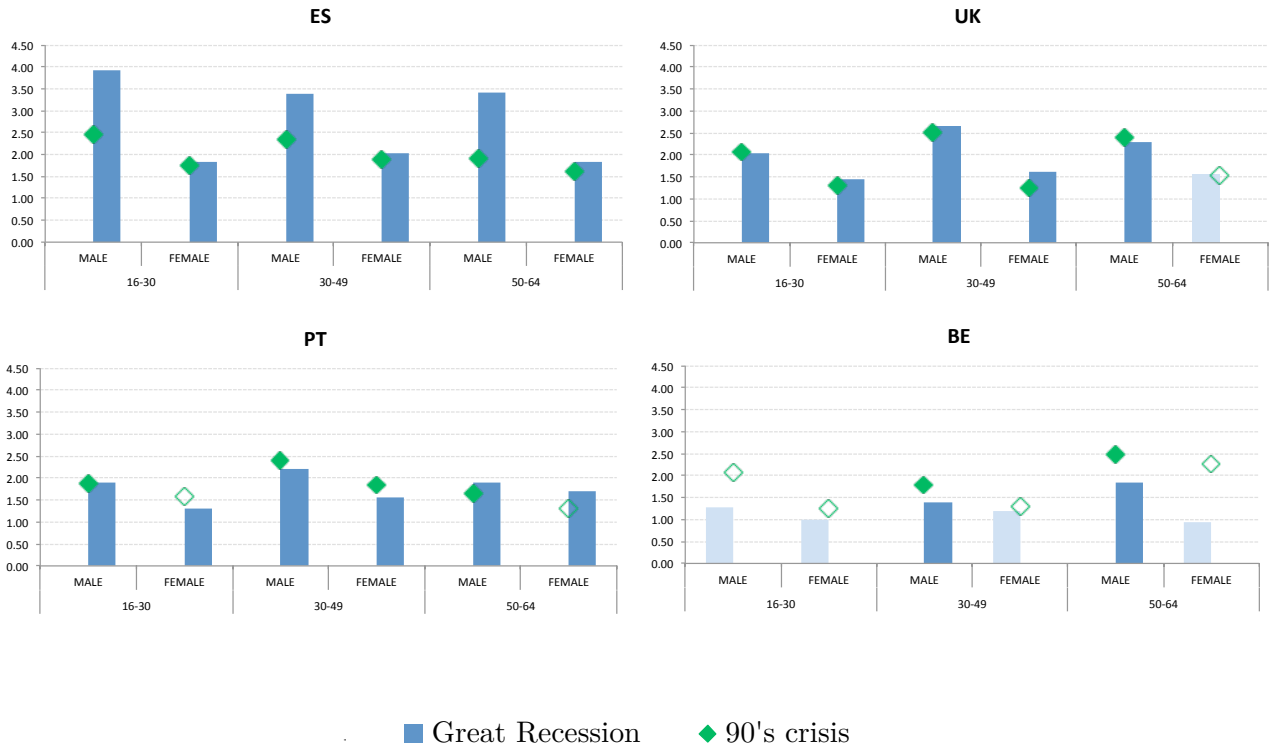
Probability growth of flowing from **unemployment to employment**



Note: Each blue bar is the difference in the probability of flowing from unemployment to employment between 2009 and 2007 for each specific group. Dark blue indicates that the difference is significant and light blue that it is not significant. Each red dot is the difference in the probability of flowing from unemployment to employment between 2012 and 2007 for each specific group. When the dot is not colored, it means that the difference is not significant.

Figure 5a: RECESSION COMPARISON

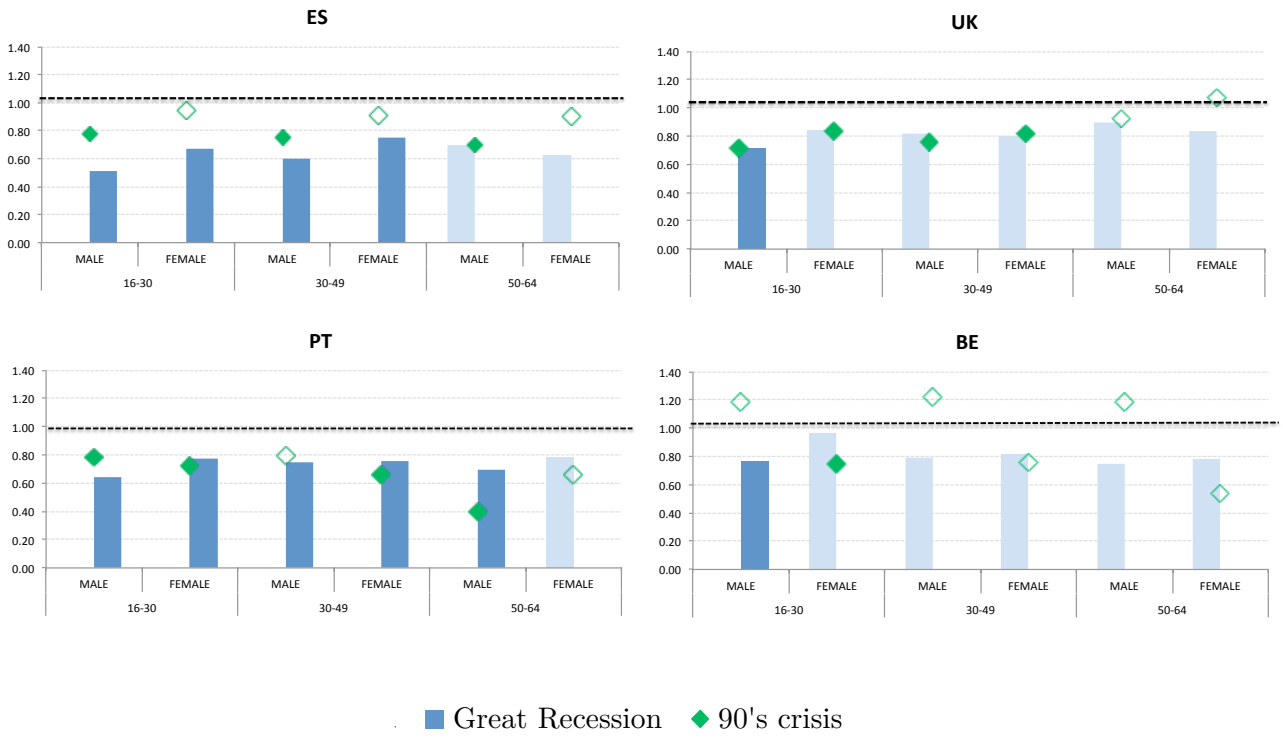
Probability growth of flowing from **employment to unemployment**



Note: Each blue bar is the difference in the probability of flowing from employment to unemployment between 2012 and 2007 for each specific group. Dark blue indicates that the difference is significant and light blue that it is not significant. Each green dot is the difference in the probability of flowing from employment to unemployment between 1994 and 1992 for each specific group. When the dot is not colored, it means that the difference is not significant.

Figure 5b: RECESSION COMPARISON

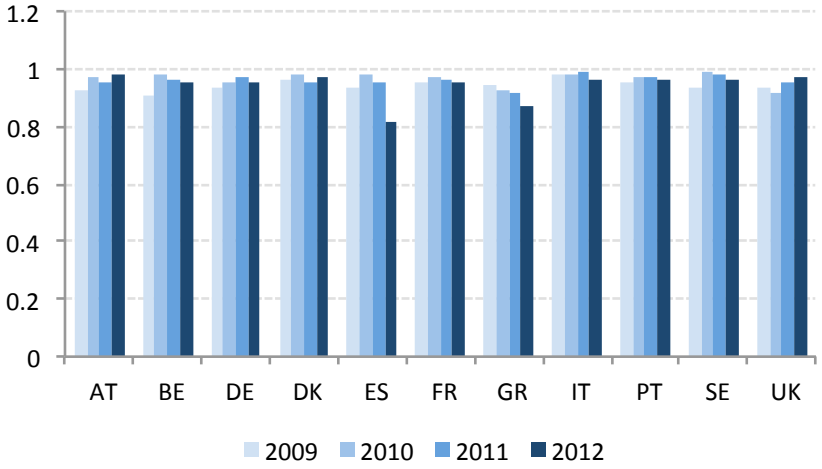
Probability growth of flowing from **unemployment to employment**



Note: Each blue bar is the difference in the probability of flowing from unemployment to employment between 2012 and 2007 for each specific group. Dark blue indicates that the difference is significant and light blue that it is not significant. Each green dot is the difference in the probability of flowing from unemployment to employment between 1994 and 1992 for each specific group. When the dot is not coloured, it means that the difference is not significant.

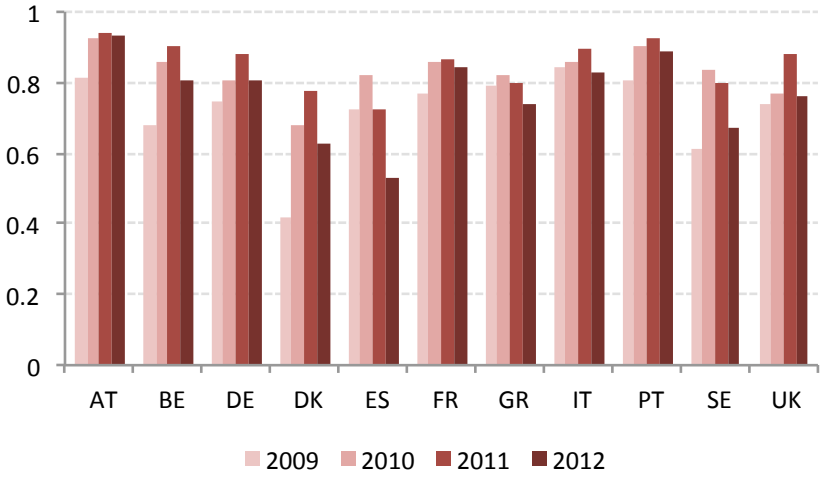
Figure 6: INTER-SECTORAL REALLOCATION

Figure 6a: Correlation of sector distribution of hiring in each year vs sector distribution of hiring in 2008



Note: Values close to one means that hirings each year take place in the same sector where hirings took place in 2008.

Figure 6b: Correlation of sector distribution of hiring in each year vs sector distribution of firing in 2009



Note: Values close to one means that hirings each year take place in the same sector where firing took place in 2009.

Figure 6c: Scatterplot of the sector correlation of hirings 2012-firings 2009 vs Unemployment rate growth between 2006 and 2012.

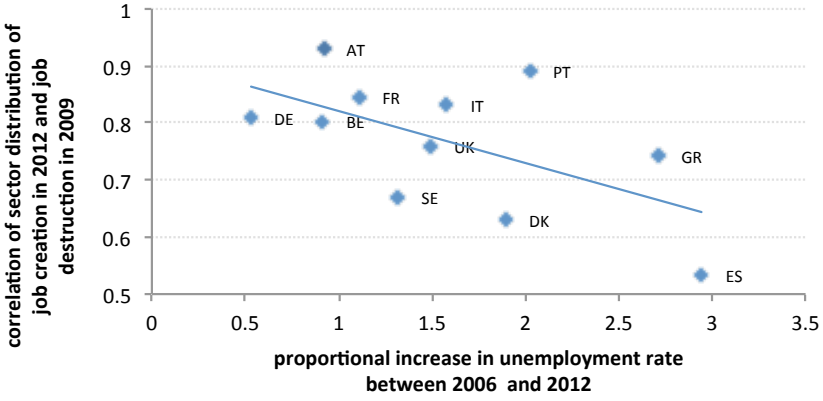
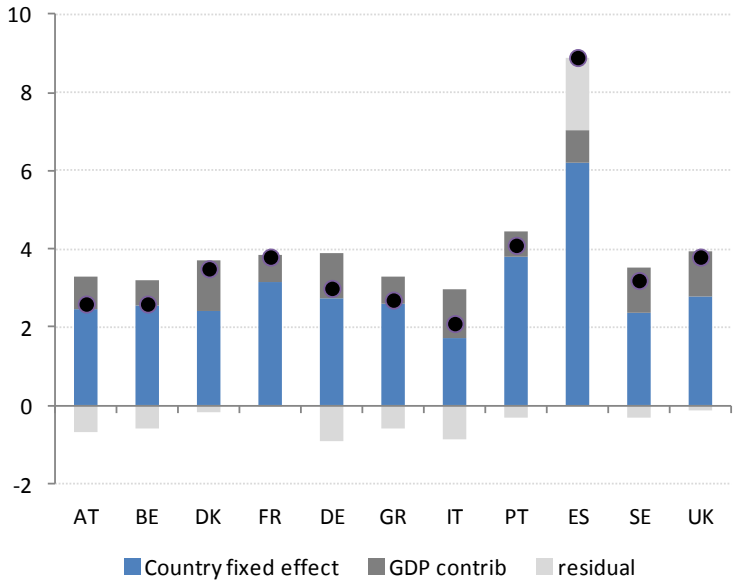


Figure 7a: CONTRIBUTION OF THE COUNTRY FIXED EFFECT AND GDP GROWTH RATE TO THE FLOW RATE IN 2009

Employment to Unemployment



Unemployment to Employment

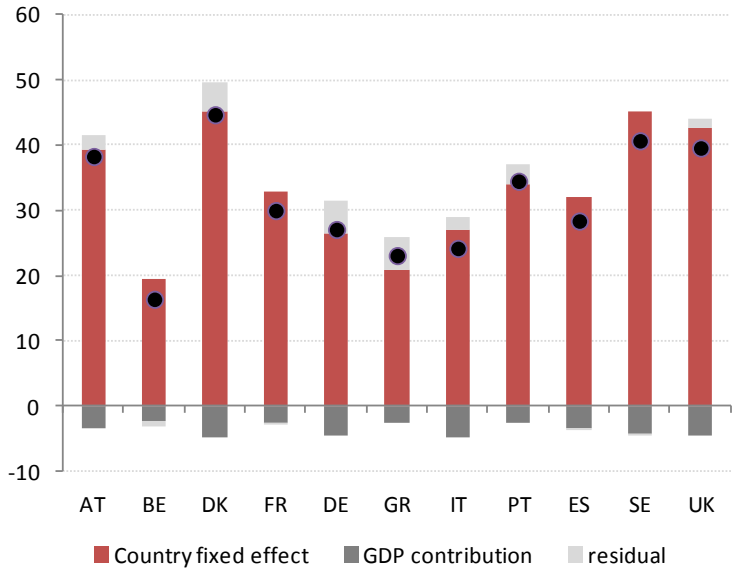
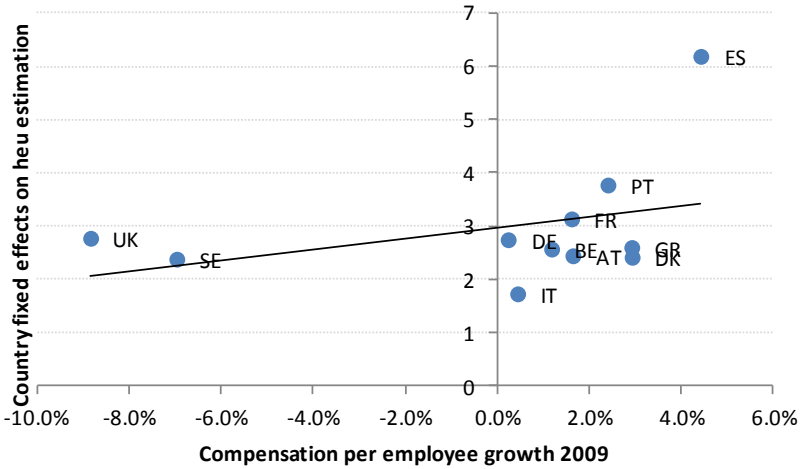
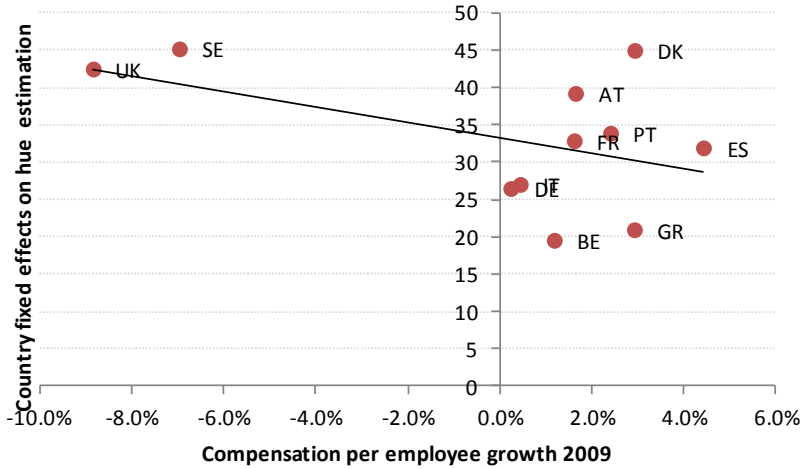
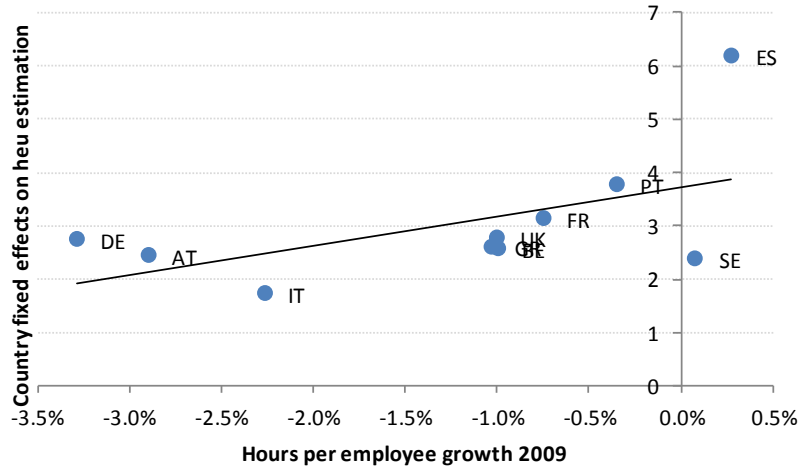


Figure 7b: COUNTRY FIXED EFFECTS VS COMPENSATION PER EMPLOYEE AND HOURS PER EMPLOYEE GROWTH RATE IN 2009







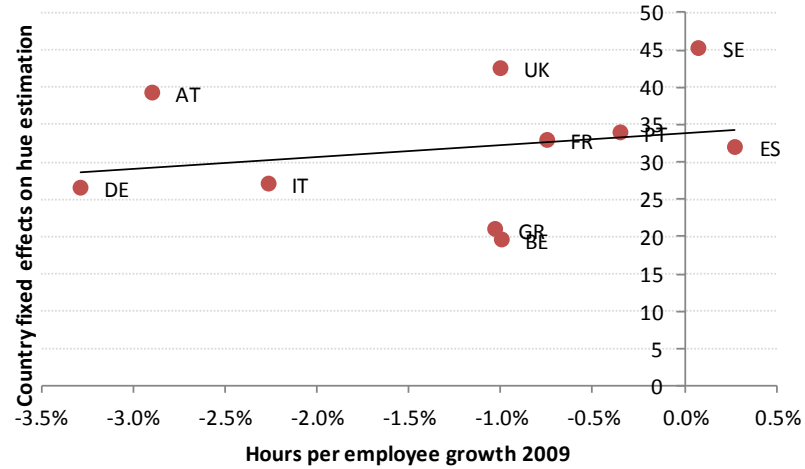


Figure 8: EFFECTS OF LABOUR MARKET INSTITUTIONS

Figure 8a: Employment Protection Legislation on HEU

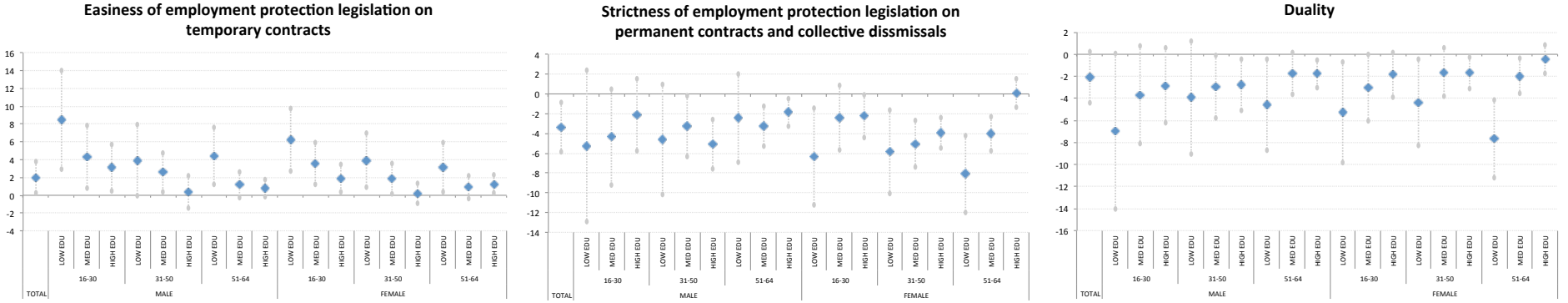
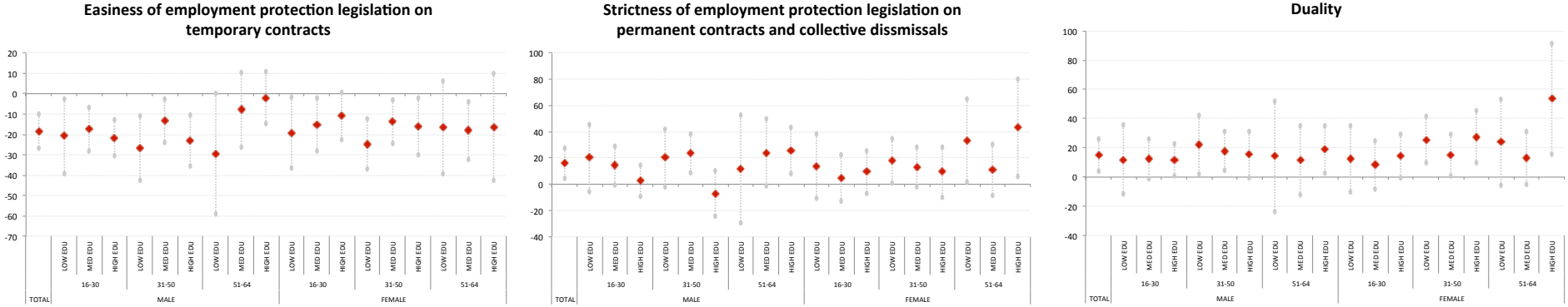


Figure 8b: Employment Protection Legislation on HUE



Note: Each blue (red) dot represents the effect of the institution on the probability of flowing from employment to unemployment (unemployment to employment). Employment protection legislation on temporary contracts is constructed as (6-strictness of EPL on temporary contracts) so it should be interpreted as the easiness to use them. Both indexes enter in the estimation in terms of deviations to the cross country mean. Besides, in this case, both measures of EPL plus the interaction term enter in the estimation simultaneously.

Figure 8 (cont): EFFECTS OF LABOUR MARKET INSTITUTIONS

Figure 8c: Replacement Ratio on HEU

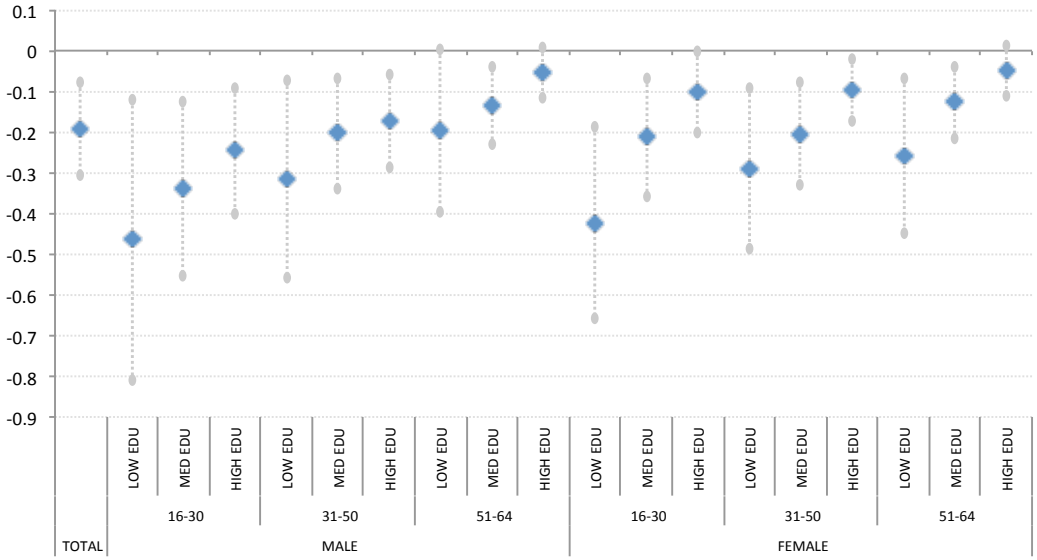
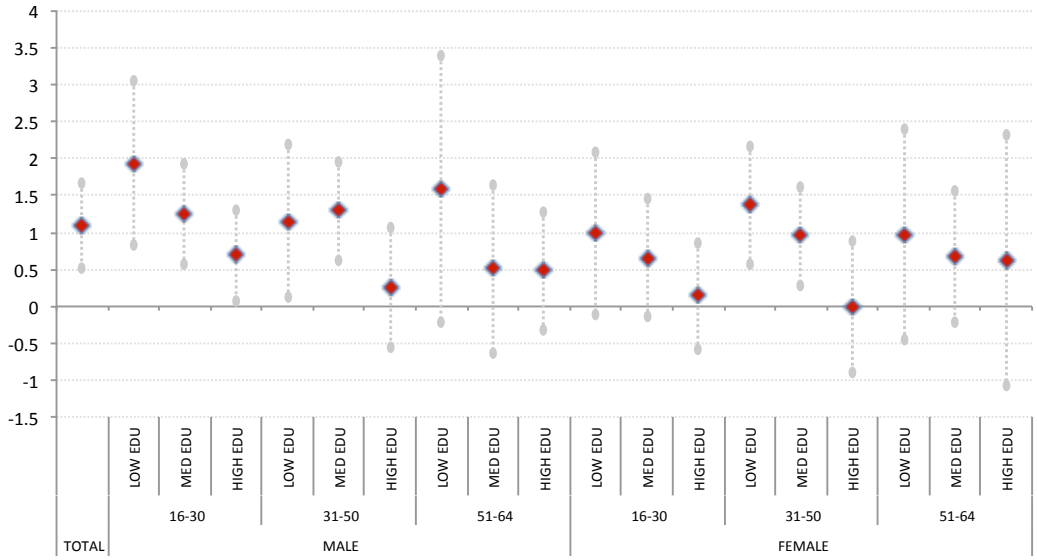


Figure 8d: Replacement Ratio on HUE



Note: Each blue (red) dot represents the effect of the institution on the probability of flowing from employment to unemployment (unemployment to employment).

Figure 8 (cont): EFFECTS OF LABOUR MARKET INSTITUTIONS

Figure 8e: Expenditure per unemployed on HEU

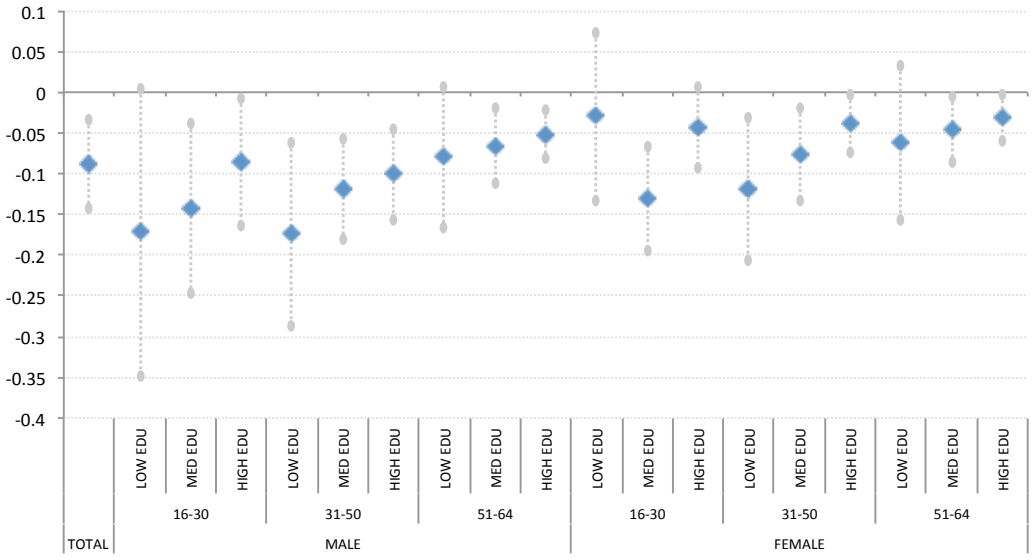
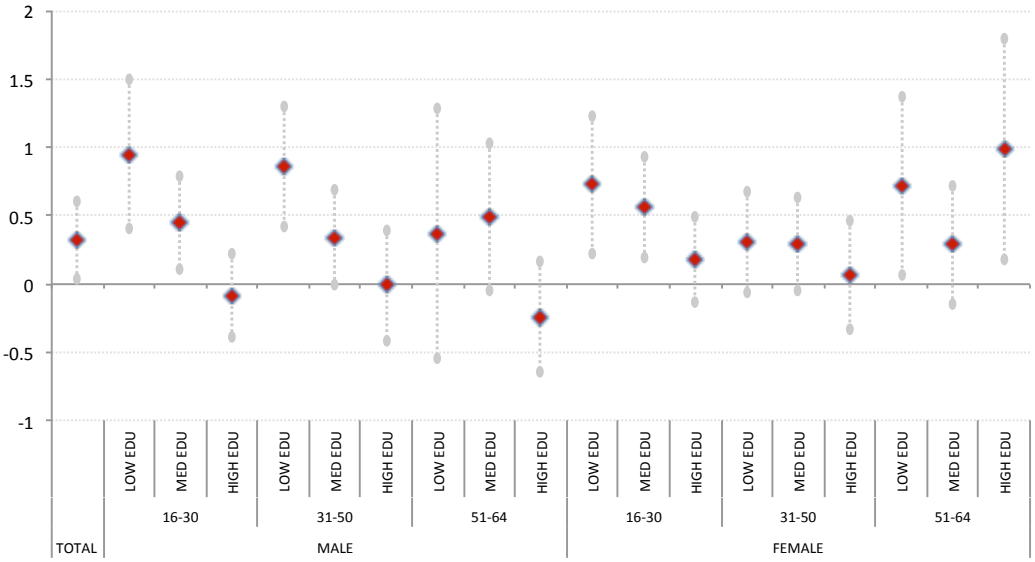


Figure 8f: Expenditure per unemployed on HUE



Note: Each blue (red) dot represents the effect of the institution on the probability of flowing from employment to unemployment (unemployment to employment).

Appendix A.1.: Inflows and Outflows Rates

percentage

Country	Years	Employment-Unemployment	Unemployment-Employment	Employment-Inactivity	Inactivity-Employment	Unemployment-Inactivity	Inactivity-Unemployment	Unemployment Rate
Austria	2006-2008	2.00	41.39	4.36	21.89	30.85	2.78	4.38
	2009-2010	2.39	39.38	4.38	23.43	32.41	2.79	4.66
	2011-2012	2.00	40.41	4.10	24.37	32.21	2.73	4.30
Belgium	2006-2008	2.15	20.41	2.47	7.79	43.84	4.05	7.60
	2009-2010	2.63	18.74	2.70	6.69	43.32	4.47	8.15
	2011-2012	2.29	22.47	3.08	7.94	44.22	4.25	7.40
Germany	2006-2008	2.56	28.73	2.60	15.16	20.51	3.98	8.85
	2009-2010	2.73	27.63	2.65	15.68	27.08	4.00	7.57
	2011-2012	1.82	26.75	2.36	19.35	30.73	3.40	5.77
Denmark	2006-2008	1.52	48.26	3.41	29.39	29.90	5.11	3.71
	2009-2010	3.42	43.99	3.94	25.20	26.88	7.78	6.74
	2011-2012	2.71	41.42	3.45	23.53	24.20	9.12	7.50
Spain	2006-2008	3.94	42.13	3.45	10.52	22.36	6.29	9.42
	2009-2010	7.98	27.23	3.39	6.59	16.45	8.39	19.13
	2011-2012	7.35	22.58	3.00	7.39	13.71	9.01	23.47
France	2006-2008	2.16	35.15	2.63	9.18	26.02	3.93	8.25
	2009-2010	3.63	32.13	4.12	9.55	25.68	4.44	9.42
	2011-2012	3.44	32.65	4.08	9.55	24.12	4.53	9.72
Greek	2006-2008	1.57	24.68	1.44	3.17	11.93	3.02	8.40
	2009-2010	3.09	20.54	1.51	2.92	10.44	3.86	11.17
	2011-2012	5.13	10.07	2.02	1.64	10.01	5.11	21.18
Italy	2006-2008	1.39	30.28	3.01	5.59	43.49	2.84	6.62
	2009-2010	2.10	24.39	3.32	4.41	45.85	2.80	8.21
	2011-2012	2.18	23.59	3.19	4.46	44.05	3.24	9.68
Portugal	2006-2008	2.68	39.33	1.66	6.07	10.38	2.87	8.22
	2009-2010	3.83	33.77	1.71	5.48	10.25	3.03	10.72
	2011-2012	5.50	25.20	2.45	5.03	25.55	6.62	14.90
Sweden	2006-2008	1.06	34.69	1.64	20.43	12.09	5.51	6.53
	2009-2010	2.70	42.05	2.96	25.63	19.26	10.00	8.60
	2011-2012	1.94	45.06	2.50	28.69	19.50	10.79	8.02
United-Kingdom	2006-2008	2.08	46.58	2.88	19.06	16.20	6.43	5.48
	2009-2010	3.41	40.26	3.09	16.39	12.74	7.38	7.88
	2011-2012	2.80	40.11	2.90	16.76	11.11	8.39	8.16

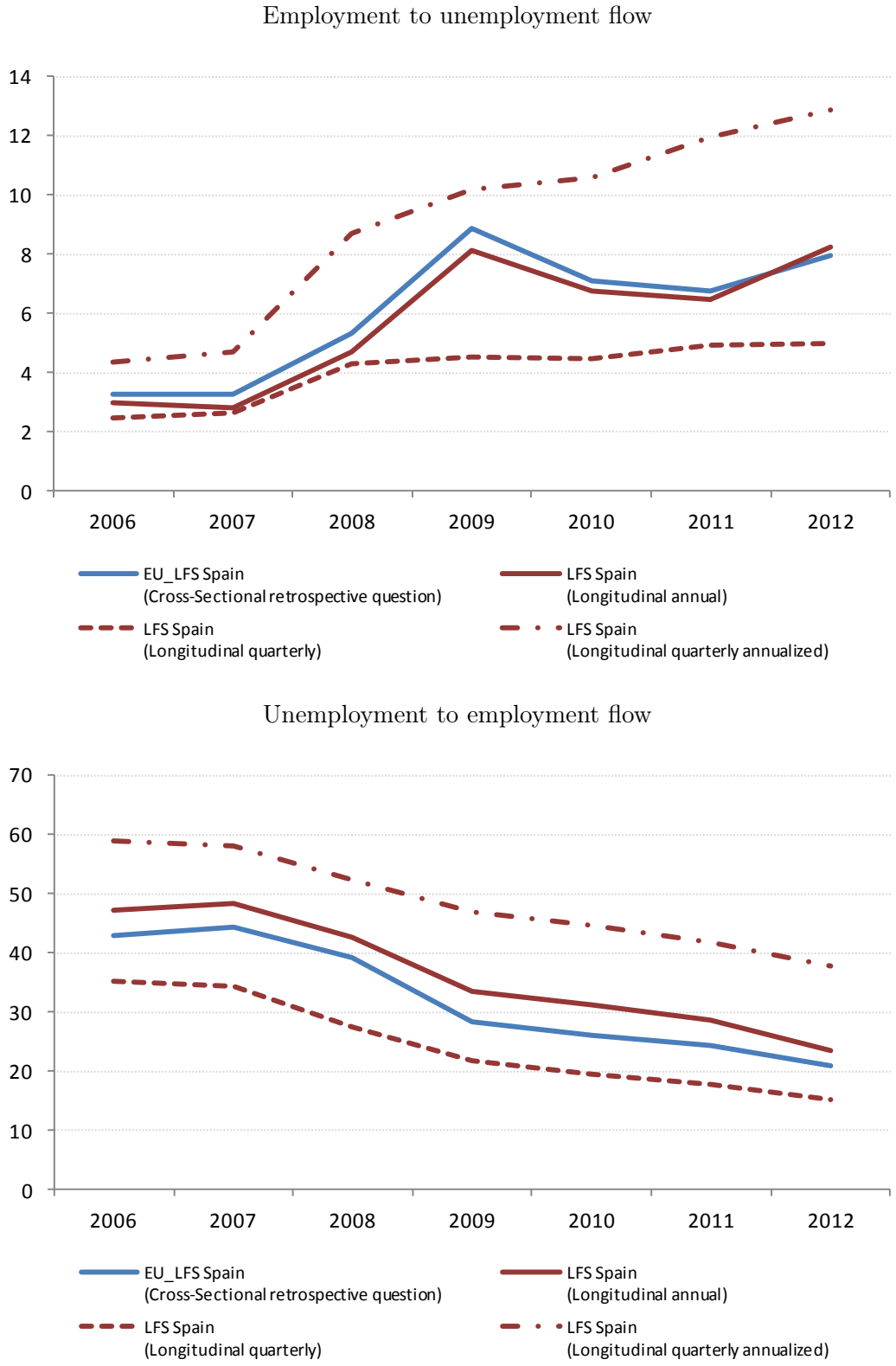
Appendix A.2.: Sample Size

	AT			BE			DE			DK			ES			FR		
EMPLOYED	**2007**	**2009**	**2012**	**2007**	**2009**	**2012**	**2007**	**2009**	**2012**	**2007**	**2009**	**2012**	**2007**	**2009**	**2012**	**2007**	**2009**	**2012**
Male-LowEducation-15-29	3510	2985	2,834	1011	846	776	758	736	6,169	2370	2808	4,275	2630	1928	1,182	3464	3345	3,684
Male-LowEducation-30-49	2744	2161	2006	3497	2784	2323	667	530	5185	2565	1315	1556	6216	5413	4491	9541	10206	11093
Male-LowEducation-50-64	1740	1438	1335	2186	1913	1733	274	262	3023	1947	2498	1436	3941	3921	3256	6304	7413	8790
Male-MedEducation-15-29	7477	6999	6532	2533	2299	1972	1343	1402	14085	2246	1666	2772	1378	1070	709	8021	8723	9513
Male-MedEducation-30-49	19491	17075	15,929	5984	5530	4869	3695	3607	33,513	6421	3821	5,498	3114	2926	2,820	19098	21548	25,671
Male-MedEducation-50-64	6738	6824	7,785	2088	2130	2,114	1882	1926	21,569	4257	6300	3,750	1097	1168	1385	7836	9748	13,921
Male-HighEducation-15-29	836	845	827	1401	1305	1149	239	256	3,250	783	431	981	1420	1180	796	4180	4887	5,551
Male-HighEducation-30-49	6320	5803	5,656	5209	4770	4528	1975	2056	20,118	4613	2675	4,372	4459	4663	4,724	11301	13980	19,163
Male-HighEducation-50-64	2757	2713	3,092	2162	2204	2,171	1197	1337	13,835	2676	3840	2,584	1698	1874	1,968	4177	5449	7,542
Female-LowEducation-15-29	2,351	2011	1,869	534	443	403	530	574	4,128	1840	2310	3,703	1,304	1000	629	1,670	1976	1,930
Female-LowEducation-30-49	4,604	3659	3,097	2,207	1743	1,385	650	561	5,010	2,390	1590	1,119	3,503	3421	2,953	8,578	8311	8,522
Female-LowEducation-50-64	2671	2359	2,309	1,491	1417	1,285	441	447	4,432	2,407	3369	1,727	2,153	2390	2,471	6852	8049	10,132
Female-MedEducation-15-29	6,608	6421	6002	1,674	1560	1366	1,281	1322	12,457	2,228	1725	2858	1,204	1020	719	5,905	6748	7539
Female-MedEducation-30-49	16,602	15320	14,544	4,684	4432	3,785	3,413	3327	30,655	6,490	4198	4,413	2,463	2527	2,479	15,480	18219	21,658
Female-MedEducation-50-64	4,343	4723	5,961	1,438	1701	1,758	1,591	1804	19,764	3,057	4423	2,771	713	897	1126	6,582	8271	11,737
Female-HighEducation-15-29	898	1067	1120	2,066	1914	1754	313	340	4461	1250	773	1340	1,881	1581	1229	5680	6420	6807
Female-HighEducation-30-49	4,376	4288	4485	5,865	5635	5426	1,445	1483	16056	6,434	4395	6227	4,755	5021	5383	12,348	16433	22599
Female-HighEducation-50-64	1,277	1497	1776	1,493	1586	1838	633	808	9233	3,035	4704	3240	1,050	1371	1664	3,583	5115	7238
UNEMPLOYED																		
Male-LowEducation-15-29	388	427	326	312	308	293	167	135	908	212	439	828	398	1053	1,235	1202	1722	1,773
Male-LowEducation-30-49	188	228	166	418	379	362	139	101	812	107	175	138	373	1308	1811	1133	1550	1737
Male-LowEducation-50-64	76	90	81	146	126	132	62	65	415	78	204	101	209	617	1051	501	682	1003
Male-MedEducation-15-29	355	487	411	317	375	316	130	132	889	117	224	393	150	327	447	1174	1820	1987
Male-MedEducation-30-49	422	573	463	306	315	299	279	259	1,661	140	299	289	127	363	623	1010	1358	1,937
Male-MedEducation-50-64	170	215	257	78	102	73	172	180	1,427	139	385	191	35	86	200	309	526	878
Male-HighEducation-15-29	29	35	19	133	127	91	4	18	109	41	46	143	130	256	372	454	607	664
Male-HighEducation-30-49	92	85	85	155	167	160	51	55	331	154	157	153	128	316	601	473	637	881
Male-HighEducation-50-64	41	32	38	62	84	78	55	47	347	135	165	87	51	65	153	164	223	303
Female-LowEducation-15-29	360	339	304	264	199	179	110	106	627	168	293	629	365	713	754	898	1025	1,108
Female-LowEducation-30-49	332	256	212	395	293	218	113	94	678	146	167	111	580	1124	1,511	1,250	1481	1,720
Female-LowEducation-50-64	104	90	76	129	112	107	74	68	392	154	185	115	283	503	828	550	673	1,006
Female-MedEducation-15-29	399	379	340	375	310	277	95	108	654	128	158	338	225	380	482	1,222	1679	1883
Female-MedEducation-30-49	605	460	456	370	338	284	286	225	1,499	224	244	286	244	467	801	1,213	1557	2,021
Female-MedEducation-50-64	116	137	158	117	91	89	205	141	1,191	178	195	137	57	92	200	304	499	808
Female-HighEducation-15-29	47	60	54	153	174	149	14	14	163	65	56	170	229	344	576	564	678	805
Female-HighEducation-30-49	113	98	101	203	195	173	55	43	376	221	196	283	252	460	871	607	761	1104
Female-HighEducation-50-64	26	22	16	48	68	54	30	29	225	97	143	127	23	53	152	144	199	270

Appendix A.2.: Sample Size (cont)

	GR			IT			PT			SE			UK		
EMPLOYED	**2007**	**2009**	**2012**	**2007**	**2009**	**2012**	**2007**	**2009**	**2012**	**2007**	**2009**	**2012**	**2007**	**2009**	**2012**
Male-LowEducation-15-29	4540	4232	1,759	8206	6440	4,644	5556	4243	2,395	2741	2131	2,994	1426	934	640
Male-LowEducation-30-49	13752	13184	7970	37136	33291	26292	14763	13039	9779	4895	4007	4868	2966	2259	1724
Male-LowEducation-50-64	11117	11231	7050	19220	17845	16119	9470	9005	8024	6581	5845	6572	1665	1480	1104
Male-MedEducation-15-29	5723	5589	2845	12428	10771	8634	1829	1703	1692	9800	8620	11279	3219	2305	1868
Male-MedEducation-30-49	14222	14693	10,542	35041	34078	30101	2583	2724	2,992	22050	19964	21,721	6363	4240	3,530
Male-MedEducation-50-64	4258	4666	3,648	13114	13813	14,092	770	886	1,040	11339	11244	14,452	3896	2872	2501
Male-HighEducation-15-29	1827	1813	1,242	1688	1584	1377	718	683	700	2818	2654	3,725	1424	1069	1081
Male-HighEducation-30-49	8563	8439	6,305	10339	10340	9888	1895	1983	2,363	10280	10526	13,668	4957	3819	3,878
Male-HighEducation-50-64	3801	3934	3,248	5542	5515	5,372	1028	944	1,162	6067	5795	6,720	2288	1844	1,842
Female-LowEducation-15-29	1,304	1164	484	3171	2628	2,009	2,909	2289	1,182	2277	1779	2,602	867	664	410
Female-LowEducation-30-49	7,006	6773	4,199	17,771	15610	13,054	11,829	10460	7,832	3,912	3165	3,485	3,062	2047	1,412
Female-LowEducation-50-64	6216	6637	4,630	9,870	9504	8,991	7,719	7571	7,007	6,416	5630	6,044	2,274	1784	1,303
Female-MedEducation-15-29	4,198	3854	1658	9,248	7528	6378	1,854	1732	1,631	8,159	7117	8898	3,352	2261	2,009
Female-MedEducation-30-49	10,985	11238	8,048	29,524	28689	25,197	3,033	3150	3,757	17,734	15518	17,559	5,302	3732	3,194
Female-MedEducation-50-64	2,456	2840	2,373	8,772	9967	11,470	615	717	1,084	8,990	9049	11,427	2,398	1902	1903
Female-HighEducation-15-29	2489	2759	1806	2,832	2617	2365	1,432	1465	1320	3911	3543	4970	1,805	1510	1411
Female-HighEducation-30-49	7,915	8121	6549	12,101	12799	12689	3,229	3385	4093	15,051	14769	19454	5,162	4061	4234
Female-HighEducation-50-64	1,961	2152	1761	4,137	4623	5008	971	1074	1508	8,499	8454	10279	2,105	1677	1750
UNEMPLOYED															
Male-LowEducation-15-29	539	721	1,102	1513	1510	1,936	728	793	1,184	904	1049	1,521	380	373	277
Male-LowEducation-30-49	592	897	2381	1933	2608	3308	858	1247	2101	356	532	796	188	241	194
Male-LowEducation-50-64	375	610	1389	729	974	1623	668	853	1280	265	375	732	100	129	105
Male-MedEducation-15-29	829	987	1963	1731	2109	2601	203	276	658	973	1723	1876	357	400	357
Male-MedEducation-30-49	531	809	2,306	957	1432	1997	108	166	402	600	942	993	214	297	225
Male-MedEducation-50-64	90	201	608	183	358	575	70	44	176	471	639	1,118	126	179	137
Male-HighEducation-15-29	329	375	790	281	309	382	104	128	203	192	252	363	53	117	111
Male-HighEducation-30-49	264	331	742	293	395	495	56	88	251	320	427	569	90	130	122
Male-HighEducation-50-64	39	86	242	23	53	91	27	28	82	177	198	430	64	76	63
Female-LowEducation-15-29	455	441	568	1002	982	1,099	623	629	648	943	931	1,298	258	197	162
Female-LowEducation-30-49	1,150	1178	1,716	2,076	2204	2,581	1,226	1242	1,480	341	438	609	219	224	175
Female-LowEducation-50-64	395	531	898	436	556	835	556	651	1,017	239	312	621	54	75	63
Female-MedEducation-15-29	1,379	1400	1877	1,843	1914	2386	304	341	695	960	1195	1380	307	266	294
Female-MedEducation-30-49	1,610	1747	3,394	1,800	2001	2,589	189	278	658	680	836	956	187	190	194
Female-MedEducation-50-64	172	238	534	152	233	460	35	42	139	393	398	772	58	43	75
Female-HighEducation-15-29	740	819	1424	575	636	663	355	239	511	258	253	376	63	93	101
Female-HighEducation-30-49	532	602	1374	582	704	910	164	174	358	426	477	657	98	139	167
Female-HighEducation-50-64	31	57	119	25	50	90	11	13	43	139	216	352	29	38	50

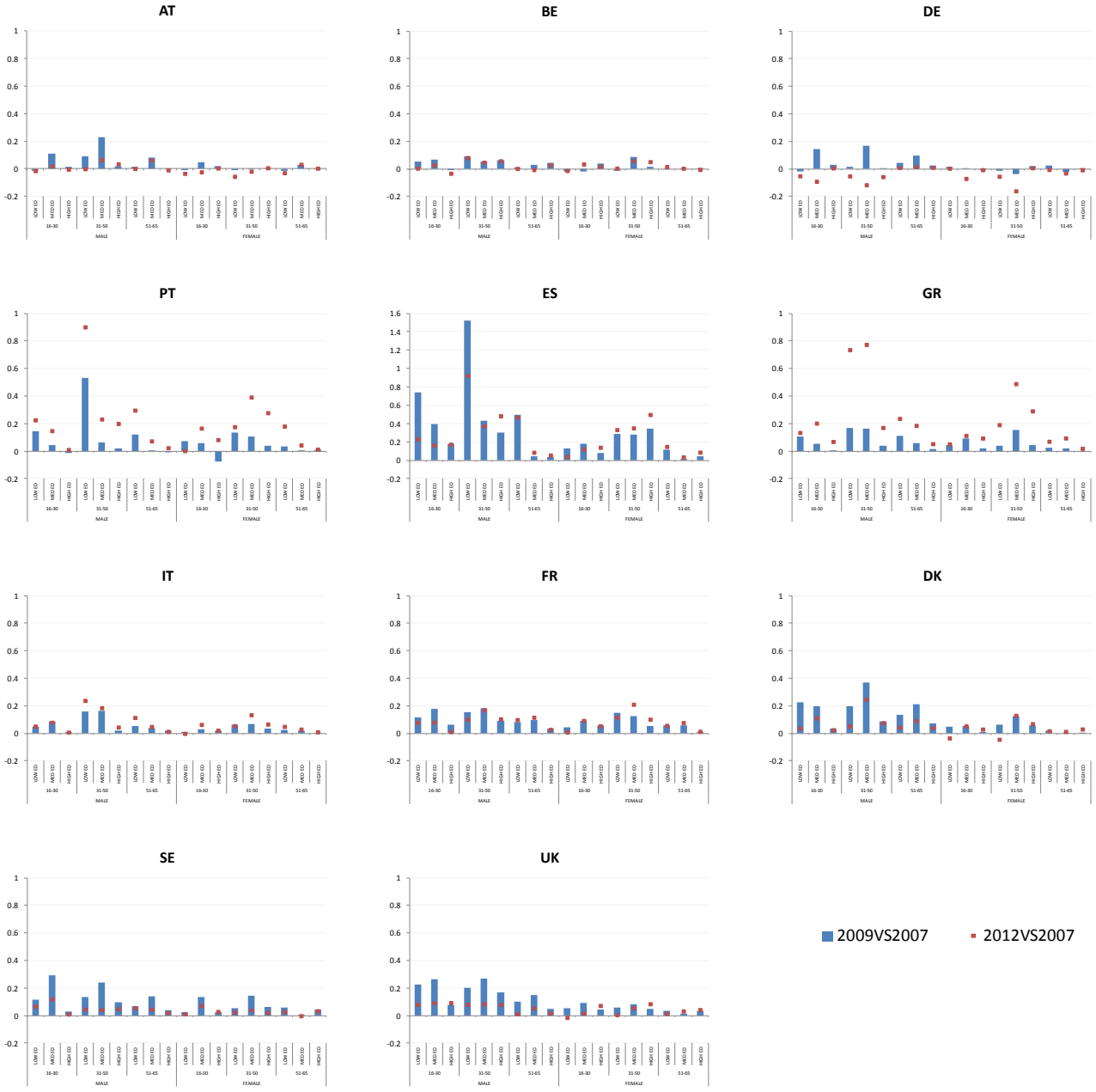
Figure A.3: ANNUAL AND QUARTERLY TRANSITION RATES



Note: Figure in the top (bottom) panel compares the proportion of employed (unemployed) workers flowing into unemployment (employment) using sources with different time frequency as well as different panel dimension: cross-sectional (relying on retrospective question) and longitudinal)

Figure A.4.1: SOCIO-DEMOGRAPHICAL FLOW DECOMPOSITION

Contribution of each demographic group to the change in the **employment to unemployment** aggregate flow

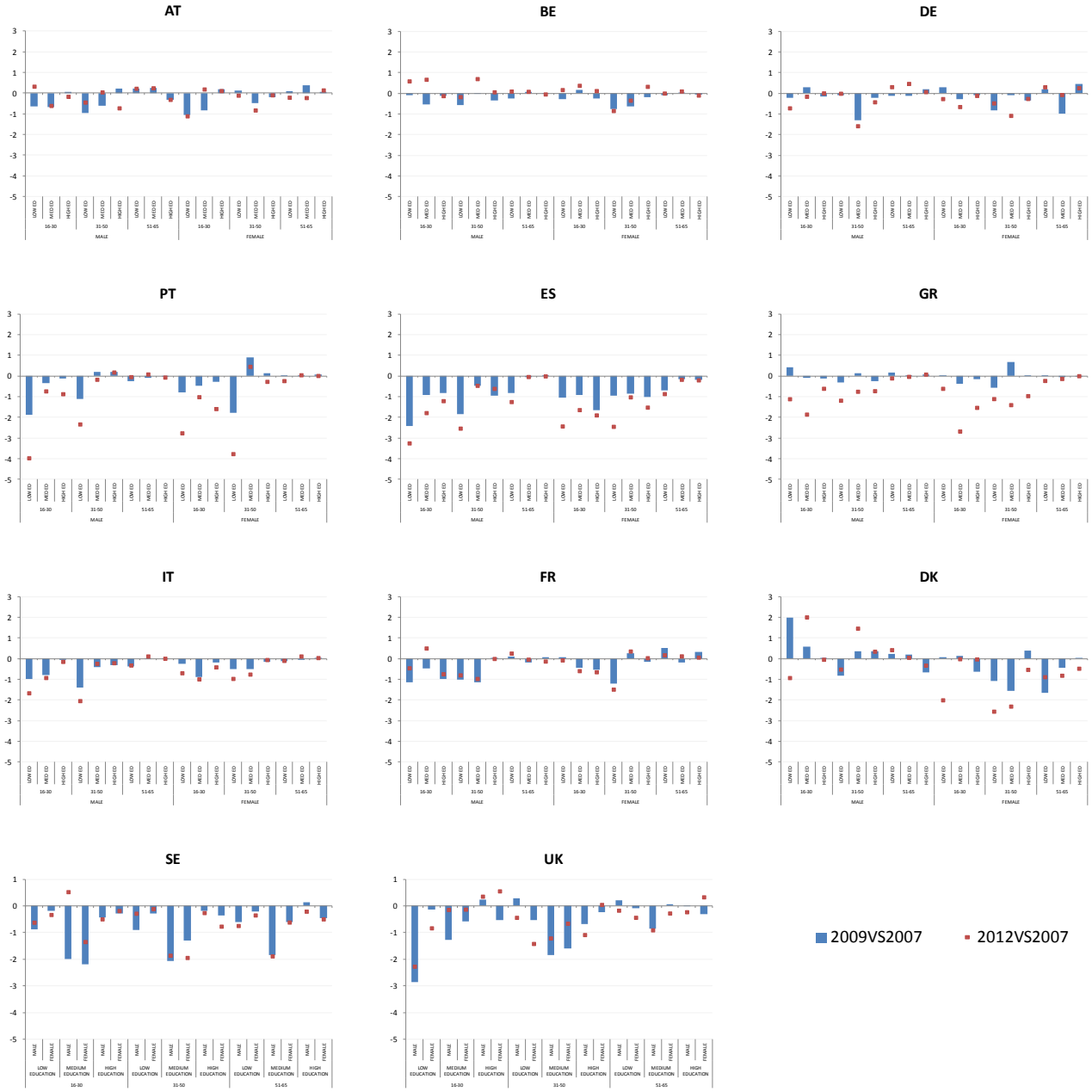


Note: All the blue bars sum up to the aggregate variation in the employment to unemployment flow between the period 2007 and 2009.

All the red dots sum up to the aggregate variation in the employment to unemployment rate between the period 2007 and 2012.

Figure A.4.2: SOCIO-DEMOGRAPHICAL FLOW DECOMPOSITION

Contribution of each demographic group to the change in the **unemployment to employment** aggregate flow



Note: All the blue bars sum up to the aggregate variation in the unemployment to employment flow between the period 2007 and 2009.

All the red dots sum up to the aggregate variation in the unemployment to employment rate between the period 2007 and 2012.

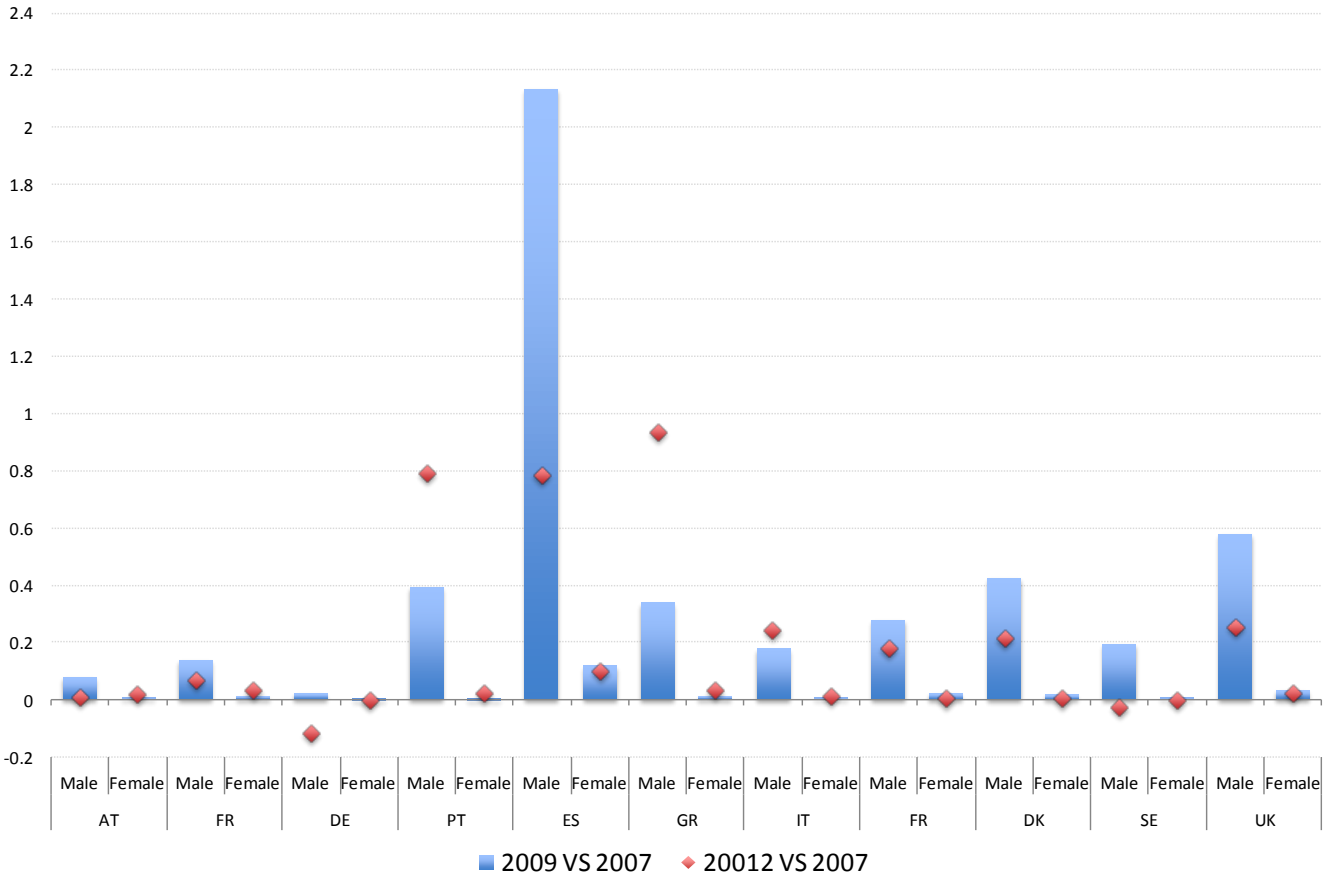
Appendix A.5.1: EMPLOYMENT IN CONSTRUCTION SECTOR (Probabilities)

Probability growth of flowing from **employment to unemployment** of workers on construction sector

Note: Each blue bar is the difference in the probability of flowing from employment to unemployment between 2007 and 2012 for each specific group in the construction sector. Each red dot is the share of male workers on the construction sector.

Appendix A.5.2 EMPLOYMENT IN CONSTRUCTION SECTOR (Contributions)

Contribution of each male and female working on construction to the change in the **employment to unemployment** aggregate flow



Note: Blue bars (red dots) for each country sum up to the aggregate contribution of construction to the change in the employment to unemployment flow between the period 2007 and 2009 (2007-2012).

Acknowledgements
Part of this research was conducted while Juan F. Jimeno was at ECB-DG-Research under a Duisenberg Fellowship. The views expressed here are those of the authors and do not necessarily reflect those of the Banco de España. All remaining errors are our own.

Jose Maria Casado
Banco de España, Madrid, Spain;
e-mail: jmcasado@bde.es

Cristina Fernandez
Banco de España, Madrid, Spain;
e-mail: cfvidaurreta@bde.es

Juan F. Jimeno
Banco de España, Madrid, Spain; CEPR, and IZA
e-mail: juan.jimeno@bde.es

Postal address	60640 Frankfurt am Main, Germany
Telephone	+49 69 1344 0
Website	www.ecb.europa.eu

ISSN	1725-2806 (online)
ISBN	978-92-899-1675-2
DOI	10.2866/135950
EU catalogue No	QB-AR-15-102-EN-N