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Please address correspondence to
Banco de Portugal, Economics and Research Department
Av. Almirante Reis 71, 1150-012 Lisboa, Portugal
T +351 213 130 000 | estudos@bportugal.pt

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Income smoothing mechanisms after labor market transitions

Nuno Alves
Banco de Portugal

Carlos Martins
Banco de Portugal

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Abstract
This article quantifies several household income smoothing mechanisms following labor market shocks. These shocks correspond to individual transitions between employment, unemployment and inactivity. The analysis covers 25 European countries for the period 2004-2011. We identify the relative role of labor and non-labor household income sources, income taxes and individual and household transfers in smoothing income fluctuations. We conclude that the tax and transfer system is the main household insurance mechanism following individual labor market transitions. This finding is robust before and after the Great Recession of 2009. Quantitatively, the relative role of these smoothing mechanisms is conditional on the characteristics of the labor market shock and varies across countries in the sample. Finally, even though we do not identify a relevant labor market response of household members in the intensive margin, household income pooling is an important smoothing mechanism among couples.

JEL: D31, J6, O15

Keywords: Labor market transitions, household income smoothing, tax and transfers, European Union.

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E-mail: njalves@bportugal.pt; cmmartins@bportugal.pt

1. Introduction

Labor market shocks are a primary source of individual income fluctuations. The transmission of these shocks to household disposable income is mediated by several smoothing mechanisms, both at the individual and family levels. These mechanisms are fundamental to understand issues related not only to income dynamics (Low *et al.* (2010)), but also to income inequality (Huggett *et al.* (2011)) or to the welfare costs of business cycles (Storesletten *et al.* (2004)). Disentangling the relative role of these smoothing mechanisms has proven to be quite challenging, due inter alia to data constraints (Blundell (2014)). In fact, estimating the full econometric processes underlying earnings dynamics, as well as the insurance mechanisms to individual market income, requires long panels of individuals and their family members, coupled with detailed information on the respective sources of income. However, such data sets are still quite rare (see Blundell *et al.* (2014), for a rich analysis focusing on Norway).

In this article we characterize the importance of several income smoothing mechanisms following individual labor market transitions between employment, unemployment and inactivity. These labor market events are relevant determinants of individual income trajectories. The focus on a subset of labor market shocks makes the analysis complementary to the panel data modelling of aggregate labor income dynamics typically addressed in the literature (Guvenen *et al.* (2014)). We take advantage of the detailed information available in the European Union database on income and living conditions (EU-SILC), which includes almost all European countries. The sample covers the period from 2004 to 2011. Crucially for our purposes, this database has comprehensive longitudinal information on the composition of households, on the labor market events affecting each individual and on the income sources underlying both individual and household disposable income. As a downside, the panel component of the database is quite short. This hinders the discussion of important issues regarding the income processes, notably the varying persistence of shocks, the role of cohort effects and the dynamics over the life-cycle.

The empirical strategy adopted in this study is as follows. We start by identifying individual labor market transitions between the three states in the labor market: employment, unemployment and inactivity. The sample is restricted to households experiencing at most one labor market transition. We then estimate the impact of those transitions on the one-year change in household income, controlling for several individual and household characteristics. We start by assessing the contribution of changes in earnings of the individual experiencing the shock and replicate the exercise adding the contributions of changes in the remaining income sources of household disposable income. This allows characterizing the relative role of a set of income smoothing mechanisms: (i) the transfer system, which works primarily through the individual experiencing the shock but which is also analysed for

the remaining members of the household, as well as for the household as a whole; (ii) the impact of income pooling in the case of households with several labor earners, in particular as regards changes in labor supply at the intensive margin; (iii) the evolution of non-labor income of the family; and, finally, (iv) the tax system. We uncover three main findings from the analysis.

First, the availability of outside insurance is a crucial mechanism to smooth the impact of changes in individual earnings. This is particularly significant in the transition from employment to unemployment and in the transition from employment to retirement. In these cases, most individuals are entitled to transfers which partially insure against these income shocks. This mechanism is particularly important for households with only one adult. These conclusions are qualitatively robust across countries and demographic groups in the sample. However, the degree of insurance varies significantly across countries, depending on the characteristics of the respective safety nets. In particular, the relative role of the transfer system in smoothing labor market shocks is much stronger in northern and continental European countries relative to eastern and southern European countries.

Second, income taxes also act as a significant income smoothing mechanism. As expected, following positive or negative labor market shocks, the tax system robustly contributes to attenuate the overall impact on household income. The automatic stabilizing role of the tax system identified at the macro level is particularly salient in the experiences of households facing the large labor market shocks identified in this article. This finding is robust across countries in the sample.

Third, household income pooling is an important smoothing mechanism among couples. In fact, irrespective of the labor market transition, the impact on household income from changes in individual labor income is always larger for households with only one adult. This holds both before and after the functioning of the full set of insurance mechanisms analysed in this article. We do not identify a significant labor market response of the remaining household members in the intensive margin. Overall, we conclude that the presence of several earners in the household, even supplying labor inelastically, acts as a significant source of income smoothing. Nonetheless, given that, by construction, we are not able to identify possible changes in spouses' labor supply at the extensive margin, this assessment remains incomplete.

The remainder of the paper is organized as follows. Section 2 presents the data and characterizes the variables used in the analysis. Section 3 describes the empirical strategy and Section 4 discusses the main findings, including a country breakdown of the results. Section 5 concludes.

2. The Data and the Definition of Variables

The information used in this article comes primarily from the longitudinal modules of the Survey of Income and Living Conditions (EU-SILC) database (see Atkinson and Marlier, eds (2010)). The EU-SILC was launched in 2003 (in seven countries) and afterwards expanded to the full set of European Union countries. The sample underlying each longitudinal database is based on a rotating panel with four subgroups of equal size. This implies that each individual or household is followed at most for a period of four years. Given this limited time-series dimension in the longitudinal EU-SILC database, we will characterize labor market transitions between years t-1 and t and analyse the functioning of income smoothing mechanisms in those consecutive years. We use microdata from the surveys conducted between 2005 and 2012. Given that the information on household income typically refers to the previous calendar year, this implies that the actual data cover the period 2004-2011.

Our study will relate labor market transitions experienced by working-age individuals (between 16 and 64 years) with the ensuing income changes observed at the individual and at the household levels. Uncovering the smoothing channels affecting these changes will be the ultimate aim of the analysis. For our purposes, a crucial characteristic of the EU-SILC database is the availability of detailed information on the different income sources at the level of each individual and household. The richness of the information allows decomposing total disposable income y of household i (composed of N members indexed by j) in year t as follows:

$$y_{i,t} = \sum_{j=1}^{N} \left(LabourIncome_{j,i,t} + Transfers_{j,i,t} \right) + OtherIncome_{i,t}$$

$$+ OtherTransfers_{i,t} - Taxes_{i,t}$$

where $LabourIncome_{j,i,t}$ corresponds to gross labor income earned by member j (including employee cash or near-cash income, non-cash employee income and cash benefits from self employment); $Transfers_{j,i,t}$ corresponds to the sum of all unemployment, old-age, survivor's, sickness and disability benefits earned by member j; $OtherIncome_{i,t}$ refers to household i's income from rental property or land, interest dividends and profit from capital investments in unicorporated businesses; $OtherTransfers_{i,t}$ includes transfers that are computed at the household level, namely family/children related and housing allowances, social exclusion benefits not considered at the individual level and regular inter-household net cash transfers; and $Taxes_{i,t}$ corresponds to taxes on income and social insurance contributions as well as taxes on wealth (all are reported for the household as a whole). All series were deflated using national CPI indexes.

We assume that there is perfect sharing of resources within the household. Each member j of the household is thus attributed the same level of

income, which is equivalised using the OECD modified equivalence scale.[1] This equivalised household income is denoted by $\tilde{y}_{i,t}$. It follows that $\tilde{y}_{j,t} = \tilde{y}_{i,t}$ for all j members of household i. Note that the equivalisation is innocuous for the analysis given that we restrict the sample to households without demographic changes from one year to the next. In what follows references to income aggregates will always refer to the respective equivalised aggregates. The change in annual disposable income for each working-age individual j between years $t-1$ and t, $\hat{\tilde{y}}_{j,t}$, is defined as $\hat{\tilde{y}}_{j,t} = (\hat{\tilde{y}}_{j,t} - \hat{\tilde{y}}_{j,t-1})/\hat{\tilde{y}}_{j,t-1}$.

The identification of transitions in the labor market is anchored on the reference period of household income. As mentioned above, this reference period covers the calendar year immediately preceding the survey date in almost all countries. The EU-SILC includes information on the economic situation of each individual in each month of the income reference period, namely if the individual is employed, unemployed or inactive. The latter includes both retirees and individuals in other types of inactivity. We assign an individual to the state in the labor market where she spent most of the year. Specifically, an individual is considered to be employed if she works more than six months during the income reference period. An analogous definition was adopted to identify unemployed or inactive individuals. Based on this assumption, it is straightforward to define transitions in the labor market for each individual in two consecutive years. Given these definitions, data on changes in household income and on labor market transitions are concomitant.[2] Note that there are countries where the income reference period does not correspond to the previous calendar year, namely the United Kingdom and Ireland. These countries were therefore excluded from the analysis.

In order to minimize attrition, we restrict the analysis to households experiencing at most one labor market event in each year and to households that maintain the same demographic structure in two consecutive years (as regards the number of adults and the number of children). These constraints are important because it is not possible to identify the degree of exogeneity or causation between labor market and demographic shocks occurring simultaneously. Furthermore, we excluded households with negative or very low income levels (annual income below 700 euros at time $t-1$), as well as households with very high incomes (above 125 percent of the ninety ninth percentile of the income distribution in each country, computed with the EU-SILC cross-sectional database).[3]

1. The OECD modified equivalence scale attributes a weight of 1.0 to the first adult in the household, 0.5 to other adults and 0.3 to children (below 15 years).

2. For a thorough discussion of issues relating to the timing of variables in the EU-SILC database, see Debels and Vandecasteele (2008).

3. This excludes about 2.5 per cent of the sample.

We define two different samples, both covering 25 European countries.[4] The first, which will be our baseline case, is composed of all working-age individuals in households with more than one adult. This allows untangling smoothing mechanisms both at the individual and at the household levels. The second sample includes only working-age individuals who are the sole adult in the household, which by construction restricts the set of potential smoothing mechanisms.

The size of both samples and the respective frequency of labor market transitions are presented in Table 1. The baseline sample is composed of around one million observations, while the sample with single-adults comprises around 100 000 observations. The table reveals some interesting patterns. In sample, around 7 per cent of working-age individuals experience a labor market transition. The most frequent labor market transitions are associated with flows from inactivity to employment and from employment to inactivity. These are respectively associated with young cohorts entering the labor market and older cohorts retiring. Transitions to and from employment and unemployment are also noteworthy, each representing slightly more than 1 per cent of working age individuals in our sample. Transitions between inactivity and unemployment are the less prevalent in the sample (less than 1 per cent).

Individual labor market transitions between t-1 and t:	Households with more than one adult	Households with only one adult
Employed in t after		
unemployed in t-1	1.1	1.4
inactive in t-1	1.8	1.7
Unemployed in t after		
employed in t-1	1.1	1.5
inactive in t-1	0.8	0.6
Inactive in t after		
employed in t-1	1.6	2.3
unemployed in t-1	0.8	0.9
Number of observations	960914	101352

TABLE 1. Sample frequency of labor market transitions

Notes: Frequency values in percentage of the respective sample.

4. The data for Hungary were excluded due to lack of reliability regarding the decomposition of household income in the various sub-components required for our analysis.

3. The Empirical Strategy

The direct impact of labor market transitions experienced by individuals on household income may be very large. The first column in Table 2 shows that the loss in gross labor income earned by an individual falling into unemployment or retiring may amount to over 30 per cent of overall household disposable income. A symmetric outcome occurs when an individual finds a job after being unemployed or inactive.

However, households do not experience this extreme volatility in disposable income. In fact, there are several smoothing mechanisms that insure against labour market events faced by the different household members. The second column in Table 2 illustrates the strong mitigating impact of these mechanisms. It is clear that the dynamics of household disposable income are much smoother than those implied solely by gross labour income shocks. For example, when an individual becomes inactive after being employed, the respective household only experiences a small loss in disposable income, in contrast with the sharp fall in earnings. An analogous result occurs with transitions from employment to unemployment. The goal of this article is precisely to quantify the role of different mechanisms that contribute to smooth household disposable income following labor market transitions.

	Change in household disposable income from:	
Individual labor market transitions between t-1 and t:	changes in labor income of the individual	changes in all sources of household disposable
Employed in t after		
unemployed in t-1	0.35	0.23
inactive in t-1	0.26	0.22
Unemployed in t after		
employed in t-1	-0.32	-0.09
inactive in t-1	0.01	0.06
Inactive in t after		
employed in t-1	-0.31	-0.03
unemployed in t-1	0.00	0.07
Number of observations	960914	960914

TABLE 2. Changes in household disposable income: households with more than one adult

Notes: The table displays the sample average change in household disposable income following each labor market transition.

The breakdown of household income available in the longitudinal modules of EU-SILC allows analysing several of these mechanisms at the individual and at the household levels. In order to quantify these mechanisms, we estimate the impact of each labor market transition (between $t-1$ and t) on the changes of the different sources of household income (also between $t-1$ and t), controlling for several household and individual characteristics, as well as for time and country fixed effects. The unit of analysis is each working-age individual in the sample.[5] The estimated panel regressions take the following general specification:

$$\hat{\tilde{X}}_{j,t} = \sum_{n=1}^{6} \gamma^n Transition_{j,t}^n + \sum_{k=1}^{q} \theta^k HouseholdCharact_{j,t-1}^k + \sum_{h=1}^{p} \varphi^h IndividualCharact_{j,t-1}^h + \alpha_{country} + \tau_t + \varepsilon_{j,t} \quad (1)$$

where the dependent variable $\hat{\tilde{X}}_{j,t}$ represents the estimated changes in equivalised disposable income due to changes in specific sub-components of disposable income $\tilde{X}_{j,t}$ which are defined as $\hat{\tilde{X}}_{j,t} = (\hat{\tilde{X}}_{j,t} - \hat{\tilde{X}}_{j,t-1})/\hat{\tilde{X}}_{j,t-1}$. This variable is the central unit of the empirical strategy. In order to quantify the role of several income smoothing mechanisms following labor market transitions experienced by individuals, we estimate equation (1) for different $\tilde{X}_{j,t}$. Specifically, $\tilde{X}_{j,t}$ starts by including only the contribution of changes in labor income earned by the individual j who experiences the shock. This allows identifying the impact on equivalised income stemming from changes in individual j's labor market earnings. Afterwards, the numerator in $\tilde{X}_{j,t}$ is enlarged by successively adding the change in (i) the set of individual transfers to the individual, (ii) the remaining transfers to the household, (iii) the remaining gross labor and non-labor income earned by the household and, finally, by subtracting the change in (iv) taxes on income and social security contributions. After this last step, we are estimating the impact of each labor market transition on overall equivalised household disposable income, i.e. $\tilde{X}_{j,t} = \tilde{y}_{j,t}$.

The independent variables in equation (1) are the following: $Transition_{j,t}^n$ corresponds to six dummy variables (one for each labor market event) which assume a value equal to 1 when a j individual experiences a labor market transition between years $t-1$ and t; γ^n is our main parameter of interest and

5. As mentioned above the estimation only includes individuals in households where at most one labor market transition occurred. In order to tighten the identification of the impact of individual labor market transitions, we only included in the estimation the household member experiencing the shock. It should be underlined that the exclusion from the estimation of the remaining members of those households has no material impact on the results.

captures the estimated impact of each labor market transition on equivalised income, controlling for the remaining variables; $HouseholdCharact^{k}_{j,t-1}$ corresponds to a set of household characteristics in period t-1, namely the share of individuals in the household in different age groups (between 16 and 34 years, 35 and 49 years, 50 and 64 years and over 64 years), the share of individuals with different levels of education (primary, secondary and tertiary education), the size of the household, the number of children and, to take into account the degree of participation of the household in the labor market, the share of months in which the individuals in the family were employed, unemployed or inactive; $IndividualCharact^{h}_{j,t-1}$ corresponds to a set of individual characteristics in period t-1, including age, sex and education; finally, $\alpha_{country}$ are country fixed effects and τ_t are time fixed effects.

A comparison of the γ^n coefficients associated to the different $\tilde{X}_{j,t}$ in the successive regressions allows identifying the role of each mechanism in smoothing household income following the individual labor market transitions.[6]

The estimation period is 2004-2011. As mentioned above, the panel built with the EU-SILC is inevitably limited in the time series dimension. The final sample used to estimate the models has an average time-series length of only 1.8 years. The models were thus estimated by pooled OLS. It should be underlined that the estimation with random effects or fixed effects pointed to similar results vis-à-vis the pooled OLS. All results presented were calculated using the sample weights available in the longitudinal databases.[7]

4. The Findings of the Exercise

4.1. The Results for the European Union

Table 3 presents the main results of the baseline sample, i.e. including working-age individuals in households with more than one adult. The case of households with only one adult is analysed subsequently. The table only displays the γ^n coefficients in the successive estimations described by equation (1). Several conclusions can be drawn from these results.

6. In Blundell (2014), the channels of household insurance following income shocks are also examined by changing the definition of income, distinguishing between male earnings, household earnings and family net income.

7. These weights are constructed to allow an extrapolation from the sample to the entire population. When sample weights were not available, the observation was dropped from the sample.

Dependent variable	Change in household disposable income due to: change in transfers labor income	(1) plus change in transfers to the individual	(2) plus change in other transfers to the household	(3) plus change in other household income	(4) minus change in taxes and social insurance contributions
	(1)	(2)	(3)	(4)	(5)
Labor market transitions					
Employed in t after					
unemployed in t-1	0.43 ***	0.35 ***	0.34 ***	0.32 ***	0.24 ***
	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
inactive in t-1	0.33 ***	0.31 ***	0.29 ***	0.30 ***	0.24 ***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Unemployed in t after					
employed in t-1	-0.38 ***	-0.26 ***	-0.25 ***	-0.26 ***	-0.20 ***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
inactive in t-1	-0.03 ***	-0.03 ***	-0.02 ***	-0.01	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Inactive in t after					
employed in t-1	-0.33 ***	-0.15 ***	-0.15 ***	-0.14 ***	-0.08 ***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
unemployed in t-1	-0.08 ***	-0.04 ***	-0.03 ***	-0.01	0.00
	(0.00)	(0.01)	(0.01)	(0.02)	(0.02)
Number of observations	960914	960914	960914	960914	960914

TABLE 3. The impact of transitions in the labor market on disposable income of households with more than one adult

Notes: The table displays the γ coefficients described in equation (1) in the text. All regressions include country and year fixed effects, as well as several explanatory variables related to individual and household characteristics. At the individual level, the respective age group, education level and sex are considered. At the household level, the share of household individuals in different age groups, the share of individuals with different levels of education, the share of months that household individuals were working, unemployed or inactive, as well as variables related to the size of the household and to the number of children are included. All models are weighted with sample weights. Robust standard errors of coefficients are displayed in parenthesis; *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

First, changes in individual labor income associated with labor market transitions often imply very large changes in aggregate household income. On average, when an unemployed individual becomes employed, the associated increase in gross labor income contributes to rise aggregate household income by 43 per cent (column (1) in Table 3). That figure is 33 per cent in the case of households where an inactive individual becomes employed. In turn, when an individual falls into unemployment after being employed, the associated decline in labor income implies on average a fall of 38 per cent in aggregate household income (-33 per cent when an individual transitions to inactivity). There are also cases where, on average, labor market transitions have a very small impact on household income, notably the cases of transitions to and

from unemployment and inactivity. In order to understand household income fluctuations, it is therefore crucial to know both the origin and end statuses in the labor market.

Second, the set of insurance mechanisms at both the individual and household levels significantly mitigate income fluctuations after labor market transitions. In the cases of transitions from employment to unemployment and from unemployment to employment, the overall set of insurance mechanisms reduces the change in household income by about half (see columns 1 and 5). In the case of transitions from employment to inactivity, the fall in household income is reduced even more substantially (from 33 to 8 per cent). In turn, the smoothing of the increase in household income associated with transitions from inactivity to employment is more muted (from 33 to 23 per cent). Overall, these findings confirm a substantive role of income smoothing mechanisms operating within households.

Third, the most prevalent labor market transitions are smoothed to a large extent via transfers to individuals, in particular in the case of negative income shocks. This insurance consists mostly of welfare benefits and social insurance programs (see column 2). Notably, in the case of inactivity after employment, the decline in household income is mitigated by around half (18 percentage points). This is attributable to the functioning of pension systems. In the case of unemployment after employment, the fall in household income is attenuated by around one third (12 percentage points). It should be noted that our analysis only covers contemporaneous (yearly) impacts, which minimises the cases where individuals lose eligibility to unemployment benefits. In turn, when an individual becomes employed after unemployed, the associated increase in household income is mitigated by 8 percentage points. Finally, the estimates also reveal the muted role of individual transfers in the cases of transitions between inactivity and unemployment and in the case of moving from inactivity to employment. This is not surprising, given that individuals are typically not eligible to social transfers in these cases.

Fourth, the remaining transfers to households and the remaining labor and non-labor income generated within the household have a negligible income smoothing role following labor market transitions (see columns 3 and 4). The finding that family labor supply does not contribute significantly to smooth labor market shocks is in contrast with some empirical findings in the literature (see Blundell (2014)). However, this comparison should be qualified by two features of our empirical strategy. On the one hand, the analysis only takes into account the labor market response of the remaining household members at the intensive margin. In fact, as explained in section 2, the sample does not include households with more than one labor market transition, in order to mitigate endogeneity issues. On the other hand, given the characteristics of the database, we only analyse the contemporaneous (yearly) response to labor market transitions. The full intertemporal response – both at the intensive and extensive margins – is thus not analysed in this article.

Finally, the tax system significantly smoothes household income following labor market shocks. This countercyclical role is evident both in the case of positive and negative income shocks. In the case of individual transitions from unemployment or inactivity to employment, the tax system mitigates the associated increase in household income by 8 and 6 percentage points, respectively. In turn, in the case of transitions from employment to unemployment, the tax system attenuates the decline in household income by 6 percentage points.

Overall, it can be concluded that the tax and transfer system is fundamental in smoothing the impact of the labor income shocks identified in this article. This supports the conclusions in Blundell *et al.* (2014). A specific contribution of this article is disentangling the relative role of transfers and taxes in smoothing household income shocks. This is only possible due to the richness of the EU-SILC database. We conclude that transfers to individuals have the dominant smoothing role following adverse labor market transitions. In turn, taxes and transfers play a relatively similar mitigating role in the case of favourable labor market shocks.

Until now, the analysis focused on households with more than one adult. However, the case of households with only one adult is also interesting on its own, as it allows identifying directly the functioning of several insurance mechanisms at an individual level. Table 4 mimics Table 3 for the case of households with only one adult. There are three main findings that stand out from a comparison of both tables. First, from a qualitative point of view, and wherever comparable, all patterns uncovered for the case of families with several adults also hold true in the case of one-adult households. Second, household income pooling is an important smoothing mechanism among couples. In fact, the impact on household income associated with the change of individual labor income is always much larger, in absolute value, in the case of one-adult households (column (1)). Third, even after all smoothing mechanisms are accounted for, the final impact of labor market transitions on household income is also larger for households with only one adult. For example, in the case of transitions to employment (from either unemployment or inactivity), the increase in household income ranges above 40 per cent in one-adult households, whereas it was estimated to be around 25 per cent in the case of households with more than one adult. Nonetheless, it is also worth noting that there are cases where the difference between both types of households is relatively small, notably in the case of transitions to unemployment or inactivity.

	Change in household disposable income due to:				
Dependent variable	change in transfers labor income	(1) plus change in transfers to the individual	(2) plus change in other transfers to the household	(3) plus change in other household income	(4) minus change in taxes and social insurance contributions
	(1)	(2)	(3)	(4)	(5)
Labor market transitions					
Employed in t after					
unemployed in t-1	1.03 ***	0.79 ***	0.64 ***	0.58 ***	0.43 ***
	(0.07)	(0.07)	(0.07)	(0.10)	(0.07)
inactive in t-1	0.99 ***	0.83 ***	0.72 ***	0.70 ***	0.49 ***
	(0.06)	(0.06)	(0.06)	(0.06)	(0.05)
Unemployed in t after					
employed in t-1	-0.79 ***	-0.43 ***	-0.36 ***	-0.37 ***	-0.22 ***
	(0.02)	(0.04)	(0.04)	(0.04)	(0.03)
inactive in t-1	-0.02	-0.02	0.04	0.02	0.02
	(0.03)	(0.04)	(0.06)	(0.06)	(0.05)
Inactive in t after					
employed in t-1	-0.65 ***	-0.27 ***	-0.24 ***	-0.23 ***	-0.12 ***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
unemployed in t-1	-0.13 ***	0.03	-0.02	-0.08	-0.02
	(0.02)	(0.04)	(0.04)	(0.09)	(0.06)
Number of observations	101352	101352	101352	101352	101352

TABLE 4. The impact of transitions in the labor market on disposable income of households with only one adult

Notes: The table displays the γ coefficients described in equation (1) in the text. All regressions include country and year fixed effects, as well as several explanatory variables related to individual and household characteristics. At the individual level, the respective age group, education level and sex are considered. At the household level, the share of household individuals in different age groups, the share of individuals with different levels of education, the share of months that household individuals were working, unemployed or inactive, as well as variables related to the size of the household and to the number of children are included. All models are weighted with sample weights. Robust standard errors of coefficients are displayed in parenthesis; *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

4.2. Cross-Country Evidence

In this sub-section we examine whether the identified income smoothing mechanisms play a similar role across the different countries in the sample. This is an interesting issue given the large institutional heterogeneity prevailing across the European Union. It remains an open question whether this institutional heterogeneity translates into different income dynamics following labor market shocks.

We evaluate this issue with two empirical approaches, both focusing on the sample including households with more than one adult. In the first approach, we estimate a pooled specification (see equation (1)), multiplying each labor

market transition by a country fixed effect. This specification thus imposes the same structure for all countries and only allows for heterogeneity as regards the impact on household income of each labor market transition. In the second approach, we estimate a separate equation for each country, allowing for diversity as regards the estimated coefficients of all explanatory variables in each country. Overall, there is a remarkable consistency of results between both empirical approaches. In this subsection we will therefore only present the results obtained with the set of country-specific regressions. Figure 1 depicts the main results of this exercise, focusing on the transitions between employment and the remaining states in the labor market. The figure highlights the relative role of individual transfers and the tax system, given that the smoothing impact of the remaining household income is very small in basically all countries. Several interesting patterns emerge from the analysis.

First, there is high heterogeneity across countries as regards the impact of labor market transitions on household income, both before and after the functioning of the smoothing mechanisms analysed in this article. There is no robust country ordering as regards the impact of the different labor market shocks. This heterogeneity is in part influenced by relatively small sample sizes in some countries.

Second, the evidence supports the idea that looking at the impact stemming from changes in individual labor income is quite different from the final impact on household disposable income. Taken together, the individual and household smoothing mechanisms analysed in this article contribute to significantly attenuate household income fluctuations in virtually all cases. However, the overall magnitude varies substantially across countries and depends on the type of labor market shock being analysed. While the country ordering (before and after the functioning of the smoothing mechanisms) is basically preserved in the case of transitions from inactivity to employment, that ordering is substantially changed in the cases of transitions from unemployment to employment, from employment to unemployment or from employment to inactivity. The latter are cases where the institutional framework in each country, in particular as regards social insurance rules, is crucial to characterize household income dynamics after labor market shocks.

Finally, the relative role of transfers and taxes in smoothing household income differs across countries and for the different labor market transitions. It is worth analysing each case in turn.

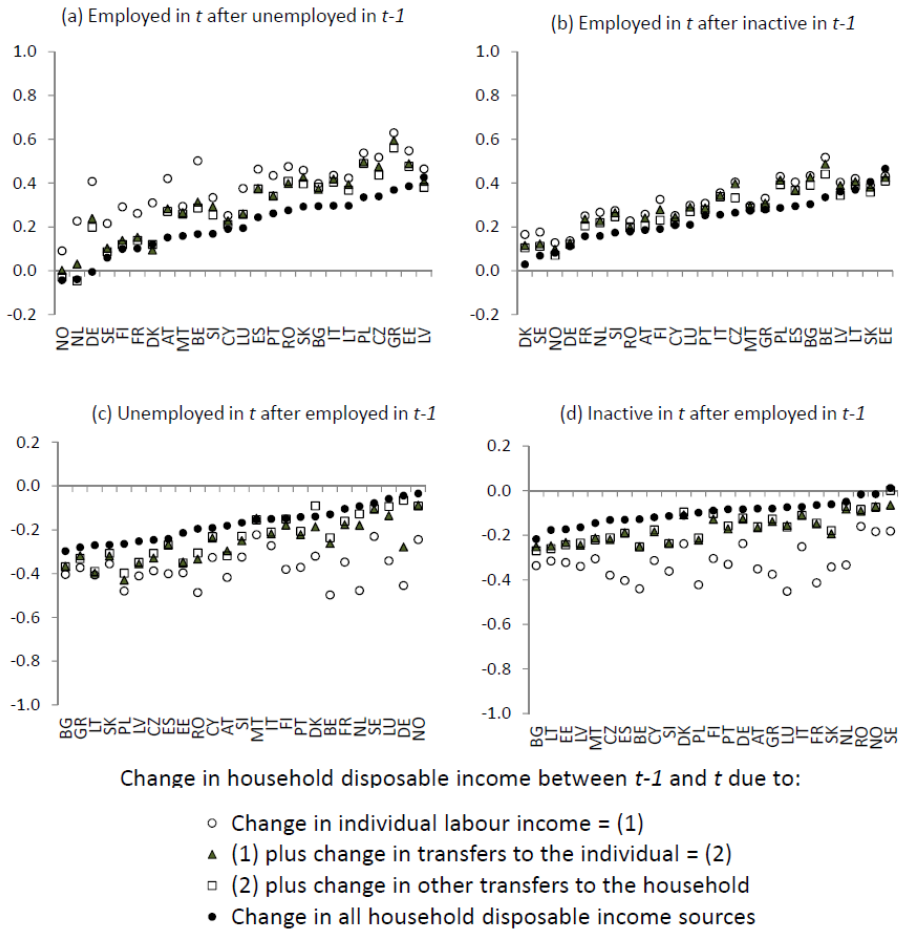

FIGURE 1: Impact of labor market events on household disposable income

Notes: The sample includes working-age individuals in households with more than one adult. The figure displays the γ coefficients described in equation (1) in the text. Countries are ranked in ascending order of the change in household disposable income following each labor market event.

In the case of transitions from unemployment to employment (Figure 1a), the related increase in household income is mitigated by several mechanisms. First and foremost is the loss of unemployment benefits. These benefits are particularly important in many continental and northern European countries, while their relevance in more muted in eastern and southern European countries. This evidence accords broadly with the characteristics of the unemployment insurance mechanism in European countries, both in terms of duration and eligibility rules (Esser *et al.* (2013)). In addition, Figure 1a shows that taxes play a sizable role in all countries. Overall, after the functioning of

all smoothing mechanisms, there are some continental and northern European countries where an individual transition to employment has a small impact on household disposable income, while in several eastern and southern European countries the impact is sizeable, amounting to increases above 30 percentage points.

As expected, this broad picture is mirrored in the case of transitions from employment to unemployment (Figure 1c). Again, the final ordering of countries as regards the impact on household disposable income is basically unrelated to the contribution arising from the change of individual labor income. For almost all countries, the loss of labor income implies an average fall in household income in the range between 30 and 50 percent. After the functioning of the several smoothing mechanisms, households in almost all continental and northern European countries face reductions in total income below 20 per cent, in some cases close to zero, whereas in many eastern and southern European countries household disposable income falls substantially, on average close to 30 per cent. These stark differences across countries should be attributable to different unemployment insurance schemes. Note that we are only measuring the impact on household income over one-year. Therefore, differences in the duration of unemployment benefits cannot be fully captured in this framework.

Transitions from employment to inactivity (Figure 1d) correspond to a large extent to older individuals who retire. In these cases, pensions contribute to attenuate – in some countries fully – the ensuing downward impact on household income. There is no clear geographically divide across European countries as regards the degree of smoothing attributable to these individual transfers. Declines in taxes and social security contributions also play a role in smoothing the impact on household income albeit to a lesser extent. The relative importance across countries of this smoothing channel is unrelated to the degree of smoothing stemming from individual transfers.

Finally, the transitions from inactivity to employment (Figure 1b) are concentrated on young individuals in the beginning of their life cycle or discouraged workers who become again activated. These individuals are typically not entitled to specific transfers while being inactive. It is thus not surprising that individual transfers play almost no role in smoothing income in all countries. The impact of the remaining smoothing mechanisms under study is also rather minor in almost all countries, with the exception of taxes, which increase following the positive shock to earnings in the household. It is thus not surprising that this is the labor market shock which is transmitted to the largest extent to household income. This conclusion is robust across countries.

Overall this evidence supports the idea that composition and aggregation matters when estimating income processes. In this context, it seems crucial to (i) identify the type of shock underlying the change in income; (ii) understand the different smoothing channels available at the individual and at the household level; and (iii) distinguish the impact on individual earnings from

the impact on overall household disposable income. On these three dimensions, one size does not fit all.

4.3. The Impact of the Great Recession of 2009

The great recession of 2009 hit all European Union countries without exception. This was one of the deepest recessions in recent history. In this context, it is interesting to assess whether the functioning of the income smoothing mechanisms uncovered above was robust to this event.

As is well known, income growth in the European Union declined significantly following the great recession. This observation is also born out in the evolution of disposable income in the EU-SILC database. For example, the time fixed effects estimated in regression (1) when the dependent variable is the change in household disposable income average 0.03 between 2004 and 2008, falling to -0.06 on average between 2009 and 2011. This is related, among other factors, to increased transitions from employment to unemployment and declining transitions from inactivity to employment (see Table 5). This higher pace of job destruction coupled with lower job creation implied a rise in unemployment incidence and duration in the aftermath of the great recession.

	Households with more than one adult		Households with only one adult	
Individual labor market transitions between t-1 and t:	2004-08	2009-11	2004-08	2009-11
Employed in t after				
unemployed in t-1	1.1	1.1	1.4	1.3
inactive in t-1	2.1	1.5	1.9	1.4
Unemployed in t after				
employed in t-1	0.9	1.4	1.2	1.9
inactive in t-1	0.8	0.8	0.6	0.5
Inactive in t after				
employed in t-1	1.6	1.6	2.3	2.4
unemployed in t-1	0.8	0.7	1.0	0.9
Number of observations	580014	380900	59081	42271

TABLE 5. Sample frequency of labor market transitions (before and after the Great Recession)

Notes: Frequency values in percentage of the respective sample.

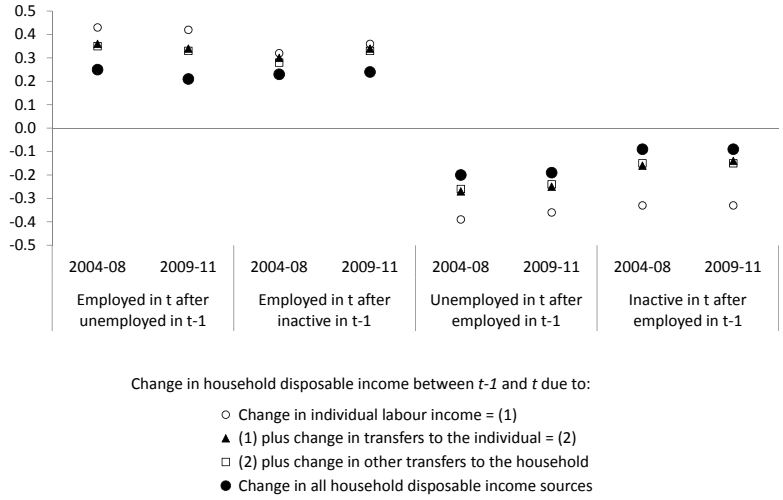

FIGURE 2: Impact of labor market events on household disposable income (before and after the great recession)

Notes: The sample includes households with more than one adult. The figure displays the γ coefficients described in equation (1) in the text.

Have these changing characteristics of labor market transitions impacted on the functioning of income smoothing mechanisms? In order to shed some light on this issue, Figure 2 compares the role of smoothing mechanisms in 2004-2008 and in 2009-2011. The figure does not reveal any significant differences across sub-samples. This finding is qualitatively robust across countries, including those which were more severely hit by the sovereign debt crisis in the euro area. Thus, the evidence suggests that changes in policies following the great recession did not significantly affect the role of the tax and transfer system in mitigating (contemporaneously) the transmission of individual earnings' risk to household income.

5. Conclusions

This paper investigated the role of several smoothing mechanisms at the individual and household levels, following individual transitions in the labor market. The analysis encompassed almost all European Union countries for the period 2004-2011. Some of the individual labor market transitions

imply sizeable changes in households' labor earnings. In these cases, the impact on households' disposable income is attenuated by several smoothing channels. The tax and transfer system plays a prominent role as an insurance mechanism for individuals and households. Transfers are particularly important in smoothing negative labor income shocks. These results are robust for the large set of countries covered in our sample. They are also robust to splitting the sample before and after the great recession. Finally, the pooling of resources within households was also found to be an important source of income smoothing in face of labor market shocks affecting each individual.

Looking further at the evidence from a cross-country perspective, we find high heterogeneity as regards the country-specific impact of labor market transitions on household income. This heterogeneity is prevalent both before and after the functioning of income smoothing mechanisms. The evidence reveals that in all countries social security mechanisms are important in smoothing household income following individual transitions to and from unemployment, but their impact is stronger in northern and continental Europe.

The evidence uncovered in this paper underlines the importance of explicitly modeling the sources of labor market shocks in order to characterize the dynamics of income risk (see Low *et al.* (2010) and Altonji *et al.* (2013)). Further, the analysis highlighted the importance of disentangling the role of the insurance mechanisms mediating the transmission from individual earnings to households' disposable income (see McKay and Reis (2013) for an explicit modeling of the role of taxes and transfers in driving business cycle dynamics in a general equilibrium framework with incomplete markets). This transmission depends on the nature of shocks as well as on the institutional setting in each country. Moving from models where individuals can only self-insure to models encompassing other sources of insurance, including the sharing of resources within households, continues to be a promising research avenue ahead.

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