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Effects of labour and product market regulation on worker flows: Evidence for the euro area using micro data

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GEP

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Abstract

Evidence using macroeconomic data shows that employment-output elasticities in the euro area increased during the recovery from the crisis, especially in those countries where reforms aimed to facilitate labour market adjustments. In this paper, we investigate whether similar Okun-style empirical relationships show similar changes at the micro level. We econometrically estimate the responsiveness of individual worker flows (i.e. flows of individuals from employment to unemployment and from unemployment to employment) to GDP dynamics in euro area countries during the period 2000-2015; we also investigate whether structural reforms implemented in those countries are associated with a change in the flexibility of job transitions after the crisis. The econometric specifications include, in addition to GDP, micro (individual-level) explanatory variables from the Eurostat Labour Force Survey (EU-LFS) – i.e., socio-demographic variables such as gender, age, and education – in order to capture the key determinants of the individual flows. Overall, the results presented in this paper are consistent with previous results using aggregate data and show a higher responsiveness of individual worker flows to changes in GDP after the crisis, particularly for a group of euro area countries which implemented significant reforms. Moreover, we find that a number of measures which decrease the stringency of regulation (such as reforms which reduce employment protection legislation, product market regulation, and collective bargaining) increase the flexibility of the labour market as they have a positive and statistically significant impact on worker flows.

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[1] Anonymised micro (individual-level) data used in this paper are provided by Eurostat – Labour Force Survey.
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[4] All views expressed in this paper are those of the authors and do not necessarily correspond with those of the European Central Bank. We are grateful for earlier discussions and comments regarding some of the results in this paper by colleagues at the ECB and other National Central Banks of the ESCB.

Introduction

During the global economic and financial crisis, the co-movement between economic performance and employment was not always as clear as in the past. At the same time, many euro area countries showed different output-unemployment responses (i.e., Okun's law)[5], which may indicate that unemployment was not only driven by output fluctuations but also by country-specific policies, institutions and shocks[6]. Nevertheless, since the recovery in euro area activity which began in early 2013, a considerable re-connection between output and employment has been observed, with a seemingly employment-rich recovery in some euro area countries, suggesting a possible structural change in their underlying relationship[7]. An increasing body of mostly macroeconomic evidence shows that the wave of labour and product market reforms implemented during the crisis in some euro area countries have made it easier to adjust employment in response to changing economic conditions[8].

In this paper, we use micro (individual-level) data to further investigate whether the flexibility of euro area employment with respect to output has changed over the course of the crisis and the subsequent recovery period. A first inspection of the micro individual-level data shows that, similar to the aggregate employment dynamics, worker flows are very sensitive to output growth. Despite strong heterogeneity across countries, worker flows across employment and unemployment share a common pattern in all the countries, showing in particular a sizable change during the downturn during the crisis and then changes in the opposite direction as the recovery in output began (Figure 1)[9].

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[5] For example, during the recession, in Ireland and Spain the unemployment rate increased by about 7½ percentage points, despite the fact that output dropped by more than 8 percent in Ireland but by only half as much in Spain. Moreover, although Germany suffered an output drop of about 7 percent, its unemployment rate actually decreased.

[6] See International Monetary Fund (2010), "Rebalancing Growth", World Economic Outlook (WEO), pp. 69-107.

[7] See European Central Bank (2016), "The employment-GDP relationship since the crisis", Economic Bulletin, Issue 6, Box 3, "Recent employment dynamics and structural reforms", pp. 53-71, Article 1.

[8] For example: regarding macroeconomic results showing an increased employment-GDP elasticity after the crisis, particularly for euro area reforming countries, see article in the ECB Economic Bulletin Issue 6/2016 'The employment-GDP relationship since the crisis', including Box 3 'Recent employment dynamics and structural reforms'; on the micro side (see ECB OP 210), the latest Wage Dynamics Survey (WDN) in 2016 surveyed around 25,000 individual firms across 25 EU countries and asked them whether they perceived labour markets to be more flexible at the end of 2013 compared to 2010. A significant number of firms felt that flexibility had increased in this period, particularly in countries such as Portugal, Spain, Greece and Cyprus. A very high proportion of firms in Spain and Greece also answered that a major reason behind the greater easiness of adjusting employment during this period was due to labour reforms.

9 For further related work on labour market flows and unemployment dynamics see, for example, the important contributions by Burda and Wyplosz (1994), Davis and Haliwanger (1999) and Elsby et al (2013).

Figure 1

Evolution of worker flows in the Euro Area
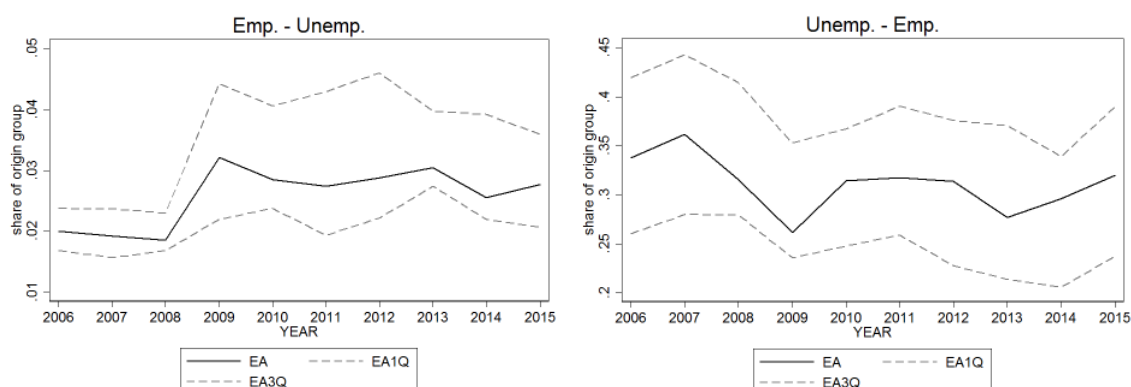
Notes: Worker flows from unemployment to employment (U-E) and from employment to unemployment (E-U). Data aggregated across individuals and countries to proxy the euro area (EA). Solid black line depicts the EA median and the dashed lines represent the first and third quartiles. Source: EU-LFS.

Against this background, this paper uses micro (individual-level) data from the Eurostat labour force survey (EU-LFS) on worker flows across employment and unemployment, and their socio-demographic compositions (i.e., gender, age, and education), to investigate the role played by institutional differences and whether structural reforms have changed the behaviour of labour market flows in euro area countries during the period 2000-2015. In particular, the paper econometrically estimates the response of worker flows to output dynamics and finds that in countries where reforms were implemented, job transitions after the crisis seem more responsive to changes in GDP compared to the pre-crisis period. In particular, the higher responsiveness of worker flows to GDP growth is most notably observed in a group of reforming countries, namely Greece, Spain and Portugal[10]. It is worth noting that this result applies to the flow of workers with any type of contract, i.e. the results remain the same and are robust whether workers on all contracts are included in the estimation sample or whether the sample is restricted to only permanent contracts. This paper uses similar econometric specifications to those mentioned above to also examine whether labour and product market regulation and institutions affect worker flows – by including indicators capturing Employment Protection Legislation (EPL), Product Market Regulation (PMR) and the degree of centralisation of collective bargaining. As expected, we find that stricter regulation tends to reduce worker flows. Therefore, reforms which reduce these rigidities can enhance labour

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[10] This group of euro area reforming countries was selected due to their significant reform activity over the period examined according to the following indicators: employment protection legislation, product market regulation and the degree of centralisation of collective bargaining.

market flexibility by decreasing excessive employment protection and/or making wage adjustments more responsive to the economic cycle, influencing the probability of flowing to and from employment and unemployment.

Data

The analysis is conducted using micro (individual-level) data from the EU-LFS. This database is compiled by Eurostat from surveys among private households and contains individual-level data about socio-demographic characteristics and job status for individuals in the EU countries. Specifically, we access the anonymised individual-level dataset, which has annual frequency and a cross-section structure.[11] Our database is an unbalanced panel[12] with the bulk of the data covering the period 2000-2015.

With regard to the variables used in this analysis, the data include information about individual characteristics such as gender, age, and educational attainment levels. Worker flows are constructed from the declared employment status of the previous year. In particular, comparing the job status of an individual in the year of the survey to the one in the previous year, we generate a dummy variable which has a value of 1 (and zero otherwise) if the individual flows (from unemployment) to employment or (from employment) to unemployment. One caveat of this measurement is that transitions regarding employment status from one year to the next could be affected by the time aggregation bias resulting from the lack of observations of changes in employment status within a given year, hence job creation and job destruction rates are likely to be somewhat higher on a quarterly, compared to an annual basis. Nevertheless, in our sample, the time evolution of the annualized quarterly transitions and those obtained from annual data are qualitatively similar. Furthermore, this is confirmed by a study using EU-LFS data for Spain (Jimeno et al, 2015[13]) which shows that the evolution of annual and quarterly measures over time is qualitatively similar. Hence, our focus on data for annual transitions seems to be a valid approach.

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[11] Further details on the EU Labour Force Survey are given in an Annex.

[12] The microeconomic data are available for all euro area countries but Ireland. The period covered varies across countries because several questions were not compulsory for all the countries until recent years. In this respect, there are annual data for the period 2000-2015 for Belgium, Cyprus, Germany, Estonia, Spain, Finland, Greece, Italy, Luxembourg, Portugal and Slovenia. In addition, starting from 2001, Lithuania, Latvia and Slovakia are available. From 2006, Austria, France and Netherlands became part of the dataset. Finally, data for Malta are only available from 2009 onwards.

[13] Casado, J. M., Fernandez, C. & Jimeno, J. F., 2015. Worker flows in the European Union during the Great Recession, ECB Working Paper Series.

Regarding sample representativeness, we use the yearly individual weight coefficients provided by the EU-LFS database. However, since methodological changes[14] in the weighting scheme occurred during the period of analysis, the weighting scheme has been corrected for all the countries in the sample by adjusting[15] the old weights according to the new methodology.

Empirical Analysis

In this section, we develop an empirical econometric analysis of the relationship between worker flows and GDP dynamics. For this purpose, we use individual-level data on job status, age, education and gender, and macro data on GDP growth over 2000-2015, for almost all euro area member states.

The core model specifications used in our empirical analysis can be summarised as follows:

$$Flow_{i,c,t} = GDP\ growth_{c,t-1} + crisis_{c,t} + \ GDP\ growth_{c,t-1} * crisis_{c,t} + X_{i,c} + FE + u_{i,c,t} \quad (1)$$

$$Flow_{\ i,c,t} = GDP\ growth_{c,t-1} + crisis_{c,t} + \ GDP\ growth_{c,t-1} * crisis_{c,t} + X_{i,c} + I_{c,t} + FE + \varepsilon_{i,c,t} \quad (2)$$

We estimate a Linear Probability Model, weighting each observation by the inverse of its probability of being sampled. The dependent variable is a dummy variable denoting the worker flows from unemployment to employment (U-E) and from employment to unemployment (E-U). It takes a value of 1 in the respective equations if the individual flows (from unemployment to employment or from employment to unemployment) in the specific year and 0 if she remains in the origin group (in unemployment or employment, respectively). $GDP\ growth_{c,t-1}$ is measured in percentage points and is included to capture the impact of changes in overall macroeconomic activity on the flows (i.e., capturing an ''Okun'' style relationship for the flows). Given that individual characteristics may also affect the probability of job transitions, we include $X_{i,c}$ which are dummy variables that identify whether the individual belongs to any socio-demographic group such as gender (male, female), educational attainment levels (low, medium, and high), and age groups (16-29; 30-49; 50-65). Two dummy variables are also included in the specification to capture various distortions and asymmetries during the crisis, namely: (1) a $crisis_{c,t}$ dummy – which has a value of 1 when the GDP growth in a given country-year is negative during the post-crisis period from 2008 onwards and 0

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[14] The methodology changed in 2005 for all the countries, with the exception of Finland and Ireland, for which the weighting scheme changed in 2007.

[15] To this end, we just rescale the old weights matching the total of the country weights for every year with the average of the totals for every country over the period in which the new methodology applies.

otherwise; and (2) the $\text{crisis}_{c,t}$ dummy is also interacted with GDP $\text{growth}_{c,t-1}$. $I_{c,t}$ in equation (2) represents policy variables (i.e. employment protection legislation, product market regulation and the degree of centralisation of collective bargaining) which are included in the model one at a time. FE represents country and time fixed effects while $u_{i,c,t}$ and $\varepsilon_{i,c,t}$ are error terms.

We include the intercept $\text{crisis}_{c,t}$ dummy variable (when GDP growth is negative during the crisis) as well as an interaction of this dummy with GDP growth to remove various distortions due to: (a) the extraordinarily sharp downturns in GDP during the crisis and the associated somewhat volatile responses of both employment and unemployment during this time; (b) possible breakdowns in the GDP-employment-unemployment relationship during the crisis due to various short-time working policies which reduced hours worked rather than reducing employment,[16] and/or changing perceptions as to whether the shock was temporary or more persistent (which can affect the degree of labour hoarding). By including these dummy variables we hope to remove various distortions during the crisis which may have disrupted the normal relationship between labour market flows and economic activity. The inclusion of these dummy variables follows similar approaches using aggregate macroeconomic data when investigating whether the Employment-GDP elasticity (i.e., Okun's law) changed due to the introduction of structural reforms during the crisis.[17]

The model presents one caveat – relating to the correlation of the residuals across the units of observation – which should be acknowledged. In both equation (1) and (2), the outcome is observed at the individual level though the regressors of interest, $GDP\ growth_{c,t-1}$ or $I_{c,t}$, vary only at a higher level of aggregation (see Moulton 1990; Bertrand, Duflo, and Mullainathan 2004). In particular, since we combine individual micro-level data with macro variables, the effective sample sizes are much closer to the number of clusters than to the number of individuals. When the number of clusters is small, the results may underestimate either the serial correlation in a random shock like $u_{i,c,t}$ or the intra-class correlation as in the Moulton problem (Moulton 1986). This leads to downward biased standard errors because the within-group (intra-class) correlation across individual units is not accounted for. Although we use robust standard errors to account for heteroscedasticity problems,

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[16] Faced by the weakening of activity, firms have shown a widespread preference for forms of internal flexibility, such as cutting overtime and making use of short-time working (STW) schemes. STW schemes have been mostly used in Belgium, Germany and Italy, but also in other countries. For further details, please see the ECB's 2012 Structural Issues Report entitled "Euro area labour markets and the crisis", Occasional Paper Series, No 138, ECB, 2012.

[17] For example, see Box 3 'Recent employment dynamics and structural reforms' and other parameter estimates in the article in the ECB Economic Bulletin Issue 6/2016 "The employment-GDP relationship since the crisis".

we cannot correct for clustering bias. Therefore, we apply a 'Moulton factor'[18] to correct the standard errors for first-order serial correlation at country level. This parametric approach, although seems to work well when estimating unweighted regressions, does not allow for using weighted estimation. Therefore, as we did not manage to exactly replicate the same model presented in the main results using unweighted estimates, we cannot affirm whether the clustered standard error bias needs to be corrected. However, when estimating the same specification but with unweighted regressions, we find that the standard errors are virtually unchanged when we apply the Moulton correction factor. This may provide some evidence that the standard errors in the weighted regressions reported later would also be unaffected by the ''Moulton correction methodology''.

Notwithstanding the limitations of the EU-LFS as regards conducting a longitudinal analysis of worker flows over a long period of time with anonymised[19] microdata, we believe the results presented in this paper are robust and broadly confirm the main findings in the literature.

In the regression results reported in Table 1 (based on specification (1) above), we compare the GDP responsiveness before and after the crisis to check whether this change in the two periods is due to the reforms implemented in the crisis period, or even more recently. In order to make the empirical analysis clearer, the group of euro area countries excludes Germany because of the different pattern and timing of reforms. In Germany, by contrast, most of the reforms (Hartz reforms) were implemented in the former period (i.e., the early 2000s). Meanwhile, the selected group of reforming countries ES, GR and PT implemented reforms during the crisis as shown by the changes in the EPL and PMR indicators between 2008 and 2013[20]. By comparing the different parameter estimates for the period 2000-2007 with the period 2008-2015, we see that the responsiveness of both worker flows to GDP in the euro area countries has increased after the crisis (see first row in Table 1 corresponding to the parameter for "GDP growth (t-1)"):[21] for individuals flowing from unemployment to employment (U-E) by 0.3 p.p., while for individuals flowing from employment to unemployment (E-U) by 0.1 p.p. When the sample is restricted to the group of reforming countries,

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[18] We use Stata's *moulton* command. Alternatively, one could follow Angrist and Pischke (2009) and allow for more general correlation structure among individuals within countries using estimates of cluster-robust standard errors where the clusters are the countries.

[19] With the anonymised EU-LFS micro database, identifiers for each individual are consistent across the four quarters of a year, so individuals can be compared between waves. However, this applies only to the four quarters of one year (i.e. Q1 and Q4 of 2015). Identifiers of separate yearly files are not consistent, and thus it is not possible to combine data for multiple years (i.e. Q4 of 2014 and Q1 of 2015).

[20] After ranking the euro area countries by the change in the EPL (for both temporary and regular contracts) and PMR indicators between 2008 and 2013, PT, GR and ES resulted to be the top three countries where major reform efforts were undertaken.

[21] Given the sharp downturns in GDP during the crisis, and the associated somewhat volatile responses of employment and unemployment, we include an intercept dummy variable when GDP growth is negative during the crisis as well as an interaction of this dummy with GDP growth.

the change in the responsiveness is more evident and seems larger, increasing by 1.9 p.p. for the U-E and by 0.4 p.p. for the E-U flows[22]. Although the change in responsiveness might be driven by various factors, the structural reforms implemented during the crisis may be one factor underlying the strengthening of the reaction of employment and unemployment dynamics to GDP growth. The larger increase in responsiveness for the group of reforming countries, compared with the euro area, is not observed when including other euro area countries in the group of reforming countries which implemented reforms later (such as Italy).

Turning to the more general results for the gender, age and education variables, we find that the probability of losing a job and becoming unemployed seems to be higher for young, female, low-skilled workers. On the other hand, the results suggest that the increase in the probability of finding a job, conditional on being unemployed, is mainly been driven by young, male and educated workforce. In the reforming countries under analysis, age plays a stronger role in determining the flow from unemployment into employment.

In the next section, we provide some further evidence on how structural reforms may affect worker flows by investigating whether there are statistically significant associations between indicators of employment protection legislation, product market regulation and the degree of centralisation of collective bargaining, on the one hand, and flows between employment and unemployment of different population groups, on the other.

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[22] The change between the two periods is statistically different from zero.

Table 1

Responsiveness of worker flows to GDP growth

		EA countries				Reforming countries		
	2000-2007 (1) U-E	2008-2015 (2) U-E	2000-2007 (3) E-U	2008-2015 (4) E-U	2000-2007 (5) U-E	2008-2015 (6) U-E	2000-2007 (7) E-U	2008-2015 (8) E-U
GDP growth (t-1)	0.006807***	0.009986***	-0.001125***	-0.002565***	0.01010**	0.02841***	-0.0007692*	-0.004961***
	(0.0019)	(0.0012)	(0.0002)	(0.0002)	(0.0039)	(0.0049)	(0.0004)	(0.0010)
GDP growth (t-1)*crisis		-0.002265		0.0004677*		-0.01448***		0.001752**
		(0.0014)		(0.0002)		(0.0036)		(0.0007)
crisis		-0.02529***		0.003339**		-0.05170***		0.01444***
		(0.0073)		(0.0011)		(0.0132)		(0.0031)
male	0.06567***	-0.006531	-0.006470***	0.001721**	0.09481***	0.004308	-0.01227***	0.005306**
	(0.0044)	(0.0045)	(0.0005)	(0.0007)	(0.0079)	(0.0071)	(0.0011)	(0.0018)
education medium	0.05147***	0.05769***	-0.008742***	-0.01803***	0.02581*	0.04643***	-0.008361***	-0.02347***
	(0.0050)	(0.0051)	(0.0006)	(0.0009)	(0.0102)	(0.0090)	(0.0015)	(0.0025)
high	0.1126***	0.1077***	-0.01758***	-0.03381***	0.08148***	0.08051***	-0.01980***	-0.04842***
	(0.0075)	(0.0069)	(0.0007)	(0.0010)	(0.0111)	(0.0100)	(0.0014)	(0.0021)
age 25-34	-0.01892**	0.02525***	-0.02567***	-0.03548***	-0.04809***	0.05328***	-0.02885***	-0.05220***
	(0.0058)	(0.0070)	(0.0015)	(0.0022)	(0.0100)	(0.0117)	(0.0027)	(0.0060)
35-44	-0.03892***	-0.01351	-0.03728***	-0.05474***	-0.1089***	0.0002996	-0.04378***	-0.08003***
	(0.0064)	(0.0071)	(0.0014)	(0.0021)	(0.0112)	(0.0118)	(0.0027)	(0.0058)
45-54	-0.08144***	-0.07341***	-0.04317***	-0.06371***	-0.1862***	-0.07452***	-0.05474***	-0.09386***
	(0.0071)	(0.0070)	(0.0014)	(0.0021)	(0.0132)	(0.0113)	(0.0026)	(0.0058)
55-64	-0.1848***	-0.1422***	-0.04745***	-0.07222***	-0.3490***	-0.1408***	-0.05885***	-0.1137***
	(0.0098)	(0.0081)	(0.0014)	(0.0021)	(0.0156)	(0.0124)	(0.0026)	(0.0058)
constant	0.2513***	0.2718***	0.08706***	0.1120***	0.4745***	0.3273***	0.07287***	0.1246***
	(0.0176)	(0.0114)	(0.0026)	(0.0026)	(0.0186)	(0.0146)	(0.0033)	(0.0060)
time FE	yes	yes	yes	yes	yes	yes	yes	yes
country FE	yes	yes	yes	yes	yes	yes	yes	yes
N	124999	165528	1290148	1514868	51608	65700	490094	383067
R-sq	0.0456	0.0665	0.0126	0.0214	0.0771	0.0615	0.0126	0.0244

Notes: Linear Probability Model pooled over different groups of countries. The dependent variable is, depending on the model, the worker flows from unemployment to employment (U-E) or from employment to unemployment (E-U). It is a dummy variable which is equal to 1 if the individual flows in the specific year and 0 if she remains in the origin group. The specification also includes: the following dummies for individual characteristics, i.e.: male, education, age, plus an intercept dummy variable where GDP growth is negative during the crisis as well as an interaction of this dummy with GDP growth. Time and Country FE are included. The group of euro area countries excludes Germany because of the different timing pattern of reforms compared to the other reforming euro area countries. The group of reforming countries includes Spain, Greece and Portugal. GDP growth (t-1) is measured in percentage points. Robust standard errors are shown in parentheses: * p<0.1, ** p<0.05, *** p<0.01.

Table 2

Impacts of institutional rigidities on worker flows

	EA countries		Reforming countries (1)		Reforming countries (2)		Reforming countries (3)	
	(1) U-E	(2) E-U	(3) U-E	(4) E-U	(5) U-E	(6) E-U	(7) U-E	(8) E-U
EPL (t-1)	-0.1263** (0.0519)	-0.08276*** (0.0075)	-0.1402 (0.0885)	-0.1332*** (0.0201)	-0.3272*** (0.0531)	-0.06687*** (0.0094)	-0.3272*** (0.0531)	-0.06687*** (0.0094)
PMR (t-1)	-0.01866*** (0.0044)	-0.001651*** (0.0005)	-0.03282*** (0.0119)	-0.0002555 (0.0015)	-0.02622*** (0.0064)	-0.003735*** (0.0008)	-0.02055*** (0.0045)	-0.001358** (0.0006)
Centralisation of Collective Bargaining (t-1)	-0.07741*** (0.0057)	0.006126*** (0.0006)	-0.06965*** (0.0104)	0.007592*** (0.0018)	-0.08574*** (0.0082)	0.009403*** (0.0013)	-0.07559*** (0.0076)	0.009148*** (0.0013)

Notes: Linear probability model pooled over different countries. The dependent variable is, depending on the model, the worker flows from unemployment to employment (U-E) or from employment to unemployment (E-U). It is a dummy variable which is equal to 1 if the individual flows in the specific year and 0 if she remains in the origin group. EPL (t-1) refers to Employment Protection Legislation for regular contracts from the OECD. PMR (t-1) refers to the OECD indicator of regulation in energy, transport and communications (ETCR). The degree of centralisation of collective bargaining index was developed by the Fraser Institute and has been flipped to make it consistent with the other policy variables (i.e. the higher the index the lower the flexibility in wage setting). The specification is the same as in Table 1, namely: GDP growth (t-1), GDP growth (t-1)*crisis, crisis, male, education, age, time fixed effects and country fixed effects. All euro area countries included (columns 1 to 2). Columns 3 to 8 refer to different groups of reforming countries: (3, 4) Greece, Spain, Portugal; (5,6) Greece, Spain, Portugal, Cyprus, Italy; and (7,8) Greece, Spain, Portugal, Cyprus, Italy, Slovakia, Estonia. The policy variables included in columns 1-8 are estimated one at a time in the respective equation (i.e., not included all together). Hence, due to the high number of regressions and ensuing parameters to report, N and R-sq are not shown in the table, but these are available upon request. The estimation is conducted over the period 2000-2015. Robust standard errors are shown in parentheses: * p<0.1, ** p<0.05, *** p<0.01.

Labour and product market institutions and worker flows

In order to assess whether reforms or changes in the institutional environment can have a direct impact on the labour market flows, we study the impact of some key policy indicators – which are designed to capture institutional rigidities in labour and product markets – for both the euro area and different groups of reforming countries (Table 2, columns 1-8). Reducing these rigidities can enhance labour market flexibility by decreasing excessive employment protection and making wage adjustments more responsive to the economic cycle, thereby influencing the probability of flowing to and from employment and unemployment. In addition, product market deregulation may affect the probability of flowing to and from employment and unemployment[23], by encouraging the creation of new companies and the expansion of existing ones, or by making profit margins more responsive to the cycle. In Table 2, we estimate the linear probability specification (2) over the whole sample period (2000-2015) by including, once at a time, the following indicators (which vary at country level) of labour and product market regulation: EPL (t-1) refers to Employment Protection Legislation (OECD) for regular contracts; PMR (t-1) refers to the OECD indicator of regulation in

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[23] An increase in the PMR ETCR index compiled by OECD is associated with a decrease in the probability of flowing both to employment and unemployment. The index ranges from 0 to 6 and has a standard deviation of 0.78.

energy, transport and communications (ETCR)[24]; the degree of centralisation of collective bargaining index is developed by the Fraser Institute and it has been flipped in order to be consistent with the other policy variables (i.e. the higher the index the lower the flexibility in wage setting). All euro area countries in the data sample are included in columns 1-2 in Table 2, while columns 3-8 refer to results for different groups of reforming countries: (3-4) GR, ES, PT; (5-6) GR, ES, PT, CY, IT; (7-8) GR, ES, PT, CY, IT, SK, EE. The econometric results in Table 2 show that the vast majority of the institutional variables are statistically significant and negatively signed indicating that higher employment protection, higher product market regulation and a higher degree of centralisation of wage bargaining tend to reduce worker flows.[25] Therefore, reducing these rigidities via structural reforms can increase worker flows in euro area countries and make the labour market more flexible. These results are consistent with Haltiwanger et al. (2014) who also found that stricter regulations reduce the pace of job creation and destruction using firm-level data for several countries.[26]

Robustness checks and additional results

During the period of the recovery in euro area employment after the crisis, a significant number of workers in some countries were employed under temporary contracts (e.g., Spain). An important question is whether our above finding of increased worker flows from unemployment to employment after the crisis is only due to temporary contracts. Therefore, in Table 3 we estimate the same specification (1) as in Table 1 but only focus on observations for individuals flowing from unemployment to employment under a permanent contract. In this way, we check whether our previous finding of an increase in the responsiveness of the flows to a change in GDP in the post-crisis period is only driven by a higher share of individuals hired under temporary contracts after the crisis. The results of this specification on the restricted sample of permanent contracts are in line with the previous ones shown in Table 1. Specifically, when only looking at unemployed workers flowing to employment and hired under a permanent contract, we still observe an increase in the GDP-employment elasticity after 2008, both for the euro area and reforming countries (ES, PT and GR). Therefore, our conclusion is that the general increased responsiveness of flows to output, which

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[24] The PMR ETCR index is commonly used as a good proxy of product market regulation in the whole economy (as in several OECD papers and Anderton, R. (2018)) as it is highly positively correlated with the PMR indicator. The advantage of using the PMR ETCR indicator is that it provides annual observations over a long sample period (available on an annual basis from 1975 to 2013) and is therefore well suited for time-series analysis, whereas the PMR indicator is limited to the years 1998, 2003, 2008 and 2013.

[25] The results are a bit weaker for the centralisation of wage bargaining as the parameters for this variable are both positively and negatively signed.

[26] For further analysis of worker flows and regulation, see, for example, Kugler and Pica (2008), Gomez Salvador et al (2004), Bassanini and Garnero (2013) and Cournede et al (2016).

may be associated with the implementation of structural reforms, is not driven by those hired on temporary contracts.

As an additional robustness check, Table 4 presents the results of specification (1), restricting the country sample in order to have a balanced panel. In particular, we remove from the euro area country group DE, MT, AT, FR, NL as data were only available starting from 2006 for AT, FR, NL and from 2009 for MT. As before, Germany is excluded given the different timing of their reforms, and not for data availability. Since the results are overall very similar and in line with those of Table 1, they suggest that the increased GDP-employment elasticity after the crisis is not driven by the missing observations for some countries in the first period (2000-2007), hence the general results of Table 1 pass this robustness check.

In Table 5 we investigate whether the results of Table 1 are robust to an alternative way of checking if the parameters of GDP growth change between the pre- and post-crisis periods. In more detail, Table 5 first estimates specification (1) for the pre-crisis period 2000-2007 (i.e., columns 1, 3, 5 and 7) and then for the whole sample period 2000-2015 (i.e., columns 2, 4, 6 and 8): the hypothesis is that if the latter period shows larger parameters for the output variable than the pre-crisis period then we again have evidence of structural change in the post-crisis period. After controlling for the downturn and the asymmetric response of the flows during the recession as before, the results in Table 5 indeed show that GDP parameters are indeed larger for the whole sample period (2000-2015) relative to the pre-crisis period, indicating that the responses of labour market flows to changes in GDP are indeed higher in the post-crisis period. Again the increase in parameters is higher for the reforming countries, indicating that structural reforms implemented during the crisis may, at least, partly explain this increased flexibility of labour market flows. Again our micro data results are consistent with results using macroeconomic data based on a similar methodology which finds that the employment-GDP elasticity has increased for reforming countries during the post-crisis period.[27]

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[27] For example, see Box 3 'Recent employment dynamics and structural reforms' and other parameter estimates in the article in the ECB Economic Bulletin Issue 6/2016 'The employment-GDP relationship since the crisis', as well as Jimeno et al (2015).

Table 3

Permanent contracts: changes in responsiveness of worker flows to GDP growth

		EA countries		Reforming countries	
		2000-2007 (1) U-E	2008-2015 (2) U-E	2000-2007 (3) U-E	2008-2015 (4) U-E
GDP growth (t-1)		0.006600*** (0.0019)	0.008443*** (0.0011)	0.009966** (0.0044)	0.01716*** (0.0040)
GDP growth (t-1)*crisis			-0.001401 (0.0013)		-0.008504** (0.0030)
crisis			-0.01724** (0.0066)		-0.02369** (0.0104)
male		0.07192*** (0.0045)	0.004468 (0.0037)	0.09171*** (0.0085)	0.0004576 (0.0051)
education	medium	0.05416*** (0.0049)	0.04549*** (0.0042)	0.04154*** (0.0104)	0.02655*** (0.0064)
	high	0.1195*** (0.0084)	0.09241*** (0.0062)	0.1043*** (0.0134)	0.05401*** (0.0081)
age	25-34	0.01444* (0.0060)	0.05035*** (0.0057)	0.001443 (0.0110)	0.04862*** (0.0082)
	35-44	0.01474* (0.0064)	0.02928*** (0.0056)	-0.03012** (0.0115)	0.02109** (0.0076)
	45-54	-0.0007015 (0.0073)	-0.006353 (0.0054)	-0.04394** (0.0147)	-0.006926 (0.0073)
	55-64	-0.06271*** (0.0086)	-0.03765*** (0.0063)	-0.1427*** (0.0124)	-0.02227** (0.0078)
constant		0.1433*** (0.0170)	0.08891*** (0.0098)	0.1626*** (0.0201)	0.08794*** (0.0104)
time FE		yes	yes	yes	yes
country FE		yes	yes	yes	yes
N		97547	137510	36072	55735
R-sq		0.0518	0.0840	0.0330	0.0311

Notes: Linear probability model pooled over different countries. Same specification (1) as in Table 1, except that the sample is restricted to those individuals flowing to employment under a permanent contract. The dependent variable is the worker flows from unemployment to employment (U-E). It is a dummy variable which is equal to 1 if the individual flows in the specific year and 0 if she remains in the origin group. All euro area countries included (columns 1 to 2). Columns 3 and 4 refer to the following group of reforming countries: Greece, Spain and Portugal. The estimation is conducted over the period 2000-2015. Robust standard errors are shown in parentheses: * p<0.1, ** p<0.05, *** p<0.01.

Table 4

Balanced panel: changes in responsiveness of worker flows to GDP growth

		EA countries			
		2000-2007 (1) U-E	2008-2015 (2) U-E	2000-2007 (3) E-U	2008-2015 (4) E-U
GDP growth		0.006811*** (0.0019)	0.007461*** (0.0009)	-0.001098*** (0.0002)	-0.002729*** (0.0002)
GDP growth (t-1)*crisis			-0.0001804 (0.0011)		0.0004204* (0.0002)
crisis			-0.03168*** (0.0066)		0.004185*** (0.0012)
male		0.06796*** (0.0043)	0.003814 (0.0046)	-0.006979*** (0.0005)	0.002366** (0.0008)
education					
	medium	0.04393*** (0.0049)	0.04776*** (0.0053)	-0.008810*** (0.0006)	-0.01819*** (0.0011)
	high	0.1102*** (0.0073)	0.09733*** (0.0073)	-0.01836*** (0.0008)	-0.03685*** (0.0012)
age					
	25-34	-0.02153*** (0.0057)	0.03908*** (0.0070)	-0.02543*** (0.0015)	-0.04038*** (0.0029)
	35-44	-0.04178*** (0.0062)	0.002038 (0.0071)	-0.03725*** (0.0014)	-0.06056*** (0.0028)
	45-54	-0.08000*** (0.0068)	-0.05652*** (0.0069)	-0.04363*** (0.0014)	-0.06945*** (0.0028)
	55-64	-0.1893*** (0.0095)	-0.1178*** (0.0080)	-0.04787*** (0.0014)	-0.08094*** (0.0028)
constant		0.2569*** (0.0175)	0.2662*** (0.0109)	0.08775*** (0.0027)	0.1161*** (0.0032)
time FE		yes	yes	yes	yes
country FE		yes	yes	yes	yes
N		123662	150964	1234156	1169917
R-sq		0.0462	0.0603	0.0128	0.0252

Notes: Linear probability model pooled over different countries. Same specification (1) as in Table 1, except that the sample is restricted in order to have a balanced panel. The dependent variable is the worker flows from unemployment to employment (U-E). It is a dummy variable which is equal to 1 if the individual flows in the specific year and 0 if she remains in the origin group. Euro area countries for which data coverage is similar are included. The estimation is conducted over the period 2000-2015. Robust standard errors are shown in parentheses: * p<0.1, ** p<0.05, *** p<0.01.

Table 5

Alternative method of capturing change in responsiveness of worker flows to GDP growth

		EA countries				Reforming countries			
		2000-2007 (1) U-E	2000-2015 (2) U-E	2000-2007 (3) E-U	2000-2015 (4) E-U	2000-2007 (5) U-E	2000-2015 (6) U-E	2000-2007 (7) E-U	2000-2015 (8) E-U
GDP growth		0.007367*** (0.0017)	0.01256*** (0.0009)	-0.002027*** (0.0002)	-0.002736*** (0.0001)	0.01010*** (0.0039)	0.01664*** (0.0020)	-0.0007692* (0.0004)	-0.001624*** (0.0003)
GDP growth (t-1)*crisis			-0.004219*** (0.0012)		0.0005723** (0.0002)		-0.01784*** (0.0023)		0.001805*** (0.0004)
crisis			-0.04178*** (0.0066)		0.003531*** (0.0010)		0.03263*** (0.0087)		-0.002563* (0.0015)
male		0.05852*** (0.0045)	0.01332*** (0.0034)	-0.005847*** (0.0005)	-0.001040* (0.0005)	0.09481*** (0.0079)	0.02778*** (0.0057)	-0.01227*** (0.0011)	-0.001788 (0.0012)
education	medium	0.05561*** (0.0051)	0.05645*** (0.0039)	-0.009733*** (0.0006)	-0.01433*** (0.0006)	0.02581* (0.0102)	0.04393*** (0.0072)	-0.008361*** (0.0015)	-0.01706*** (0.0016)
	high	0.1190*** (0.0075)	0.1127*** (0.0055)	-0.01830*** (0.0007)	-0.02818*** (0.0007)	0.08148*** (0.0111)	0.08451*** (0.0079)	-0.01980*** (0.0014)	-0.03737*** (0.0014)
age	25-34	-0.01668** (0.0060)	0.009300 (0.0050)	-0.02685*** (0.0015)	-0.03116*** (0.0015)	-0.04809*** (0.0100)	0.01696* (0.0085)	-0.02885*** (0.0027)	-0.03790*** (0.0032)
	35-44	-0.03783*** (0.0065)	-0.02539*** (0.0053)	-0.03825*** (0.0014)	-0.04755*** (0.0014)	-0.1089*** (0.0112)	-0.03680*** (0.0089)	-0.04378*** (0.0027)	-0.06045*** (0.0031)
	45-54	-0.08860*** (0.0072)	-0.08124*** (0.0053)	-0.04361*** (0.0014)	-0.05555*** (0.0014)	-0.1862*** (0.0132)	-0.1109*** (0.0088)	-0.05474*** (0.0026)	-0.07319*** (0.0031)
	55-64	-0.1883*** (0.0098)	-0.1554*** (0.0064)	-0.04814*** (0.0015)	-0.06315*** (0.0014)	-0.3490*** (0.0156)	-0.1940*** (0.0100)	-0.05885*** (0.0026)	-0.08720*** (0.0031)
constant		0.2371*** (0.0172)	0.1875*** (0.0093)	0.09873*** (0.0027)	0.1114*** (0.0019)	0.4745*** (0.0186)	0.3411*** (0.0125)	0.07287*** (0.0033)	0.1040*** (0.0037)
time FE		yes	yes	yes	yes	yes	yes	yes	yes
country FE		yes	yes	yes	yes	yes	yes	yes	yes
N		138887	290527	1495849	2805016	51608	117308	490094	873161
R-sq		0.0452	0.0635	0.0131	0.0192	0.0771	0.0972	0.0126	0.0225

Notes: Linear Probability Model pooled over different groups of countries. Same specification (1) as in Table 1, except that the sample periods differ. The dependent variable is, depending on the model, the worker flows from unemployment to employment (U-E) or from employment to unemployment (E-U). It is a dummy variable which is equal to 1 if the individual flows in the specific year and 0 if she remains in the origin group. The specification also includes: the following dummies for individual characteristics, i.e.: male, education, age, plus an intercept dummy variable where GDP growth is negative during the crisis as well as an interaction of this dummy with GDP growth. Time and Country FE are included. Group of euro area countries excludes Germany because of the different pattern of reforms. The group of reforming countries includes Spain, Greece and Portugal. GDP growth (t-1) is measured in percentage points. Robust standard errors are shown in parentheses: * p<0.1, ** p<0.05, *** p<0.01.

Conclusions

Previous work using macroeconomic data shows that employment-output elasticities increased for some reforming euro area countries during the recovery from the crisis, while many firms in comprehensive and large surveys in some of these countries also state that it became easier to adjust employment due to reforms implemented during the crisis. In this paper, we build on these previous findings by using micro (individual-level) data across euro area countries to investigate whether flows from employment to unemployment, and from unemployment to employment, also display a change in behaviour and flexibility after the crisis, and whether structural reforms are associated with any change in flexibility.

We econometrically estimate the determinants of worker flows across employment and unemployment in euro area countries during the period 2000-2015, using individual-level micro data from the Eurostat Labour Force Survey (EU-LFS), and use socio-demographic variables (such as gender, age, and education), as well as macroeconomic data as explanatory variables (e.g., changes in GDP dynamics) to capture Okun-style macroeconomic relationships within a micro data estimation framework. We find that the micro data-based worker flows show a higher responsiveness to changes in GDP after the crisis, particularly for a group of euro area countries which implemented significant reforms. Secondly, we empirically estimate whether institutional features of the labour market (such as employment protection legislation, product market regulation, and the degree of collective bargaining) have an impact on worker flows. We find that the institutional variables are statistically significant and their signs indicate that the higher the rigidities, or the higher the restrictiveness of the regulation, the lower the worker flows. This result is also consistent with structural reforms being the reason behind the increased responsiveness of the flows to changes in GDP for reforming countries (as reducing these rigidities via structural reforms can increase worker flows in euro area countries and make the labour market more flexible). Another important question is whether our above finding of increased responsiveness of worker flows to the evolution of GDP is only due to the increase in temporary contracts in some countries after the crisis. We therefore re-estimate our specification but only use data for unemployed workers flowing to employment and hired under a permanent contract: the results confirm our findings of an increase in the worker flows-GDP elasticity in the post-crisis period, particularly for the selected group of euro area reforming countries. Accordingly, our conclusion is that the general increased responsiveness of flows to output is not driven by those hired on temporary contracts but

also applies to those hired on permanent contracts. Finally, we show that the above results still hold after various robustness checks are carried out.

Annex

Further details on the European Union Labour Force Survey (EU LFS)[28]

The EU-LFS is conducted in the 28 Member States of the European Union, 4 candidate countries and 3 countries of the European Free Trade Association (EFTA) in accordance with Council Regulation (EEC) No. 577/98 of 9 March 1998. The surveys are conducted by the national statistical institutes across Europe (interviewing around 1.5 million people) and are centrally processed by Eurostat. The 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 data collection covers the years from 1983 onwards. Initially, 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. In general, data for individual countries are available depending on their accession date.

One advantage of the survey for our purpose is that the definition of labour status is similar across countries. As 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. It is set out in 5-year age band: 15-24; 25-34; 35-44; 45-54; 55-64. 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 and delivers homogeneous groupings across countries, but there could still be some cross-country heterogeneity in this regard.

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[28] More can be found on https://ec.europa.eu/eurostat/web/microdata/european-union-labour-force-survey.

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